Integrated Bidding and Operating Strategies for Wind-Storage Systems - DTU Orbit (08/11/2017)

Integrated Bidding and Operating Strategies for Wind-Storage Systems

Due to their flexible charging and discharging capabilities, energy storage systems (ESS) are considered a promising complement to wind farms (WFs) participating in electricity markets. This paper presents integrated day-ahead bidding and real-time operation strategies for a wind-storage system to perform arbitrage and to alleviate wind power deviations from day-ahead contracts. The strategy is developed with two-price balancing markets in mind. A mixed integer nonlinear optimization formulation is built to determine optimal offers by taking into account expected wind power forecasting errors and the power balancing capability of the ESS. A modified gradient descent algorithm is designed to solve this nonlinear problem. A number of case studies validate the computational efficiency and optimality of the algorithm. Compared to the existing strategies, the proposed strategies yield increased economic profit, regardless of the temporal dependence of wind power forecasting errors.

General information

State: Published
Organisations: Department of Applied Mathematics and Computer Science , Department of Electrical Engineering, Center for Electric Power and Energy, Electricity markets and energy analytics, Tsinghua University
Authors: Ding, H. (Ekstern), Pinson, P. (Intern), Hu, Z. (Ekstern), Song, Y. (Ekstern)
Pages: 163-172
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: IEEE Transactions on Sustainable Energy
Volume: 7
Issue number: 1
ISSN (Print): 1949-3029
Ratings:

BFI (2017): BFI-level 1

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 1

Scopus rating (2016): CiteScore 7.8 SJR 2.636 SNIP 2.883

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 1

Scopus rating (2015): SJR 3.031 SNIP 3.235 CiteScore 7.09

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 1

Scopus rating (2014): SJR 2.972 SNIP 3.954 CiteScore 7.03

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 2.384 SNIP 3.777 CiteScore 7.03

ISI indexed (2013): ISI indexed no

Web of Science (2013): Indexed yes

Scopus rating (2012): SJR 1.355 SNIP 3.731 CiteScore 6.58

ISI indexed (2012): ISI indexed no

Scopus rating (2011): SJR 0.818 SNIP 3.133 CiteScore 5.13

ISI indexed (2011): ISI indexed no
Original language: English
Power, Energy and Industry Applications, Bidding strategy, electricity markets, Electricity supply industry, Energy storage, energy storage system (ESS), Optimization, Probabilistic logic, real-time operation, Real-time systems, wind farm (WF), Wind forecasting, Wind power generation
DOIs:

10.1109/TSTE.2015.2472576
Source: FindIt
Source-ID: 276922015
Publication: Research - peer-review › Journal article – Annual report year: 2016