Spirit Lake Schools
Spirit Lake, IA

Technical Specifications
750 kW NEG Micon
NM 750/48 Wind Turbine
180 ft. tower

Project Cost: $780,000
AERLP: $250,000
Loan Term: 10 yrs.
Lender: Wells Fargo Bank
Lender share: $530,000
Est. Annual O & M Cost: $5,000
Est. Payback: 7 yrs.
Installation Date: October 2001

In 1993, the Spirit Lake School District installed one of the nation's first school wind turbines. Their success with the 250 kW Windworld turbine, connected to their elementary school, led them to add a 750 kW NEG Micon turbine in 2001 to power all additional district facilities, including their high school, middle school, vocational-tech building, district offices, maintenance building, and athletic fields.

Project History
The district funded $119,000 of the $239,500 cost of the first turbine with a grant from the U.S. Department of Energy. Lacking such an opportunity for the second turbine, the district turned to the Iowa Energy Center's Alternative Energy Revolving Loan Program (AERLP) to cover $250,000 of the total $780,000 cost with no-interest financing.

"The main reason for utilizing the [AERLP loan] is that we did not have to use our district's general fund dollars for this project," says district facility director Jim Tirevold. "The money that we offset from our energy bill makes the payments on this project."

System Performance
The NEG Micon turbine averaged nearly 83 percent of projected output in its first five years. District superintendent Tim Grieves says they were surprised that the turbine didn't meet or beat expectations based on the performance of their first turbine, along with technology improvements made in the intervening years.

"We've been a little disappointed," he says, "but still very happy with where it's at." He notes that the NEG Micon's $120,000 in annual production value in its first five years exceeded their yearly loan payment amount of $93,000. Grieves says they initially used the surplus revenue

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Project Performance

Year	Production (kWh)	School Use (kWh)	Production/ Use (%)	Production Value ($)
10/29/01 - 10/08/02	1,611,360	1,554,956	103.6	117,817
10/09/02 - 10/12/03	1,487,880	1,955,056	76.1	112,591
10/13/03 - 10/10/04	1,623,240	2,066,402	78.6	124,430
10/11/02 - 10/10/05	1,467,330	2,277,619	64.4	128,000
10/11/05 - 10/08/06	1,163,520	2,432,674	47.8	109,167
10/09/06 - 10/12/07	1,630,890	2,472,934	65.9	136,252
totals	8,984,220	12,759,641		$728,257
avg.	1,512,939	2,141,631	70.6%	$122,514

Notes: Estimated Production = 1,765,797; 2001-02 values prorated by 20 days to compute averages

to pay ahead on their 10-year loans, but have since found the money more useful in paying for other district expenses.

The district increased its electricity usage significantly from 2001-2006 because of new construction and the addition of a geothermal heating and cooling system. In 2006, the district produced less than half of their electricity needs with more construction in the works, causing them to consider an additional turbine to make up the deficit. Tirevold says that the district's 2006 energy price of $0.095 per kWh gives them a strong incentive to maximize production.

"It's unfortunate that we keep growing our electricity demand," says Grieves, "but we have the unique ability to offset what we use."

Operation and Maintenance

The district reported only two major repair issues through 2006: replacing turbine computers in 2003 following a lightning strike and replacing the gearbox in 2006. School insurance covered all but $1000 of the $4400 computer expense, and their warranty agreement with NEG Micon paid the entire gearbox fee, which exceeded $50,000.

The district's service agreement with NEG Micon covered all parts, labor, and scheduled-maintenance expenses for the first five years of the project at an annual fee of $5000. The district renewed the contract in 2006 for $18,500 per year.

Tirevold says he spent a great deal of time working on the district's first turbine but rarely deals with problems on the newer turbine. He notes that when occasional electronics problems shut down the turbine, NEG Micon can usually resolve the situation quickly from a remote data center in Illinois.

"They know about problems before we do, and a lot of times things are fixed before I even learn about them," Tirevold says.

Overall Satisfaction

While the revenue-generating potential of wind energy factored heavily in the district's decisions, Grieves and Tirevold add that their community has bought into three main benefits of the investments. First, the turbines are viewed as an educational tool, second as a source of clean energy, and third as way to save money.

They note that classes from first-grade to high school have integrated the turbines into lessons ranging from language arts to physics. And they estimate that in the NEG Micon's first five years it produced power equivalent to burning 3700 tons of coal, while averting the release of 11 million pounds of carbon dioxide and 1.6 million pounds of sulfur oxide. The district shares their production details and other turbine information on their web site.

Grieves says he's been "very pleased" with the district's experience with wind energy, and he marvels at the transformation he's seen in community attitudes since the early 1990's.

"There were quite a few doubters with the first turbine," he says. "We couldn't get the second turbine up fast enough. Now it's almost a mandate."

The Iowa Energy Center's Alternate Energy Revolving Loan Program (AERLP) plays a supporting role in stimulating renewable energy development within the state. Since its inception in 1996, the AERLP has supported numerous wind, biomass, solar, hydro, and hybrid projects.

Successful applicants receive a low-interest loan from a combination of Energy Center and lender funds. The Energy Center provides loan funds equal to 50% of the projects financed cost (up to $250,000) at 0% interest. Matching financing must be obtained from a lender of the applicant's choice. The maximum loan term for the Energy Center's funds is 20 years.

The lending institutions are responsible for financially qualifying the borrower, while the energy center assists in technically qualifying the borrower. By partnering with expertise from lending institutions the Energy Center is able to cost-effectively process the loans in a timely manner and maximize the impact of the loan program.

Eligibility

The AERLP is open to all individuals and groups who want to build renewable energy production facilities in Iowa. Utilities that are not required to be rate-regulated are not eligible. AERLP loan funds may not be used to refinance an existing loan or be applied to existing alternate energy facilities.

Application Deadlines

January 31, April 30,
July 31, October 31

For more information

Contact the Iowa Energy Center,
(515) 294-8819
www.energy.iastate.edu

The Iowa Energy Center is dedicated to improving Iowa's energy efficiency and use of renewable energy through research, demonstration, and education.

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