

FACT SHEET:

ICING AND WIND ENERGY SYSTEMS

Every day, rural communities benefit from wind energy. Wind development provides new income for landowners, 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 issue of **icing**.



Icing on wind energy systems

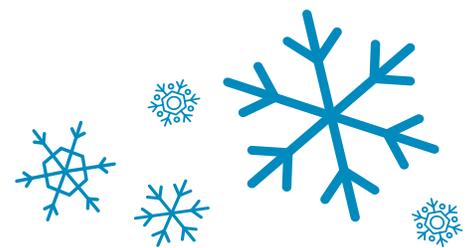
- › Like most structures, the accumulation of ice on wind turbines occurs due to localized temperature and other weather conditions, such as humidity and precipitation.
- › While accumulation itself may not pose a particular threat to a wind system or the surrounding area, the shedding of ice can be hazardous to the area directly underneath a system or to nearby locations due to ice throw.¹
 - › Ice throw is a term applied to the shedding of ice from a turbine blade while a turbine is in operation, with the motion of the blades potentially propelling ice over a greater distance.
 - › The distance that ice can travel when thrown varies, depending on factors such as blade speed, weight and size of the ice, the position of the blade when the ice is dislodged, etc.
- › When ice formation is detected—either by personnel or automated systems—wind farm operators may shut down turbines until the ice has been shed.





Recommendations

- › If ice accumulation is likely in a project area, local officials may request developers to provide data on potential ice throw from the wind energy systems that will be used, as well as maps for the affected area around each turbine.
 - › Officials should also request information about the procedures that a wind farm operator will use during periods of icing and methods that will be used to detect ice formation on systems.
- › While the overall risk of ice throw may be small due to the amount of variables that affect the formation and shedding of ice, officials should consider the possibility when determining appropriate setback distances for wind energy systems.
 - › One study suggests that a buffer zone of 1.5 (hub height + rotor diameter) may be sufficient to reduce risk to the nearby area in locations with a high probability for ice formation.²
 - › Officials may also require signage placed near this buffer zone to alert people to the risk of ice throw under certain weather conditions.
- › Wind farm operators can employ passive or active measures that reduce the potential for icing or address the accumulation of ice. Officials should consider the overall effectiveness of these measures as well as the associated costs before requiring their use.
 - › An example of a passive mitigation measure is the application of a hydrophobic coating to the surface of a wind turbine which can limit icing. Although this may be a low-cost option for addressing ice build up, wind farm operators will likely have to reapply this coating to maintain its effectiveness.
 - › Heating systems integrated into a turbine are an active measure for preventing ice formation. The effectiveness of these systems depends upon the ability of personnel to identify icing conditions and activate the systems to address icing.³



Sources

- 1 Wahl, David, and Philippe Giguere. "Ice Shedding and Ice Throw - Risk and Mitigation." GE Energy, 2006, ge.com/content/dam/gepower-pgdp/global/en_US/documents/technical/ger/ger-4262-ice-shedding-ice-throw-risk-mitigation.pdf. Accessed July 2019.
- 2 Tammelin, B., et al. "Wind energy production in cold climate (WECO)." Finnish Meteorological Institute, 2000, orbit.dtu.dk/files/167477321/26134.pdf. Accessed July 2019.
- 3 Froese, Michelle. "Cracking the icing problem on turbine blades." Windpower Engineering and Development, March 28, 2017, windpowerengineering.com/business-news-projects/cracking-icing-problem-turbine-blades/. Accessed July 2019.

