

*CASE STUDY:****Carleton College's Wind Turbine*****By Karla Kingsley, The Minnesota Project**

For years students of Carleton College and other Northfield community members had pushed for green energy. Since Green Pricing was not available in Northfield, they began exploring the option of having their own renewable energy source, wind. The planning process started in mid 2002 with a meeting between the Northfield School District, St. Olaf College, the City of Northfield, Carleton College, and Renewable Energy for a New Northfield (ReNew), a non profit working to make Northfield less dependent on non renewable sources of energy and to move to a more sustainable, efficient use of locally owned renewable energy resources.

Working with wind developer Dan Juhl, of Danmar and Associates Inc., Richard Strong, director of facilities at Carleton conducted a preliminary survey to elect the most suitable location for a wind turbine, taking into consideration wind speed and reliability along with current electrical infrastructure. He selected a site

on a ridge one and one half miles east of Carleton College campus. After this preliminary work, the Northfield school district and Carleton College decided to continue pushing the project forward. They hired Juhl, who selected the precise potential location for the turbine and set up

an anemometer to measure wind speed, frequency, and volume over a time period of three months.

As the planning progressed, ReNew Northfield facilitated a public meeting to gauge public opinion and provide information on the proposed project. A few attendees posed questions about potential bird kills, but general feeling towards the project among the 90 attending

community members was very positive. In addition to the meeting, an outside firm was hired to conduct a poll to gauge the public acceptance.

After a vote, the school district decided not to take part in developing the wind turbine, but Carleton College opted to move ahead with project planning. Strong sent out the anemometer wind data to



various turbine manufacturers, soliciting bids.

“We got three bids back, so we were able to pick the best from those, based on cost and energy production,” Strong said. Strong worked with Jeff Paulson, a lawyer with experience working in energy, to evaluate the proposals, and chose to go with the company N.E.G. Micon, now part of Vestas.

“It turned out that N.E.G.



Micon’s proposal came with the M-82 turbine – the blades we’re 82 meters long, about 26 ft longer, in diameter, than the standard machine,” Strong explained, “so in a place where there are slower wind speeds, the larger diameter of the blades can capture more wind, and produce more power.”

Paulson took the lead in negotiating the turbine purchase with Micon, and the 1.65mW turbine was ordered in March of 2004. Paulson kept Strong informed of the purchase and shipping process as the turbine, tower and base were being delivered in August. Paulson also worked on the power purchase agreement (PPA) with Xcel Energy, in which Xcel agreed to purchase power from the College at the rate of 3.3 cents per kWh for 20 years. Getting a power purchase

agreement was essential to the project’s progress for a few reasons. First, Carleton had to have the PPA in order to be eligible to apply for state production incentives for renewable energy. Secondly, the PPA provided assurance that Carleton would have a reliable market for the wind energy for the next 20 years.

Negotiating the PPA “wasn’t a difficult process, but it took a long time, and it didn’t seem like there was much flexibility,” Strong said. He said that originally they had wanted two ten-year agreements, so that if the price of power increased, there would be a chance of Carleton receiving a higher rate of payment from Xcel in the second block of ten years. Xcel, however, preferred the longer 20-year contract at a steady rate, and if the turbine remains viable for more than 20 years, there is the possibility of negotiating a continuance of the agreement.

In addition to the turbine purchase and the PPA, Paulson also worked on the interconnect agreement with Xcel – the agreement to actually put the turbine’s power into grid to sell energy. The plans called for “distributed generation,” where the energy produced would be interconnected to the local distribution lines, instead of transmitting the power over long distances. The Mid-continent Area Power Pool (MAPP) did reliability studies to gauge the impact of the turbine on the grid. MAPP, whose reliability testing function now is covered by the Midwest Reliability Organization (MRO), generally “looks after the grid and does studies on it, to make sure there is fidelity on the grid, that it is fairly balanced, so that everyone has access and assurance that they are going to get the power they need,” Strong explained.

After much planning, the turbine, tower, and base arrived in Northfield on August 27<sup>th</sup>. Paulson hired a contractor to do the cement and installation of the turbine, which occurred over the next few days. Finally the electrical connection to the grid was established.

On September 16, 2004, around 3:00 in the afternoon, the turbine went online, providing a stream of power directly to the grid. In its first year of operation, the turbine produced 4.8 million kWh. At this rate, it will take 10 to 12 years of electricity to pay for the turbine, a \$1.8 million investment. Carleton College supplied the funding, with help from a \$150,000 Community Wind grant from the Department of Commerce.

Currently, all the power from the turbine is sold to Xcel, and is not directly connected to Carleton College's electricity network. If it were, however, it could supply up to 40% of the campus's energy needs, said Strong. Currently, Carleton is conducting studies to determine the feasibility of interconnecting the turbine directly to the College's energy supply.

According to Strong, the general reaction of the student body and the community has been positive. In addition to the environmental benefits of clean wind energy, there are educational benefits. Students participated in siting the turbine and it is currently used as a learning tool for various geology, energy, and economics classes.



Moreover, the construction of the turbine has sparked interest from other institutions and communities. Strong said he usually gets a few calls each month from other colleges interested in replicating the project. Groups of community members also tour the facilities each month.

Strong said that the wind turbine fits into the college's

wider philosophy of hands-on learning. "Sustainability is just one of the things we do. We try to work into the curriculum." Although there aren't definite plans yet, Carleton may explore the option of putting up another turbine in the future, near the site of the first one.

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