

Utility Scale Energy Storage Application and Development in Korea

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Abstract

In recent years, there has been a world-wide increase in the use of energy storage systems for improving the efficiency of power systems and increasing the penetration of renewable energy resources. This presentation will discuss the current status of ESS R&D activities and ESS installations in Korea.

Korea Electric Power Corp. (KEPCO) has been conducting ESS R&D and commercialization activities since 2010, beginning with the development of ESS control algorithms for wind power output smoothing, frequency regulation, and peak-shaving. And in 2014, KEPCO completed the construction of a 4 MW / 8 MWh multipurpose ESS in Jocheon, Jeju Island; this ESS facility is used to demonstrate and promote the capabilities of grid-connected ESS using the algorithms developed by KEPCO.

In 2015, KEPCO finished construction of additional ESS facilities across different sites for the purpose of frequency regulation (FR) in the main power grid of South Korea. These FR-ESS facilities use improved versions of the frequency regulation algorithms developed for the Jocheon ESS; in addition, PSS/E models were also developed for the analysis of power systems that use ESS. Currently, KEPCO now operates a total of 236 MW of ESS capacity for primary frequency regulation; and, in the future, the company plans to expand this capacity to 500 MW.

At the Gochang Power Test Center, KEPCO is currently working on a new demonstration project that will have 28 MW / 17 MWh of ESS capacity, and construction of the facility is expected to be complete by September 2017. This new demonstration project will use various battery types (e.g. NCM, LTO, LFP, NCA) and will provide continuous power output for periods of 1 hour, 30 minutes, or 15 minutes. The ESS will be connected to a 60 MW offshore wind farm and will demonstrate its versatility in providing wind power output smoothing, wind ramp-rate limiting, wind power shifting, and wind power capacity firming. The highly flexible control algorithm being developed for this facility will also allow the ESS to provide frequency regulation, peak reduction, and arbitrage services. For this multipurpose large-capacity ESS, KEPCO also developed a common data model that selects the optimal operation mode that best utilizes the ESS in various situations. The optimal operation mode will aid in maintaining the stability of the power system.

This presentation will serve as an opportunity to share ESS technology and business trends in Korea.