

TOOLS

OF THE WIND-ELECTRIC TRADE

by Ian Woofenden

Designing and installing a home-scale wind-electric system takes knowledge, experience, smarts, strength, and courage. Working on these systems should not be taken lightly. At a minimum, get training and experience before you install your own system. If you're planning to go into the business of designing and installing systems, apprentice with an experienced and reputable wind installer first.

system design tools

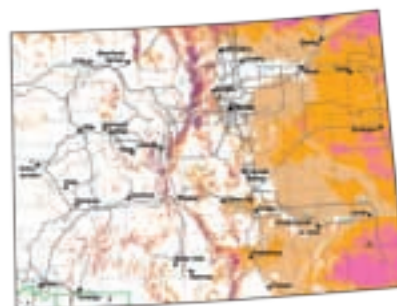


DIGITAL CAMERA

Photos of the site will help you remember details when you're back at your desk, designing your system. Shots from trees or nearby hills can help with siting and tower height decisions.

TREE REFERENCE BOOKS & MEASURING ROD

Knowing mature tree height is crucial to determining tower height at your site. In addition to tree reference books, a calibrated rod can help measure existing tree and building heights.



Courtesy Wind Powering America

WIND RESOURCE MAP, TOPOGRAPHICAL MAPS, AERIAL PHOTOS & GPS

These tools will help you get a sense of the site's topography, potential home and tower sites, and a general idea of the wind resource in the area.



Shawn Schreiner (2)

Siting, installing, and maintaining home-scale wind-electric systems require both specific knowledge and specific tools. Whether you'll be designing and installing one system or dozens, you need the right tools for the job. Basic hand tools, such as wrenches, sockets, and screwdrivers used for any mechanical work, should certainly be in your toolbox. And you will need the tower, turbine, and other equipment manuals to facilitate your installation.

Beyond these things, the gear shown here is the most important equipment for the jobs at hand. If you're only going

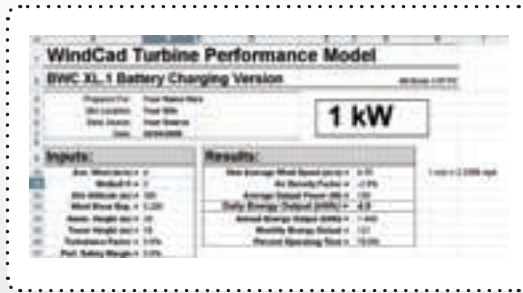
to install one system, you may be better off borrowing or renting some of these tools, or hiring a professional for certain parts of the project.

Some of the tools listed are specialized; others are common. Some will only be used once; others will be useful for maintenance and analysis throughout the life of your wind system. Once you have the mechanical, construction, and safety skills necessary for installing a wind-electric system, having the right tools for the job will make your wind installation job better, faster, and safer.



RECORDING ANEMOMETER

For larger wind projects, datalogging the wind resource at the site is vital to making an accurate projection of energy production. An anemometer allows you to measure average and peak wind speed. It may also measure wind direction, energy density, and wind distribution.



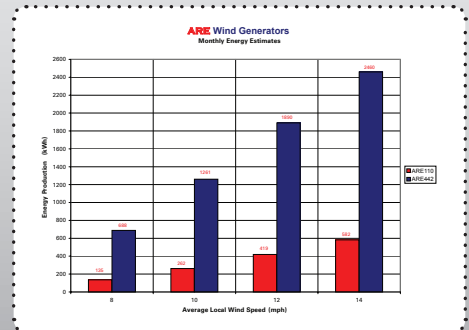
WIND OUTPUT CALCULATOR

A comprehensive wind output calculator, such as WindCad, can estimate wind energy production for a specific turbine based on your site's characteristics. A number of manufacturers have these spreadsheets available on their Web sites.



ENERGY USAGE HISTORY

For on-grid installations, recent utility bills will show your average monthly energy use in kilowatt-hours (KWH), which you can use to size your turbine correctly. For off-grid homes and houses in the design stage, you'll need to do a detailed energy analysis to determine what your energy needs will be.



TURBINE ENERGY-OUTPUT CHARTS

Any turbine manufacturer worth doing business with will provide estimated annual energy figures (in KWH) for their turbines in a variety of average wind speeds.

Clockwise, from top left: Courtesy NRG Systems; Bergey Windpower Co.; Abundant Renewable Energy



tower & turbine assembly tools



TRANSIT OR WATER LEVEL

Either of these tools will allow you to set tower base and anchor points, and the transit can help you make a tower plumb.



SMALL GREASE GUN & NEEDLE TIP

Most modern wind turbines don't require a lot of greasing, but it's important to do it well. This small gun gets grease into the places you need to.



CORDLESS RECIPROCATING SAW

With its ability to cut a variety of materials—metal, wood, and plastics—even in hard-to-reach places, this increasingly common tool often becomes one of the handiest on the job.

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GROUND-ROD DRIVER

Grounding is critical for wind generator towers and renewable electricity systems, and this tool makes the labor-intensive job of getting the 8-foot-long rods in the ground much easier.



HOLE SAWS & STEP BITS

Electrical work almost always involves putting holes in wood, metal, or other materials. These tools cut smooth-edged holes of various sizes with minimal effort.



TAP & DIE SET

Too often, wind system studs and threaded holes are gummed up with crud or galvanization. A tap and die set allows you to clean them with ease.

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tower & turbine assembly tools



200-FOOT TAPE MEASURE

Measuring tower guy radius, tower layout footprint, and obstruction heights are a few of the jobs that this tool can assist with.



Shawn Schreiner (2)

CORDLESS IMPACT DRILL & DRIVERS

Attaching cable clamps and other tower and turbine hardware is a snap with a cordless drill. Having the impact-driver feature helps loosen stubborn fasteners.



CORDLESS ANGLE GRINDER

Cutting guy wires to length is one common use for this tool on a wind installation site, and other cutting and grinding jobs become easier with it on hand.



Shawn Schreiner

SPUD WRENCHES & ALIGNMENT PUNCHES

With guyed lattice and freestanding towers, getting the bolt holes to line up is often a challenge. So having these tools—known to tradespeople as spud wrenches and spuds—is essential while aligning parts.



TORQUE WRENCH

Tower and turbine fasteners often have torque specifications, and this tool lets you accurately tighten nuts and bolts to meet specs.

ELECTRICAL TOOLS

Electrical work requires a mix of specialty electrical tools. Shown here are some of the tools used most frequently for the electrical side of wind-electric installations.



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climbing & rigging gear



RIGGING GEAR

Raising towers, installing wind turbines, and doing tower and turbine work require rigging skills and rigging gear, such as blocks, carabiners, shackles, cable grips, and grip hoists.



CLIMBING HARNESS & CLOTHING:

Trained climbers working on guyed lattice or freestanding towers need to be equipped with steel-shank boots, gripping gloves, a full-body harness, lanyards, and closeable tool bags.



CRANE WITH LIFTING SLINGS

Using a crane to lift a fixed-guyed or freestanding tower, or a turbine onto a tower, is often the safest and most cost-effective option, allowing almost all assembly work to be done on the ground before the lift. Careful project planning is needed to minimize the time spent with this high-dollar rental.



FALL-ARRESTING DEVICE & CABLE

Any climbable tower should have a fall-arresting system, such as a Lad-Saf cam-locking device and its dedicated cable. Gravity is unforgiving! Don't take chances with your life.

Access

Ian Woofenden (ian.woofenden@homepower.com), one of *Home Power's* senior editors, lives with wind energy, teaches workshops on wind energy, consults about wind energy, and gets involved with wind installations on a regular basis. He is looking to better his current tallest tower installation record of 167 feet.

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