A stochastic adaptive robust optimization approach for the offering strategy of a virtual power plant

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Abstract-

This paper proposes a novel approach for the offering strategy of a virtual power plant that participates in the day-ahead and the real-time energy markets. The virtual power plant comprises a conventional power plant, a wind-power unit, a storage facility, and flexible demands, which participate in the day-ahead and the real-time markets as a single entity in order to optimize their energy resources. We model the uncertainty in the wind-power production and in the market prices using confidence bounds and scenarios, respectively, which allows us to formul-ate the strategic offering problem as a stochastic adaptive robust optimization model. Results of a case study are provided to show the applicability of the proposed approach.

Index Terms- Robust optimization, stochastic programming, strategic offering, uncertainty, virtual power plant.

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