

Shadow Flicker Analysis Summary

Sapphire Sky Wind Project
McLean County, Illinois

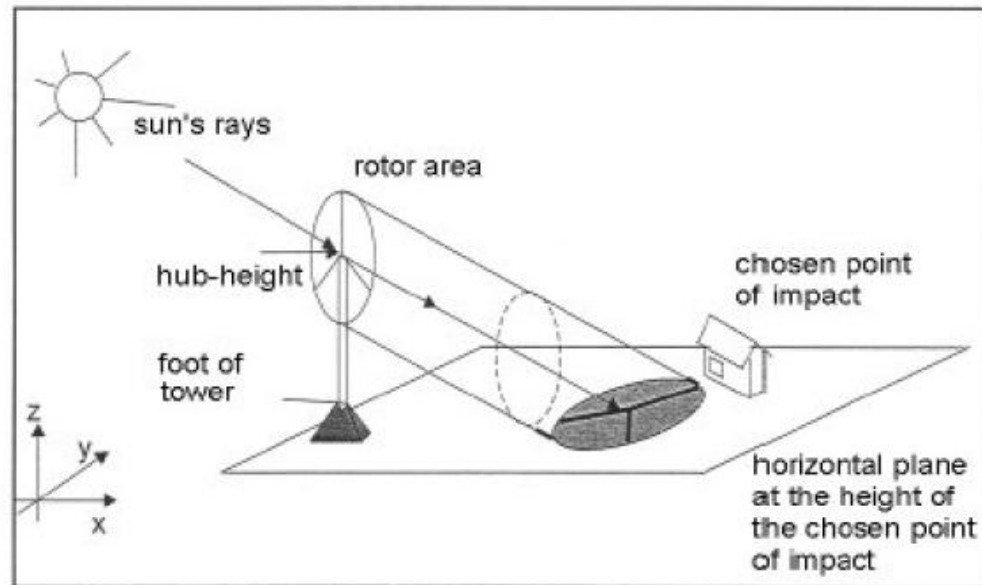
June 1, 2021

Personal Qualifications

JoAnne Blank

- Master of Science Atmospheric and Oceanic Sciences
- Master of Science Environmental Monitoring
- 21 years experience in environmental consulting industry
- 15 years experience in wind power industry
- Wind experience includes shadow flicker studies, feasibility analyses, facility siting, environmental permitting, sound studies, decommissioning plans, post- construction compliance and more

Shadow flicker describes the effect caused by shadows cast by the rotating blades of an operating wind turbine.



Occurs only in direct line between
sun – blades – object

Shadow Flicker

- Only occurs during the daytime when skies are not cloudy or overcast
- Turbines must be operational and blades turning
- Amount depends on alignment of blades to sun and receptor
- Diminishes with distance between turbine and receptor

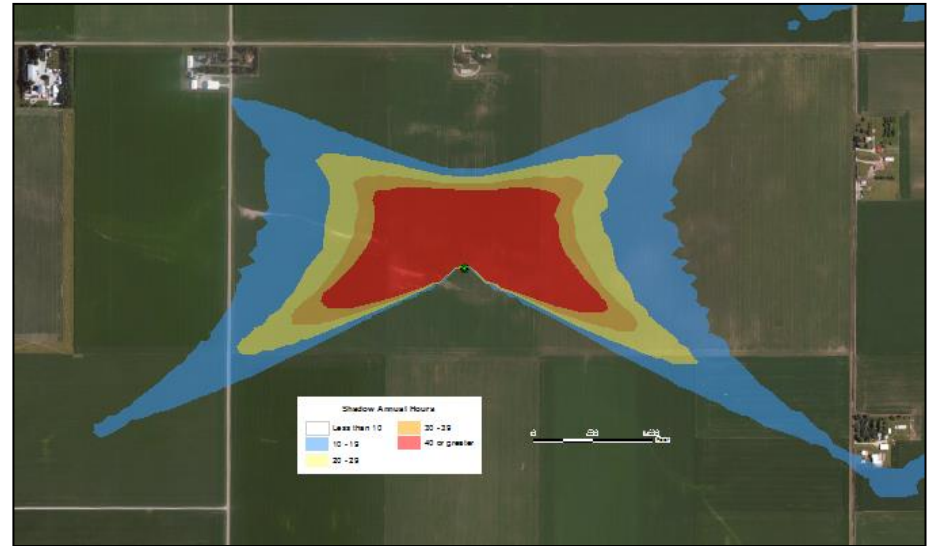


Shadow Flicker

- Diminished by vegetation and buildings between turbine and receptor (near)
- Changes as sun progresses during day (limited time on receptor)
- Most noticeable in early morning and late day (sun low in sky)
- Changes with seasons as sun position and angle changes

Analysis Methods

- Models were performed in WindPRO, software that progresses through year in one-minute increments
- Calculated hours of expected shadow per year (takes wind speed, direction and hours of sunshine into consideration)
- Calculated maximum shadow hours per day
- Considered residences, parks, churches, schools
- No vegetation or blocking effects were included



Results of Study

- **89 turbines were assessed within the model; however, only 64 will be constructed**
- Approximately 326 non-participating residences included in study
- Results of study indicate that:
 - No residences are expected to receive greater than 30 hours of shadow per year
 - 15 residences – 20 to 30 hours per year
 - 30 residences – 10 to 20 hours per year
 - 281 residences – 0 to 10 hours per year