

# To rid electric grid of carbon, shore up green energy support

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Cornell and Northwestern University engineers, along with a federal economist, have created an energy model that helps to remove carbon-generated power from the U.S. electric grid—replacing it with a greener,

financially feasible wind, solar and hydro energy system.

Their new model is explained in a paper published Oct. 28 in *Nature Energy*.

"We're trying to balance the priorities of maintaining a reliable, low-cost, efficient [electricity](#) system in the U.S., while shifting to a cleaner, greener system," said co-author Jacob Mays, a Cornell University postdoctoral associate in civil and [environmental engineering](#). Mays will join Cornell's engineering faculty after next semester as an assistant professor, where he will study the optimization of transportation and energy systems.

"The model in this paper," he said, "is helping to structure tradeoffs between goals, such as low prices, greener energy and reliable electricity."

The paper, "Asymmetric Risk and Fuel Neutrality in Electricity Capacity Markets," is co-authored by David Morton, Northwestern University professor of industrial engineering and management sciences; and Richard P. O'Neill, chief economic adviser at the Federal Energy Regulatory Commission.

In the last three decades, [electric utilities](#) throughout the U.S. - which once controlled both power generation and transmission—have shifted toward restructured markets. These foster more competition than the once-traditional monopoly utility model, Mays said, as electric energy now can be created by one company and transmitted by another.

Choices made in the design of these restructured markets, however, make it easier for investors to fall back on carbon-based ways—such as natural gas—to make electricity. Developing a new model keeps the creation of wind, solar, nuclear and hydro power economically

competitive and aligns markets toward a green future.

About two-thirds of the country participates in restructured electricity markets, according to Mays. When these markets were established, solar and wind made very little contribution to the overall energy mix.

"The complexity of electricity makes it difficult to have completely free markets. Instead, competition happens within the context of administrative rules," Mays said. "Since those rules were written for traditional fossil fuel technologies, we need to rethink some of them as new technologies become a larger part of the [market](#)."

"With states and utilities setting goals for much higher levels of clean [energy](#)," he said, "it's important to make sure we incorporate renewables into the grid as efficiently as possible."

**More information:** Jacob Mays et al, Asymmetric risk and fuel neutrality in electricity capacity markets, *Nature Energy* (2019). [DOI: 10.1038/s41560-019-0476-1](https://doi.org/10.1038/s41560-019-0476-1)

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