Riding the Wind

The answer, my friend, is blowin' in the wind.
Bob Dylan

Rely increasingly on natural energy flows.
St. Olaf Sustainability Principle #4

There's always lots of hot air on a college campus, but scientists haven't yet discovered how to harness it to make useful energy.

Other air can be more productive, especially the wind. For thousands of years, human civilizations have used wind to move boats, crush grain, and pump water. Just a hundred years ago, rural America was dotted with small windmills that pumped water from wells drilled into the prairie. St. Olaf College used a windmill to provide water for its students
Now the college is going back to the future, installing a 1.65 megawatt wind turbine to generate electricity for our lights and refrigeration, our computers and printers, our TVs and stereos and radios, our coffee makers and other assorted appliances. In 2004, the college applied for a grant from Xcel Energy's Renewable Development Fund. St. Olaf's application was the highest-ranked wind project in the funding cycle, and we received the full amount of 1.5 million dollars for a 1.9 million dollar project. When the turbine is operational in 2005, it will generate about 6 million kilowatt-hours of energy annually, replacing about one-third of the college's electricity purchases. It will also make the college Kyoto-compliant, because we will have reduced our carbon impact by more than 20 percent.

The turbine will stand in one of the college's farm fields, about 1200 feet west of Ytterboe Hall. It's a gargantuan construction: the tower is almost a football field in height, and the wingspan of the blades is 80 meters. Historically speaking, however, the turbine is even bigger than that. The revolution of its rotors marks a revolution in American consciousness and environmental responsibility. It's a Statue of Liberty and a declaration of independence, freeing people from their unthinking dependence on fossil fuels. And with Carleton's wind turbine on the east end of Northfield, the two turbines bracket a town of cows, colleges, contentment and ecological accomplishment.

The Story of St. Olaf's Wind Turbine

The story of St. Olaf's wind turbine is a simple story of good people and good planning making good things possible.

Conversations about wind energy have been part of the environmental culture of St. Olaf College for a long time. Faculty and staff on the Environmental Concerns Committee considered the possibilities more or less continuously. Students who graduated and worked in wind power wondered why St. Olaf didn't think more seriously about a wind turbine. Sometimes it seemed like an obvious choice.

But even a desirable choice wasn't possible until a few things changed. First, St. Olaf isn't located in Western Minnesota, where stronger winds on Buffalo Ridge have created "the Saudi Arabia of wind." Rather than relocate the college to take advantage of the wind, we waited until inventors developed technologies better adapted to the wind currents of our own location. The NEG Micon NM82—the Danish windmill we have chosen—is especially designed for maximum productivity in moderate wind resources. Second, like most private liberal arts colleges, St. Olaf isn't awash in money. We don't have a large endowment, and our expenses seem to expand faster than our income. A wind turbine seemed like a good idea, but so did maintaining buildings and faculty salaries. So we needed a source of capital.

The Renewable Development Fund (RDF) became that source. In 1999, as part of a renewal of the 1994 Radioactive Waste Management Facility Authorization Law, the Minnesota State legislature required Xcel Energy to contribute $500,000 to the RDF for every dry cask containing spent nuclear fuel stored at its Prairie Island nuclear plant. In 2001, Xcel issued its first request for proposals and funded about 9 million dollars worth of projects.

Facilities Director Pete Sandberg submitted St. Olaf's request in the second round of proposals for projects, in the Spring of 2004. We asked for 1.5 million dollars to fund a 1.8 million dollar project for a single 1.65 megawatt turbine on our own lands. We argued that we were well situated to take advantage of this investment, and to set an example for other institutions looking at the potential of wind energy.

Our situation was especially favorable because of good business decisions the college had made over a period of 20 years. Utility companies often offer lower rates to customers who agree to reduce electrical load during peak-use periods. Residential customers get a break, for example, if they agree to let their utility turn off their air conditioners for short periods on the hottest days of the year. St. Olaf is in an even stronger position than most customers, because we own diesel generators that can supply all our power at any time. With our back-up capability, we have 100% redundancy in power production. When the lights go out in Northfield, they don't stay out at St. Olaf. This diesel installation includes equipment that makes the incorporation of wind generation possible in our configuration.

The story of the generators involves politics, economics and imagination. In 1992, it wasn't clear if the Minnesota Public Utilities Commission (PUC) would re-permit the Prairie Island nuclear plant because of its age and the accumulation of nuclear waste in above-ground casks. Northern States Power (NSP), therefore, faced the possibility of losing a major power source. So they asked St. Olaf to consider installing electrical generators on campus that could help save NSP the construction costs of larger power plants by helping them to flex their production. NSP would own and operate the generators for 20 years, after which they would turn them over to the college. This seemed like a good idea, but ultimately the program wasn't implemented.

But NSP still offered special rates for interruptible customers, and Pete Sandberg realized that the rate savings would pay for the generators over the long haul. So St. Olaf invested two million dollars to install three diesel-powered generators with reverse-current protection in 1999. Located at the foot of the hill on the east side of campus, they are capable of generating 4.2

megawatts of electricity. But even when they're not working, they're saving money for the college. As a result of our generating capacity, we save about $150,000 a year on our electric bill, money that can be spent for other college purposes.

Besides our own savings, these generators have other positive benefits for our utilities and for our community. Because we can go off the grid during peak periods, Xcel Energy (our new electricity provider) avoids building additional power plants. Because we can generate our own electricity at any time, St. Olaf has also become the most significant civil defense site in Rice County. And we are the standby site for Northfield Hospital in the event of a catastrophic event that compromises its power supply or its capacity.

The college also benefited from the special configuration of its electrical service. We currently operate a 225-amp, 13,800-volt service, which circulates electricity in a loop around campus. On a daily basis, the loop distribution system means that power can be continuously fed into the loop even if there's a power interruption somewhere on campus. As we considered adding wind generating capacity, the loop also meant that we could easily wire the wind turbine into our electrical loop, and feed the power into our own grid. In many situations—as at Carleton College—a wind turbine generates electricity which is sold to a utility, and purchased back again. In our case, wind energy will continuously supply our base electrical load for most of the year.

As a result of all this preparation, St. Olaf's proposal was the highest-rated wind proposal in the 2003 cycle of the Renewable Development Fund. Evaluators acknowledged the college's "unique setting" and noted that "St. Olaf College appears well attuned to energy issues and their relationship to the community and the utility from an energy supply/load perspective." They said that "the project scored high on the two primary criteria (Barriers to Market Deployment, Soundness of Technical Basis, Assumptions and Approach)." And they funded us for the full amount of our request.

The moral of the story is that we can ride the wind today because we've harnessed other energies (human and natural) creatively for years.

How a Turbine Teaches

A college teaches not just in its classrooms, but by its example.

St. Olaf's proposal to the Renewable Development Board emphasized the teaching possibilities of a college wind turbine. In the proposal, Pete Sandberg suggested that the St. Olaf project could provide "a model that Xcel Energy can take to other institutional users throughout the service area." More specifically, he said, "Any college or university campus, significant medical complex, veteran's home, or municipal/county government complex could benefit from having this completed model of an institutional customer that has worked to minimize its impact on its community and region, the utilities that serve it, and the people and programs that it houses."

In addition to this institutional education, a turbine also offers opportunities for interdisciplinary thinking. A wind turbine can be a liberal education—in history, economics, engineering,

computer science, political science, sociology, literature and art. Here are a few lessons of St. Olaf's wind turbine.

Our wind turbine shows that wind energy is plentiful and powerful, clean and renewable.

Our wind turbine teaches how the science of wind affects the technology of windmills.

Our wind turbine shows how computer science allows today's wind turbines to be smarter than their parents and grandparents.

Our wind turbine teaches us that conomics and environmental concerns can often be harmonized.

Our wind turbine proves that wind energy is a crop that can be harvested, changing the culture of agriculture in places like Minnesota.

Our wind turbine is a proof of the proposition that enlightened public policy makes a difference in the world. Renewable development grants and production credits make things happen.

Our Danish wind turbine suggests that the United States generally lags behind European countries in wind technology, because our energy policy has emphasized nuclear power and fossil fuels.

Our wind turbine shows that group of committed people can make history by making electricity. People can make a difference in the world.

Our wind turbine teaches religious people one way to exercise both dominion and stewardship in the natural world.

Why It Matters

Paul Jackson `92

Q. Why is the wind turbine such a big deal? Why should the average person care?

A. 5 words, two concepts. CLEAN ENERGY and LONG TERM SOURCE. It demonstrates what is meant by clean energy and the development of an energy source that will not run out until the sun does.

Q. Why is the wind turbine such a big deal at St. Olaf College?

A. The acquisition and installation of a wind turbine on-campus fully embodies the mission of St. Olaf College, and one can explore its richness in the context of commitment to the liberal arts, rootedness in the Christian Gospel, and incorporating a global perspective.

Within the framework of the liberal arts, many disciplines intersect with the wind turbine. Wind power has roots throughout human history and bridges many social structures and cultures. For instance, government policies about wind, including tax credits, subsidies and regulations, dot the landscape of a nation's energy plan. Others use energy to do their work at a time and place in the fabric of a community. Transforming energy to do work and the efficiencies of the various processes comprise important lines of discovery and application in the natural sciences. The structure and location of the turbine itself brings the above areas into conversation with issues of land use and one's sense of aesthetics. It provides a real-life, local case study for on-going analysis in and outside of classrooms and shows us a way to reconnect to the rhythms of the earth—wind whistling through the trees and the blades of the turbine, changing with the daily cycles of the earth.

Rootedness in the Christian Gospel brings us to our call to be stewards of God's gifts, to use our gifts to care for our neighbor and our environment. Moving to a cleaner, more sustainable energy source improves the health of organisms, human and non-human, scattered about the globe by shrinking the pool of materials emitted into the earth's atmosphere. It saves land and water from being mined or contaminated in societal efforts to recover finite resources like coal, oil and gas. Concomitantly we discover savings and stimulation of gifts at the college itself. Resources, once used to purchase our total energy needs, may be reallocated to improve current programs and initiatives or invest in new ideas. The turbine may serve as a point of inspiration that allows the greater community to recognize additional gifts and talents and put them forward as offerings in our call to serve the neighbor.

Finally, but not the least of these intersections, wind energy allows St. Olaf to create another point of engagement with the global community. We are not the first to successfully transform wind energy into electricity or develop a broader vision for living in harmony with the other inhabitants of this planet. Whether at home or abroad people can share their stories about the impact wind energy has on our daily life, daily culture and personal sense of self. We build connections with each other, with the earth, and with God. This is why a wind turbine is such a big deal at St. Olaf College.

Paul Jackson is a St. Olaf graduate (`92) and faculty member in the Department of Chemistry. He teaches Environmental Chemistry and is on the St. Olaf Sustainability Task Force. He wrote this in Fall 2004.

A Crop of Kilowatts

St. Olaf's wind turbine is an essential element of its strategic plan and its sustainable energy plan, but it's also an element of the college's agricultural stewardship. The wind tower will be planted in the middle of a field that grows corn and soybeans and alfalfa.

Unlike those crops, which are annuals, the wind turbine is a perennial. Unlike those crops, which live and die in Minnesota's short growing season, the turbine will harvest its crop of kilowatts year round. In fact, we expect bumper crops of electricity in the months between November and March, when northwest winds whip across Manitou Heights.