Bidding strategies with fuel supply uncertainty in auctions of long-term energy call options

B. Bezerra, L.A. Barroso, M. Pereira

Abstract— This work develops a stochastic optimization model for the creation of a bidding strategy for a generator in an energy call option auction similar to Brazil's, i.e., where the bidder can offer both the premium and the strike price. The objective of the model is to maximize the bidder's competitiveness while ensuring that the project's target rate of return is achieved with a given probability, for example 95%. The problem's complexity is compounded by uncertainties in fuel supply and the need to switch between fuels. The generators face the conundrum of bidding a single strike price to cover the expenses generated by using multiple types of fuels. We address the problem of finding bidding strategies which, taking into account uncertainty in fuel supply and risk constraints, set the combination of strike price and option premium that ensure a desired risk-adjusted return for greenfield dual-fuel thermal plants.

Index Terms— Energy call options, generation adequacy, power system economics, power system planning.

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