

The first wind solar and storage integration





Overview

Can a solar-wind system meet future energy demands?

Accelerating energy transition towards renewables is central to net-zero emissions. However, building a global power system dominated by solar and wind energy presents immense challenges. Here, we demonstrate the potential of a globally interconnected solar-wind system to meet future electricity demands.

Are solar and wind resources interconnected?

Theoretically, the potential of solar and wind resources on Earth vastly surpasses human demand 33, 34. In our pursuit of a globally interconnected solar-wind system, we have focused solely on the potentials that are exploitable, accessible, and interconnectable (see “Methods”).

Do self-sufficiency strategies drive overexploitation of solar and wind resources?

Our analysis indicates that such self-sufficiency strategies—resembling the S-I scenario—drive overexploitation of solar and wind resources (Table 1), undermining the global electricity supply balance enabled by optimized interconnection. The resulting imbalance exerts widespread impacts.

How can a solar-wind strategy be improved?

By optimizing solar-wind deployment, storage capacity, and trans-regional transmission, the solar-wind penetration could be achieved using only 29.4% of the highest potential, with a 15.6% reduction in initial investment compared to a strategy without interconnection.



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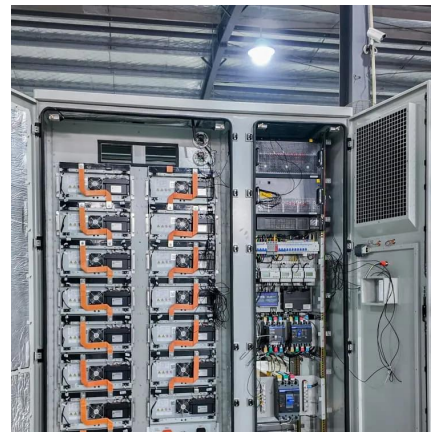


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