

# What's It Take To Live Off The Grid?

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(originally published in *Log Home Living January 2004*)

For many of us, the idea of living off the power grid conjures up images of Spartan austerity and constant denial of the amenities we all take for granted. Not too many years ago, when renewable energy technology was in its infancy, this was true. But not anymore. Increased demand coupled with reliable, efficient components have made the prospect of living off the grid a viable option for anyone willing to be mindful of their energy usage.

There are many benefits to powering your home with renewable energy sources. For starters, you'll never pay another electric bill, nor will you ever find yourself wringing your hands in a dark, cold home, wondering when the power is going to come back on. Best of all, renewable energy opens up a whole world of possibilities for where you live.

## **The Basic Concept**

The basic concept of using renewable energy sources to produce electricity is simple: a power source—sunlight, wind, and/or flowing water—is harnessed to produce low-voltage direct current

(DC), usually 12, 24, or 48 volts, which is then converted—via a remarkable component called an inverter—into usable 120-volt alternating current (AC). House current, in other words. Excess DC energy produced during times of low demand is stored as chemical energy in a bank of batteries, where it can later be retrieved and likewise pressed into service to power anything from radios and TV's to microwave ovens and voracious shop tools.

The process is all automatic, of course, and does not require any thought on your part. Your only job—aside from a little simple battery maintenance—is to make sure that, over the long haul, you don't use more energy than you produce. It's really quite simple, once you get the hang of it. The key is in sizing your system to fit your lifestyle and, to some degree, adjusting your lifestyle to fit your system. But in order to size a system, you will need to know where your power is coming from.

## **Power Sources**

The bread and butter of most renewable energy systems is the solar (photovoltaic) array. In all likelihood, it will provide most—if not all—of your power. At the very least, you will need to have a home site that allows unimpeded sunlight to fall on the array during the 6 hours straddling high noon. More is always better, and sunny climates will obviously require less array wattage than cloudy ones.

Wind is more elusive, for the simple fact that its strength varies from place to place, hour to hour. Hilltops are always good places to harness wind energy, as are high plains. As a general rule, an average annual wind speed of at least 10mph is needed for wind to be a significant factor in your energy equations.

For those of you fortunate enough to have a steady stream of fast-moving water near your homes, micro-hydro power is the most reliable source, since it's always there night or day, rain or shine. An ideal micro-hydro site requires two elements: sufficient volume (rate of flow), and sufficient drop in altitude from the point of collection to the point of power generation (head), though an excess of one can, to a degree, compensate for a dearth of the other. The formulas are complicated but, as an example, a stream flowing at 100 gallons per minute with a head of 50 feet will provide over 12 kilowatt hours (kWh) per day of power, more than enough for most off-the-grid homes.

## **Home Design Considerations**

Once you've determined that your generating sources can amply fulfill your energy demands, you'll want to make the best use of what you have. That means designing a log home that's comfortable and heat-efficient, with plenty of natural lighting. South-facing windows under wide eaves allow plenty of winter sunshine, while the eaves block the harsh rays of the summer sun. A minimum of windows on the north side will likewise help retain precious heat in winter. A rectangular floor plan, with the long axis running east and west, will permit plenty of solar radiation to penetrate deep into the house during the coldest months.

In-floor hydronic (hot water) heat is the best type of central heating system for an off-the-grid log home. Propane-fired boilers are extremely efficient, and the zone circulating pumps require considerably less electricity than the squirrel-cage fans used in forced-air heating systems. Hydronic heating systems are also naturally suited to work with solar-heated hot water.

And don't discount the heating capacity, as well as the comfort and charm, of a centrally-located wood stove. A good, high-efficiency wood stove can provide nearly all of the non-passive heat a well-designed home needs.

## **RE Components and Cost**

Okay, so you've got a good site with enough sun, wind and/or running water to power your new log

home. You've also designed a home that makes the most of passive solar heat. Now you are probably wondering how much it's going to cost, and what changes you'll have to make to your lifestyle to live independently from the power grid. Unfortunately, there aren't any easy answers to either question. For two people in a modest home willing to conserve, \$15,000 will buy a nice system. This is a little more than we paid for our comfortable solar and wind setup in 1999, when prices were higher than they are today. We use it to power our 1,600 square foot log home—complete with a heated garage and two home offices—with the 6 to 7 kWh's it averages each day.

The cost will vary greatly, depending on your needs. But even with a Cadillac system, you will

still need to use a propane-fired range and clothes dryer, and air conditioning is taboo.

Additionally—unless you've got a great micro hydro site—there will be times when you'll need to use a backup generator, though with a well-designed system those times will be few. Pumping water from a deep well is another sizable power drain, but manageable with a properly designed system and the right pump.

Personally, I think living off the grid is an exhilarating experience. The independence I feel by producing my own power more than offsets any minor inconveniences.

I can't imagine living any other way.