

Tilting at wind farms

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A way to make wind power smoother and more efficient that exploits the inertia of a wind turbine rotor could help solve the problem of wind speed variation, according to research published in the *International Journal of Power Electronics*.

Wind power is being touted as a clean and inexhaustible energy source across the globe, but the wind is intermittent and so the power output of wind farms can be variable. Proposed measures to smooth these power fluctuations usually involve the installation of units of batteries or capacitors to store electricity on good days and release their energy on still days or at times when wind speeds are too high for system stability. Technology to smooth the power supply and prevent blackouts due to the tripping of safety switches when electricity frequency deviates wildly is also essential.

Despite its deficiencies, a report from the US Department of Energy suggests that installed wind energy capacity could reach 300 gigawatts by 2030 to meet a fifth of the US electricity demand.

Now, Asghar Abedini, Goran Mandic and Adel Nasiri at the Department of Electrical Engineering and Computer Science, Power Electronics and Motor Drives Laboratory, University of Wisconsin-Milwaukee, have devised a solution to the electricity grid susceptibility to changes in wind speed.

The researchers have devised a novel control method that can mitigate power fluctuations using the inertia of the wind turbine's rotor as an

energy storage component. Simply put, they have created a braking control algorithm that adjusts the rotor speed so that when incoming wind power is greater than the average power, the rotor is allowed to speed up so that it can store the excess energy as kinetic energy rather than generating electricity. This energy is then released when the wind power falls below average.

This approach, the team explains, precludes the need for external energy storage facilities such as capacitors and the additional infrastructure and engineering they entail. Their method also captures wind energy more effectively and so improves the overall efficiency of wind farming potentially reducing the number of turbines required at any given site.

"Wind power smoothing using rotor inertia aimed at reducing grid susceptibility" in *International Journal of Power Electronics*, vol 1, pp 227-247

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