CIRCUITS

NEWS FOR DAKOTA ELECTRIC MEMBERS

Employees from the three companies involved in the project (L-R): Mike Fosse and Jane Siebenaler, Dakota Electric Association; David Ranallo and Christov Churchward, Great River Energy; Bill and Mike Forbord, Schmitty & Sons.

Electric cooperatives, transportation company launch Minnesota's first electric school bus program

Beginning this fall, some Lakeville students will be transported to and from school on an all-electric school bus as part of a first-of-its-kind program in the state.

This opportunity is made possible through a collaboration between Schmitty & Sons, Dakota Electric Association and Great River Energy to launch a program that will demonstrate the technology of a battery electric school bus in a cold-weather climate, as well as on longer suburban and rural routes.

"We're also seeking to document the economics of the bus on our system and as part of Schmitty & Sons' bus fleet, including overall operation and maintenance cost savings and the calculation of emissions reductions," said David Ranallo, manager of member services and marketing at Great River Energy.

The eLion bus, manufactured by Canada-based Lion Electric Co., appears like a

- continued on page 2

eLion Electric Bus BY THE NUMBERS

100% ELECTRIC

Recharges in **4-6 HOURS**

100% WIND POWERED revolt EMBRACE ELECTRIC VEHICLES

100 MILES
Electric school bus range

66 MILES
Average school bus route

SAVES $12,000
Annually on operation and maintenance costs over traditional buses

Prevents **15 METRIC TONS** of CO_2 emissions annually

MEETS OR EXCEEDS
all Minnesota safety standards. With no noisy engine, musical tones alert students the bus is nearby.

In This Issue

August 2017

Upcoming events

Dakota County Fair . . . . . August 7-13
Board Meeting . . . . . August 31, 8:30 a.m.

DAKOTA ELECTRIC ASSOCIATION
Your Touchstone Energy® Cooperative

Utilities in hot water: Realizing the benefits of grid-integrated

Editor's Note: *This article was originally published on June 20, 2017 in Utility Dive magazine. A portion of the article has been reprinted here with*

By Herman K. Trabish

Utilities have always tried to stay out of hot water with their customers. But now, they're itching to get into it.

A wave of interest is building in grid-integrated water heating (GIWH) as a path to system flexibility at a fraction of the cost of battery energy storage. At last count, 53.6 million of the 118.2 million U.S. water heaters were electric. Each could act as a battery for load shifting, peak shaving, or to integrate renewables, according to a Regulatory Assistance Project (RAP) paper.

Hot water is used largely by residential utility customers in morning and evening hours, wrote RAP Sr. Advisor Jim Lazar. But it can be heated "when power is most available."

The stored hot water could then be used during the morning and evening without increasing system burden, Lazar wrote. And, to optimize the use of variable renewables, it could be heated at night to take advantage of high wind production and at mid-day to take advantage of abundant solar production.

> "Eventually, all water heaters will have some smarts. They will either be connected to a utility grid or to a home energy management system."
>
> **Joshua Green**
> Vice President, A.O. Smith

Effective utility control of residential water heating could integrate "up to 100,000 MW of additional variable wind and solar energy in the U.S.," Lazar wrote.

Transforming the U.S. electric water heater fleet to 100-percent GIWH represents a $3.6 billion per year market, according to think tank Rocky Mountain Institute (RMI). And "utilities, GIWH manufacturers, installers, solar companies, aggregators and customers themselves can all capture a piece of this prize."

Utilities across the country are catching on. There are GIWH pilots at Portland General Electric (PGE), Arizona Public Service (APS) and Green Mountain Power (GMP) in Vermont. PJM has introduced GIWH for frequency regulation and the California Energy Commission is discussing GIWH, according to Brattle Principal Ryan Hledik, co-author of a recent paper describing the GIWH opportunity.

electric bus (cont.)

regular diesel school bus but is powered 100 percent by electricity. The 72-passenger bus contains up to five batteries, giving it a range of 100 miles per charge, which fits well within the average 66-mile daily route of a school bus in the United States. It can recharge overnight when electricity demand — and cost — is lower, ensuring that it's ready to go the next morning when a bus driver hits the road.

Lakeville residents got a first look at the electric school bus at the city's Pan-O-Prog parade on July 8.

"We've looked at other fuel-alternative school buses but haven't seen any additional advantages like we have with the eLion model," said Bill Forbord, COO of Schmitty & Sons. "It's a quiet, smooth ride and has the next generation of operational and safety features. It's also very user-friendly for the driver."

The three companies are using this program as an opportunity to promote and educate the public on the value of electric vehicle technology.

"We are thrilled at the opportunity to bring this technology to our members," said Jane Siebenaler, Dakota Electric business account executive. "Because of this collaboration, we are able to strengthen a member relationship, pilot cutting-edge electric bus technology and lay the foundation for what could be an excellent, energy-efficient school bus option."

water heaters

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In the next 12 months to 18 months, Hledik said, it is likely there will be a utility-led "new wave of grid interactive water heating pilot programs." The challenge, however, remains in spreading the benefits to all parties involved.

The market opportunity

Mark Dyson, RMI electricity markets division manager, agreed there is a new wave of interest in GIWH and added there is still ample room for growth. The $3.6 billion potential market is less than 1 percent of the U.S.'s $400 million per year aggregate spending on electricity.

More significantly, between 40-60 percent of the electricity demand used for water heating can be shifted to create customer savings and grid services, he said. Grid services could include avoided generation capacity, avoided transmission and distribution capacity, energy arbitrage and ancillary services in wholesale markets.

Dyson said water heaters are a commodity business. "To reach scale, every water heater that comes off the assembly line needs to have an inexpensive microchip that makes it grid interactive."

The chip itself is no more than $5, but retooling an assembly line would add cost that could "bump manufacturers' products off dealers' trucks and cost market share," he said.

A.O. Smith Vice President Joshua Greene said his company has pilots in place with two electric cooperatives. He said his company sees customer adoption as the key hurdle. "Over time, as homeowners and small businesses become familiar with this technology, there will be an uptick in adoption."

What Dakota Electric is doing with grid-interactive water heaters

Dakota Electric is planning its own grid-interactive water heater pilot project with a local home builder in Lakeville.

Eighty-one homes in the new housing development will feature grid-interactive electric thermal storage water heaters.

Dakota Electric is working with the Steffes Corporation and will use this pilot project to study the operation and benefits of grid-interactive water heating.

Watch for more project information in next month's *Circuits*.

Do you have **unclaimed capital credits** waiting for you?

When you signed up to receive electric service from Dakota Electric Association, you became a member of an electric cooperative. While investor-owned utilities return a portion of any profits back to their investors, electric cooperatives allocate margins to members as "capital credits," and retire—or pay—them when the cooperative's financial condition permits. Dakota Electric has paid out capital credits to members who purchased electricity through 1988.

If you move, it is important that you inform Dakota Electric of your current address.

To determine if you, or someone you know, has capital credits waiting, visit dakotaelectric.com and click on About Us > Capital Credits. You can also view a list of frequently asked questions that explains how the capital credits process works.

Did you know?

Some members are eligible to make an early withdrawal of their capital credit account balance at a discounted rate. Those members must meet one of the following criteria:

- Age 65 and older
- The funds belong to an estate

The board of directors has approved the policy of discounting early capital credit payouts so that all are made on a fair and equal basis with those who will have to wait for their payments. For example, $10 received in cash today is worth more than $10 received 20 years from now.

If you meet one of the above criteria and would like to request a discounted payout, contact Dakota Electric at 651-463-6218 or email capitalcredits@dakotaelectric.com.

Dakota Electric planting pollinator habitat

Less than 1 percent of Minnesota's original prairie habitat exists today, and that is having an impact on bees and other pollinator populations. In honor of National Pollinator Week in June, Dakota Electric announced plans to plant pollinator habitat at local substations and an upcoming solar installation (see page 7).

Since many Dakota Electric substations are located in urban areas, they are surrounded by grass. However, the cooperative is planning to restore natural prairie habitat around a couple of rural substations as a pilot project.

"We have been looking for the right locations to plant pollinator habitat," said Craig Knudsen, Dakota Electric's land use manager.

The substations, one in Inver Grove Heights and one just north of Red Wing, are properties that are compatible for this type of natural restoration improvement due to location and typography. A naturally restored environment has tangible benefits such as reduced fertilizer, chemical weed control and mowing, besides assisting the pollinator population. These projects will help Dakota Electric assess the overall impacts, including costs and benefits, and determine if more locations could benefit from habitat restoration.

Beth Markhart from Prairie Restorations is managing the projects for Dakota Electric.

"The locations will be planted with ecologically appropriate species from the Midwest once site preparation is completed in early summer," Markhart said. "The final habitat will be a perfect environment for bees, butterflies and other pollinators."

Prairie Restorations said it may take up to three years to get the landscape habitat fully functioning, but natural benefits will already be seen in the first year.

Students return from **Washington, D.C. Youth Tour**

Five area high school students, sponsored by Dakota Electric Association, recently returned from a Washington, D.C. trip-of-a-lifetime. Dakota Electric's students joined more than 1,800 students from across the nation (39 from Minnesota) for the 53rd annual National Rural Electric Cooperative Association (NRECA) Rural Electric Youth Tour held June 10-15.

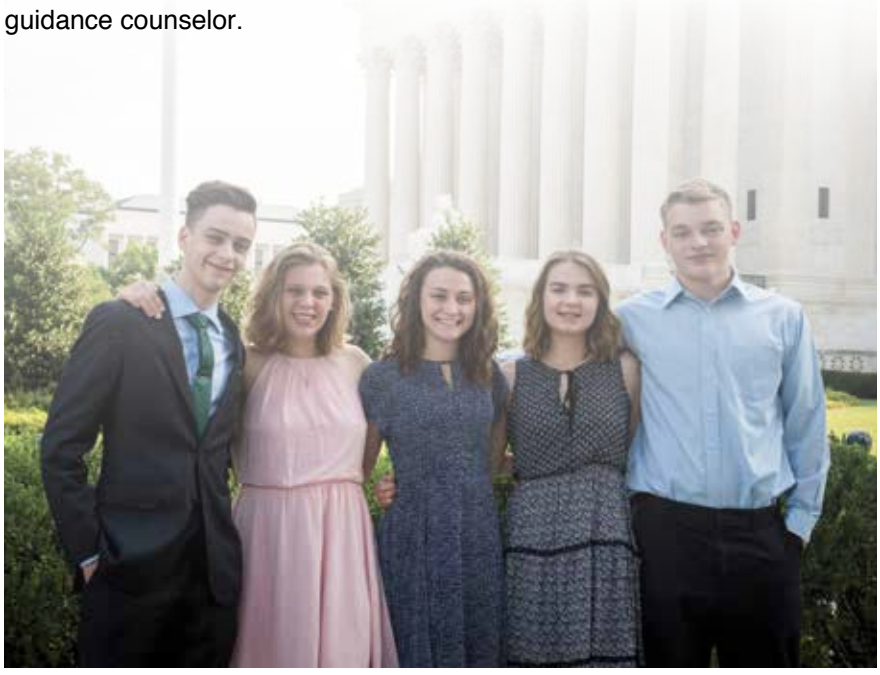
Dakota Electric awarded the students the trip after they completed the application and interview process in March. The five winners were Emma Anderson, Eagan High School; Holly Anderson, Christian Life Academy; William Barnes, Lakeville South High School; Kyle Ringley, Christian Life Academy; and Kelsey Shaw, School of Environmental Studies.

Each year in June, an activity-filled week affords these high school youth opportunities to learn firsthand what it is like to be involved in politics, community development and today's social issues. This year, events consisted of learning about governmental processes, issues of the day, electric cooperatives, American history and meeting with elected legislators including Representatives Peterson, Nolan, Lewis, Emmer, Walz and Senator Franken.

"I can't wait until I'm working in congress and making a positive change in our country," said Shaw.

Seeing the monuments, especially the National Museum of the Marine Corps, was a moving experience. Barnes said he "could not go far without a feeling of great national pride."

Students wishing to participate in Youth Tour 2018 should watch for more information in *Circuits* or at dakotaelectric.com in January, or contact your guidance counselor.



Pictured from L-R: William Barnes, Kelsey Shaw, Emma Anderson, Holly Anderson and Kyle Ringley. Emma Anderson was selected to represent Minnesota on the Youth Leadership Council (YLC). As a delegate to the YLC, she returned to Washington, D.C. in July to focus on leadership skills, and then in 2018 she will participate in NRECA's annual meeting. This is a huge honor and it is the second year in a row that a Dakota Electric student was selected for this role.

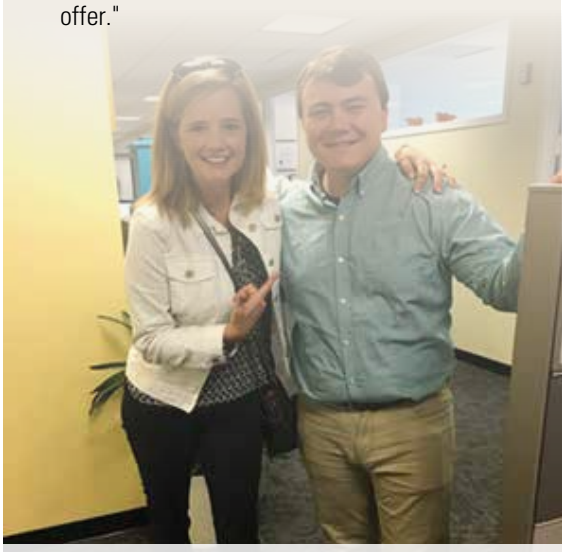
Former Dakota Electric youth tour delegate interning with NRECA

Zach Eichten of Rosemount, and 2013 Dakota Electric youth tour delegate, is working as a government relations and environmental regulation intern at the National Rural Electric Cooperative Association (NRECA) in Arlington, Va. this summer.

Eichten attends St. John's University in Collegeville, Minn. and is majoring in political science and economics. He hopes to work in public policy in St. Paul or Washington, D.C. and noted, "I would love to work with cooperatives in the future, and I believe in their mission and think they do a great job representing their members."

"I really enjoy the feel of the city," said Eichten. "It's very welcoming and full of history. I am just happy to be near that."

About the internship, Eichten shared, "So far, I have been excited to learn about the innovation that [electric] co-ops are doing. I will be putting together a series of case studies on the consumer-centric cooperative, highlighting the great new ideas and initiatives co-ops offer."



Zach Eichten, of Rosemount, was a Dakota Electric youth tour delegate in 2013 and is now interning with NRECA. He is pictured here with Beth Knutson, former MN youth tour coordinator and current NRECA youth programs and scholarship coordinator.

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Circuits
Quick Clips

AGi project update

Dakota Electric's AGi project is progressing as planned. Proposals have been reviewed and the team has narrowed the list of potential vendors. The group is currently working with those vendors on proposal details in order to select the one with which they will begin negotiations.

AGi stands for advanced grid infrastructure. It refers to what has been called "smart meters," but it is also referring to more than that. AGi captures the wider scope of this project, from the meter to load management to meter data management software and analytics.

Dakota Electric's existing meters and load management devices are nearing the end of life, so we are looking at the best technology to replace this critical infrastructure and provide even better service to our members.

With the AGi project, Dakota Electric looks to increase system efficiencies, improve outage notification and restoration, and provide more energy information for members.

Dakota Electric building 1-MW solar array near Hastings

Dakota Electric, in conjunction with SoCore Energy, is currently constructing a 1-megawatt (MW) solar array on five acres along Hwy. 316 near Hastings.

The array will have more than 3,500 panels and will generate enough energy to power about 150 homes. The solar energy generated will be used within Dakota Electric's distribution system and will benefit all of its members. The 25-year solar array is expected to provide a hedge on future wholesale power costs, providing savings for all members.

The project is expected to be completed this month. A 2-MW solar project is in the planning stages and is expected to be operational in the spring of 2018.

More than 3,500 solar panels will be constructed on five acres of land along Hwy. 316 near Hastings.

Register to attend our annual wind farm tour

Dakota Electric's popular wind tours offer an up-close look at an operating wind farm. Space is limited, so sign up early! Tours fill quickly on a first-come,first-served basis.

Tour dates

Tours will take place on Sept. 7 and 8. Each tour leaves Dakota Electric's headquarters in Farmington at 8 a.m. and returns at approximately 3:30 p.m.

Tour stops

McNeilus Wind Farm, located in Dodge Center, Minn., includes 41 turbines. Members will have the opportunity to go inside the base of a turbine and talk to an engineer.

Pleasant Valley Station, near Sargeant, Minn., is a natural gas peaking plant that generates electricity during times of high electricity demand.

If you have questions, contact Brenda at 651-463-6234. Registration deadline is Friday, Sept. 1. The cost is $10 per person and includes transportation and lunch.

Due to limited space, we request that members who have previously attended a tour please let others attend. Children must be at least 12 years old and accompanied by an adult.

REGISTER ONLINE

https://2017deawindtour.eventbrite.com

Select the tour date you plan to attend and click register.

CIRCUITS

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