

Steve Maxwell's

# INDEPENDENT ELECTRIC POWER

How to build your own off-grid solar-and-wind electrical system

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# INDEPENDENT ELECTRIC POWER



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# INDEPENDENT ELECTRIC POWER

Except for food and water, energy is the single most important commodity in our civilized world. Electric energy is especially important because so much either runs on electricity or is controlled by it. Trouble is, when you get that electricity from the grid, you're limited and vulnerable. Limited in that you need to build and live within reach of the grid, and vulnerable to power blackouts and subject to electrical costs set by someone else.

Solving the problem of grid dependency is what this course is all about. It delivers a working overview of how to design an independent electrical system and exactly how to make it real at your place. Make no mistake, though. This isn't an easy job, nor is it cheap. Sure, for a few hundred dollars and a few hours time you can build a tiny system that'll deliver a few hundred watts of power for lighting or charging your cell phone, but this is hardly sufficient to support a fully modern lifestyle. No, for this you need a reliable electrical system that provides serious amounts of power, and this demands serious engineering and care. This is what you'll learn to apply here. And while it's true that no course can teach every last little thing about creating an independent power system at your place in your unique situation, you will get all the building blocks of knowledge you'll need to make it happen. Reality itself and the struggles you'll face and overcome will be great teachers too, but by the time you're done this course you'll understand how to:

- design and build an independent solar-and-wind power system to supply all the electricity needed for your house, cottage, workshop and outbuildings. You can make your system as large or small as you want.
- learn from a real-world system that's been energizing an entire modern home perfectly for more than 20 years. You'll be inspired to see it.
- choose the specific components needed to build your own independent power system and learn how to connect them. It's never been a better time to create your own system because there are so many great components available these days.
- find today's best suppliers of the alternative energy hardware you'll need. I'll give you specific links to specific components and suppliers that I know will work well for you.
- make wiring choices and connections that apply especially to independent power systems. This isn't complicated and you'll learn quickly by seeing it done on video.
- explain to friends and neighbours how electrically vulnerable our way of life is, and what they can do to protect themselves now, in both small and large ways. People don't realize how most households are just one long-term power failure away from collapse.
- enjoy the freedom of a grid-free lifestyle while also protecting yourself from the unpredictable costs of utility power.



## HOW TO USE THIS VIDEO ECOURSE

### A Real World Power System

Is it really possible to enjoy a modern lifestyle without being connected to the electrical grid? Yes, it is. Thousands of people have done it, including a couple named Fritz and Anne Kettling. Back in 1997, they built their own off-grid electrical system to provide power for appliances, for controlling their heating

system, for powering electronics, energizing their lighting and running power tools in their modern rural home and workshop. They live on a quiet corner of a quiet island that's 10 miles from the nearest power lines. A grid connection would have cost \$360,000 back then, plus they'd then have to pay for power forever. Naturally, they said "no thanks".

Since the Kettlings were absolutely committed to building their house on a particular piece of lakeshore property, they created an independent power system of their own that's also pretty much completely immune to anything that happens in the wider world. I say "pretty much" because part of their system does include a stationary propane backup generator as a supplemental source of power for charging the bank of batteries if wind and solar generation can't keep up. Their generator is larger than it needs to be for recharging, but it's sized to run the 3-phase industrial machinery Fritz has in his metalworking shop. That's not a typical situation, but having fossil fuel backup isn't a bad idea if you want

100% assurance you'll have plenty of power all the time. That said, a generator is not necessary for off-grid living. The design and information you'll find here are based in part on the Kettling's experience, updated to include modern hardware and details that have become available since they built.

The video tour up next shows what a real-world independent power system looks like in a general sense. It'll give you an idea of what it's like to build one.

## VIDEO LESSON #1



## REAL WORLD INDEPENDENT POWER SYSTEM TOUR

### WIND AND SOLAR – THE PERFECT PARTNERSHIP

Taken on its own, a wind turbine brings a lot of energy freedom and reliability to any independent power system. Add photovoltaic (PV) panels to the system and things get much better. Cloudy weather could very well bring wind. A calm day might be clear and sunny. A wind turbine can gather energy at night, when the sun isn't shining and energy demands are low. Equipment exists to allow both a wind turbine and PV panels to be connected to the same bank of batteries for charging, as you'll see. I strongly recommend you consider using both wind and solar in combination as part of your system. Both these can also be configured to feed power back into the grid if you're connected.



# INDEPENDENT ELECTRIC POWER

Before I get started, I want to explain something important. Let's say you've got a building or home where you can't connect to the grid for electricity or don't want to. Why not just get a really nice generator and be done with it? This is what some people do, so why bother with the complication of solar, wind and batteries? Three reasons: cost, peace-and-quiet and long-term electrical production.

Having a back-up generator is a wonderful thing during power outages that last for hours, days or weeks, but generators aren't great as a sole source of permanent off-grid power. Most generators are loud, they need a surprising amount of maintenance and they won't protect you in a very long-term power outage. That's because gasoline and diesel generators still need the support of the entire petrochemical industry to keep running. What good is your generator when local gas stations have run dry because shipments of fuel have stopped? Even if there is fuel in underground tanks below the pumps, what if your local stations don't have electricity to run their pumps? Then there's

the issue of cost per kilowatt-hour of power. If you figure out all the costs involved in running a generator, you'll find you're paying many times the going rate for grid electricity – sometimes 10x the rate. All this is why a multi-source, independent electrical system that uses a combination of solar and wind is worth building for long-term freedom from the grid.

Even though the Kettlings aren't survivalists in any sense of the word, their system provides an excellent and field-tested pattern to follow when creating an off-grid power system no matter what your goals are. Their independent system can provide up to 10 kW of grid-free electricity and it's done this in all seasons without a breakdown for decades. The same photovoltaic panels, same windmill, same bank of batteries have been working perfectly since 1997. Taking their design as a starting point, and learning from the experience of others, I'll show you the main parts of an independent, grid-free, collapse-proof electrical power system. You don't have to build as big as the Kettlings did, but their work is an excellent place to start learning.

## UNDERSTANDING THE EMP THREAT

The letters "EMP" stand for electromagnetic pulse, and this poses one of the single biggest threats to the modern world. Sounds crazy, but it's true. EMPs are overloads of energy that can fry electronics and the electrical grid. They travel through the air and through power cables and can occur naturally from solar flares, or by people intent on destroying our way of life. EMPs have done major damage before, and terrorists weren't even involved.

Back in 1859, a natural solar flare triggered an EMP event that was so powerful it fried telegraph equipment in use at the time. Dubbed the "Carrington Event" after the astronomer who observed the solar flare happening, National Geographic writer Richard Lovett says that a repeat of the Carrington Event today would devastate our world. Modern electronics, power transmission systems and communications are much more sensitive to EMP destruction than the big wires of the old telegraph systems, wires that actually caught fire because the overload was so great. Experts warn that it could take years for North America to rebuild its electrical system after a massive EMP event. All major replacement power transformers are only made off shore and take years to deliver after an order. Also, our electrical grid requires a source of electricity in order to fire up the system after a complete shut down. How would all this happen if North America was completely without power?

By having your own independent electrical system you'll keep refrigeration, running water, heating controls and communications going without grid power. Will an EMP disaster occur? No one knows for sure, but the situation seems ripe for one. We're vulnerable. If you wait for the need, it's too late to protect yourself.



# INDEPENDENT ELECTRIC POWER

## WHY DO WE HAVE A GRID AT ALL

On November 16, 1896, electric lights switched on in Buffalo, New York for the first time in history. It was one of the first examples of the centralized, grid-based electrical system we have today and it was the outcome of a technological fight. Beginning in the late 1880s, the two giants of invention at the time, Thomas Edison and Nikola Tesla, argued for different philosophies of electrifying the world. Edison favoured a system that used direct current (DC) supplied over short distances by local generating stations located here and there in cities. By contrast, Tesla was a firm believer in alternating current (AC) delivered by centralized generating stations over much larger distances. This AC system is the forerunner of the electrical grid we have today, and it's what the authorities in Buffalo decided to implement along with other jurisdictions working hard to electrify their areas across North America. Although Tesla's centralized AC approach does have distinct advantages over a decentralized DC system, one of the drawbacks is the vulnerability of the large electrical grid. An overload or EMP event in one part of the country can cause a ripple effect that shuts down electrical supply thousands of miles away. Ultimately, the entire electrical system of North America is like one big organism. Kill one part of it and the rest can collapse.

## INDEPENDENT POWER SYSTEM: AN OVERVIEW

Before I lead you into the details, you'll benefit from an overview of the off-grid electrical system concept. All components in the illustration coming up work together to create a reliable source of electrical energy that's the steadiest stream of power you can expect from any alternative energy system (with the possible exception of a micro hydro setup). Print out the INDEPENDENT ELECTRIC POWER overview illustration on the next page then have it in front of you as you watch the video up next.

To make things easier to understand, I've broken the overall design into six parts: batteries; wind turbine; photovoltaic panels; inverter; charge controller and supplemental generator. I'll introduce you to them all now briefly, then I'll go into details later.

## INDEPENDENT POWER SYSTEM PART#1:

### A Bank of Batteries:

Lead-acid batteries are the central storehouse of energy I recommend for any independent power system. You need batteries of some kind to supply a constant source of power at times when the sun isn't shining and the wind isn't



## VIDEO LESSON #2



## INDEPENDENT POWER SYSTEM OVERVIEW

# Purchase the Full Course



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The full course includes **20,000 words, dozens of photos, plans, 15 teaching videos & one-on-one advice from me, course creator and instructor, Steve Maxwell.**

## BY THE TIME YOU'RE FINISHED THIS COURSE YOU'LL KNOW HOW TO:

- determine how much off-grid energy you really need to run your home or vacation property.
- understand why combining wind and solar delivers the best and most reliable performance.
- choose and install photovoltaic solar panels that provide 20+ years of electricity from the sun
  - select and install the right size and type of wind turbine to create electrical power for your situation.
- choose the right kind of storage batteries for your system and understand how to make them last a long time.
- work with a multimeter, strip cables, solder wires and make solder-free electrical connections.

I'm Steve Maxwell, award-winning how-to instructor with regular articles appearing in publications such as Harrowsmith, Canadian Contractor, Mother Earth News, Cottage Life, Homes & Cottages magazine and many others. I've lived on a rural island in Canada and for 30 years I've lived everything I teach in my video courses. There's no big publishing company behind my work, just a little guy (me) and my son (Robert) creating some of the most detailed and well-loved information products about hands-on living in the world.

Download the full version of the **INDEPENDENT ELECTRIC POWER** course right now and get started building your own renewable energy system for your home or vacation property. Examine the material for 90 days and if you're not completely delighted, just ask for a refund. **You'll get it. I promise.**

## FREQUENTLY ASKED QUESTIONS:

**Q:** How many watts will this system produce?

**A:** The wattage output depends on the components you choose for the project. I mention specific brands and models of inverters, charge controllers, batteries, etc in the course, but you can use whatever size you want to get the results you need. My course also leads you through exercises to determine how much power you really need for your situation.

**Q:** Can you build a larger system or do you need to build multiple units if you want more capacity?

**A:** The system you'll learn to build is all one unit, but can be made larger or smaller – whatever you like. The system can also be expanded later if your needs change. That's the nice thing about being the builder of something. It's easy to alter things because you know the system inside-out.

**Q:** How much space does the off-grid power system take up?

**A:** Space required depends on how much battery backup you choose, but a couple of phone booths worth of space would be plenty.

**Q:** How much does this system cost in materials?

**A:** The smallest decent system anyone could build would run around \$1000 with batteries. The sky is the limit for how much you can spend to get a larger size. The typical rule of thumb is \$2 to \$3 per installed watt of output. A 5KW off-grid power system would cost about \$12,000 to 15,000.

**Q:** How long does it take to build?

**A:** Time for construction will vary tremendously based on the person doing the building and the specific design chosen. For an inexperienced person working evenings and weekends in their spare time, it might take a month or so to put together. Professionals install complete off-grid power systems in a couple of days.

Got any more questions? I'm the guy who designed and created this video course, so I'm sure I can help you.  
I'm also only an email away at [steve@stevemaxwell.ca](mailto:steve@stevemaxwell.ca)