



GRID INTEGRATION

Wind Energy & Reliability

How windpower keeps the lights on despite variable winds

What happens when the wind isn't blowing? It's a common question as windpower expands in the Midwest. Wind is a growing part of our electric portfolio, and now represents over 25% of electricity used in Iowa and South Dakota. Thankfully, utilities and grid operators can effectively integrate large amounts of wind into our power mix. An understanding of how the power grid operates can provide more insight.

Five Key Facts About Reliability

Our electric grid is like one big machine. Power is the only product that is simultaneously produced and consumed, and utilities operate integrated power grids covering millions of people in multiple states.

Consumer demand fluctuates constantly, but it's predictable. Grid operators know how to ensure generation will be available when needed. They already adapt to changes across huge regions by ramping power plants up and down to match demand. This ensures the grid has enough juice to meet our needs 24/7/365.

Wind energy is variable but predictable, and utilities can integrate it using existing strategies and technologies. Changes in wind output happen gradually and predictably, and wind farms can forecast their output to deliver power to the grid as needed.

Fossil fuel plants are unreliable too. Technical problems, fuel shortages and safety concerns can cause abrupt failures and outages at any power plant. These are much harder for utilities to manage than any wind farm's gradual, predictable variability.

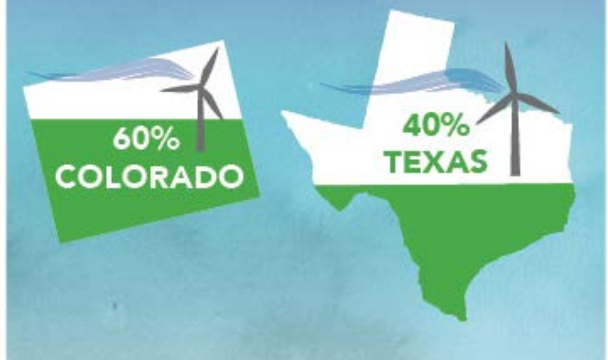
More turbines = less variability. The wind is always blowing somewhere. Even if one area with a wind farm is not very windy one day, another area will be, and their changes in output can cancel each other out. That's why a large, robust grid is essential.

Let's work together to create a more reliable, balanced electric portfolio with wind energy!

The more wind energy we add, the more reliable it becomes. If one area is not windy, it's likely that other areas are!



Think it can't be done? It already has! At times, wind has supplied more than 60% of the electricity for the grid in Colorado, and nearly 40% in Texas!



Information and graphics courtesy of the American Wind Energy Association. www.awea.org

What's Next: How Can We Bring More Wind to Market?

It's about transmission, not batteries. Large, regional power pools and a more interconnected grid that connects supply to demand will help integrate more variable generation. Storage provides useful services, but is far more expensive than existing solutions like transmission and market-based reforms.

How much wind can we reliably integrate? Ten years ago, utilities questioned whether they could integrate 5% wind. Today, they have much more experience, and wind provides on average, over 12% of electricity in 9 states. Wind has even provided utilities in Colorado with 60% of their power at times, and nearly 40% of Texas' massive power needs at other times.

Wind energy is an American success story thanks to brilliant engineers and smart, forward-thinking policymakers. Let's work together to bring more windpower to the Midwest!



U.S. Wind Energy Share of Electricity Generation, by State

