

Abstract

Hydrogen is emerging as a central pillar of the global energy transition, offering a pathway to decarbonize hard-to-abate sectors, enhance energy security, and support long-term sustainability goals. As countries accelerate their transition toward net-zero energy systems, hydrogen is increasingly viewed not only as a fuel, but as a strategic element of future energy systems and industrial development. This keynote examines hydrogen's role in the energy transition from a system and policy perspective, building on current developments in hydrogen production, value chains, financing, and international cooperation. It highlights the key challenges associated with scaling hydrogen deployment, including cost, infrastructure readiness, and system integration, and emphasizes the importance of coordinated action across energy, industry, and markets. Within this broader context, the talk reflects on the influence of the digital era on modern energy systems. It outlines how digitalization and artificial intelligence can support the effective deployment of hydrogen by improving planning, forecasting, and operational efficiency, while helping manage increasing system complexity. The keynote offers a clear and balanced perspective on hydrogen as a cornerstone of the energy transition, while recognizing the supporting role of digital technologies in enabling resilient, efficient, and future-ready energy systems. It concludes with a call for strategic leadership and collaboration to ensure hydrogen fulfills its potential in shaping a secure and sustainable energy future.