Operation of South Australia as an electrical island – Jan/Feb 2020

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About AEMO

AEMO is the independent system and market operator for the **National Electricity Market** (NEM) and the WA **Wholesale Electricity Market** (WEM).

We also operate **retail and wholesale gas** markets across south-eastern Australia and Victoria's gas pipeline grid.

Ownership

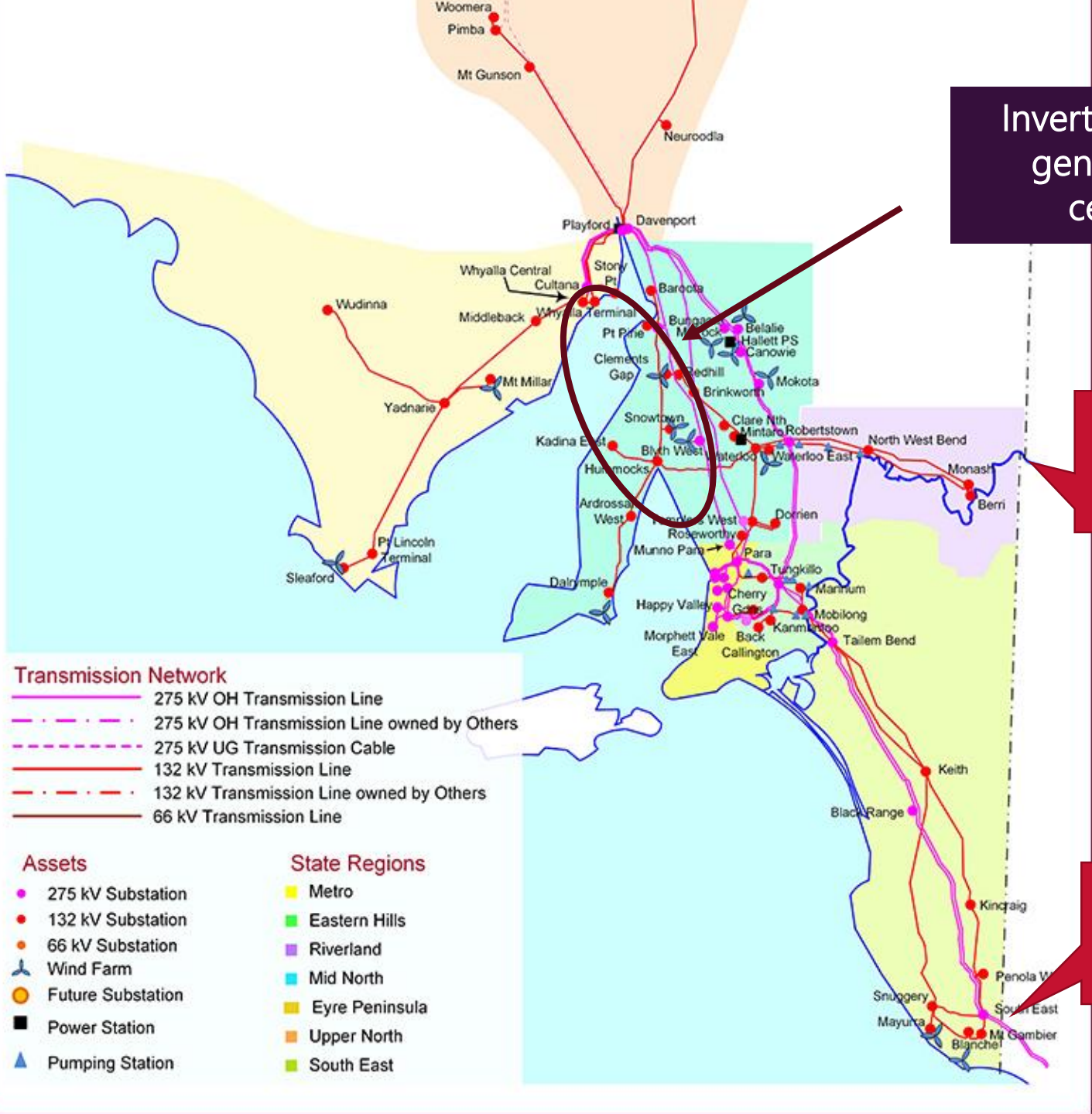
40% Market participants

60% Governments of Australia

31 January 2020: SA-VIC separation

South Australia power system

- Demand: ~600-3,100 MW with a 1,400 MW median
- Installed inverter-based generation: ~2,700 MW
- This includes 150 MW of large-scale batteries with 50 MW to connect soon
- Rooftop PV in addition: ~1,300 MW
- Certain combinations of synchronous generators must be online at all times



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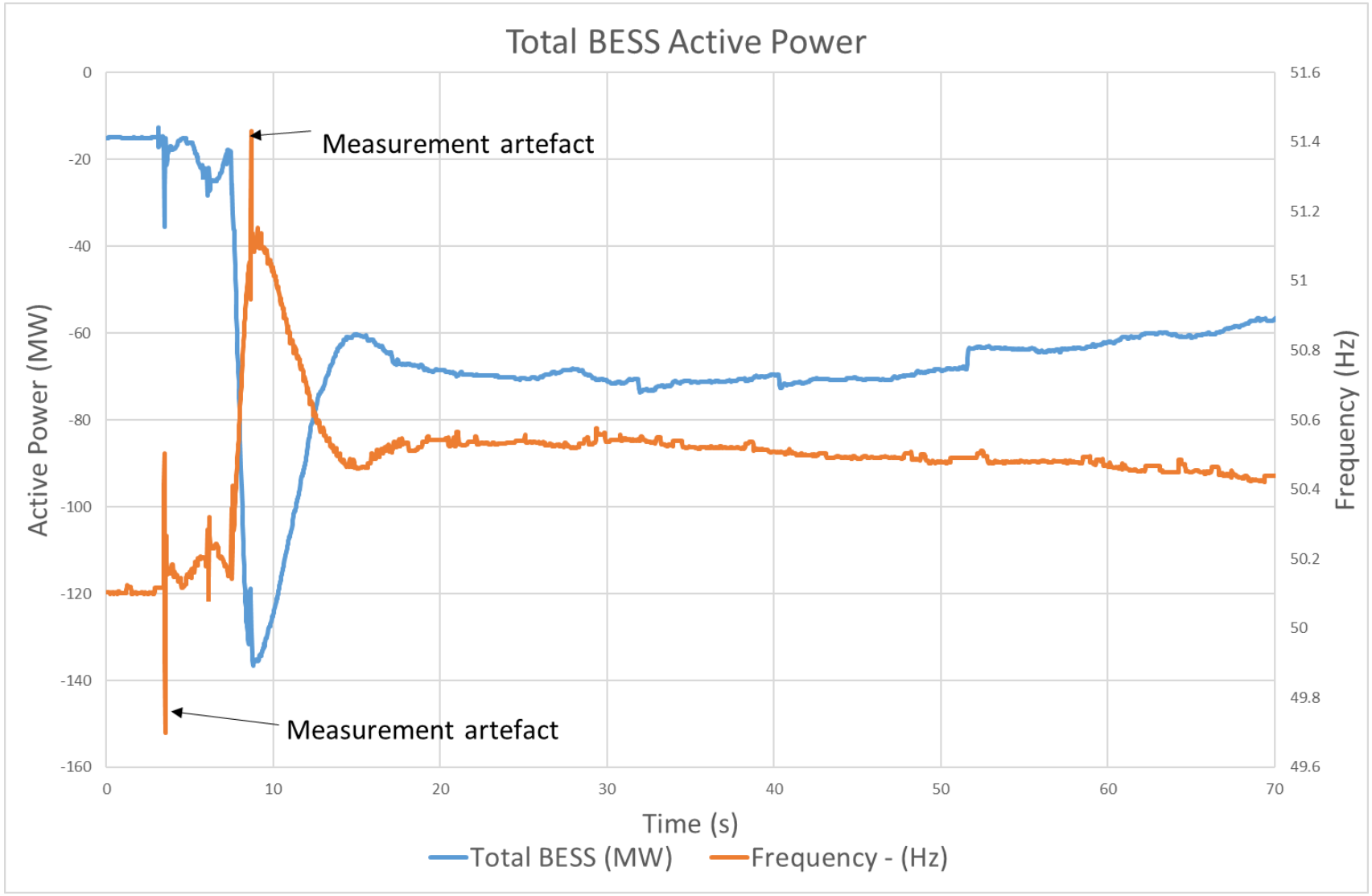
Sustained islanding operation

- On 31 January 2020 a non-credible event resulted in formation of an electrical island with the whole South Australia power system and small part of adjacent state network (Victoria).
- Islanding conditions lasted for 17 days.
- Several combinations of synchronous generators were developed for islanded system based on EMT modelling.



Response of large-scale batteries during system separation

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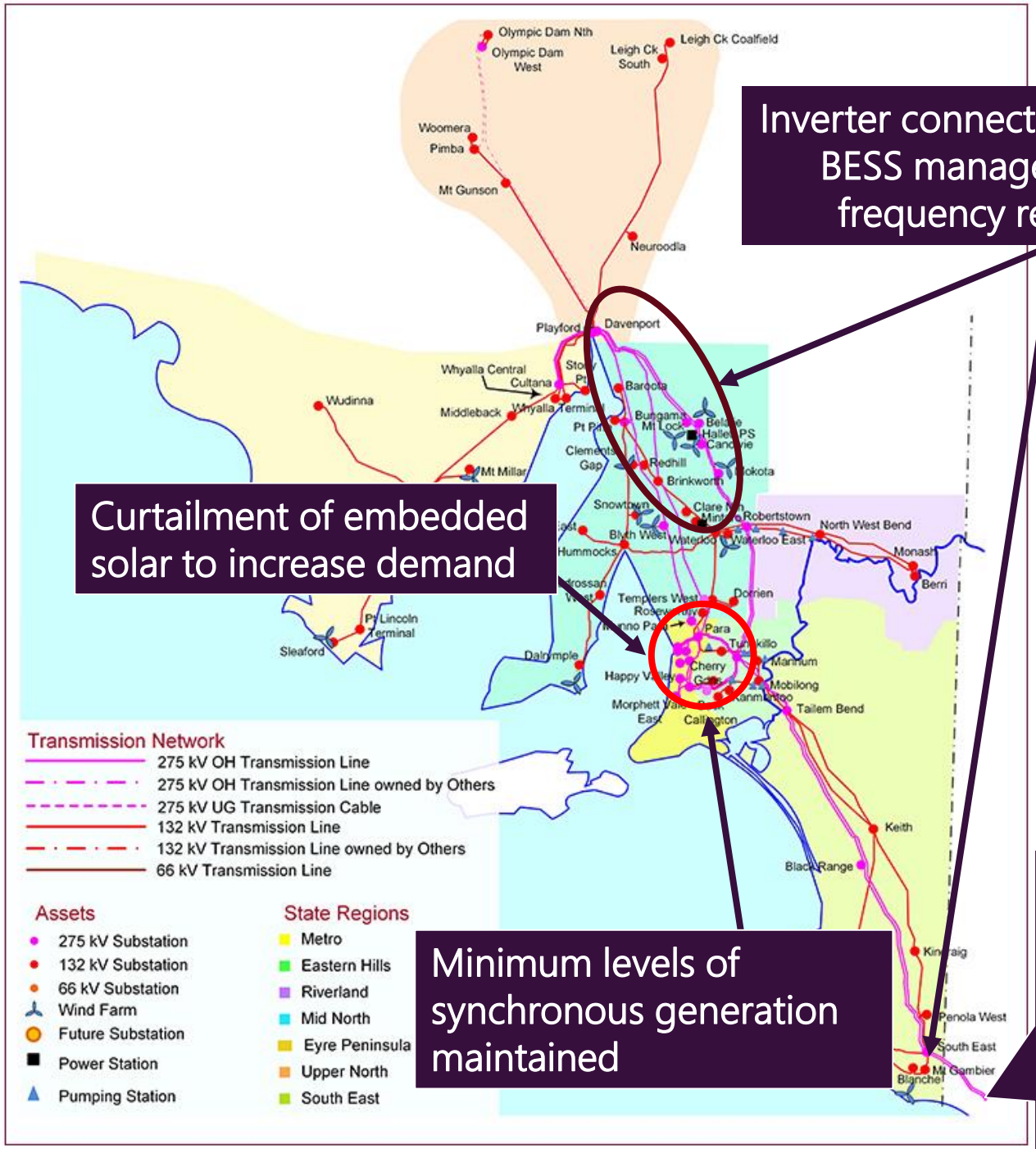
Operational action taken

- Electricity demand required to be maintained to keep required combinations of synchronous generators online
- Inertia, fast frequency response and generation on the over-frequency generation shedding scheme optimised to limit rate of change of frequency following an event
- Protection on Heywood adjusted to protect SA from loss of Mortlake Portland Smelter event



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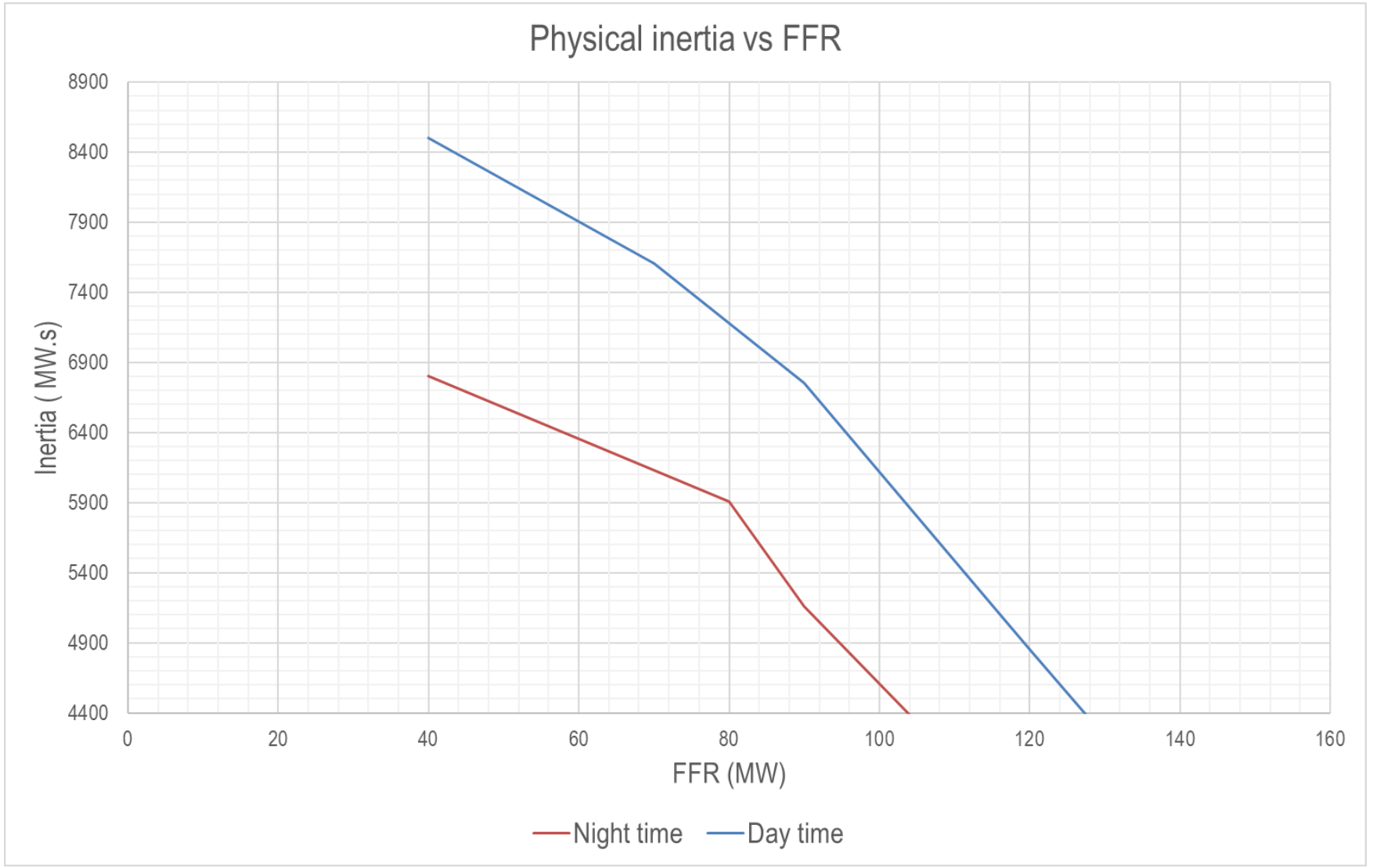
Frequency control under islanding conditions

- Synchronous generators provide both the physical inertia and frequency control.
- Batteries provide frequency control only, but it is typically 5-10 times faster.
- Trade-off is possible between physical inertia and fast frequency response (FFR).
- Some levels of FFR are required at all times due to their speed of response.
- Most efficient points are those with higher FFR and lower inertia.



Higher requirements in daytime to cater for sudden loss of distributed PV which creates a larger credible contingency than that could otherwise occur.

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