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Sommario/riassunto

This book is essential for understanding the transformative integration of cyber-physical systems in smart grids, providing valuable insights that will shape the future of sustainable energy production and distribution. A novel modeling methodology that blends cyber and physical components is a significant advancement for future energy systems. A Cyber-Physical System (CPS) is an integrated component of physical microgrids that combines computers, wireless connections, and controls to create a holistic solution. As a result of cyber-physical systems, a new generation of engineering systems incorporating wireless communication has begun to emerge. Despite that there are various major CPS systems in use today, one of the most challenging sectors for implementation is the smart grid which aims to distribute dependable and efficient electric energy while maintaining a high level of global environmental sustainability. Smart grids incorporate advanced monitoring to ensure a secure, efficient energy supply, enhancing generator and distributor performance while offering consumers more choices. These systems aim to boost the capacity and responsiveness of energy production, transmission, distribution, and consumption. As renewable energy sources grow, traditional methods are being challenged, requiring cross-domain integration of energy systems and data. This book explores architectures and methods for integrating cutting-edge technology into the power grid for more sustainable energy production and distribution.