Special Session 5: AI-driven Energy System Planning and Market Mechanism Design

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Brief Description of the Session Theme:

The future of the global energy structure is steering towards low-carbon development, with renewable energy generation technologies such as wind and solar power playing pivotal roles. This shift has significantly impacted the planning and market mechanism design of power systems. Traditional energy system planning methods often struggle to cope with the complexities introduced by renewable energy integration, fluctuating demand, and evolving market policies. Artificial Intelligence (AI) technologies present promising solutions to these challenges. By harnessing advanced data analytics, machine learning algorithms, and predictive modeling, AI facilitates dynamic and adaptive energy system planning. It enables planners to make well-informed decisions by analyzing vast datasets from various sources, including weather patterns, energy demand, grid conditions, and market dynamics. Moreover, AI is crucial in designing effective market mechanisms that incentivize renewable energy production and consumption. AI-driven market mechanisms, such as smart grid technologies and demand-response systems, allow energy markets to efficiently balance supply and demand, optimize resource allocation, and integrate renewable energy sources into the grid. Thus, the synergy between AI-driven energy system planning and market mechanism design holds tremendous potential to revolutionize the energy sector, driving the transition towards a cleaner, more resilient, and sustainable energy infrastructure.

Topics and Keywords:

1. Optimization of renewable energy integration using AI-based forecasting models
2. AI-driven optimization techniques for energy resource allocation
3. Enhancing grid stability and resilience through AI-driven predictive maintenance
4. AI-driven electricity market operation simulation and mechanism design
5. Applications of AI in energy system planning
6. AI-based evaluation methods for energy system planning
7. Policy implications of AI-enabled energy system planning