

Special Issue on
**Management and Control Strategies of Distributed
Storage in Interconnected Grid Systems**

CALL FOR PAPERS

The increasing penetration of renewable energies, such as wind and photovoltaic energy, spurred by favorable policies implemented in the different countries, has increased concerns about the reliability and the efficiency of the power system. For the secure operation of the power systems it is required that all connected units provide flexibility including RES generators, flexible loads, storage systems, and synergies between energy systems including conversion between different energy vectors like gas, heat, and electricity. Energy storage can be used to integrate intermittent renewable energies in the power network, also providing the ancillary services necessary to ensure the proper operation of the power system (operating reserves, frequency regulation, imbalance energy, etc.). In addition, energy storage can also provide numerous beneficial services and cost savings, including arbitrage, renewable integration, grid support, and peak shaving. The optimal operation of energy storage systems is a complex problem, because several factors may be involved at the same time, such as the outdoor temperature, the operating features, the cost of electricity, the total investment, and operating costs. These problems can traditionally be approached exploiting mathematical programming methods, such as mixed integer linear programming (MILP) and dynamic programming (DP) methods, able to derive a theoretically optimal solution against a long computational time (due to the many decision variables involved). Conversely, metaheuristic optimization methods allow obtaining an optimal solution faster, even if the problem is complex.

This special issue of this journal intends to explore the latest developments in the sizing, control, and management of storage technologies. It is expected to address recent advanced topics in optimization algorithms and their complexity techniques. Papers based on primary leading research, as well as cutting-edge exemplars from industrial practice, which can be used to encourage sustainable development and performance of control of energy storage systems are welcome. Review papers are also eligible for publication.

Potential topics include but are not limited to the following:

- ▶ Advanced energy storage technologies (batteries, supercapacitors, fuel cells, etc.)
- ▶ Battery management and control and charging and discharging techniques
- ▶ Community energy storage
- ▶ Energy storage systems for grid support including use with ancillary services
- ▶ Storage for grid integration and managing of renewables
- ▶ Storage applications in microgrids
- ▶ Lifetime testing ageing mechanisms and lifetime prediction
- ▶ Distributed fault diagnosis for interconnected systems
- ▶ Objective function optimization methods
- ▶ Dynamic programming methods
- ▶ Heuristics and metaheuristics optimization methods
- ▶ Demonstration or field application experiences
- ▶ Explorations of the future of energy storage systems and associated control problems
- ▶ Discussion on planning, operation, market, or policy issues related to adoption of storage technologies
- ▶ Economic and technical benefits of incorporating energy storage into the power network

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First Round of Reviews

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