

Accepted Manuscript

Energy-storage system sizing and operation strategies based on discrete Fourier transform for reliable wind-power generation

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PII: S0960-1481(17)30990-4
DOI: 10.1016/j.renene.2017.10.028
Reference: RENE 9316
To appear in: *Renewable Energy*
Received Date: 21 June 2017
Accepted Date: 09 October 2017

Please cite this article as: Eunsung Oh, Sung-Yong Son, Energy-storage system sizing and operation strategies based on discrete Fourier transform for reliable wind-power generation, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.10.028

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Highlights

- This study proposes two-step energy storage system (ESS) sizing and operation strategies based on discrete Fourier transform approach for enhancing the wind power generation (WPG) reliability.
- This study analyses that the uncertainty of WPG is highly correlated to the high-frequency component of WPG, and with this in mind the proposed strategy manages the uncertainty by cutting-off the high-frequency component in frequency domain.
- Case studies show that the root-mean-squared error using the proposed strategy is reduced by up to 26% compared to the case without the ESS, and is improved by about 3% more than the case using the conventional method with the ESS.
- Economic sensitivity is also analysed considering the energy and capacity payment from energy market as well as the ESS cost, and shows that the proposed strategy can achieve the benefit in economic perspective.

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