

Predicting Fickle Electricity Markets

Identifying and explaining patterns in volatile electricity prices could help small-scale wind and solar producers to integrate with the power grid.

By **Rachel Berkowitz**

Despite incredible developments in wind and solar energy in recent decades, the large temporal variability of these energy sources is a major challenge for the operation of energy systems. Coordination of power generation is mainly achieved by short-term trading on electricity markets, but as renewable energy begins to play a bigger role, it results in increasingly volatile electricity prices. It therefore becomes more important to understand how markets respond to external causes. Providing a detailed analysis of the prices in the European electricity market, Chengyuan Han, at Jülich Research Centre and University of Cologne in Germany, and his colleagues quantify the fluctuations, averages, and extremes in electricity prices on various timescales [1]. The researchers provide physical explanations for some pricing trends.

The team analyzed price data from short-term day-ahead and same-day markets on the European Power Exchange from 2015 to 2019. They found that on the shortest timescales, positive or negative price fluctuations tend to be followed by similarly

sized changes in the same direction. But on longer timescales, price increases tend to follow decreases (and vice versa), averaging out the fluctuations. To understand why, the researchers examined the strength and direction of weather patterns over central Europe. They found that large-scale circulation weather conditions, which persist for approximately four days, have a pronounced footprint on both the averages and fluctuations of electricity prices: weather patterns associated with strong winds come with low mean prices and high standard deviations; weather patterns with calm winds, the reverse. Extreme price events occur if these strong jumps and strong weather conditions coincide.

By explaining this weather-price relationship for short-term markets, the study could help renewable-energy producers price their power to ensure profitable rates.

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REFERENCES

1. C. Han *et al.*, “Complexity and persistence of price time series of the European electricity spot market,” *PRX Energy* **1**, 013002 (2022).



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