

Real options valuation applied to transmission expansion planning

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Abstract— Transmission expansion planning (TEP) is a complex problem where building a new line involves a long permitting process of around 10 years. Therefore, transmission expansion must anticipate the evolution of uncertainties, particularly those derived from changes in the capacity and location of new generating facilities. As it is not possible to request permits for all possible lines, priorities must be established. We develop a formulation to use real options valuation to evaluate the potential benefit of candidate lines and thereby identify priority projects. We present a feasible representation of optionality in TEP projects and propose a tractable evaluation of option value. The proposed technique identifies the candidate transmission lines with the highest potential, as well as their main value drivers. This is implemented in a realistic large-scale case study based on the Spanish system.

Index Terms— Power transmission; Circuit optimization; Mathematical programming

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