Utility Scale Storage Performance and Opportunities in the FCAS Regulation Market

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National Electricity Market (NEM) Context

Out with the old:
- Centralised
- Synchronous

In with the new:
- Variable
- Nonsynchronous
- Renewable

Result:
- Frequency challenges
- Increased demand & cost for FCAS
What is FCAS?

Frequency Control Ancillary Services

NORMAL OPERATING BAND

49.85Hz

50.15Hz
What is FCAS?

FCAS

- Regulation
  - Fast
  - Slow
  - Delayed

- Contingency
Hornsdale Power Reserve (HPR)

- South Australia
- One of the first nonsynchronous generator to provide FCAS Regulation services
- 30MW of its capacity in FCAS Regulation services
Large Conventional Steam Turbine

ISSUE
Both generators paid the same!

Hornsdale Power Reserve

High Quality FCAS Regulation Services:
1. **Speed** of response
2. **Accuracy** of response

Research Areas

1. Generator Ramping Capabilities

2. Impact of HPR on FCAS Regulation
Generator Ramping Capabilities
SA Generators’ Ramping Capabilities
Impact of HPR on Regional FCAS Regulation
Impact on Generator Availability & Targets
How can we improve the FCAS Regulation Market?

- PJM Interconnection Market in the US
- Two different AGC signals:
  - **RegA**: Traditional generators
  - **RegD**: Dynamic generators
- Performance metrics
  - Performance Score
  - Benefits Factor (only RegD)
Conclusions and Future Work

- Storage key FCAS Regulation source
- Increase in SA FCAS Regulation
- Difficult to assess impact of HPR on other generators
- Performance metrics incentivise high quality FCAS Regulation
- Storage in FCAS Contingency and FFR??
Thank you… and any Questions?