

Battery Energy Storage in Hybrid Power Supply Operations

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Keywords : Energy Storage, Secondary Reserves, Ancillary Services, AGC

Abstract

In December 2010, 8 MW of A123's lithium-ion based battery energy storage was brought online to provide frequency regulation (secondary reserves) in the United States. This paper analyzes grid dispatch data to show how a fast-ramping, limited energy storage device can complement traditional ramp-limited generators. The data, based on historical dispatch from a North American interconnection, shows the total real time deviation between scheduled and actual energy needs on four second intervals over thirty days. A Fourier transform filter is applied to the deviation data to create separate energy-focused and ramp-focused signals. The analysis shows that this separation enables a high degree of generation resource specialization. The relevant reliability criteria can be met using generators with a low ramp in combination with a fast storage device with a small quantity of energy capacity. The paper then explains how recent rulings by the U.S. regulator (the Federal Energy Regulatory Commission) will likely codify financial incentives to implement this hybrid operation nationwide.

Background

Data Source

Signal Separation

Comparison to Resource Performance Attributes

Reliability Criteria

New Market Structures