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A practical approach to solve power system constraints with application to the Spanish electricity market

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Abstract-

The solution of power system constraints is an important issue that has to be addressed to achieve a fair operation of a competitive electricity market. In the Spanish electricity market, the System Operator (SO) is in charge of determining the technical feasibility of the generation dispatch provided by the Market Operator (MO). An optimal solution method of power system constraints in the Spanish market must take into account the connection of off-line units to solve both branch overloads and voltage constraints, the adjustment of voltage control resources, the solution of the postulated n-1 and n-2 contingencies with a preventive criteria and the coupling of the solution in the 24 hourly scenarios due to the start-up cost of nonconnected units. This paper details the management of power system constraints in the Spanish market, and contains a comprehensive review of solution methods of power system constraints. In addition, the paper proposes a novel approach to solve Spanish power system constraints that overcomes the limitations of existing methods, by decoupling the solution of branch overloads and voltage constraints. Francisco Miguel Echavarren Cerezo, M.I. Navarrete, R. Casanova, G. López,

Index Terms- Power system dispatch, security assessment, congestion management, optimal power flow, unit commitment

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