

Special Issue on **Modeling and Control in Electrical Systems in the Presence of Energy Storage Devices**

CALL FOR PAPERS

The central role of energy storage devices in modern electrical systems clearly appears by the analysis of relevant scientific literature and the interests of power industry in exploiting feasible applications. The interest in energy storage relies on the variety of benefits it can provide to different stakeholders involved along the entire value chain of the electrical system.

Relevant examples of benefits achievable thanks to the use of energy storage systems refer to their potential contribution in terms of power quality and reliability improvement, capacity support and deferral of investments, provision of ancillary services, regulation, and price arbitrage. Also, beneficial effects can be derived in case of end-user applications in terms of reduction of costs related to energy consumption and peak demand. Furthermore, energy storage systems are particularly useful for allowing network integration of intermittent renewable energy sources in order to meet the modern tendency aimed at increasing the share of renewable energies in the production of electrical energy.

The main drawbacks in the adoption of storage devices refer to their costs and lifetime durations that sometimes appear as they do not justify the benefits achievable. Thus, a serious challenge to be faced with is the adoption of new techniques and strategies for the optimal control and management of electric power systems that include storage devices. Attention can be put on both storage devices which are exclusively used to provide services to the network as well as storage devices that are usually adopted for different uses and are connected to the grid for charging purposes. This last case refers, such as examples, to the battery storage devices on board of plug-in and hybrid plug-in electric vehicles or metro/bus transportation or storage devices equipping the uninterruptible power supply units of some critical loads. This topic is even more important under the smart grid paradigm, in which enhanced functionalities of the electrical grid infrastructure characterized as intelligent can be used thus exploiting the potentiality of storage devices in taking advantages from several benefits across multiple applications.

We welcome papers based on primary leading research, as well as cutting-edge exemplars from industrial practice that can be used to encourage sustainable development and performance of control of modern power grid in the presence of energy storage systems. Approaches devoted to both planning and operation of power networks can be considered.

Potential topics include but are not limited to the following:

- ▶ Optimal control of energy storage systems
- ▶ Modeling and control of transmission and distribution systems in the presence of energy storage systems
- ▶ Optimal network scheduling in the presence of energy storage systems
- ▶ Optimal planning of transmission and distribution networks in the presence of energy storage systems
- ▶ Planning and operation of microgrids in the presence of energy storage devices
- ▶ DC networks modeling and control in presence of energy storage devices
- ▶ Hybrid AC-DC networks modeling and control in the presence of energy storage devices
- ▶ Life cycle analysis of storage devices connected to the electrical networks
- ▶ Renewable energy (wind and solar) bidding strategies considering local storage devices
- ▶ Increasing renewable energy penetration considering local storage devices
- ▶ Optimal sizing and control of energy storage system in smart grid context
- ▶ Optimal control of network considering increased penetration of plug-in (hybrid) electric vehicles

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