

Morris robotics team engineers new funding stream with solar array

HIGH SCHOOL ENERGY COST SAVINGS POWER UP THE TEAM | By Laura Billings Coleman



The Plaid Pillagers robotics team from Morris Area High School recently installed solar to help fund their activities. Submitted photo.

Building and programming a 120-pound robot that can drive, pivot, and pick things up is part of the challenge Minnesota's more than 200 high school robotics teams are getting set to take on as the official "build season" begins in January. But during the off-season, The Plaid Pillagers, a high school robotics team in Morris, Minnesota, solved an engineering puzzle even more complex—finding a way to turn renewable energy into a sustainable source of funding for their high school team.

Tapping into community and clean energy

In early 2020, in fact, the Morris Area High School community will celebrate the successful launch of a new 8 kW ground-mounted solar array expected to generate nearly 10,000 kilowatt hours of electricity each year—about as much energy as it takes to power an average Minnesota home. Paid for with help from a CERTs Seed Grant, a public solar rebate program from the local utility Otter Tail Power Company, and hundreds of private contributions raised by the robotics team, the new solar array will save the district nearly \$1,000 in energy costs every year—money that will be reprogrammed into the team's robot-building budget.

"It's really exciting to see kids get involved and concerned about their environment and energy usage at their schools," said Lori Moxness, Energy Management Representative at Otter Tail Power Company. "This project is a great learning experience, not just in terms of teaching renewable systems and how they function, but also in pointing out the possibility for future careers as these students graduate. There's going to be a real need for people who are trained to maintain renewable energy systems."

A spark from Saerbruck, Germany

The inspiration for this project was actually imported from Morris's sister city of Saerbruck, Germany, a town of 7,500 that's made a remarkable transition to renewable energy in record time. That's where Eric Buchanan, a renewable energy scientist for the West Central Research and Outreach Center, traveled with a Climate Smart Municipalities delegation from the town of Morris, and learned about a team of Saerbruck high school students who had led the way in bringing rooftop solar arrays around town.

"Since I'm also the robotics coach, I know our high school students are just as capable and passionate as those in our sister city, so right away I thought that could be a project the kids on my team could pull off," says Buchanan, who came home and pitched the idea to his 2018-19 team.

"We're always struggling to raise annual operating funds," said Buchanan, "so we thought, 'Why not have our team get a solar array installed and get the school's electric bill savings dedicated to the robotics team? And why not conduct a few public educational and fundraising events to get others involved? And why not make solar production data available to high school science teachers?'"

Building support

After investigating the costs of solar panels and available options, the team presented a plan for a \$31,000 solar array to the school board, and outlined a strategy to pay for nearly two-thirds of it through the CERTs Seed Grant, Otter Tail Power's POP Solar program, which rebates \$1,250 per kilowatt installed at publicly-owned properties, and other grant opportunities. The school board approved, provided the students came up with the remaining \$10,000 costs from the community. "In a community our size, that amount of money can be pretty daunting," says Buchanan. "But the best advantage of working with kids is they don't know why it can't work."

Team captain Teresa Boyd took the lead on the project, putting together a presentation about the long-term costs and environmental benefits of solar power, and hosting a series of picnic-style fundraisers for the community. "It really was a student-led project, and we had so much to learn, like the difference between kilowatts and kilowatt hours, and how to conceptualize what the solar panels would be producing for the school," says Boyd. "We found out that if you say 'This is going to produce eight kilowatt hours of power,' most people are like 'What?'"

Learning, growing, and celebrating

Enthusiasm for the project helped the Plaid Pillagers achieve their funding goal last year and install the solar array near the tennis courts, where they're visible and accessible for Morris science classes. The solar array is being interconnected at a new bus garage that's currently being built, and enthusiasm for the solar project led the school to leave room to expand solar in the future to up to 40kW. Boyd, who is now a freshman at the University of Minnesota, Morris, and a member of the campus Sustainability Team, says it's exciting to see her team's hard work pay off in a tangible way and provide inspiration for others.

"There's a lot to celebrate," Boyd shared, "but I think everyone is most excited about the extra \$960 per year that will be added to our team budget so we can make even better robots."

Lessons learned

- **Keep an eye on costs:** The cost of solar has dropped by nearly a quarter over the last five years, but vendor prices can fluctuate widely. The Plaid Pillagers recommend getting multiple bids and making sure to stay in touch with solar contractors throughout the course of a project to keep costs in line.
- **Get creative about community fundraising:** The Plaid Pillagers tried a variety of approaches, from posting a simple Go Fund Me page for online donations, to applying for grants, and grilling up burgers at community cultivation events. "The most important part is to keep track of where the money is coming from so you can tell people how close you are to your goal," says Boyd.
- **Be patient:** Getting approval and buy-in for renewable energy between multiple entities can take time, but yield even better results. The Pillager's small array included provisions to increase the size of the system up to 40kW, a forward-thinking plan that would increase current energy production five times over.

Solar for more Minnesota schools

Even before the robotics team's array was fully operational, the Plaid Pillagers were fielding calls from other schools curious about how to turn renewable energy into a teachable moment in their communities. To reach more people, Plaid Pillagers coach, Eric Buchanan, recently had the opportunity to present about their team's solar project to 500 kids and their coaches from across Minnesota at the JUMPSTART robotics training session at St. Cloud State University December 6-7, 2019. So expect to see more and more robotics-fueled solar projects built up at schools across the state!

Project snapshot

- Technology: Solar Electric
- WC CERT Seed Grant: \$7,300
- Total Project Cost: \$30,907
- Other Funds: Southwest Regional Sustainable Development Partnerships, non-profit funding contribution, utility solar on public properties program, fundraising with community members
- Project Team: Sydney Bauer and Abbey Dickhudt (University of Minnesota Morris), Chuck Melchior (Zenergy, LLC), Teresa Boyd, Mara DeRung, Eric Buchanan (High School Robotics Team), Rick Lahn (Morris Schools Superintendent)
- People Involved and Reached: 139
- Annual Energy Savings: 10,969 kWh

Learn more

- See more photos of the Morris robotics solar project, as well as a presentation from Eric Buchanan about how other robotics teams can use solar for fundraising at mncerts.org/morris-robotics.
- Looking to power your school with solar? Get support from CERTs: mncerts/public-solar-procurement.

About the Clean Energy Resource Teams (CERTs)

The CERTs mission is to connect individuals and communities in Minnesota to the resources they need to identify and implement community-based clean energy projects. CERTs offers unbiased technical assistance, provides limited financial assistance for projects, and works across the state of Minnesota.



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