

## Victorian Minimum System Load (MSL): role of BESS

### Background

This information has been prepared in response to industry request for an example exercise of the role of BESS in the Victorian Minimum System Load (MSL) framework and information on the associated compensation arrangements.

The power system is now operating at times for periods with very high levels of distributed PV (DPV) and low load, such that power system security issues can arise. To manage these potential security issues, AEMO has introduced the Minimum System Load (MSL) framework. The MSL framework<sup>1</sup> is summarised in Table 1. It aims to mirror the existing lack of reserve (LOR) framework and is intended for managing MSL conditions which are expected to impact on power system security. These MSL conditions may arise on rare occasions, for example during low demand periods when there is high levels of rooftop solar generation and network outages that affect the export capability of Victoria (VIC).

**Table 1 VIC MSL framework**

	Definition	AEMO actions
MSL1	Two of the largest credible load contingencies from MSL3	Monitor the situation. Publish MSL market notice with MSL thresholds when forecast, which can be up to a week ahead.
MSL2	The largest single credible load contingency from MSL3	Take actions required to land satisfactory and return to and remain secure within 30 minutes following a credible load contingency.
MSL3	Level of regional demand where power security issues are forecast to occur	Additionally, instruct network service providers (NSPs) to maintain regional demand above the MSL3 threshold.

AEMO has identified a possible risk of scenarios where the VNI export limit violates in very low demand conditions. This document summarises the intended approach for directing battery energy storage systems (BESS) in South Australia (SA) and VIC to assist with maintaining power system security during MSL2 or MSL3 events for the spring and summer 24/25 period.

AEMO is currently forecasting a moderate possibility of a single MSL2 period occurring in the upcoming spring and summer period. Accounting for credible load contingencies, AEMO estimates that up to the full capability of all the BESS in VIC and SA (including MW and MWh) could be required to maintain system security during an MSL2 or MSL3 condition. BESS with a maximum state of charge less than 15 MWh, non-BDUs, and BESS not yet fully commissioned will be exempt from this process.

This document is provided for information purposes and does not constitute advice. It may be subsequently updated. If any part of this MSL framework is inconsistent with the National Electricity Rules, the rules will prevail. AEMO's overarching responsibilities to maintain and restore power system security may require AEMO to direct BESS outside of this framework.

<sup>1</sup> AEMO, Power System Operation, <https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation>



## Proposed approach

AEMO will follow a hierarchy of actions to maintain system security for forecast MSL2 or MSL3 conditions. AEMO intends to only consider issuing directions to BESS after other appropriate actions have been taken to attempt to clear the MSL2 or MSL3 condition, including recalling line outages and constraining non-essential scheduled, semi-scheduled and non-scheduled units offline, consistent with AEMO's responsibilities<sup>2</sup>.

Where AEMO identifies a forecast MSL2 or MSL3 condition in the VIC region later in the day:

At 0700<sup>3</sup> hrs AEMO will:

- Firstly, direct VIC and SA BESS to make full MW capacity available, follow dispatch targets and provide primary frequency response<sup>4</sup>, including at 0 MW dispatch.
- Secondly, invoke a constraint set that will discharge BESS progressively based on their real-time state of charge, such that by 0900 hrs BESS reach their minimum state of charge levels.
  - The minimum state of charge levels will be pre-agreed with each BESS, and are intended to be agreed at levels that:
    - Respect all technical limitations
    - Allow continued stable and predictable operation
    - Allow BESS to continue to meet their pre-existing network support obligations and emergency control scheme obligations if they are necessary for power system security during MSL conditions
    - Meet required OEM warranty obligations and
    - Allow BESS to continue to fully provide R1 and R6 FCAS, all lower FCAS services and primary frequency response (PFR). BESS will not be inhibited from providing any FCAS services, but minimum state of charge levels focus on provision of R1 and R6 only<sup>5</sup>.
  - For AEMO awareness only, BESS will also be asked to inform AEMO of their maximum charge capacity (MW), maximum discharge capacity (MW) and maximum state of charge (MWh). These will be used for understanding the potential response from BESS in MSL periods.
  - The constraint set will keep the BESS state of charge within a limited level close to the minimum agreed state of charge.

The constraint set is invoked immediately following the direction to BESS. If a BESS is unable to comply with the direction, they must advise the AEMO control room as soon as possible.

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<sup>2</sup> The only action likely to be taken after directions to BESS is instructions to NSPs to maintain regional demand above the MSL3 threshold, since this may include load shedding.

<sup>3</sup> This time was assessed as the latest time to intervene, but may be reviewed based on operational conditions.

<sup>4</sup> BESS may need to assess whether their plant settings are appropriate to provide PFR at 0 MW dispatch target.

<sup>5</sup> If BESS offer services into any markets, they will retain all existing responsibilities and obligations for full delivery of these services.

At 0900 hrs:

- The direction on BESS from 0700 hrs remains in place.
- AEMO will revoke the existing constraint set on the directed BESS.
- AEMO will invoke a different constraint set which prevents batteries generating or charging (dispatch target of 0 MW), unless they are required to do so to manage a power system security issue<sup>6</sup>, or recharge back up to their minimum state of charge (given BESS state of charge may go below the agreed minimum state of charge due to delivery of FCAS, PFR or emergency control scheme response).

If a BESS is unable to comply with the direction, they must advise the AEMO control room as soon as possible.

The direction on BESS will remain in place until no longer required. For the process outlined above this is likely no later than 1300hrs unless there is an active MSL3 condition or ongoing power system security risks that warrant the direction remaining in place under the National Electricity Rules.

If an MSL2/3 condition is first forecast after 0700hrs and before 0900hrs, AEMO will endeavour to follow the process above as closely as possible. If an MSL2/3 is first forecast after 0900hrs, AEMO will endeavour to follow the process outlined from 0900hrs.

This is the usual process for managing forecast MSL conditions. As part of AEMO's responsibilities for managing power system security, if an unforecast MSL2/3 condition occurs, BESS may be directed outside of this framework.

## Compensation arrangements

Under direction, BESS are eligible for compensation over the entire period:

- Where energy is being provided under the direction, compensation is payable for energy provided (NER 3.15.7(a1)(1)<sup>7</sup>). Energy provided is compensated at the 90th percentile, 12 month rolling spot price in that region as calculated under NER 3.15.7(c). BESS can also apply for additional compensation under NER 3.15.7B, which, other than the initial compensation received, considers net direct costs and loss of revenue.
- When energy is not being provided under the direction, for example when load or 0 MW is required under the direction, compensation is payable for other compensable services (NER 3.15.7(a1)(2)). The services being provided are required to manage power system security during an MSL event. As such, BESS can claim fair payment compensation under 3.15.7A, which considers contractual arrangements, lost revenue and net direct costs.

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<sup>6</sup> This is achieved by using a constraint violation penalty factor of 1, which allows these constraints to violate before a system security issue arises. All constraints used for BESS directions will have a constraint violation penalty factor of 1.

<sup>7</sup> See also NER 3.15.7(a2)(4)

Compensation payable for energy is calculated by AEMO in accordance with a formula under NER 3.15.7. Compensation for other compensable services and claims for additional compensation may be determined by AEMO or by an independent expert in accordance with NER 3.15.7A and NER 3.15.7B respectively.

AEMO recommends that BESS operators maintain appropriate records that could be used by AEMO or an independent expert to determine compensable costs including information on contractual arrangements, direct costs and lost revenue. Without limitation this may include record of:

- Revenue (such as from energy and/or FCAS) due to the battery discharging under the direction.
- An estimate of the revenue (such as from energy and/or FCAS) that the operator considers it would have been earned were it not for the direction.
- Maintenance and labour related costs
- Additional direct costs arising from the direction

AEMO expects that in most circumstances, compensation claims for other compensable services and for additional compensation will be assessed by independent experts appointed by AEMO. AEMO maintains a panel of independent experts for assessing such claims.

Independent experts are required to assess claims in accordance with certain principles and relevant factors set out in the National Electricity Rules, but within that framework are responsible for determining the appropriate methodology for assessing each particular directions compensation claim. As such while AEMO expects there will be consistency in the principles applied by independent experts to determine payable compensation across these claims, each claim will be assessed on a case-by-case basis.

### **Application of intervention pricing**

According to NER 3.9.3(b), intervention pricing does not apply as the reason for the direction is to provide a service that is not a market traded service (provision of energy or FCAS), nor a direct substitute for a market traded service.

### **Next steps**

These arrangements are intended to apply for the spring and summer 24/25 period only.

For future:

- AEMO is currently investigating alternative pathways for procurement of MSL management services from BESS to reduce the need for directions.
- AEMO will continue to assess the need and quantity of MSL management services from BESS to address MSL2 and MSL3 conditions.