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North Shore Community School
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"Thanks to the energy efficiency measures and Minnesota Power's investment, we can power the entire new addition with solar energy under normal operating conditions."

Phil Strom, North Shore Community School Founder and Chair of Affiliated Building Company

Solar Powers School Addition Thanks to Minnesota Power and an Array of Energy Efficiency Measures

Sunny summer days gave way to a solar-powered school year for students and teachers at North Shore Community School. A brand new 30 kW solar energy system, erected between the school and an onsite rain garden, was commissioned in August 2016. It culminated three years of planning, construction and upgrades that included a new 10,000-square-foot addition and energy-efficiency improvements in the school's original building.

Minnesota Power provided conservation rebates for energy-saving lighting and HVAC technologies installed in the school and was a leading force in the solar installation, contributing $150,000 to the project. North Shore Community School's focus on environmental education made it a perfect place to showcase energy efficiency and clean, renewable solar energy.

North Shore Community School is located on 40 acres of forested land between Duluth and Two Harbors. Its unique setting features a mile-long nature trail, school forest and year-round greenhouse, all integrated with classroom studies to help students learn from their surroundings. There is even an "edible classroom" initiative, which allows students to follow food from seeds to table.

The rural charter school was created in 2001 when Lake Superior School District closed an elementary school on the same site. Area residents rallied to transform the location into a public K-6 charter school committed to connecting students with their natural and social environments.

Enrollment has almost doubled since then, going from 182 students the first year to 350 today. The school initially purchased portable classrooms to handle the overflow, but eventually overcrowding and security concerns led officials to consider a $3.5 million, 10,000-square-foot expansion.

Planning began in 2013. Energy efficiency was a top priority. School officials and architects set out to achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver certification, but soon realized the steps required for actual certification would be cost prohibitive.

"We shifted protocol to something we call Smart Energy and Environmental Design Standards, or SEEDS," said Phil

"Having a solar installation at North Shore Community School is significant for our region because it can inspire other schools to take a hands-on approach to learning about energy and ecology."

Paul Helstrom, Renewable Program Lead, Minnesota Power

From left: A greenhouse built as part of the addition serves as an "edible classroom," where students grow, harvest and process food used in the school cafeteria. Phil Strom of North Shore Community School's Affiliated Building Company explains how LED lighting, passive solar collectors, and walls constructed of insulated concrete forms make classrooms bright, comfortable, energy-efficient spaces for learning.

Strom, a school founder and chair of Affiliated Building Company, which owns the building and leases it to North Shore Community School.

The addition was designed to maximize passive solar energy and constructed to heightened standards of thermal integrity and air tightness that far exceed Minnesota State Code. Energy modeling helped decision makers choose building materials, mechanical systems, lighting and lighting controls, and other energy-saving features that would yield the best return on investment.

Minnesota Power's Power of One® Business conservation improvement program (CIP) provided more than $5,000 in rebates for mixed energy-efficient lighting (primarily LED), lighting controls, variable frequency drives on fan and pump motors, and a ground source heat pump. Choosing these high performance technologies over standard equipment will result in annual energy savings of 100,000 kWh and monthly demand savings of 20 kW. Payback on the incremental cost to invest beyond standard efficiency is less than five years. The school reinvested rebates from the expansion project to install energy-efficient LED troffers and wrap fixtures in common areas of the original building.

"North Shore Community School is more proactive than reactive when it comes to energy efficiency," said Charlotte Currier, a CIP consultant with Energy Insight, Inc., who verified technologies and processed the rebates. "Having these unique systems and being able to demonstrate how they save energy is a really good way to make students mindful of energy efficiency."

In June 2015, the school held a ribbon cutting for the expansion. ALLETE Chairman, President and CEO Alan Hodnik and Vice President-External Affairs David McMillan attended. School officials and Minnesota Power had already begun discussions about an opportunity for Minnesota Power to fund a sizable solar project—much larger than one the school was already considering.

The recently installed 30 kW solar project consists of 98 solar modules each with 310 watts of capacity. It features two south-facing, 85-foot-long arrays, mounted with a 30-degree tilt. There is a data acquisition system and weather station that monitors irradiance and temperature of the modules as well as ambient temperature. A kiosk inside the school lets teachers and students access real time and historic solar production data, energy savings equivalencies, and educational content.

"The data system behind the kiosk is very robust, so information it collects can be made available to other schools," said Paul Helstrom, renewable program lead, Minnesota Power. "We always look to leverage our investments. Having a solar installation at North Shore Community School is significant for our region because it can inspire other schools to take a hands-on approach to learning about energy and ecology."

"North Shore Community School already was working on solar energy, and we were able to come in and co-develop a larger solar project," said Josh Goutermont, supervisor of electric operations for Minnesota Power. "This was a donation, but a lot of credit goes to the school community for having a strong interest, getting the right players together and doing their homework."

"Everything was thoughtfully put together from a practical view to fit the charter of an environmental learning school," Strom said. "Thanks to the energy efficiency measures and Minnesota Power's investment, we can power the entire new addition with solar energy under normal operating conditions. We would not have been able to do a solar project this size and scale without Minnesota Power—it would have been more for show."

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