

# General Structure of the Regulated, Deregulated and Other Generation Dispatch Systems

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In this paper a general multi-level structure is introduced which allows posing various objectives of power industry operations and planning in terms of specific industry structures and measure the suboptimality of the particular implementation relative to the benchmark performance achievable only under full certainty and coordination. This, furthermore, makes it possible to identify major unsolved industry problems and their criticality, as well as some new research problems created by the industry changes.

Electric power systems have a basic inherent structure while the details of their operation and planning vary and are governed mostly by the political-ideological character of their government which results in business organizations ranging from market to government ownership. This wide scope of business organizations create widely diverse technical demands, yet these all are manifestations of a basic structure of the engineering side of power system operation. We seek to identify this structure and illustrate its role using the current drastic reorganization of the US power supply system for illustrating it.

First of all, one must realize that the operation of the power system at the current time is the climax of a chain of activities at well defined time, various action periods preceding it. Specifically, 1) resource provision, 2) maintenance scheduling, 3) unit commitment (Level 1 of generation dispatch), 4) generation dispatch (Level 2 of generation dispatch) and finally 5) dealing with discrete events that may disrupt the operation, such as loss of availability of power or faults which may occur at discrete and unpredictable times (Level 3 of generation dispatch). Preparation for the last group, will also be part of unit commitment i.e. the final arrangements of resources to assure smooth system operation at the current state. The engineering manifestation and disposition of the various steps of the chain has universal features strongly modulated by the political-ideological character of the nation.

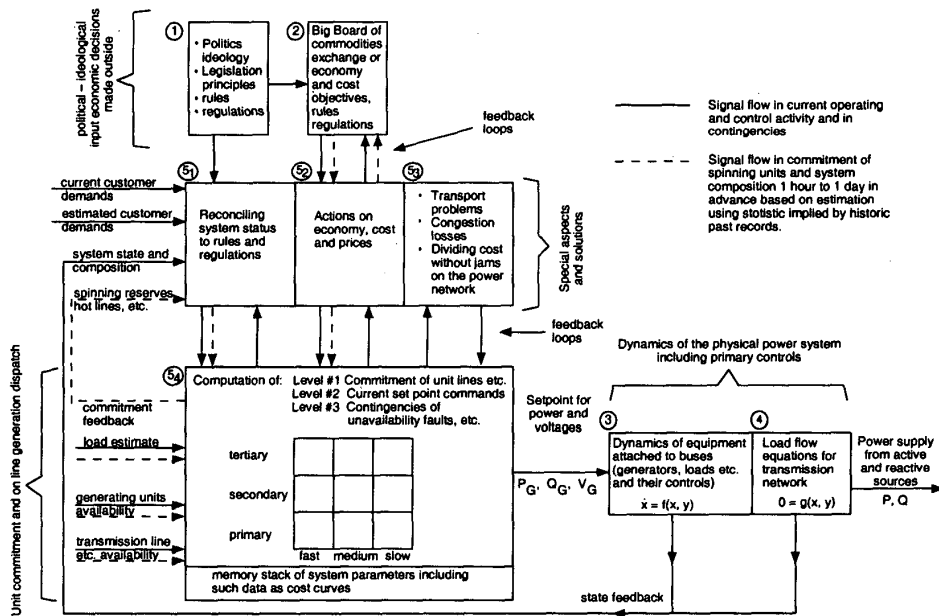


Fig. 1. Structure of unit commitment generation dispatch (-----) and control in normal operation (—).