

# Probabilistic Midterm Transmission Planning in a Liberalized Market

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## Abstract-

**This paper shows a midterm transmission planning methodology for liberalized electricity markets. This methodology evaluates expansions and reinforcements using a transmission adequacy linear programming model. This type of modeling solves efficiently, taking into account power exchange deviations, n-1 network preventive adequacy level, and nonsupply demand. Statistical results are obtained sampling power exchange scenarios and computing transmission investment sensitivities. After each sample of generation and consumption bidding and generator and circuit failures, means, ranges, and confidence intervals of transmission investment sensitivities are updated. These sensitivities are computed using dual variables and reduced costs of the transmission adequacy model. This statistical sensitivity information and additional information are evaluated jointly using multicriteria decision theory. An extended Garver's six-bus and the Spanish system cases are analyzed.**

**Index Terms-** Investment sensitivities, liberalized market, multicriteria decision theory, n-1 preventive criterion, transmission planning.

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