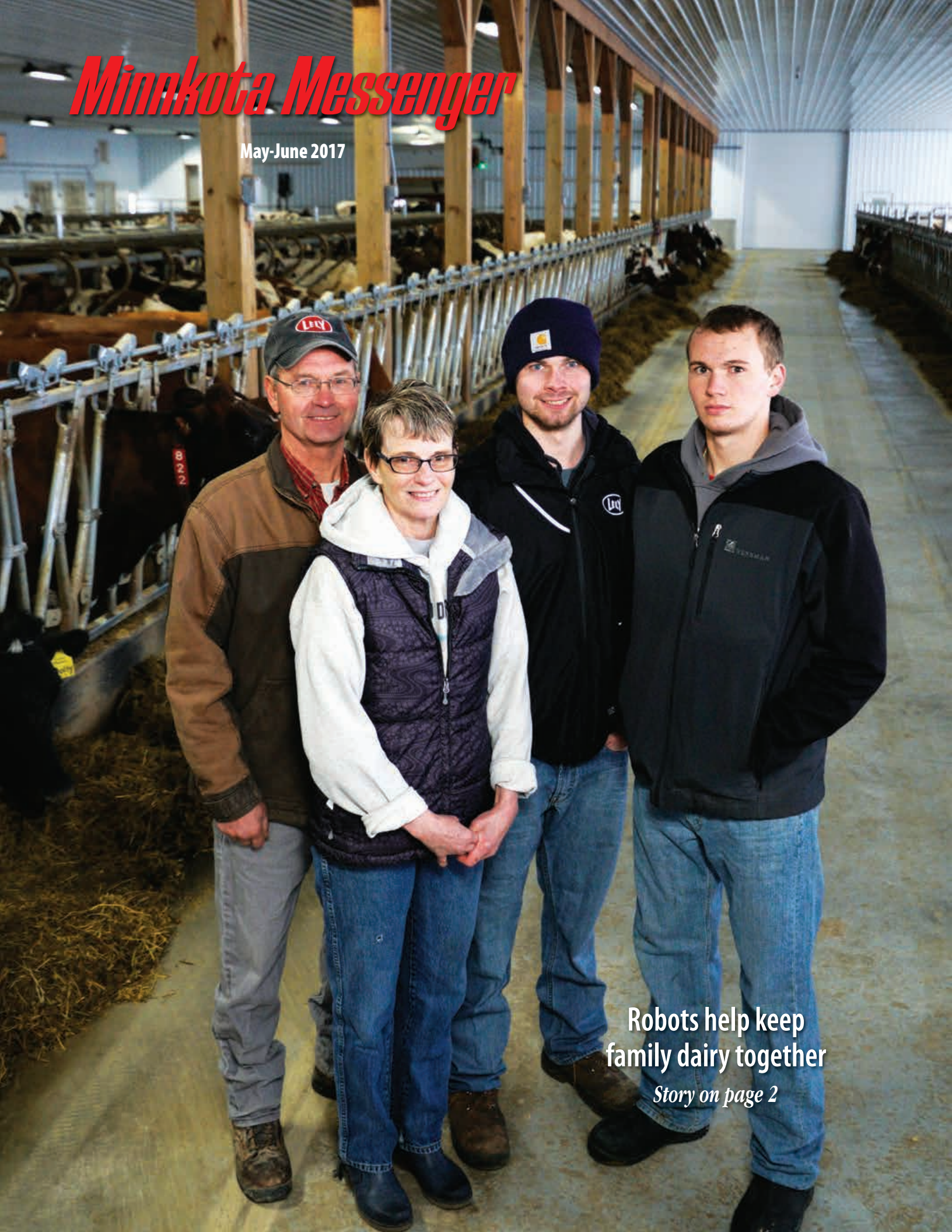


Minnkota Messenger

May-June 2017



Robots help keep
family dairy together

Story on page 2



The Vector automatic feeding system uses lasers to determine how much food it should drop off for the cows.

Robots help keep family dairy together

Something strange is happening inside the new Good-Vue dairy barn. Cows lounge lazily on waterbeds and receive footbaths. Their meals are delivered by a self-propelled robot. And, when they feel like it, each member of the herd meanders over to milk itself with help from a laser-guided robotic arm.

These cows are living the good life. But it may be lifelong dairy farmers Linda and Mike Hanson who are the happiest residents on the farm near Goodridge, Minn. The high-tech barn has automated many of the processes that kept the family on a rigid, demanding schedule all too common in the world of dairy.

“Our alarm clock still goes off at the same time, but now we just take an extra minute in the morning to drink our coffee,” Linda said with a smile. “The system just takes a lot of the time pressure off. So if we don’t get over to the barn right away, we know the cows are still getting milked and fed.”

Prior to opening the robotic barn in September 2016, the family operated a 50-head operation from their farmstead. The new 116-feet-long by 276-feet-wide facility is lo-

cated about 3 miles from home and has space for 120 milking cows and 40 dry cows.

With a passion for raising Ayrshire dairy cattle that spans four generations, the family knew they had to make a bold investment if they were going to survive in a business that has mostly vanished from the area. In 1994, there were 21 neighboring dairy farms in the Goodridge area. Now, the Hansons are the last dairy family in all of Pennington County.

With the robotic system, the fourth generation – sons David, 25; Matthew, 23; and Steven, 20 – are starting to take on a larger role in the farm. Their commitment pushed the project forward.

“If the boys weren’t interested in the dairy, we probably wouldn’t have built this facility,” Linda said.

It would be difficult to find a better team. All three sons have animal science degrees with a focus on dairy management.

Matthew, who lives nearby, completes most of the daily tasks with the help of his parents, who also farm 3,000 acres of cropland. David lives in Nicollet, Minn., with his wife, Ashley, who graduated from the University of Minnesota’s Veterinary School and



“What’s the greatest invention in agriculture? It’s got to be electricity, I think. Look at everything it does. You could not run the feeding system, the robot system or any of this stuff without it.”

– MIKE HANSON

works for a company that provides embryo transfer services for dairy and beef cattle farmers. Steven recently completed college in Willmar, Minn.

Despite the distance, the entire family is active in the operation. They are also involved in numerous county, state and national dairy boards and judging panels.

For Matthew, it wasn’t until going away to college that he realized he wanted to follow in the family footsteps.

“I just enjoy being around the cows,” he said. “And when we started talking about this facility, I became even more interested. It still amazes me some days with how far we’ve come.”

Futuristic farm

It is eerily quiet inside the barn. No mooing, snorting, stomping or scraping. Instead, you hear the subdued munch of animals feeding and the soft hum of the large, red robots.

The calm environment has helped produce healthy, happy cows. Since moving into the facility, the average cow’s milk production has increased from 55 pounds per day to

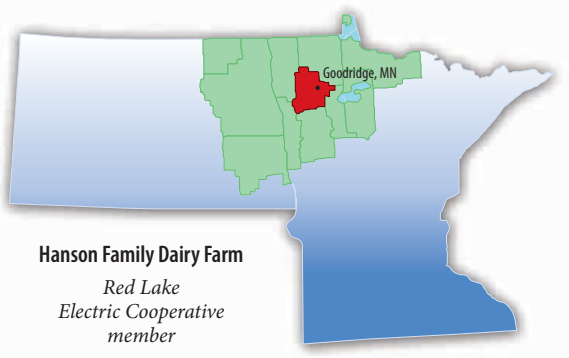
70 pounds. With a little work, the family thinks they can get to 80 pounds per day.

“A happy, well-cared-for cow is going to produce more,” Linda said. “It’s in our best interest to keep them comfortable.”

Each cow has a computer transponder on its neck that communicates with the robots and forwards information to the family’s computer and smart-phones. Upon entering one of the two robotic milking systems, the transponder is scanned and a food pellet is dispensed. While the cow eats, a mechanized



A cow scratches its back on a motorized brush.

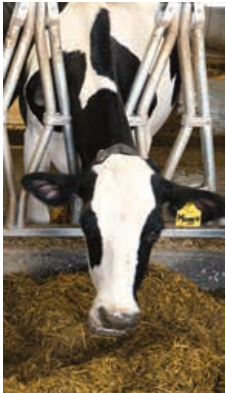


Mike Hanson reviews information on his automatic milking system. (Inset) The system collects the milk and pumps it to a 3,000-gallon bulk storage tank.





In an area of the barn known as the kitchen, a robotic claw and mixer work together to prepare feed for the 160-cow herd. Mike Hanson checks the status of the robotic feeding system from his smartphone.



Maggie helps herself to feed dispensed by the robotic system. Each cow on the Hanson farm has a name.

arm swings underneath the udder to brush it clean and stimulate milk flow. Three-dimensional laser scanners find the teats and attach four cups for milking.

About 10 minutes later, the milking is complete and the computer opens the gate to usher the cow back into the barn. A new cow enters and the process is repeated.

While milking robots are now becoming commonplace across the nation's dairies, the Hanson farm is one of the first in the nation to install a Vector automatic feeding system. The barn includes an area referred to as "the kitchen" where a large claw runs on tracks across the ceiling, scooping food and placing it inside a funnel-shaped robot. Using sensor technology, the robot precisely mixes hay, corn silage and water.

The robot leaves its electric charging station every 45 minutes and travels down the rows of cows to dispense the appropriate amount of food. The process reduces waste, improves efficiency and enhances the overall quality of the feed.

If there's a system malfunction, the family receives an alert by phone and computer. They can monitor the entire system day and night, including each cow's production, activity levels and other health-based statistics.

Built for the future

Even though many processes are now automated, don't think the Hansons are taking a hands off approach. Each cow isn't a number,

but part of the family. They greet Brenda, Bianca, Carmelo and the other cows as they pass through the barn each day.

The Hansons credit their local cooperatives for helping make the project possible. The farm is a Red Lake Electric Cooperative member and a Garden Valley Telephone Company member, which provides essential internet service. The milk is marketed through Land O'Lakes, another Minnesota cooperative.

With a system that never quits, the farm depends on reliable power from Red Lake Electric.

"What's the greatest invention in agriculture? It's got to be electricity, I think," Mike said. "Look at everything it does. You could not run the feeding system, the robot system or any of this stuff without it."

When designing the barn, the family went to great lengths to incorporate energy efficiency. It is an unheated space, but is orientated in a way that allows the cows' body heat to keep the temperature from falling below 35 degrees. In the summer, 19 automated fans keep the facility cool.

One of the biggest energy savers is the plate cooler, which reduces the temperature of the milk before it goes into a 3,000-gallon bulk tank.

While the farm is built for the future, Mike and Linda are not ready to step aside just yet. In fact, neither are their parents, who, in their 80s, still help out with the farmwork.

"There are some people who can't wait to retire, but we're not those kind of people," Mike said. "At least not yet."

Minnkota CEO meets with EPA Administrator



Mac McLennan (fourth from bottom right), Minnkota president & CEO, meets with Scott Pruitt (third from bottom left), EPA administrator, to discuss industry issues important to North Dakota's electric cooperatives.

Mac McLennan, Minnkota president & CEO, and other electric cooperative leaders in North Dakota met with Environmental Protection Agency (EPA) Administrator Scott Pruitt on April 25 to discuss issues vitally important to the industry.

"I'm grateful to Administrator Pruitt for his time and the productive discussion we had on rules and regulations that are of paramount importance to our membership," McLennan said. "Mr. Pruitt is well-versed on the issues impacting our industry and understands the important role electric cooperatives play in powering our nation's economy."

The meeting, held in Washington, D.C., was organized through U.S. Rep. Kevin Cramer and included representatives from the North Dakota Farm Bureau. Electric cooperative leaders emphasized the importance of certainty with respect to the long-term use of electric generation assets, the uniqueness of North Dakota lignite coal and the more than \$2 billion that has already been invest-

ed by the state's utilities in emission control technologies. Other topics discussed included the Clean Power Plan, coal ash rules, Waters of the United States, Regional Haze and New Source Review.

"Our ability to provide affordable and reliable electricity to consumers in the Upper Midwest is highly dependent on sensible, well-constructed regulations," McLennan said.

The meeting also included an invitation for Administrator Pruitt to visit North Dakota and tour the state's energy industry.

"I hope Administrator Pruitt will take us up on our offer to visit North Dakota and see firsthand how our state is not only a leader in energy production, but also in the development of next generation energy technologies," McLennan said.

The meeting was Pruitt's second with the nation's electric cooperative representatives since being confirmed to lead the EPA by the U.S. Senate on Feb. 17. He visited a Missouri-based cooperative's coal-based power plant on April 20 to discuss the agency's "Back to the Basics" regulatory approach.

Road warriors



Jake Larson
Electrician

Randy Gubrud
Senior Electrician

Minnkota's Gubrud, Larson help man who drives into river

Randy Gubrud and Jake Larson didn't hesitate. After Gubrud put the flashers on and Larson called 911, they jumped out of their Minnkota Power Cooperative vehicle and ran down the banks of the Goose River.

A man they were following in the southbound lane of I-29 north of Hillsboro, N.D., had fallen asleep and veered left in his car into the median. He missed the bridge guardrail but ended up flying at highway speed out of sight of the Minnkota employees and into the river.

They had no idea what to expect when they ran down to help the man, who turned out to be a North Dakotan.

"We didn't expect it to look good at all," said Gubrud, a senior electrician.

It didn't look good at first. All they saw was a tail-light of the man's 1999 blue Toyota Camry submerged in water. Then, to their surprise, they saw the man standing in water up to his chest. The first thing they asked him was whether anybody else was in the vehicle. The second thing they asked him was whether anybody else was in the vehicle.

The man said no both times, so they felt a lot better.

They had no idea whether the man was thrown through the windshield or whether he managed to escape through a car window once submerged in water. The man couldn't be reached for comment but his sister, Trish, said he told her that he managed to hit a button to roll down the driver's side window before he hit the water.

Trish said her brother was weak, stuck in mud to his

knees and couldn't get out of the water. That was until Gubrud and Larson helped him out. Just minutes later emergency vehicles arrived.

A gas tanker driver also stopped to help. He was driving northbound and feared that the driver of the Camry might veer off and hit him as he witnessed the situation unfold before his eyes. The driver also just missed a concrete bridge support when he went over the bank.

The man told Gubrud and Larson he didn't need something like this to happen to him on a day in which he was starting a new job. He also lamented about leaving money in the car.

"I'll tell you what, you're lucky," Gubrud told the man, who was treated and released from a hospital.

Mac McLennan, Minnkota president & CEO, said he wasn't surprised, but was pleased with how the employees responded.

McLennan recognized the two at a subsequent all-employee meeting.

"One of the cooperative principles is Concern for Community," McLennan said. "It's nice to see our employees respond so quickly to a fellow North Dakotan in trouble."

Larson, a Minnkota electrician, and Gubrud said they are not sure what they would have done if somebody else was left in the submerged car. Based on the quick reaction of the Minnkota employees after seeing a man in a perilous situation, they would have figured something out.

Annual Freeman awards recognize innovation at UND

Whether they were focused on picking rocks or picking a healthy lunch, students at the University of North Dakota's School of Engineering and Mines demonstrated a high level of creativity in the annual Andrew L. Freeman Design Innovation Competition.

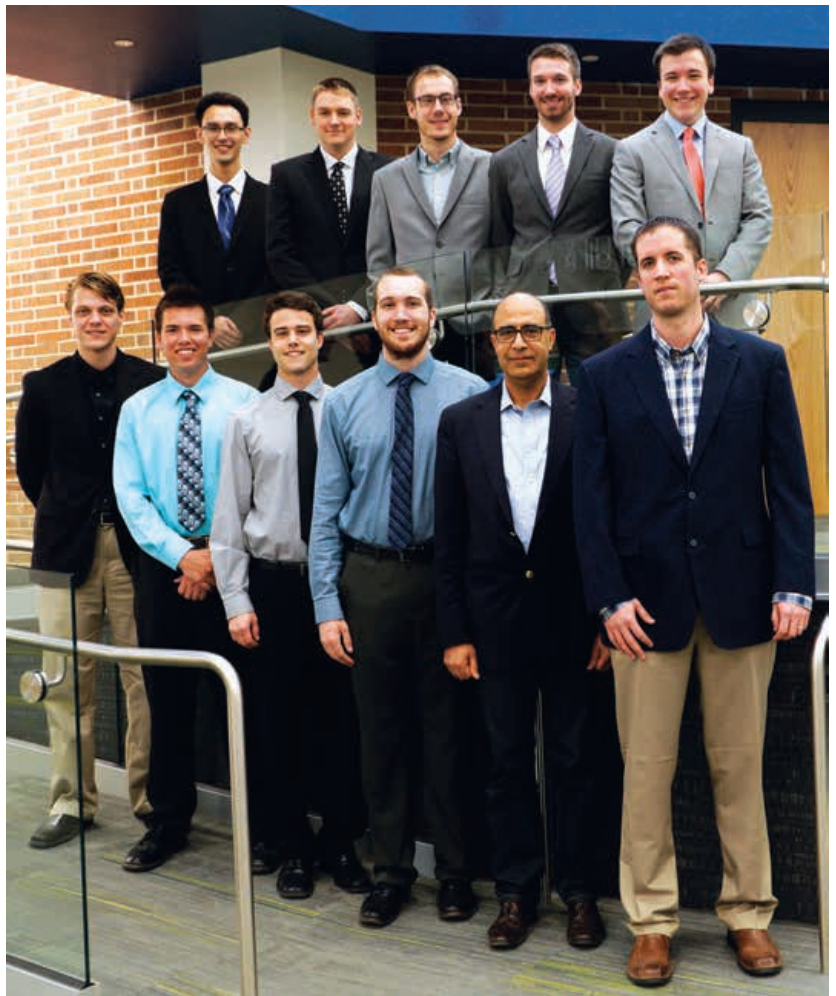
Two teams tied for first place in the competition, which was judged by a panel that included UND engineering alumni, current engineering faculty and Minnkota Power Cooperative representatives. Brendan Kennelly, Minnkota senior manager of power delivery operations, presented the awards at a ceremony held May 5 at the new Collaborative Energy Center on campus.

One first place award of \$1,500 went to the team of Eric Herbert, Eddie Hidani, Karl Raymond, Max Reagen, Zack Serebin and faculty advisor Peter Letvin for their Advanced Rock Picker Attachment. The project was based on Bobcat Company's request for the development of a loader attachment that can pick rocks from a field and then agitate the rocks to remove dirt more effectively than current designs. The attachment utilized the current tine bucket design produced by Bobcat, but features a hydraulically driven tumbler shaft across the bottom corner of the attachment.


The other first-place winner of \$1,500 was the Key Nutritional Intake Feedback System team of Eric Horton, Jeffrey Gendreau, Tyler Kast and Joseph Aymond, along with faculty advisor Reza Fazel-Rezai. The system is designed to help people who are eating at dining centers make choices that align with their nutrition and health goals. Using a smartphone app or student ID card, the system allows each user to collect and review nutritional data, as well as detailed breakdowns of daily totals and eating trends. The system has been tested and proven to work on a small scale, with future work dedicated to upscaling to a number of units

that would be representative of an actual operating environment.

The competition is held in honor of Freeman, a UND School of Engineering and Mines alumnus and former general manager of Minnkota for 42 years. Minnkota, along with other utilities and individuals, established an endowment in 1996 to honor Freeman and keep his entrepreneurial spirit alive through innovative projects that one day may become reality.



Brendan Kennelly (bottom right), Minnkota senior manager of power delivery operations, and Dr. Hesham El-Rewini (next to Kennelly), dean of UND's School of Engineering and Mines, stand with the first-place teams following the annual Andrew L. Freeman Design Innovation Competition.



NORTH DAKOTA:
Funding for Advanced
Energy Technologies

MINNESOTA:
Local
Democracy

Successful sessions

Electric cooperatives see positives at state capitols

Electric cooperatives in Minnesota and North Dakota avoided harmful legislation and helped support positive energy policy changes during the 2017 state legislative sessions.

Lawmakers in Bismarck approved advanced energy research funding, while policy changes that help reduce regulatory burden for electric cooperatives were signed into law in St. Paul. Grassroots advocacy and strong support from local lawmakers contributed to the successful legislative sessions, according to Stacey Dahl, Minnesota external affairs and communications manager.

“We were pleased to have widespread, bipartisan support for our main legislative priorities,” Dahl said. “It goes to show that electric cooperative issues aren’t driven by party politics, but rather by lawmakers who work to understand our industry.”

North Dakota

While the North Dakota legislative session was perhaps the most challenging in recent memory due to the state’s budget shortfall, electric cooperatives and the lignite industry continued to receive strong support for research and de-



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– STACEY DAHL, *External Affairs and Communications Manager*
Minnkota Power Cooperative

velopment funding to advance new energy technologies.

About \$20 million was made available for the next biennium through state oil and gas tax revenues, additional coal severance tax funding and a one-time appropriation of \$3 million for lignite research. This funding will primarily be used to advance carbon dioxide capture research for new and existing power plants.

Minnkota is partnering with Allele Clean Energy, BNI Energy and the Energy & Environmental Research Center to evaluate Project Tundra, a postcombustion carbon capture project at the coal-based Milton R. Young Station. The project proposes to equip Young 2 with technology that could capture up to 90 percent of the unit’s CO₂ and condition it for enhanced oil recovery or permanent storage.

“There are several remarkable and innovative projects being pursued in North Dakota that have the potential to transform our industry,” Dahl said. “This additional funding shows that North Dakota values its leadership in keeping coal as an important part of our energy future.”

Minnesota

Following a special session needed to finalize the state’s budget/omnibus bills, the main priority for electric cooperatives during the session – Local Democracy legislation – was signed into law.

The purpose of this legislation is to strengthen distribution coop-

eratives’ ability to meet their membership’s best interests regarding distributed generation facilities, like small solar and wind systems. Presently, the cooperative

board is responsible for setting rates, fees and charges. However, the state’s Public Utilities Commission (PUC) has re-regulated decisions made by cooperative boards regarding distributed generation systems, which is costly, unnecessary, and provides no benefit to the member-owners of the electric cooperative. The bill received strong bipartisan support from the House and Senate throughout the session, but required several revisions before Gov. Mark Dayton signed it into law.

“Lawmakers from Greater Minnesota really stepped up and supported our Local Democracy bill from the start,” Dahl said. “While the PUC has an important role in the state, the legislature recognized that democratically elected cooperative boards are better suited to respond to the unique needs of their local communities.”

Electric cooperatives benefited from a provision in the public safety bill that will allow co-ops to access state disaster funds. This legislation will assist cooperative members significantly by providing much-needed financial help when dealing



with devastating natural disasters. Damage to electric cooperative lines is included in the calculation that triggers FEMA Disaster Declarations and co-ops are now eligible for federal assistance.

A major change was also made to the Conservation Improvement Program (CIP), which requires utilities to meet an annual 1.5 percent energy savings goal. Electric cooperatives under 5,000 members and municipal utilities under 1,000 accounts are now exempted from the program.

“The energy landscape has changed significantly since CIP was established in 2007,” Dahl said. “We will continue to support broad reform of this program that reflects the realities of today’s industry, eliminates unnecessary costs and reduces other administrative burdens.”

After approving the budget/omnibus bills, Gov. Dayton line-item vetoed funding specifically for the state legislature, which includes salaries and budgets for legislators and staff. This is meant to compel the legislature back into a special session to renegotiate some provisions in the budget bills that the Governor views unfavorably. Republicans say the Governor exceeded his constitutional authority and are reviewing whether to sue on the matter.

“We will continue to keep a watchful eye on behalf of our members to ensure that any actions taken do not impact the bipartisan progress achieved during this session,” Dahl said.

NMPA celebrates 40 years

The Northern Municipal Power Agency celebrated its 40th anniversary and the retirement of a longtime leader at its annual meeting May 17 in Thief River Falls, Minn.

Many names and faces have changed, but the Agency's goal of providing an adequate, economi-

cal, reliable and long-term supply of electric energy and related services to its members hasn't wavered since the Agency was formed on Dec. 1, 1976.

"Some very forward thinking people were involved early on," said Darryl Tveitbakk, NMPA general manager. "We have the honor of being the first Joint Action Agency that was formed in the state."

Tveitbakk paid tribute to former NMPA President Jerald Pederson, who retired at the end of 2016. Pederson started working with NMPA as an adviser to the board of directors from the city of Hawley, Minn. He spent 10 years on the NMPA board and more than two years as president.

"Jerry was engaged and active in the business of the Agency," Tveitbakk said.

During a break in the meeting, Tveitbakk said he was pleased with the results of 2016. Highlights included an 11-plus-week major outage at the Coyote Station, NMPA's major source of power. NMPA is one of four owners of the Coyote Station, which is operated by Otter Tail Power Company.

During the outage, an over-fired air system was installed and the

plant's coal conveyor system was tied over to the new Coyote Creek Mine. Coyote began receiving coal from the mine and its new coal supplier in June 2016.

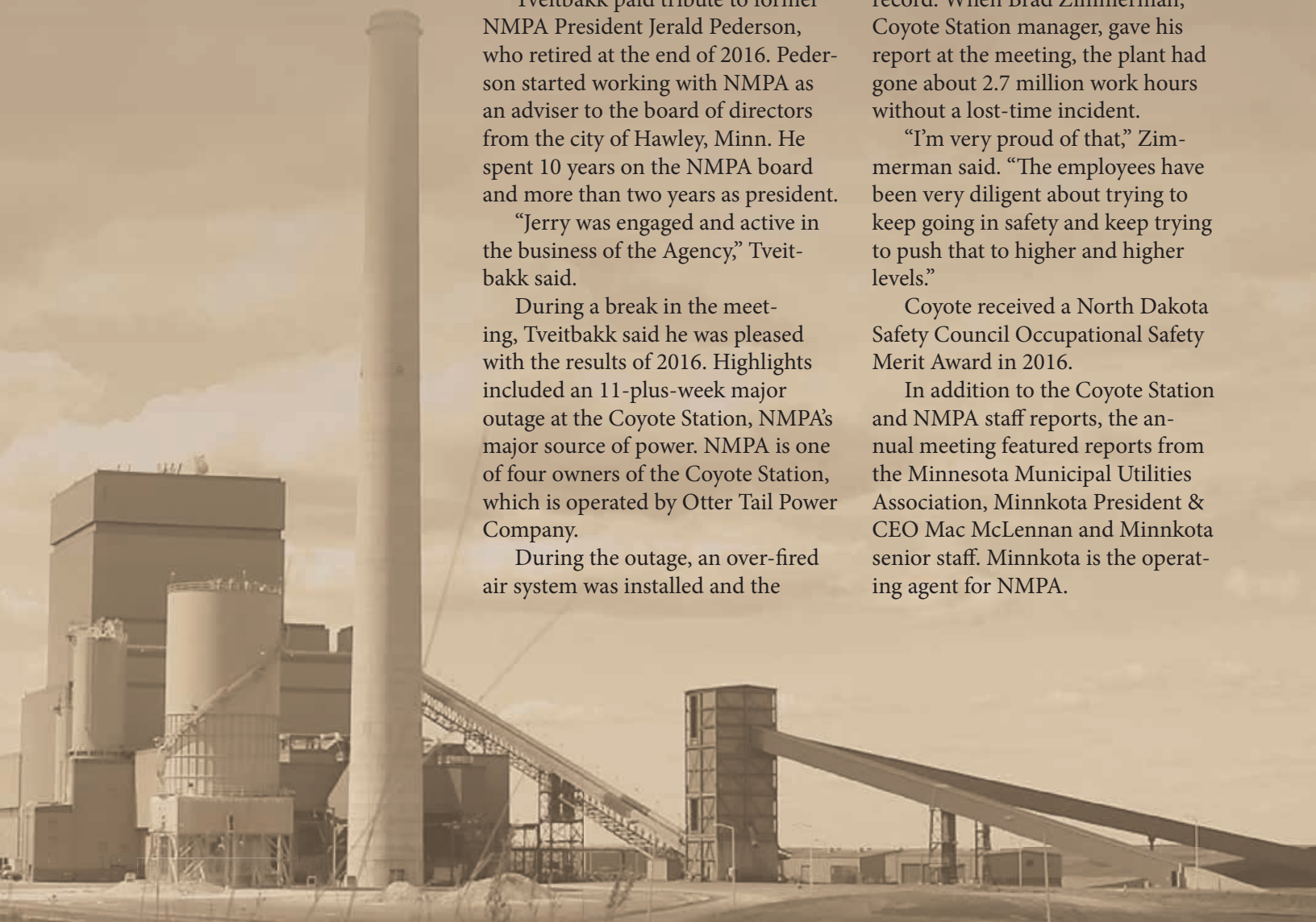
Coyote Creek Mining Company, a subsidiary of the North American Coal Corporation, owns the mine.

A big bright spot for the Coyote plant was its nearly spotless safety record. When Brad Zimmerman, Coyote Station manager, gave his report at the meeting, the plant had gone about 2.7 million work hours without a lost-time incident.

"I'm very proud of that," Zimmerman said. "The employees have been very diligent about trying to keep going in safety and keep trying to push that to higher and higher levels."

Coyote received a North Dakota Safety Council Occupational Safety Merit Award in 2016.

In addition to the Coyote Station and NMPA staff reports, the annual meeting featured reports from the Minnesota Municipal Utilities Association, Minnkota President & CEO Mac McLennan and Minnkota senior staff. Minnkota is the operating agent for NMPA.



Minnkota's Veterans substation, located in West Fargo, N.D., won the 2017 Engineering Excellence award for its innovative design.

Minnkota substation project wins Engineering Excellence award

Minnkota Power Cooperative's Veterans substation and transmission upgrade project won the 2017 Engineering Excellence award in the energy category. The award was presented May 11 by the American Council of Engineering Companies of North Dakota.

The project, located in West Fargo, was built to serve load growth in member Cass County Electric Cooperative's service area, including the new Sanford Medical Center. It was named Veterans substation as a tribute to all who have served in the U.S. Armed Forces.

Minnkota partnered with Ulteig Engineers to design the 115/25-kilovolt (kV) substation and associated transmission line upgrade. Minnkota crews assisted contracted personnel with the construction of the substation.

The substation project was recognized for successfully integrating larger transmission structures and a new substation into an urban commercial and residential environment. The innovative fencing design, which included decorative columns and a new screening material, provided a secure, yet aesthetically pleasing perimeter. The fencing, which was constructed by Minnkota crews, was also recognized for its durability and cost-effectiveness.

The substation, which was completed in mid-2016, is currently set up as a 69-kV to 25-kV step down point. The design of the substation allows for a future upgrade of the transmission feed to 115 kV. The transmission line feeding north and south of the substation was replaced with a new design that will also allow for the future system voltage increase from 69 kV to 115 kV.



Wayne Lembke, Minnkota civil engineering manager, Mark Scheid, Ulteig business development engineer, and Ryan Brorby, Minnkota civil engineer, receive the 2017 Engineering Excellence award on May 11.



Representatives from the Minnkota family present U.S. Rep. Collin Peterson with the Distinguished Service Award. (Front) Murl Nord, Beltrami Electric Cooperative director; Rick Coe, Minnkota director; U.S. Rep. Collin Peterson; Steve Arnesen, Minnkota director; Stacey Dahl, Minnkota external affairs and communications manager; and Jeff Folland, Minnkota director. (Back) Jared Echternach, Beltrami Electric CEO; Gerad Paul, Minnkota general counsel and vice president for legal affairs; Andrew Freidt, Minnkota plant operations and maintenance manager; Joel Larson, Minnkota staff attorney; and Charlie Parson, Beltrami Electric director.

Rep. Peterson receives cooperative service award

U.S. Rep. Collin Peterson (D-Minn.) received the National Rural Electric Cooperative Association (NRECA) Distinguished Service Award in late April.

Several Minnkota Power Cooperative directors, employees and member system employees were on hand to help present the award to the 13-term lawmaker for his strong support of cooperative issues. Peterson represents the vast majority of Minnkota's service area in the state.

"Thank you for what you do back home," Peterson told the co-ops. "We are doing what we can to keep you going and keep things in line."

Peterson was recognized for routinely crossing party lines to support rural electric cooperative positions ranging from Rural Utilities Service funding to the Clean Power Plan.

The NRECA board of directors bestows its Distinguished Service Award upon a national leader who has made outstanding contributions to the progress of electric cooperatives and whose history of support for rural electrification and public power merits special recognition.

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MINNKOTA POWER COOPERATIVE, INC.
P.O. Box 13200
Grand Forks, ND 58208-3200
(701) 795-4000

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For subscription or editorial inquiries, call (701) 795-4282 or send email to bfladhammer@minnkota.com.

Minnkota is a generation and transmission cooperative supplying 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.

Visit Minnkota's website at www.minnkota.com.



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On the cover: Mike, Linda, Matthew and Steven Hanson stand in their new barn located near Goodridge, Minn. See story on page 2.