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SMALL TURBINE COLUMN:

Home-sized Wind Turbines and “Strobing”

--Mick Sagrillo, Sagrillo Power & Light

Several anti-wind Web sites have created quite a ruckus with allegations that wind farm turbines cause shadows to be cast on people’s homes. They allege that this “strobing effect” is disruptive to activities in nearby houses to the point that it might even possibly trigger epileptic seizures. Subsequently, this issue has come up at several zoning hearings around the country as a concern about a similar effect from home-sized wind systems.

“Strobing” can have several definitions, depending on who is using the term. The most common understanding is that the wind turbine blades pass between the sun and the observer, which could cause an on-again, off-again shadow to be cast by the blades. This phenomenon is more accurately called “shadow flicker.”

I’ve lived with several wind turbines that have supplied electricity to our house for the past two-plus decades. I also live within three miles of 31 Vestas V-47 wind turbines with 75-foot blades, which turn at 28 rotations per minute (rpm). When the issue of shadow flicker near some homes adjoining the wind farms arose in our township, I was quite perplexed, as I had never experienced the situation with my own turbines, one of which is only 37 feet from some of our house windows. Investigating further at the wind farms, I understood what was happening.

Utility-scale wind turbines can cause a shadow flicker periodically, if a number of circumstances occur simultaneously. The sun must be very low in the sky, either rising or setting, and at the proper declination relative to a residence. Obviously, these circumstances only last for minutes on any given sunny day, and recur only a few days per year for any given location.

While the large turbines’ shadow flicker effect is nothing like a “strobe,” it is virtually unknown with home-sized wind generators. Comparing the massive size of the wind farm turbines versus home-sized wind systems can help illustrate why residential-scale turbines create no shadow flicker problems for residents or their neighbors.

- Wind farm-sized turbines are mounted on towers as tall as 200 feet or higher. Home-sized turbines are usually mounted on 80- to 120-foot towers, about 30 to 40 feet above the local tree line.
- The blades of a wind-farm scale turbine range from 75 to 100 feet and beyond. Home-sized turbines have blades ranging from four to 31 feet.
- The blades of wind farm turbines can exceed ten feet across near the butt ends. This blade size could indeed cause a shadow should the blade pass between an observer and the sun. Home-sized turbines have considerably thinner blades, ranging from a few inches to just over a foot wide.

- The blades of wind farm equipment turns at a slow 28 rpm for smaller utility-scale turbines to under 16 rpm for the largest machines that are currently being installed. Home-sized turbines operate at 350 to over 1,500 rpm. While you can see the individual blades of a wind farm turbine spin, even at full output, you'd be hard pressed to do the same with home-sized technology due to their higher operating rpm.

When I polled manufacturers of residential wind systems concerning complaints due to shadow flicker by neighbors, I came up empty-handed. The shorter tower size and blade length, much narrower blade profile, and high rpm all combined to result in the rotor possibly casting a shadow, but not a shadow flicker as can occasionally be seen with utility-scale equipment under the right circumstances.

Mike Bergey of Bergey Windpower mentioned that he has four wind turbines within 150 feet of his office window. They will occasionally cast a shadow at varying times during the year, for a few minutes on any given day, as the sun changes position in the sky relative to the wind generators. Mike likened the effect to the sun passing through the nearby trees on a windy day.

Mike stated that Bergey Windpower has never received a complaint about strobing in their 23 years in business from customers or neighbors at any of their 3,000-plus installations. Andy Kruse of Southwest Windpower spoke for many in the small turbine industry when he said he had never even heard of the problem before. Andy concluded that—with the tens of thousands of turbines installed in the field—they surely would have heard about strobing if it were indeed an issue with home-sized wind equipment.

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[Editor's Note: The opinions expressed in this column belong solely to the author.]