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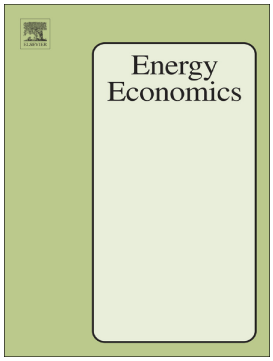

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PII: S0140-9883(17)30368-7
DOI: doi:10.1016/j.eneco.2017.10.027
Reference: ENEECO 3800

To appear in:

Received date: 6 November 2016
Revised date: 13 October 2017
Accepted date: 20 October 2017

Please cite this article as: Sayyad Nojavan, Kazem Zare, Behnam Mohammadi-Ivatloo , Robust bidding and offering strategies of electricity retailer under multi-tariff pricing. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Eneeco(2017), doi:10.1016/j.eneco.2017.10.027

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Robust bidding and offering strategies of electricity retailer under multi-tariff pricing

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Abstract: In this paper, an electricity retailer seeks to determine selling price for end-user consumers under fixed pricing (FP), time-of-use pricing (TOU) and real-time pricing (RTP). Furthermore, in order to provide power exchange between the retailer and the power market, bidding and offering curves should be prepared to bid and offer to the day-ahead market. Therefore, this paper proposes a robust optimization approach (ROA) to obtain optimal bidding and offering strategies for the retailer. To achieve this, ROA is used for uncertainty modeling of power market prices in which the minimum and maximum limits of prices are considered for uncertainty modeling. Lower and upper bounds of price is consecutively subdivided into sequentially nested subintervals which allows formulating robust mixed-integer linear programming (RMIP) problem. The proposed RMIP model helps retailer to select a robust decision in the presence of market price uncertainty. Furthermore, the bidding and offering curves of the retailer are obtained from sufficient data through solving these problems. Meanwhile, the uncertainty of customers demand and variable climate condition are modeled based on stochastic programming. To validate the proposed robust optimization model, three case studies are evaluated and the results are compared.

Keywords: Retailer, robust optimization approach, fixed pricing, time-of-use pricing and real-time pricing.

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