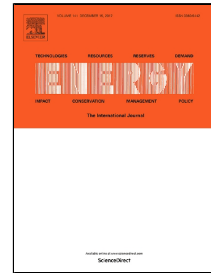


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Abstract

An energy hub, as an active element in smart distribution grid, can participate in the day-ahead market via submitting bids to maximize its profit. The multi-input and multi-output energy vectors make energy hub different from other active elements. In this paper, a comprehensive optimal bidding strategy for an energy hub is modeled. The proposed model enables the energy hub to benefit from day-ahead and real-time markets. Stochastic optimization is proposed in this strategy to handle several market uncertainties consisting of day-ahead market prices, real-time market prices, and wind generation. The model takes advantages of multi-inputs vector of energy hub to submit the optimal bids including electricity selling/buying and optimizes the cost. Moreover, it handles the coupling between different types of loads. The problem is modeled as a mixed integer linear program. Numerical simulations evaluate the proposed model.

Keywords: energy hub, bidding strategy, stochastic optimization, prosumer

Nomenclature

t	Time-interval
i, j, m	Indices for input energy, output energy, and energy storage system respectively
s	Indices for scenarios
N_{ess}	number of energy storage systems
N_s	number of scenarios
N_i, N_o	number of input/output energies
$\delta_m^{ch}, \delta_m^{dis}$	Binary variables; 1 if energy storage system m is charging/discharging
I_{ik}	Binary variable; 1 if convertor ik is on
L	Matrix of output energies
$L_j(t)$	Output energy j at time t
C	Conversion matrix
P	Matrix of input energies
$P_i(t)$	Input energy i at time t
P_i^{min}, P_i^{max}	Minimum/maximum capacity of input energy i
$P_{ik}^{min}, P_{ik}^{max}$	Minimum/maximum capacity of input energy to convertor ik

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