

## **Decision trees applied to the management of voltage constraints in the Spanish market**

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### **Abstract-**

**The security criteria of a power system require that branch power flows and bus voltages are within their limits, not only in normal operating conditions but also when any credible contingency occurs. In the Spanish electricity market, voltage constraints are solved by connecting a set of offline generators located in the areas where they occur. Thus, for a market participant it is necessary to predict approximately when its generating units are connected in order to prepare the annual budget and/or decide the time and location of new plants. This paper proposes a methodology based on decision trees to estimate the daily load pattern of units that have not been cleared in the daily energy market and can be connected to alleviate the network constraints in the Spanish power system. The method explains the behavior of the daily load patterns of a nonconnected unit (obtained through clustering techniques) with a set of explanatory variables. The explanatory variables consist of the demand-generation imbalance in the electrical area of the generating unit and the maintenance scheduling of the transmission lines that feed the area. The method proposed is illustrated with a case study.**

**Index Terms- Clustering, competitive electricity market, congestion management, decision trees, power system dispatch, security assessment**

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