

A bright future for renewables in the power grids

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The landscape of energy systems is undergoing a profound transformation, driven by the imperative to achieve a zero-carbon economy. This shift introduces a range of novel technologies and business models, necessitating the active involvement of diverse stakeholders in the journey toward sustainable energy systems.

Integrating renewables into the electricity grid is a crucial step in transitioning to a low-carbon energy paradigm, but it presents several significant engineering challenges. These challenges fall into five main categories:

- Ensuring system stability and inertia
- Fine-tuning frequency control mechanisms
- Addressing voltage fluctuations
- Mitigating network congestion
- Establishing protocols for black start procedures and system restoration

Overcoming these obstacles requires a determined effort from the entire energy value chain. Equipping current industry professionals with the necessary expertise and fostering the enthusiasm of future generations are essential strategies for achieving these goals.

The keynote lecture will outline a roadmap to a low-carbon energy system based on the UK's experience with its electricity grid. It will address challenges across all five technical aspects, providing practical examples with a particular focus on how system stability and inertia impact the transition. The lecture will also cover associated issues, mitigation strategies, and methods to improve system stability.

Additionally, the lecture will delve into frequency management challenges and solutions, voltage fluctuation issues and remedies, and new strategies for network congestion and black start capabilities.

The presentation will conclude with a discussion on the UK's zero-carbon roadmap for transitioning to a net-zero energy network. It will highlight key enablers and outline the timeline for the next steps.