

Plugged Into the Midwest Sun & Wind

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When the cool west wind blows down the Cedar River valley east of Vinton, Iowa, bending the tops of the cottonwood and soft maple trees along the bank, it soon reaches a place where the river has cut a channel through an 80-foot limestone bluff. It is a constriction in the river valley which compels the air to move ever faster as it's pushed through the narrow breezeway by the force of the air behind it. Meteorologists call it the venturi effect.

Dan and Kim Isbell, on the other hand, call it serendipity; for perched atop an 87-foot freestanding lattice tower—just 7 feet higher than the limestone bluff behind their 2-story log home—sits a Bergey 1500-watt wind turbine, lurking like a sleek and hungry predator waiting for the next opportunity to spring into action.

“The winds here aren't particularly strong,” Dan explains, “but they are reasonably steady; over the course of the year, it's enough to satisfy about 25 percent of our electrical demands.” The other 75 percent is provided by an array of ten Astropower 120-watt PV (photovoltaic) panels, mounted on a Zomeworks passive solar tracking unit, a clever mechanism that uses differences in fluid pressure, from the sunlit side to the shady side, to track the sun on its daily trek across the sky.

It's a system Dan and Kim—a couple who seemed destined for an enduring love affair with renewable energy—are understandably proud of.

As far back as 1970, when photovoltaics were little more than a scientific curiosity to everyone but NASA, Dan was reading about ways to use sunlight to do useful work. “It seemed so obvious, even in the early 80's, when we added a greenhouse porch onto a previous home, and built our first solar food dryer,” the middle school art teacher recalls. “There is such a tremendous amount of free energy just waiting to be used, but few people were doing anything with it.”

In 1987, when they built their current home from custom-milled lodgepole pine logs on a 55-acre tract outside of Vinton, things weren't much different. Wind turbines were cantankerous, untrustworthy beasts, and solar electric systems were beyond the reach of all but the well-heeled. So, as almost everyone did back then, the Isbells hooked into the power grid. “We even wired the house for electric heat,” Dan admits, with an ironic smile and a shake of his head, “though, honestly, we never really used it.”

These days, the electric heating circuits are disconnected; the house is heated exclusively with wood, and the passive-solar elements Dan and Kim built into their home. These include: south-facing windows, operable skylights, an open floor plan, and at least two sources of natural light and ventilation in every room.

Not that the couple has severed its ties with the local electric utility. Instead, they use the power

grid in much the same way remote homeowners use backup generators: as a means to recharge their bank of sealed, “absorbed glass-mat” batteries, when both the sun and wind are uncooperative. The Trace 4024 sine wave inverter used to convert the 24-volt DC coming from the wind turbine and solar array into usable 120-volt AC house current is programmed to automatically charge the batteries from the electric utility, once the batteries reach a preset level of discharge.

It’s nothing that happens very often—for the years of 2002 and 2003 the Isbells used a mere 217 kWh’s of grid power. At \$0.08 per kWh, that’s 72 cents worth of electricity per month.

Still, it begs the question: why bother to install and maintain an expensive wind and PV system when you already have a perfectly functional power pole right next to your house? Dan explains, “In 1998, when the Y2K scare was starting to pick up steam, Kim and I decided it was time. Oh, we’d have done it anyway, sooner or later, but Y2K gave us the impetus we needed.”

That was then. Today, Dan and Kim embrace their new lifestyle with the unrestrained enthusiasm of a couple of kids who have just discovered a path into an enchanted forest. “It feels great to be working with earth’s systems, instead of against them,” Dan says. “The solar was really a big surprise for us here in the upper Midwest. We weren’t sure it would work here, but it does. Just put the panels in the path of the sun, and viola, electricity! It almost seems like a miracle.”

But sunlight has other energy-saving applications beyond energizing electrons on a silicon substrate; as everyone knows, it also produces a

great deal of heat. To take advantage of that fact, the Isbells installed a pair of 3-foot by 5-foot Solahart solar collectors to heat their domestic hot water. No pumps are required; antifreeze moves by thermosyphon from the bottom of the collector through the internal tubing into a heat exchanger that runs through an 80-gallon tank mounted above the collectors. Solar heated water is then drawn from the tank and further heated, if necessary, with an Aquastar on-demand propane-fired water heater. This gives Dan and Kim an endless supply of hot water, most of it heated by sunlight. Rounding out their inventory of energy-saving inventions, the Isbells have a Zomeworks solar cooker, a rechargeable electric lawnmower, and a Honda Civic hybrid car that boasts 50 mpg.

One thing that hasn’t changed for Dan and Kim in the last 17 years is their appreciation of the inherent thriftiness of log homes. Besides being an efficient use of natural resources, log homes are easier to heat and cool than conventional homes. “Even when the mercury plummets below zero,” Dan says, “our centrally-located wood stove easily keeps both levels toasty warm. And in summer it only takes a few hours of operating a small energy-efficient window air conditioner to cool the entire house. The wall logs act like a battery to store heat and moisture, and they really moderate both temperature and humidity in the home.”

Is it really worth the trouble—and the expense—to live such an alternate lifestyle? Kim, who teaches second grade in the Vinton area, thinks so. “We care about the future,” she explains. “We don’t want to use electricity from coal or nuclear power plants. We want to face future generations knowing we did all we could to live with clean, renewable energy sources.”

It’s a simple, sustainable philosophy.