

The Levelised Cost of Frequency Control Ancillary Services in Australia's National Electricity Market

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Abstract

Over the period 2016-2021 Australia's National Electricity Market (NEM) experienced an investment supercycle, with 16,000MW of new utility-scale variable renewable plant commitments (and an additional 8,000MW of rooftop solar PV) in a power system with a ratcheted peak demand of 35,000MW. The sharp rise in intermittent asynchronous resources and the disorderly loss of 5,000MW of synchronous coal-fired generation plant placed strains on system security – most visibly represented by the rapid deterioration in the distribution of the power systems' (50Hz) Frequency. This in turn necessitated material changes to the NEM's suite of Frequency Control Ancillary Service (FCAS) markets. Utility-scale batteries are ideally suited for FCAS duties, but unlike the wholesale electricity market, there is no forward price curve for Frequency Control Ancillary Services, nor is there any systematic framework for determining equilibrium prices that might otherwise be used for investment decision-making. In this article, we develop an approach for quantifying long run equilibrium prices in the markets for Frequency Control Ancillary Services, with the intended application being to guide the suitability of utility-scale battery investments under conditions of uncertainty and missing forward FCAS markets.

Keywords Frequency control ancillary services, electricity markets, battery storage

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