WIND ON THE WIRES: **Responses to Questions posted to Michigan Energy Forum Website**

37. How are renewable energy sources and distributed generation impacting grid operation and reliability?

Wind energy has had little impact on the reliability of MISO's transmission system. Over the past few years MISO has required wind facility owners to provide day-ahead forecasts on their output and have implemented Dispatchable Intermittent Resources ("DIR") to improve MISO's remote control over wind facilities. DIR allows MISO to remotely reduce the overall output of a wind facility, instead of simply shutting the wind facility down, to avoid or minimize system congestion. This minimizes the amount of wind facility curtailments. In addition to DIR, MISO requires wind facility owners to submit day-ahead wind forecasts. The wind forecasts allow MISO to better manage variability. As experience in wind forecasting grows, the forecasting has improved and is expected to continue to improve.

In addition, the variability of wind output has been mitigated by the geographic diversity of wind facilities across the MISO footprint – from Michigan and Indiana to Iowa and Montana.

MISO estimates that wind contributes to approximately 13.3% of MISO capacity value during peak load.

Wind has had a small impact on regulation reserves. Contingency reserves have never been deployed due to a drop in wind output.

Sean Brady, Wind on the Wires