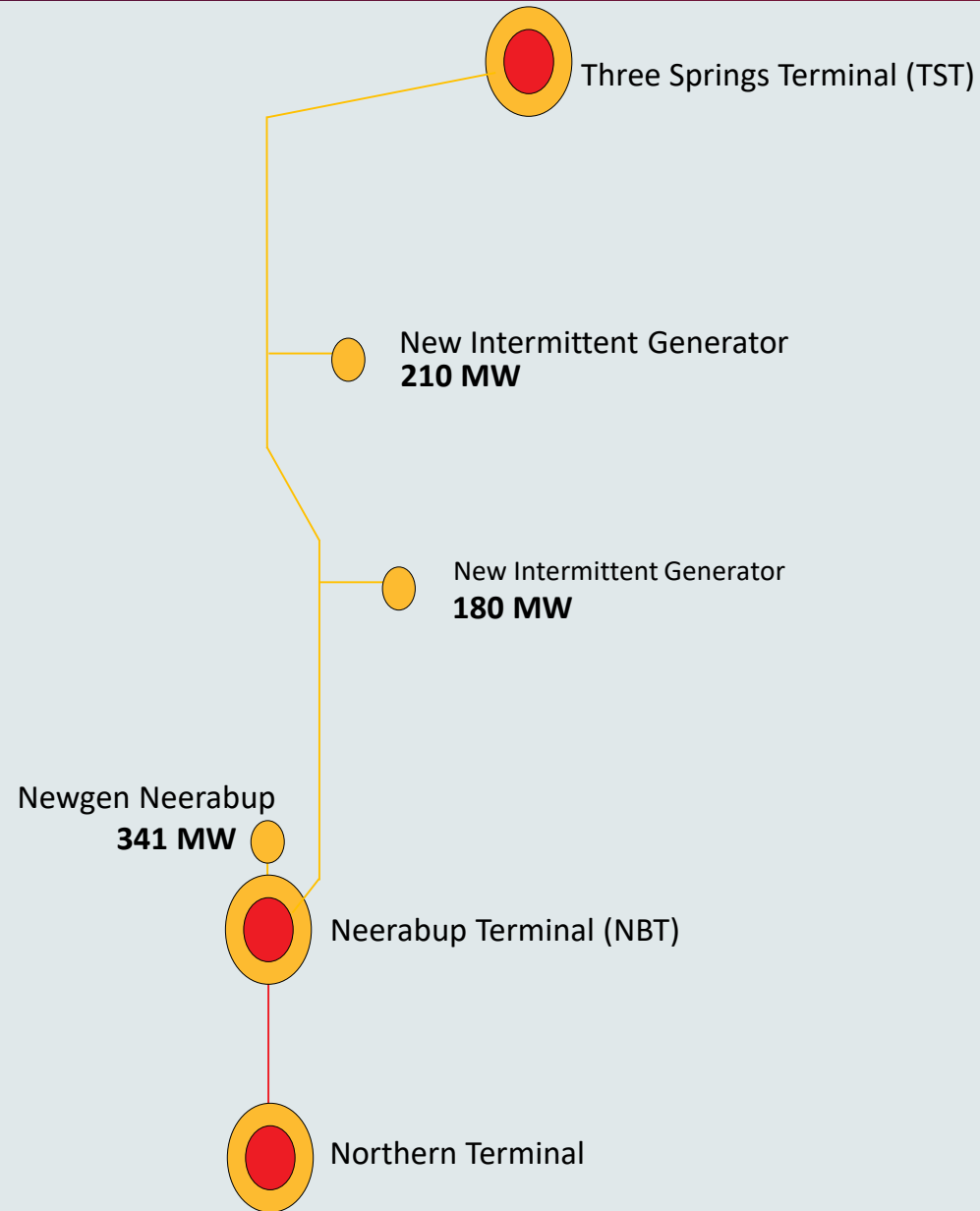


Spinning Reserve implications of multiple generators on a single transmission line

June 2019

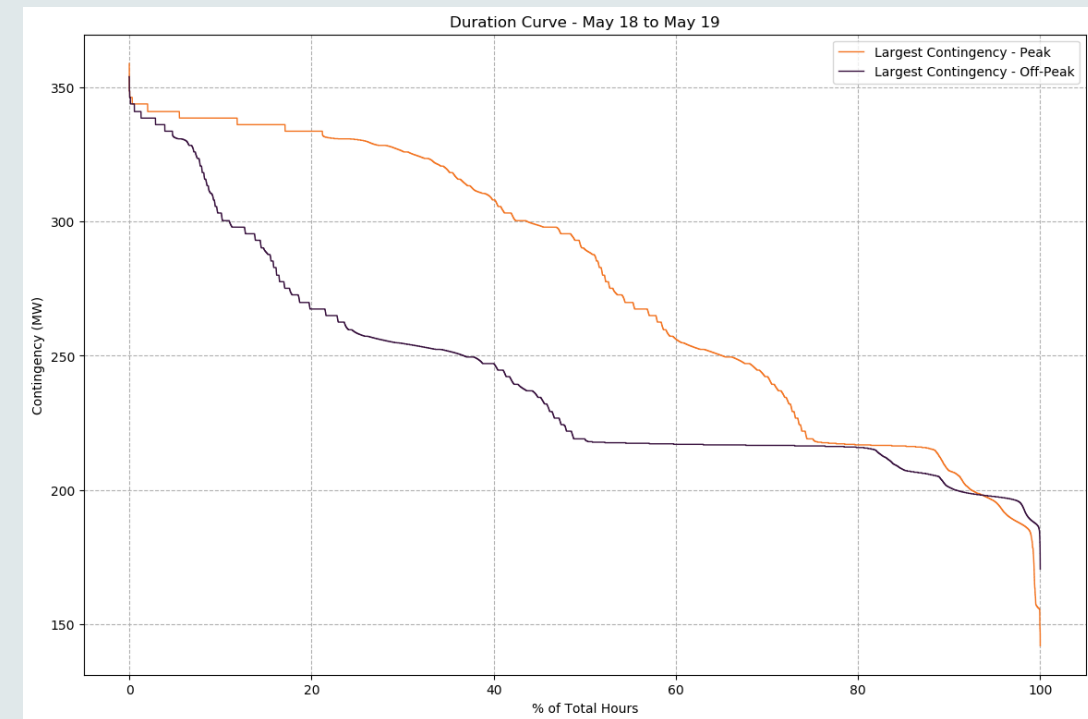
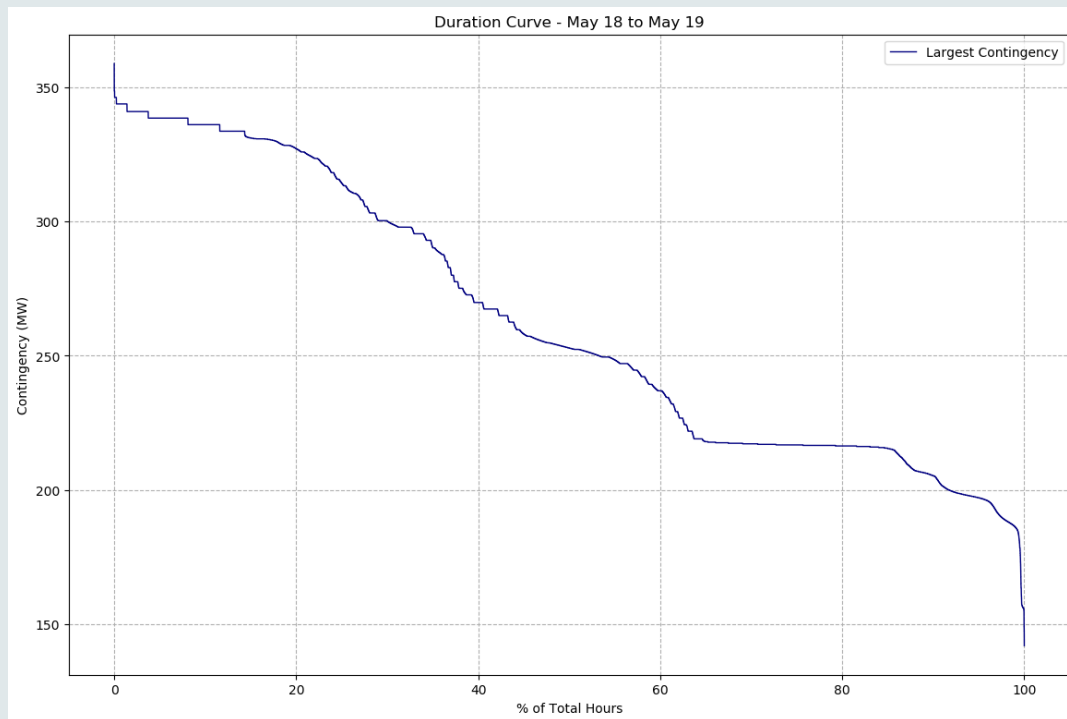
Review: Scenario

- Connection of two new intermittent generators on the single 330 kV line between Neerabup Terminal (NBT) and Three Springs Terminal (TST) in first half of 2020
- A network fault on NT-NBT-TST 330 kV line will trip both generators
 - This will become the largest SWIS generation contingency
 - Will occur when the combined output of both generators is in excess of the output of the largest single generator (340 MW at peak or 200 MW off peak)
- In certain outage conditions, a network fault between Northern Terminal and NBT will also trip Newgen Neerabup
 - Up to 730 MW generation could be lost.



Spinning Reserve Considerations

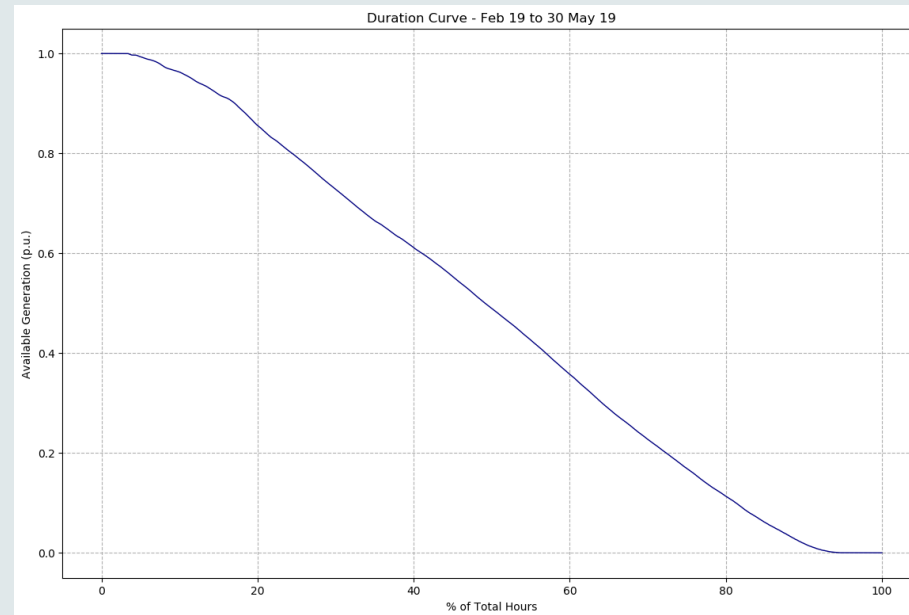
- The Spinning Reserve Requirement is currently required to meet at least 70% of the largest contingency
- The largest contingency for the past twelve months is indicated in the figures below, which show the duration curve for the total contingency, and then split between peak and off-peak hours. In general, this is a single generator.
- Although the largest contingency during peak hours is higher than in off peak hours, it is insightful to note that even during peak hours this contingency size often reduces.



- The Spinning Reserve requirement could exceed the values used in the Margin Value assessment

Similar intermittent generator profile

- The chart below indicates the output duration of an intermittent generator located in a similar area, for a three month period (this is not necessary indicative of the full year).
- Geographic diversity implies that the output of the two new Facilities may not be coincident (especially for peaks) but the chart is indicative of the proportion of time for which high output can be expected.



- Further modelling based on forecast output is required to understand the likely combined output of the two facilities as well as the coincidence to estimate the size and frequency of this contingency.

Current approach to manage SR requirements

1. Technical Rule 2.2.1(d) prevents the operation of a combined contingency that would result in under-frequency load shedding. As a result, the full output of the two Facilities must be prevented from operating at this level as a part of connection to the SWIS. The level varies dependant on system conditions.
2. AEMO will manage the Power System as usual. That is, Spinning Reserve will be acquired to meet 70% of the largest contingency.
3. Spinning Reserve can only be provided by Facilities that are online, either with a Spinning Reserve Contract or part of the Balancing Portfolio.
4. A sufficiency large contingency, especially during low load periods, may exceed the available Spinning Reserve. In this case, AEMO will be required to curtail the size of the contingency or acquire more than 70% of the largest contingency.

Considerations

1. The generators will commission during the first half of 2020. This means the largest contingency could materialise prior to the implementation of the ETS
2. In the interim, though complex, the technical impact can be managed by current practices and under the current WEM Rules. AEMO will acquire increased quantities of Spinning Reserve from Synergy and constrain the size of the contingency as required
3. Under the current WEM Rules, the determination of the largest contingency for Spinning Reserve Ancillary Service payments may not reflect the actual causer in this situation

If the resulting system implications or costs are not preferred, several options are available:

1. Modification to the 'causer pays' principles for Spinning Reserve costs to provide a more appropriate incentivisation under the WEM Rules
2. Consideration of additional scenarios where impacting generators are not compensated for being curtailed to reduce the size of the contingency under the WEM Rules
3. Potential options available to the Network Operator, including consideration of existing network infrastructure

Proposed way forward

- AEMO has contacted the relevant proponents to gather forecast information
- The directly impacted parties prepare more detailed analysis (including generation forecasts, network costs, market modelling) which is to be presented at the next MAC for further review.
- The MAC consider alternate suggestions to this issue.