

ICRERA 2026

International Conference on Renewable Energy Research and Applications
November 1-4, 2026 — Paris, France

KEYNOTE SPEECH



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Abstract

The increasing frequency and severity of climate extremes is placing unprecedented strain on the robustness of power grids worldwide. Ensuring the reliability and robustness of these critical infrastructures has become a paramount concern for utility operators, policymakers, and other stakeholders. Enhancing grid robustness against phenomena such as hurricanes, floods, heatwaves, and ice storms requires multifaceted strategies, including the hardening of physical infrastructure, the integration of advanced grid technologies, the implementation of robust grid management practices, and the adoption of adaptive, proactive maintenance protocols. The deployment of distributed energy resources, alongside the enhancement of microgrids and renewable energy systems, offers great potential to increase localised power stability during centralised grid failures. Real-data-based impact forecasting is a valuable tool to help Distribution System Operators better plan their long-term investments and further strengthen grid robustness against climate extremes.