Grid tie wind turbine inverter

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There has been a lot of discussion about using grid tie inverters (GTIs) with wind turbines to connect to the grid. Here we go trying to do our best to answer some basic questions about GTIs, their use with wind turbines, and to summarize trends we see emerging. Most of the information here is accumulated from the many discussions we have with the amazing members who frequent our Community Forums!

Inverters take direct current (DC) power and change it into alternating current (AC) power. For most small-scale do-it-yourself power generation (like what folks are doing with WindyNation"s products), the power coming out of your wind turbine or solar array is DC power.

When you charge a battery bank, your batteries are ready to put out DC power. In order to use this power with normal household appliances and lights, you need an inverter to invert the current to produce AC power. This is true unless you have wired your house to use all DC appliances and light bulbs or if you"re powering DC appliances (which are found on some RVs or sailboats, for example).

In summary, the need for an inverter with most small-scale household systems holds whether you are using a battery bank or connecting directly to the grid because, at the end of the day, what you need is AC power.

Like any inverter, grid tie inverters change DC power into AC power. The grid-tie component of a GTI allows transfer energy from a renewable source into the grid. Being connected to the grid has the obvious benefit for small-scale renewable energy producers of balancing out your load (e.g. you don"t need to produce all of your power all of the time).

With a grid tie inverter, you can either tie directly to the grid (without batteries) or elect to charge a battery bank and be connected to the grid. Though more expensive due to the cost of batteries and a grid tie inverter, the advantage of charging a battery bank is having energy in the event of a power outage. With or without batteries, tying to the grid makes it possible to reduce your utility bill by generating some of your own power. In some states and provinces, you may even be paid for the surplus power you send to the grid as you watch the meter run backwards.

First, in order to use a GTI, the grid needs to be accessible (i.e. close), so this type of inverter is not appropriate for those of you who live beyond the grid, as you would then be faced with trenching lines to the nearest part of the grid which could cost thousands of dollars (or more!), depending on the distance to the grid and on rates charged by the utility company nearest you.

Second, at present many people connecting their wind turbines to the grid are using GTIs that have not been approved by the Underwriters Laboratories (UL). The primary reason that many small-scale wind energy folks are using GTIs that are not UL-approved is that, at the moment, most UL-approved wind turbine GTIs are set

to cut-in at relatively high voltages (>30 volts) and consequently, are not very compatible with most small-scale (<1000 Watts) wind turbines. As a result, UL-listed GTIs are pricey, and blow a big hole in a small-scale wind or solar project budget.

This article, however, is focused on grid tie inverters. The main advantage to coupling batteries with a connection to the grid through a GTI is having electricity in the event of a power outage. As with other grid connections, you can also reduce your utility bill by generating some of your own power.

There are also some drawbacks to batteries. They eventually wear out (lifetime is related to usage patterns and storage), they contain a variety of toxic chemicals, and charging and discharging batteries reduces the overall efficiency of the system. You also have to carefully consider which type of battery is appropriate for your system.

When you are tied into the grid, your meter runs backwards whenever you are producing a surplus of energy. This is called net-metering, which is summing the kiloWatt-hours (kWh) you are drawing from the grid and subtracting the kWh you are giving back to the grid.

This reduces your utility bill because whenever you are producing your own electricity, you are saving the amount you would otherwise be spending on that power from your utility company. The downfall of this option as compared to batteries is that you don"t have storage capacity. The advantage is that you don"t have any batteries to worry about.

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