
Current challenges and recent progress in optimization for the smart grid

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Abstract

A smart grid is the combination of a traditional power distribution system with large amounts of renewable energy sources and two-way communication between suppliers and consumers. This combination is expected to deliver energy savings, cost reductions, and increased reliability and security, but smart grids introduce numerous challenges for the management of the resulting system. These include integrating large contributions from wind and solar electricity generation, managing bidirectional flows of both power and information, and incorporating demand-response. We will present an overview of the current challenges in this area, including important directions for future research, and examples of how optimization is helping to meet these challenges.