

# WINDLETTER

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## **SMALL TURBINE COLUMN: Installing Your Own Wind System**

Interest in home-sized wind systems is only that...until the homeowner signs on the dotted line and seals the deal with a down payment. However, many people balk at installing a wind turbine after getting a quote for a completely installed system from a dealer. This "sticker shock" experience leads many folks to investigate installing the wind system themselves.

Installing a wind system is not rocket science, but it is a complicated, time-consuming, and costly process. The following are the steps for installing a wind system.

1. Thoroughly research the wind system you are interested in and the tower options (freestanding, guyed lattice, and tilt-up) available to you. Since the output of a wind system is directly proportional to the cube of the wind speed, and wind speed increases with height of the tower, don't make the mistake of trying to save money by installing a shorter tower. Remember, a taller tower only costs the incremental difference between its price and the next lowest tower size, plus an extra bit of wire.
2. When securing equipment quotes, find out from other users, both satisfied and disgruntled, how the manufacturer or dealer treated them. Is the manufacturer or dealer available to answer questions? How many questions? What is its customer service reputation? How promptly were repairs made? Are replacement parts available?
3. Occasionally, the tower will come from a company other than the manufacturer of the wind generator. If so, ask both manufacturers about the suitability of the tower for the wind turbine you have in mind. (You do not want to have to pay for tower loading engineering to prove to a local municipality that the tower is adequate for the turbine.) Sometimes, a tower-top adaptor is required to install a specific turbine on a generic tower. This may be available from the tower supplier or the wind generator manufacturer, or it may need to be custom fabricated. In any case, get a price quote for the adaptor or stub tower, including shipping.
4. Don't forget to get price quotes for the freight to deliver the wind generator and tower. Sometimes there are hidden costs associated with shipping, like customs duties (if you are importing a foreign-built machine), crating charges, or handling fees. Do you need a forklift or tractor to unload the equipment? Truck drivers are not paid to do this work, and typically will offer little assistance. Get the delivery date in advance so that you can arrange to have the equipment unloaded. If you need to rent a tractor or forklift, get a price quote.

5. When the tower and wind turbine are delivered, be sure to inventory all parts, including hardware. (You don't want to discover that a particular part is missing while the crane's clock is ticking.) Also, check all parts to be sure they're not damaged. This is a common problem, and it may take a while to file a damage claim with the freight forwarding company and secure the replacement parts from either the tower or wind generator manufacturer.
6. Permits should always be secured before a deposit is placed on a wind system. These include a building permit, possible zoning hearings or zoning changes for the tower, and a contract with your local utility if the system is to be intertied to the grid. Also check to see if the system will need to have an electrical inspection before commissioning, or a utility inspection. Get firm quotes on all permits and inspections.
7. The tower foundation and its preparation are crucial to its lifetime. Check your soil type for suitability of the various foundations suggested for the tower. Verify how deep the bedrock is, and if it turns out to be shallow, evaluate your options carefully. Get price quotes for a backhoe to excavate the foundation hole, and equipment to backfill the hole after the concrete has cured.
8. Obtain a copy of the foundation blueprint (or at least drawings) for your tower, soil type, and bedrock. Once you have this, you can get a quote from a local contractor to pour the concrete. Be sure that the quote includes rebar and forming materials. If you decide to pour the concrete yourself, be very careful when setting up the forms, placing the rebar, and the actual pouring. Once the concrete has cured, the only recourse to a job done wrong is to tear it out and do it over -- an expensive and time-consuming endeavor.
9. The building or zoning department in your municipality may require you to submit tower and foundation engineering drawings or blueprints. This information is considered very proprietary by manufacturers, but it is available for a cost. If you encounter soil or bedrock problems, you may need the foundation to be engineered specifically for your site and tower. This could be a significant expense.

**Steps 1-9 could easily eat up a week's worth of time.**

10. Measure the length of the wire running from the tower base to the location of the wind system controller, including the height of the tower. Once you have this number, you can determine the gauge and type of wire to order for the system. Check with local electrical codes to see if the wiring must be installed in underground conduit. If your soil is rocky, this is a good idea anyway.
11. Determine all the other electrical components that will be needed to "wire" the wind system (things like a disconnect or junction box at the base of the tower, circuit breakers and boxes, maybe a kilowatt-hour meter, and the myriad of electrical odds and ends required to get your homemade electrons from the wind generator to the utility or your batteries). Don't forget grounding rods and lightning arrestors.

12. While you're on electrical wiring, remember that the wire is usually buried below grade. Get a price on renting a portable trencher. These are readily available at equipment rental companies.

**If everything goes right, wiring installation could take as little as three days.**

13. It is best to use a tractor loader to raise and hold the tower legs in place during tower assembly. If the wind generator is larger than a few kilowatts in capacity, the same equipment will be required if the turbine is bolted to the tower before raising it. (This is not the usual procedure.) If you do not have access to a tractor loader, get a rental quote. Don't forget to include a trailer to haul the loader (or delivery and pickup costs).

A good crew can assemble a tower in about a day. Add another half day to install the tower wiring. This job is always easier while the tower is horizontal (on the ground) rather than vertical.

14. If the tower is anything other than a tilt-up, you'll likely be hiring a crane to raise it and set it in place. Once the tower is up, fastened to the foundation, and plumbed, you'll need to raise and set the wind generator on top of the tower. A good crew can accomplish these tasks in two to three hours, depending on the tower type. Assume twice this time if you are a novice. Crane services are billed from "port to port," meaning from the time they leave their garage until the time they return. This includes setup time at your site. Get a quote for these services, assuming a full day's work. Always ask if there is a minimum charge.

Make sure that the crane you hire is tall enough, and has enough weight, to lift your tower and wind generator and set them in place. Also be sure that your site is accessible to a 25-40 ton crane. For example, if the crane gets stuck in wet ground, the clock is still ticking on your bill. If a bulldozer is needed to get the crane unstuck, that's on your bill as well.

15. Finally, allow about a day or two to finish up all the details and do the final wiring connections. Commission the system only after you have a contract from the utility in hand.

So, do you still want to be your own wind generator installation contractor? Considering all the steps and expenses for labor and materials, that quote from your local installing dealer might not look so bad!

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