

Wind- and Solar-Powered Generator

by Steven Rundquist

A few years ago, I got fed up with our noisy gas generator and decided to build a generator powered by renewable energy. My Colorado-based timber framing company often works on remote sites, so I wanted

a portable unit that we could easily haul to the site and use to run our tools, and that could later be plugged into the finished structure to provide temporary power for lights and outlets (1). I don't know much about electricity, though, so I enlisted my friend and colleague Mel Wright, of Greeley, Colo., to actually put the pieces together.

The heart of the system is an Outback 3,500-watt 24-volt DC/120-volt AC inverter (outbackpower.com), which is powered by four 220 amp-hour 6-volt absorption glass mat (AGM) batteries. The batteries are wired in series, which increases the voltage of the system to match the inverter. The batteries are charged with a pair of Kyocera 135-watt solar panels (kyocerasolar.com) and a 400-watt Air-X wind turbine (now called the Air 40, available from Primus Windpower) managed by a Morningstar PS-15 charge controller (morningstarcorp.com). Everything is mounted on a small trailer (2).

Power management. My system isn't very big, but it keeps up with the needs of our two-man crew all day long, day in and day out, as long as we manage our power usage carefully. For example, the 3,500-watt inverter produces about 30 amps of continuous AC power (watts ÷ voltage = amps), which is plenty to run the basic power tools we use to cut our frames. But we can't run heavy-duty tools like our chain mortiser and 16-inch circular saw at the same time without excessively draining the batteries or blowing a fuse. While fuses are easy to replace, and sunny Colorado days with a bit of wind recharge the batteries pretty quickly, this setup forces us to get into the good habit of planning ahead.

When we do run low on power, we break out the hand tools — slicks, chisels, layout tools, and the like — while the system recharges. I actually see that as a good excuse to get my hands on the wood again, dive in deep, and remind myself why timber framing is just such a wonderful way to make a living. But if we wanted to expand the system and add more capacity, Mel tells me that the first thing he would do is add more solar panels. The two that we have now produce about 5½ amps per hour each (135 watts ÷ 24 volts = 5.6 amps). In theory, if we were to use about half the total amp hours stored in the batteries,



On the Job | Wind- and Solar-Powered Generator

it would take about 10 hours for the panels to recharge them (though remember that the wind generator also helps charge the batteries). Doubling the number of solar panels would cut our charging time roughly in half. We could also add more



batteries, since the input capacity of our inverter is 300 amps at 24 volts.

As voltage in the batteries drops, power available to the inverter drops too, which makes energy management critical; otherwise, you would have to make the system much bigger to keep everything working at the same pace. As configured, my system would not keep up with a typical framing crew with a compressor, chop saws, and nail guns, but it works wonderfully for my small company.

Cost. I found the wind generator on Craigslist, but all of the parts can be found either at Home Depot or online. Our cost to build it was about \$4,000, with the inverter — a top-of-the-line unit that can provide power for a small house — accounting for probably 50% of the total cost. I'm not sure

what has happened to the price of inverters over the past five or six years, but the price for solar panels has dropped dramatically since we built our system, so a more powerful system could probably be built for about the same cost.

Right now, Mel is reconfiguring the generator. When we built the unit, all of the batteries and hardware went into a single box, which made it too heavy to lift and move around easily (3). Mel is breaking the components down into smaller modules so that one or two guys can maneuver things around more easily. There are less expensive ways to get power, but none feels as good as plugging into the sun and wind.

Steven Rundquist owns Brewster Timber Frame Co. in Bellvue, Colo.