



The UK's National Supercomputing Service

Effects of “wake steering” on wind turbine flows. The upwind turbine on the right is rotated to steer its wake away from the downstream turbine increasing the overall efficiency

The still from the video shows two computational fluid dynamics simulations of wind turbine flows ran using XCompact3D. On the left of the video, two turbines are placed directly in line, while the second simulation, on the right, shows the angle of the front turbine “steered” by 24 degrees. The aim of “wake steering” is to redirect the wake from the turbine at the front and thus its impact on the turbine that sits downstream to increase the overall power output, in this case by 12%.

The video was generated using Blender in a photorealistic way to appeal to a broader audience. The normally invisible wakes are represented using Q-criterion, a method that highlights vortices from flows. It highlights the scale of off-shore wind turbines and their wakes, the slow evolution of the produced flow and the impact of “wake steering”.

The simulations were performed by Andrew Mole (<https://arxiv.org/abs/2407.20832>).

Dr Sébastien Lemaire, EPCC, University of Edinburgh

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