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Abstract

Title: Keys to understanding the challenges of wind energy conversion and energy storage

Wind energy is currently the leading renewable energy source (excluding large hydro) in the electricity generation mix in many countries. This tutorial aims to highlight the existing technical and economic challenges, including an increasingly detailed knowledge of the intermittency and efficiency of converting wind resources into available final electricity.

However, the expected development is linked to the storage capacity needed to manage the instabilities and uncertainties induced in the supply mix. In the new context of New Energy Technologies (NET), it is important to address the issue of distributed generation in terms of efficiency and real-time energy complementarity.

Microgrids, which can include wind power, are small-scale electricity networks designed to provide reliable, high quality electricity to a small number of consumers. Realising the potential of wind power would enable the production of nearly 100,000 TWh/year worldwide.

Offshore wind farms can be connected directly to the continental grid and cover different areas of the country under the supervision and authority of a grid operator, provided that the production of wind-generated electricity is synchronised with electricity demand on an hourly basis and that grid interconnection capacity and energy storage are strengthened. The tutorial will provide a comprehensive overview of these challenges..

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