

**Smart Grids: An Intellectual Exercise or a Practical Reality?**  
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The smart grid concept evolved from the vision of an “intelligent grid” with the promise of making electric power delivery systems (grids) smarter using computer-based remote control and automation, enabled by two-way communication technology and computer processing. A "**smart grid**" includes operational and energy measures including **smart** meters, **smart** appliances, renewable energy resources, and energy efficiency resources. The grid includes power plants and wind farms, lines, substations, transformers, switches, storage facilities, and electrified transportation all the way to electricity users.

Smart Grid is a complex concept whose definition is still being debated because of the expected emphasis addressed by each participant and jurisdiction. But comparing available definitions, the common point of Smart Grid Definitions will be

- To use new techniques to improve efficiency, security and power reliability of the each zone and the whole electricity grid.
- To provide new services, new customer options and to enable the grid compatibility for new products and new services.
- To set up an entire communication system and the associated assets that improve the interpretability among related devices for better results.

At the core of a smart grid implementation is the ubiquitous Energy Management System (EMS) whose function is to plan and control energy resources in an optimal manner in a well-defined physical system. The way in which the task of an EM is carried out and how the EMS is implemented and designed, depends on the properties and requirements of the underlying controlled physical system.

Support for the smart grid in the United States became federal policy with passage of the Energy Independence and Security Act of 2007 which set out funding by federal and states, utilities and consumers to build smart grid capabilities. Since then, smart grid has become a sort of a romantic nirvana which held the promise of bountiful and unlimited rewards (especially in research funding) that attracted computer and communications specialists.

A search of IEEE Explore for the term Smart Grid yielded 20,853 items, while in Science Direct, the outcome is 35,516 items. The question that arises is how realistic are our expectations and high hopes. The increase in the proportion of renewable energy resources while ensuring a continuously secure and reliable energy supply. The weather dependent fluctuations of the power supply of renewable energies (e.g. wind turbines or photo-voltaic systems) will make it necessary to direct our research efforts and attention to learn and characterize the statistical regional characteristics of each jurisdiction. Another challenge is the possible development without entire planning and standards which usually causes problems in compatibility, and functionalities, even lead to a failure.

The presentation will examine specific cases of overly ambitious efforts contrasted with other success stories. Conclusions will be drawn and recommendations for road maps that are regional specific.