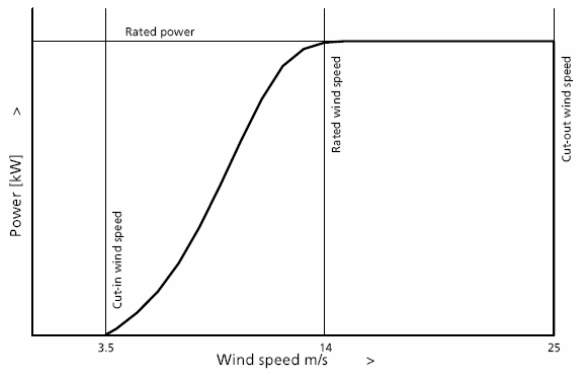
MCCR Windpower FAQ #9:

On windy days, why are some of the turbines not turning?

This question is asked often by people who have driven across the Buffalo Ridge on a very windy day. They expect to see all of the turbines cranking mightily, but instead they often see as many as three-quarters or more of them stationary. The same thing, to differing degrees, happens in other wind farms. How can that be?

There can be several reasons. First, sometimes there will be turbines shut down for maintenance purposes. Wind turbines have gearboxes and other mechanical parts that require oil changes and other scheduled maintenance, just as your car does, so sometimes the reason a turbine isn't turning is that somebody is in or on the nacelle doing some work.

Another reason can be seen from a typical wind turbine power curve. An example is shown below (this comes from Wind Energy Fact Sheet #14 published by the UK's Department of Trade and Industry).



Source: http://www.dti.gov.uk/energy/renewables/publications/pdfs/windfs14.pdf

This graph shows wind turbine power output (on the vertical axis) versus the wind speed (horizontal axis). At about 4 meters per second or 9 mph (this graph shows 3.5 m/sec), there isn't enough energy in the wind, so (not surprisingly) at low wind speeds the turbines don't turn. That speed below which the turbine output is zero is called the "cut-in wind speed". However, note that there's also a "cut-out" wind speed, somewhere around 25 m/sec (56 mph). If the wind speed is higher than this, mechanical forces on the turbine can become large enough to cause damage, and the turbine shuts down to protect itself. In other words, the turbines won't turn if there's not enough wind, but they will also stop turning if there is too much wind. Also, note that the wind speed increases with increasing height above the ground. It's entirely possible to have ground-level winds of 25 mph or so, but to have wind speeds above the cut-out speed at the turbine hub height, which may be over 260 feet. Thus, it can be deceiving to try to judge whether or not a turbine "should" be in cut-out mode based on the wind you feel on the ground.

There's one other reason that wind turbines can be shut down on a windy day, and this has emerged as an issue on some sites: an electrical problem may arise on the local power grid that leads to turbine shutdown or breaker tripping. The problem may be caused by many factors, including insufficient quality of the turbine output power, insufficient capacity on the power grid, or transient conditions existing elsewhere on the power system that require system operator intervention, among others. Isolating and solving these difficulties is the subject of quite a bit of ongoing work, but in most cases the issues can be resolved through engineering studies to determine what additional equipment or adjustments are needed.

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