Farming SUN AND WIND

How one family is achieving the good life at a B&B powered by renewable energy.

By John Ivanko and Lisa Kivirist

Since leaving the concrete jungle of Chicago nine years ago to begin a new life in rural Wisconsin, we find that more and more, our lives revolve around the sun. Along with rainfall and healthy soil, the sun nourishes the plants on our 5.5-acre farm and bed & breakfast, Inn Serendipity. It warms the day for people and animals alike. And the sun and wind provide all the power we need to run our farm and home-based businesses.

Breaking our relationship with fossil fuels was a priority when we embarked on a more sustainable lifestyle. Possessing little prior knowledge of renewable energy, we tapped books, events and organizations like the Midwest Renewable Energy Association (MREA) to garner the information needed to become micro-power producers. Renewable energy integrated well with the other elements that comprise our version of the good life: food systems, living systems and livelihood. We also rediscovered that energy independence depends on community interdependence. Many mentors, neighbors and friends lent the elbow grease, equipment and know-how essential to our transition.

Reducing Our Energy Load

Located on a ridge surrounded by dairy farms, Inn Serendipity is a collection of outbuildings including a dairy barn that houses

llamas, a granary turned straw-bale greenhouse and a chicken coop. Our 1,969-square-foot, all-electric farmhouse used to consume about 12,000 kilowatt-hours (kWh) of electricity annually and burn through $350 of heating oil in the winter — a little more than the Wisconsin average. For the first six years at the farm, we spent our efforts and money on energy conservation and efficiency.

We began by shaving our energy use to about 8,500 kWh a year and switched to an Environmental Protection Agency-certified woodstove for heat. Our efforts to use electricity more efficiently included replacing many energy-hogs with ENERGY STAR appliances such as a Sun Frost refrigerator, Maytag Neptune clothes washer, Sony computer monitor and Brother fax machine.

Other ways we worked to conserve energy included refitting incandescent lights with compact fluorescent bulbs, line-drying laundry and adding a solar thermal system for heating domestic hot water. As a next step, we're near completion of a 1,200-square-foot straw-bale greenhouse, primarily heated by a 10-collector solar thermal system. The greenhouse will help us meet even more of our annual food needs year-round with products we raise on the farm — presently about 70 percent.

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Tapping the Sun

Finally, in 2002 we took the first steps toward generating our own electricity, tapping a total of $3,536 in funds from WisconSUN and Wisconsin Focus on Energy, both state-supported incentive programs. Partnering with the MREA, a chapter of the American Solar Energy Society, we hosted an onsite installation workshop taught by Chris LaForge of Great Northern Solar, Port Wing, Wis. We installed four 120-watt Kyocera photovoltaic (PV) modules, mounted on a UniRac system cantilevered from the south-facing wall of an equipment shed. Using the existing shed saved time and resources, while allowing us to tie into the existing farm electric service. An Advanced Electronics 1,000-watt grid-intertie inverter installed on the inside wall of the shed opposite the PV array gives us the option of expanding the system. Because the system is grid-tied, all surplus PV generation yields a credit with our local utility based on the retail rate of 6 cents per kilowatt-hour.

The net cost of the project was $4,816, including work we and our neighbors contributed. To boost the output of our PV system about 5 percent annually, we adjust the angle of the array four times a year (and clean off any snow in the winter). The PV system generates about 536 kWh a year, meeting 2 percent of our annual energy needs.

Drawing on the Winds

It's the high winds that sometimes force us inside, so we knew that the site could support a small wind turbine that would meet, if not exceed, our remaining electricity needs. The site, with no significant obstructions for miles in any direction, was deemed satisfactory in a professional assessment. A year later, in May 2003, we installed our 10-kilowatt Bergey Excel-S wind turbine. Based on an annual average wind speed of 13 mph and 120-foot tower height, the turbine was estimated to generate about 13,560 kWh annually, serving all of our annual energy needs. Surplus electricity generation would be banked on the grid until a credit check is issued by our utility.

To cut costs, we purchased a rebuilt wind turbine from Lake Michigan Wind & Sun, as well as a used guyed lattice tower. The turbine and tower are located about 300 feet southeast of the house. A new Bergey GridTek 10 inverter is located on the east wall of the basement, connected to the house service and utility after passing through an old electricity meter adapted to monitor the turbine's output.

Once we completed the state incentive proposal, equipment order and arrangements with MREA to make the installation a workshop project, four steps remained. First, unlike the PV system, the wind turbine required both a conditional-use zoning permit and public hearing. Because other turbines had been erected in the county, the zoning committee noted little concern from the community. It helped that we personally contacted neighbors in advance. Secondly, we signed a grid-interconnect contract with our utility, providing a certificate of liability of insurance in excess of $300,000 and a lockable disconnect (also required for the PV system). The third step, excavation of the tower base and guy wire anchors, was completed about one month prior to the installation. Finally, seven students plus the MREA instructor, Mick Sagrillo, completed the installation over seven days, including constructing the tower, trenching and wiring from the inverter to the tower, raising the tower with the assistance of a crane and testing the system.

The total installation cost of $39,465 was offset by $15,595 in funds received from a Wisconsin Focus on Energy cash-back reward and non-financial assistance of $8,380. For the year ending May 2004, the wind system generated 7,049 kWh. The production shortfall from the site-assessment projection caused us to analyze our wind data (ongoing). It also caused us to pursue further energy-conserving measures, like the termination of a farm safety light. Still, due to rising electricity rates, we estimate that the hybrid wind-PV system has saved us about $1,000 per year in electricity expenses. Based on energy cost savings, we expect to see payback for the wind turbine in about 17 years.

The hybrid system's ability to provide virtually all of our energy needs, halting our contribution to greenhouse gas emissions, demonstrates that fossil fuel-free living is a 21st century reality. Besides the hearty vegetarian breakfasts for which Inn Serendipity is known, the wind-PV system has become our calling card for the good life. ●

John Ivanko and Lisa Kivirist are co-authors of Rural Renaissance, *which details their journey toward sustainable living. For more information, visit www.innserendipity.com or www.ruralrenaissance.org.*