

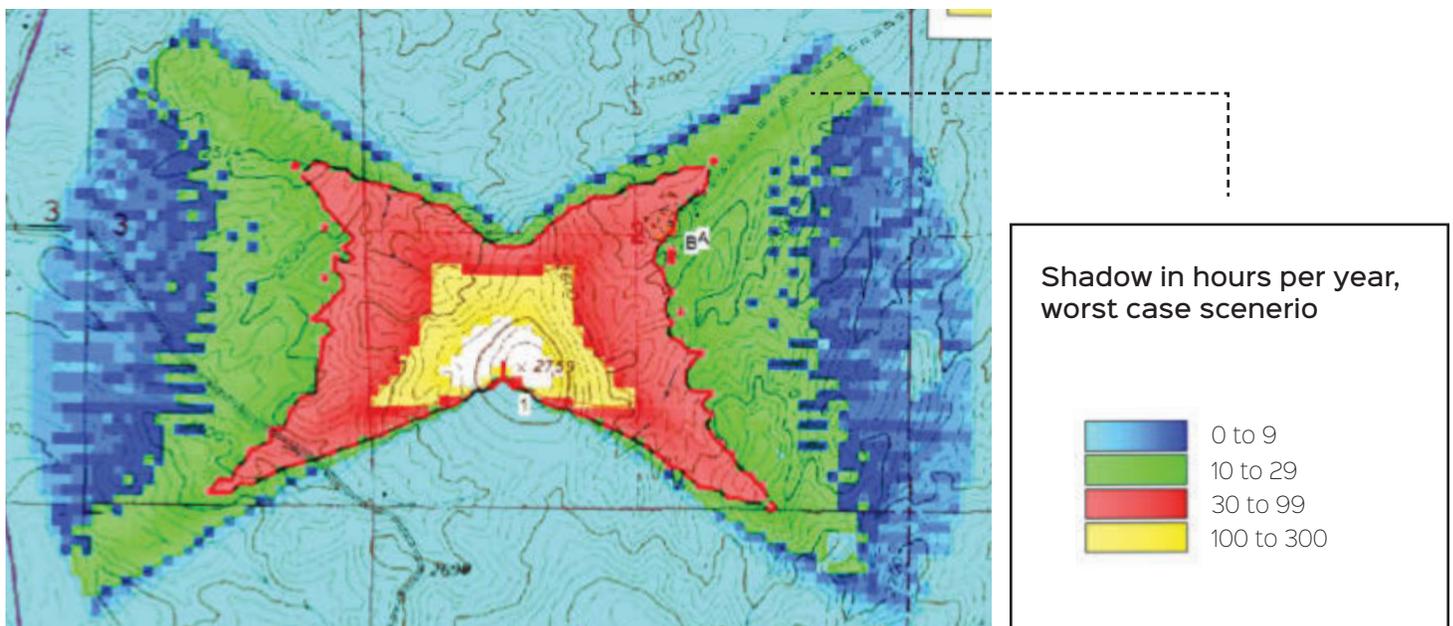
FACT SHEET: WIND ENERGY AND SHADOW FLICKER

Every day, rural communities benefit from wind energy. Wind development provides new income for land-owners, new tax revenue to fund schools and services, and creates local career and job opportunities. County officials are responsible for enacting siting or zoning standards that help ensure wind development is supported by local residents. Many seek to address the incidence of shadow flicker.

What is shadow flicker?

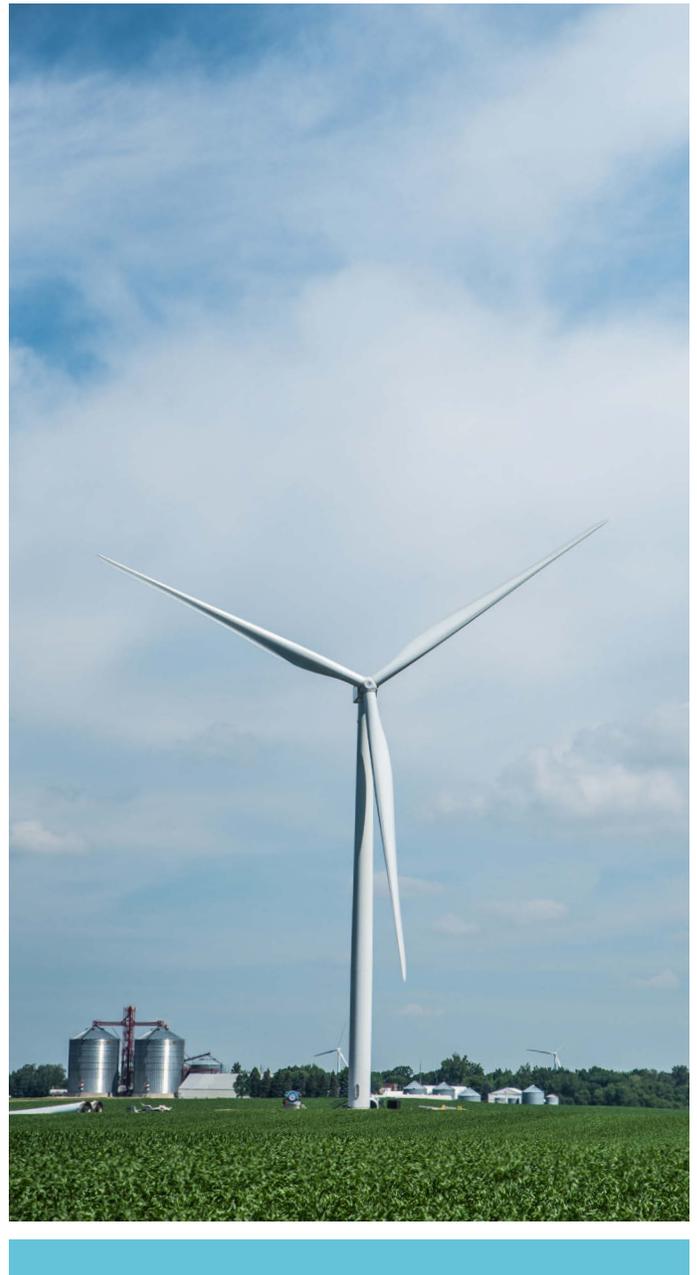
- Shadow flicker is the effect of turbines casting shadows that flicker due to the turning of the blades.
- As shadow flicker is dependent upon several factors—time of day, seasonal consideration, light source, turning of turbine blades, etc.—the effect typically occurs over a short window, and exposure is often measured in annual hours.
- Particular concerns about shadow flicker relate to shadows cast across nearby homes, and the flickering or strobe effect that may be experienced by occupants.
- While shadow flicker may be perceived as an annoyance, it is unlikely to contribute to or trigger health conditions like photosensitive epilepsy.
- Flashing lights that typically contribute to epileptic seizures fall in the 5 to 30 Hertz range, while most modern turbines would cause a shadow flicker in the range of 0.6 to 1 Hertz.¹
- Developers are able to calculate and map areas affected by shadow flicker from turbines prior to construction, creating the opportunity to reduce or avoid shadow flicker during the planning phase. See Figure 1.²

FIGURE 1. SHADOW FLICKER MAP



Recommendations

- County officials may choose to require data on the number of properties impacted by shadow flicker from turbines, as well as the total annual hours that shadow flicker will likely occur.
- While annual limits on hours of shadow flicker are found in wind energy ordinances, it is important that planning and zoning officials consider the impact limits may have on the ability of wind energy facilities to operate without curtailment.
 - For example, a county may implement a limit of 30 hours annually for a wind turbine, requiring developers to demonstrate the amount of shadow cast on homes from a turbine will not exceed that limit in a given year.
 - Additionally, officials may set similar limits for shadow flicker on other areas such as roads or recreation areas.
- Developers should use early public engagement as an opportunity to identify homes, businesses, and other properties that may fall within the area around a turbine where shadow flicker can occur. These locations and the configurations of these properties will assist developers in forming mitigation measures or reducing shadow flicker.
 - Mitigation may include siting a turbine in such a way so that shadows are blocked by existing vegetation or the placement of new vegetation. During certain times of year, it may be necessary for projects to be curtailed—a forced stop for the wind energy system—during times of day to reduce the annual total shadow flicker from systems.



Sources

- 1 Priestly, Thomas. “An Introduction to Shadow Flicker and its Analysis.” CH2M Hill, Feb. 10, 2011. windharvest.com/wp-content/uploads/2017/03/Shadow-Flicker.pdf. Accessed June 2019.
- 2 Ibid.
- 3 Rynne, Suzanne, et al. “Planning for Wind Energy.” American Planning Association, 2011, planning-org-uploaded-media.s3.amazonaws.com/publication/online/PAS-Report-566.pdf. Accessed June 2019.

