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Special Issue Reprint

AI Facilitated Cyber-Physical Energy Systems

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This Reprint collects cutting-edge research on artificial intelligence-empowered cyber-physical energy systems, covering system planning, operational optimization, and energy market development. Modern energy systems are being profoundly transformed by the integration of physical energy infrastructure, communication networks and computing technologies, with AI serving as a core enabler to boost system resilience, operational efficiency and environmental sustainability. AI delivers innovative solutions for grid optimization, energy market reform, intelligent monitoring and smart building energy management. Meanwhile, its large-scale deployment poses notable challenges, including data security, privacy risks, and compatibility issues with traditional legacy energy infrastructure. This volume systematically explores the core opportunities and practical complexities of AI-driven cyber-physical energy systems, compiling original theoretical findings, technical innovations and engineering case studies from global academia and industry. Its research scope spans AI-based power system optimization and planning, intelligent energy market operation and trading mechanisms, system security and privacy governance, generative AI for energy decision-making, deep learning-enabled energy prediction and real-time monitoring, reinforcement learning-based smart building energy management, industrial implementation practices, and AI-assisted legacy infrastructure decommissioning. This Reprint provides forward-looking, comprehensive insights to support the intelligent upgrading and high-quality development of modern cyber-physical energy systems.



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