

So What's a Watt?

It seems as though every time an industrial wind project is announced it is accompanied by the obligatory exaggerated pronouncement about how many homes the project will supply with clean, green electricity. To challenge these hucksters it's useful to know the terminology behind their phony claims.

A watt is a measure of electrical energy produced or consumed. Using the analogy of water, *watts* is the amount of water that comes out of a hose in a given time. *Volts* is the pressure pushing the water, and *amperes* (amps) is the size of the hose. A 75-watt light bulb consumes 75 watts of electricity in one hour. Leave that light on for 10 hours and it has consumed 750 watts, or more accurately, 750 watt-hours. Leave it on for 20 hours, and it has consumed 1,500 watt-hours or 1.5 kilowatt-hours, usually written as 1.5 kWh.

Leave that 75 watt light bulb burning for 20,000 hours (2.28 years) and it will have consumed 1.5 megawatt-hours, written as 1.5MWh. According to the Energy Information Administration, in 2001 the average household used 887.75 kWh per month. In a year's time, that would be 10,653 kWh or 10.653 MWh.

When the three Pendleton County Commissioners staged their Liberty Gap infomercial back in Feb. 2006 - complete with a contingent of police ready to handle unruly citizens denied any opportunity to ask follow-up questions - Tom Matthews boasted that Liberty Gap's turbines would power 40,000 homes. At that time, Liberty Gap's plans were to erect 50 1.5 MW turbines on Jack Mountain.

A 1.5 MW turbine produces that much energy only when the wind is blowing between 36 and 56 mph. Above 56 mph it feathers the rotor blades and shuts off to avoid shaking itself into oblivion. Below 36 mph, it produces less energy. The drop-off is dramatic. Because the power of the wind is cubic (the wind speed times the square footage of the area swept by the rotor blades), the relationship between energy and wind speed is not linear but curved. Wind blowing at 18 mph does not produce half the energy of wind blowing at 36 mph. Instead it produces only one-eighth the energy. Drop the wind speed to 9 mph and the energy output is one-sixteenth the energy or 0.09375 MW, or 93.75 kW, barely enough to keep 77 average homes powered $\{.09357 \times 24 \times 365 / 10.653\}$. For the 50 turbines at Liberty Gap a 9 mph wind would power 3,855 average homes - a far piece from the 40,000 homes Tom Matthews boasted about.

As shown above, because wind varies from moment to moment, there is no reliable amount of energy that can be counted upon to come from wind turbines. Wind promoters ignore that fact and like to brag about the average output of their turbines, falsely equating it with dependable energy. The 1.5 MW turbines in Tucker County at FPL Energy's Mountaineer plant, average about 27% of nameplate capacity; thus, the average output of a 1.5 MW turbine is 0.405 MW. In 24 hours that amounts to 9.72 MWh, and in 365 days adds up to 3,547.8 MWh.

As stated earlier, EIA data revealed that in 2001 an average house used 10.653 MWh in 365 days. Divide 3,547.8 MWh (the average annual output of a typical 1.5 MW turbine) by 10.653 MWh and you get 333 houses. Tom Matthews said there would be 50 turbines on Jack Mountain, which yields 16,650 houses. Theoretically, that is the highest number Tom Matthews could mathematically claim as Liberty Gap's capacity to power.

However, that leads to back to the problem that wind developers don't dare mention in their slick promotional materials. Average output is not at all the same as steady output. Constantly fluctuating wind energy cannot reliably power anything on its own. It needs the accompaniment of conventional power sources to integrate wind's variable output into the grid. The truth is that wind power alone cannot possibly provide reliable power to meet the needs of any modern, electrically dependent household.

One conclusion to draw from this might be to skip the next infomercial the county commissioners decide to sponsor. Don't go to meetings where you can't ask questions. Instead, use the letters to the editor pages to point out the phony claims of the wind guys.