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100% Renewable Energy Systems: Accelerating the Global Transition to a Carbon-Neutral Future

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The transition from fossil fuel-based energy systems to renewable energy has become one of the most effective strategies for addressing climate change, reducing greenhouse gas emissions, improving air quality, and enhancing global energy security. This presentation explores recent scientific and technological advances that support the development of fully renewable energy systems powered by wind, solar, hydropower, geothermal energy, and green hydrogen. It examines how integrated renewable energy portfolios can reliably meet electricity, transportation, industrial, and heating demands while minimizing environmental impacts and supporting sustainable economic growth.

The session highlights innovations in photovoltaic technologies, offshore and onshore wind power, battery energy storage, hydrogen production, smart grid infrastructure, and artificial intelligence-driven energy management systems that improve grid flexibility, efficiency, and resilience. Advances in digital monitoring, demand-side management, and energy forecasting are enabling higher penetration of renewable energy while maintaining power system stability. The presentation also discusses electrification of transportation, renewable-powered industrial processes, and the role of decentralized energy systems in expanding clean energy access.

Biography

Mark Z. Jacobson is Professor of Civil and Environmental Engineering at Stanford University, USA. His research focuses on renewable energy systems, climate change mitigation, atmospheric science, and sustainable energy policy. He is internationally recognized for developing pathways toward 100% renewable energy and carbon-neutral economies.