

Elimination of voltage violations in the Spanish electricity market: Part I: Theory

E. Lobato Miguélez; L. Rouco Rodríguez; T. Gómez San Román; F.M. Echavarren Cerezo

Abstract-

The solution of voltage violations in the Spanish electricity market must consider: (a) the connection of off-line units (considering the active and reactive power injection effect), (b) the adjustment of the voltage control resources (generator voltages, transformer taps and shunt reactors and capacitors), (c) the preventive solution of the voltage violations under the occurrence of the postulated contingencies and (d) the start up cost internalized in the fixed income term of the generator offer. This start-up cost plays a key role in the solution of voltage violations since the coupled solution of the 24 hourly scenarios is different from the individual solution of each hourly scenario. This is the first part of a two-part paper. The objective of Part I is twofold. On one hand, the paper analyses the complexity of eliminating voltage violations proposing a simple methodology that includes the following steps: (a) contingency analysis (b) decoupled solution of voltage violations for each hourly scenario and (c) daily coupled solution of voltage violations. On the other hand, the paper describes the mathematical formulation of a set of mixed-integer optimization algorithms designed to obtain the hourly decoupled solution and the daily coupled solution of voltage violations in the Spanish electricity market. In Part II the methodology and performance of the algorithms will be illustrated and compared using an actual example of the Spanish electricity market.

Index Terms- Contingency analysis, power system dispatch, security assessment, congestion management.

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If you institution has a electronic subscription to Electric Power Systems Research, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

Lobato, E.; Rouco, L.; Gómez, T.; Echavarren, F.M. "Elimination of voltage violations in the Spanish electricity market: Part I: Theory", Electric Power Systems Research,

vol.75, no.2-3, pp.99-109, August, 2005.