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ANALYSIS OF THE INFLUENCE OF POWER SYSTEM DIVERSION ON THE OPTIMAL SUPPLY STRATEGY OF RENEWABLE POWER PLANTS

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Abstract – This paper presents an analysis of the influence of power system deviation prediction on the bidding strategy of renewable generation units in spot markets. The optimal bid that a renewable generator makes is subject to the best possible forecast at the time it submits the energy bid to the spot market, which is usually between 12–36 hours in advance of the time of delivery. With these lead times, renewable generators have to assume a significant volume risk in relation to the difference that may occur between the energy finally delivered and the energy previously committed for their participation in the market, since deviations from the committed energy will be valued at the deviations price. In this sense, the analysis carried out in this work shows that the prices of deviations are highly influenced by the energy needs to be raised or lowered by the system at the time of delivery. In other words, in the event that the deviation of the renewable generator goes against the system, the generator will generally have a higher penalty, having to assume the cost of the energy deviation at a price higher than the spot market price. On the other hand, if the plant's deviation benefits the system, the penalty will be significantly lower (and sometimes even zero). The proposed analysis methodology develops the formulation of the expected benefit of the plant obtained through its participation in the spot market and subsequent settlement of the deviations. This formulation includes the modeling of the effect of the system deviation on the plant's profits, which allows to satisfactorily identify the influence of the prediction of this variable on the optimal offer strategy. This methodology has been tested for the case of a wind farm operating in the Spanish market. For this purpose, real data of forecasts and final production of the wind farm have been used, as well as real data of the spot market, prices of the balancing service and real deviation of the system, which has allowed to verify in totally realistic conditions the importance of the prediction of the direction of deviation of the system in the optimal bidding. In this way, it will be possible to establish new optimal bidding strategies that focus efforts on advanced prediction techniques for this variable, which will result in greater benefits for wind power plants for their participation in the energy markets.

Keywords – *Balancing services; electricity markets; optimal energy bidding; renewable energy*

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