Allocation of Certified Reserve Capacity to Intermittent Generators: Options to decrease volatility

Presentation to the Reserve Capacity Mechanism Working Group
Thursday 21 July 2022

Presented by Rebecca White and Peter Shardlow

Presentation Overview

Purpose: to inform design of a method to allocate Certified Reserve Capacity to intermittent generators that meets the purpose of the RCM, is aligned with the WEM objectives and supports investment in renewable generation (in the right places).

1. Allocation method design
2. Projections of capacity credit allocations

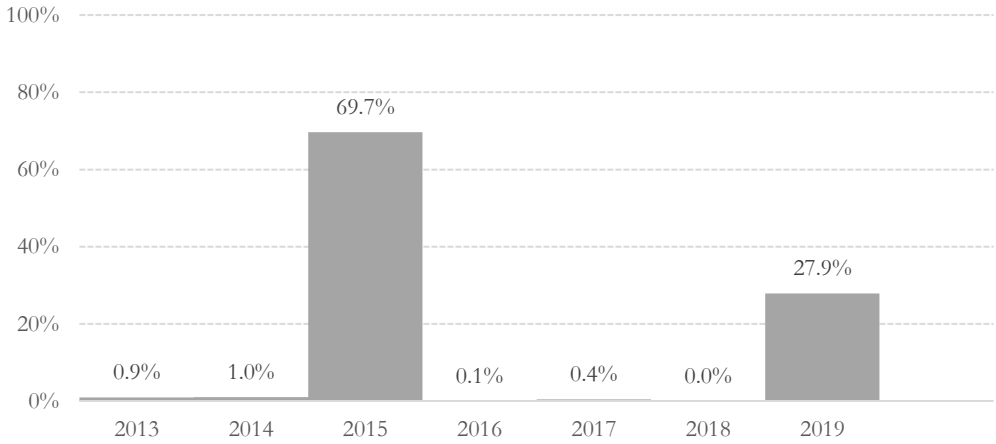
Section 1: Allocation method design

Outputs of the Delta method are determined by a small sample of trading intervals

A small change in which intervals are selected has a large impact on the fleet- and facility-level capacity allocation

- This issue was acknowledged in the Rule Change Panel report on the Delta method (see figure).
- Moving into the future, the 2015 trading intervals that drive reported results will move outside the seven-year window used by the Delta method, resulting in a significant re-calculation of which trading intervals determine outputs.
- A method that has lower volatility while still compensating facilities that generate during periods of high system stress would be preferable.

Contribution to total LOLE by year, 2013-2019



Source: Rule Change Panel RC2019-03 Report, Table 3

A hybrid of the Delta and ERA methods will reduce variability in fleet-level and facility-level capacity allocation to intermittent facilities

The hybrid approach is a combination of the Delta and ERA methods

- Determines the fleet-level Effective Load Carry Capability (ELCC) using the same algorithm as the Delta method.
- Hybrid fleet ELCC uses the mean of the annual ELCC rather than a single ELCC calculated over the entire seven-year period to reduce fleet-level volatility.
  - A variation of this option is discussed in Section 6.1.7 of the RCP Report.
- Allocates the fleet-ELCC to intermittent facilities based on their output during periods of system stress, from the ERA method.
- All other modelling steps (including demand scaling, LOLE calculation, and the treatment of small facilities) is from the Delta method.

Summary of CRC allocation methods

Item	ERA	Delta	Hybrid
Method of adjusting historic demand to account for changes in the profile of demand	Demand is scaled so each annual peak equals the 10% PoE forecast (7b.i), adjusted to reflect current installed BTM PV capacity, then overall shape is adjusted so forecast MWh target is reached. No reference to BTM battery capacity.	Step 4.2 - Historic demand is adjusted for forecast BTM PV capacity in year 3 of the reserve capacity cycle. No reference to BTM battery capacity. Requirement under 4.9.11 for AEMO to publish how they intend to implement the adjustment methodology.	Same as Delta
Method for accounting for large-scale energy storage systems (ESS)	Probabilistic approach in step 7D.	Contribution of large scale ESS is reflected in the COPT during nominated ESROI peaks.	Same as Delta
Capacity Outage Planning Table – Asset classes	Single table with Scheduled and DSP facilities.	Multiple tables depending on time-of-day to capture the interactions between scheduled, DSP, and storage facilities.	Same as Delta
Capacity Outage Planning Table – Setting the benchmark level	ERA uses planning criterion of eight intervals in ten years.	Calculation of observed LOLE during sample period used as a baseline.	Same as Delta
Aggregation of facilities	ELCC allocated to technology class groups. Individual facility contribution determined by facility average performance level (steps 8-13).	ELCC allocated on a per-facility basis. Aggregation only for small facilities.	Same as Delta
Number of trading intervals used in sample	12* trading intervals per year on separate days as per Step 8.	Variable – contribution of each trading interval is determined by relative LOLE of that trading interval.	Intervals for Fleet ELCC chosen the same as Delta but on an annual basis. Intervals for facility allocation chosen as highest four trading intervals on the peak 12 days per year (336 intervals)
Determining facility relevant level – How is the fleet ELCC allocated to facilities?	Facility performance is determined by averaging facility output over multiple peak intervals (Step 9).	Facility performance is determined by output during periods of supply shortfall, leading to a small number of intervals determining facility relevant level.	Similar to ERA - Identify peak intervals then calculate the Facility Average Performance Level during those intervals.

Section 2:
Projections of capacity credit allocations

Generating forward looking projections illustrates the dynamics of each alternative methodology

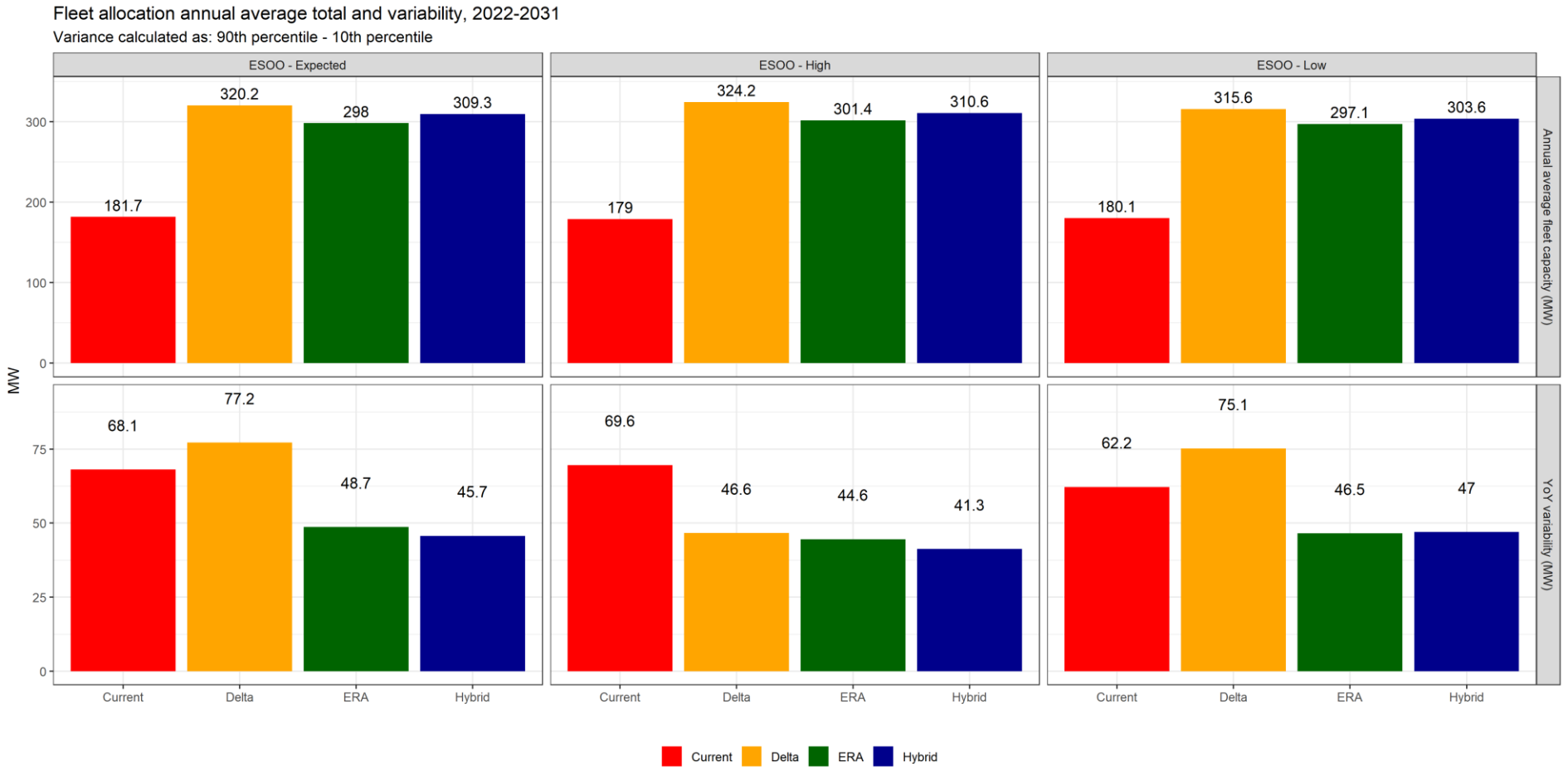
How we generate forward looking projections for each alternative relevant level method

- Implement the current, ERA, and Delta methods.
- Like dispatch modelling, we generate simulations for a ten-year horizon (2022-2031) for demand and facility output consistent with the defined scenarios.
- Simulation process captures the impacts of increases in behind-the-meter (BTM) rooftop PV and batteries, and growth in peak demand. Each simulation is stochastically generated while ensuring daily, weekly, and seasonal patterns are maintained. Assumptions are baselined to AEMO's 2022 WEM ESOO.
- Includes Muja facility retirements to be consistent with the recent State Government announcement, and new facilities coming online.
- As each method "looks backwards" by between five and seven years, the early results are primarily based on observed data, while in the later years the results are based on entirely simulated data.

Limitations with the methodology

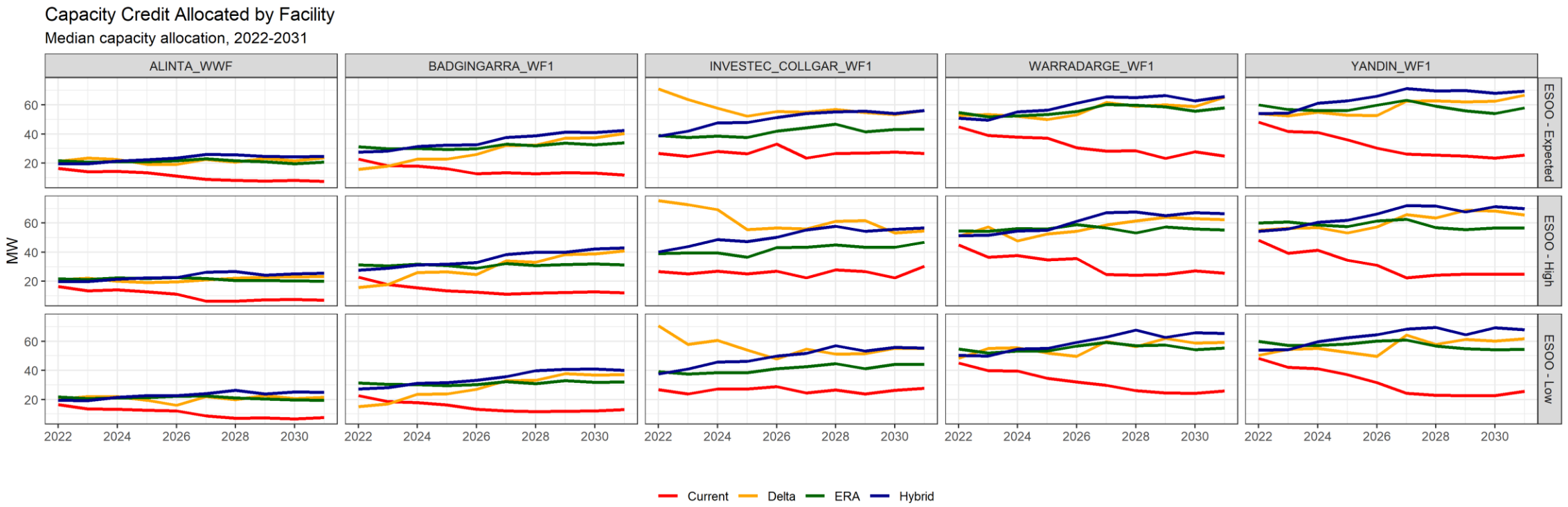
- Forward looking projections are made on the best information available at the current time and rely on assumptions and inputs that may or may not eventuate.
- The objective is to illustrate how the alternative methods interact in a relative manner with changing market conditions, not to provide point estimates.

The hybrid method produces lower variability relative to the ERA and Delta methods

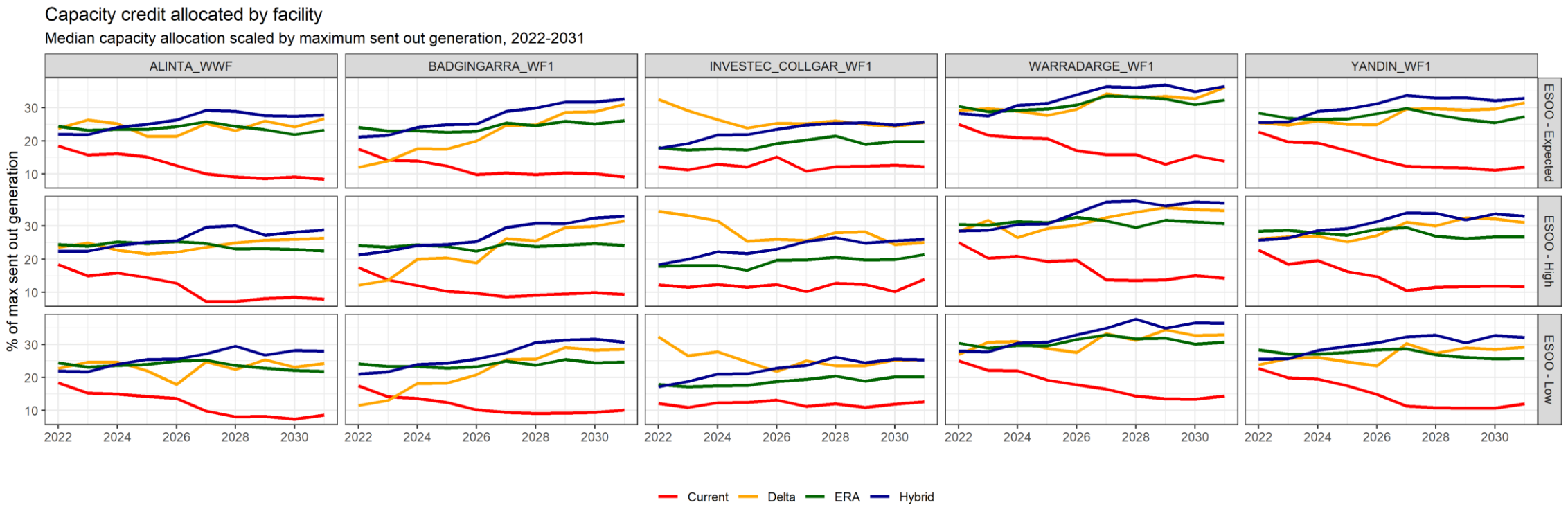


The profile of the hybrid option differs from the alternatives, but better aligns with scheduled facility retirements

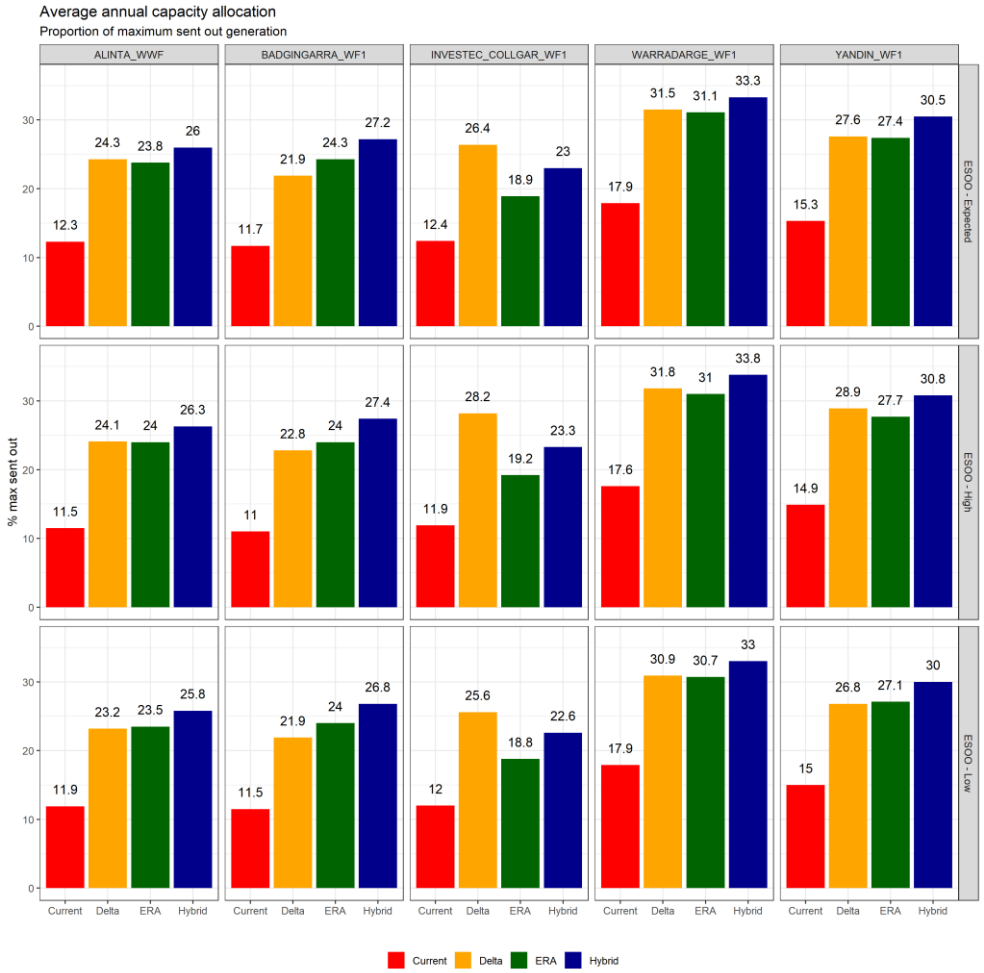
Facility-level capacity allocation is more stable under the hybrid method - Total MW

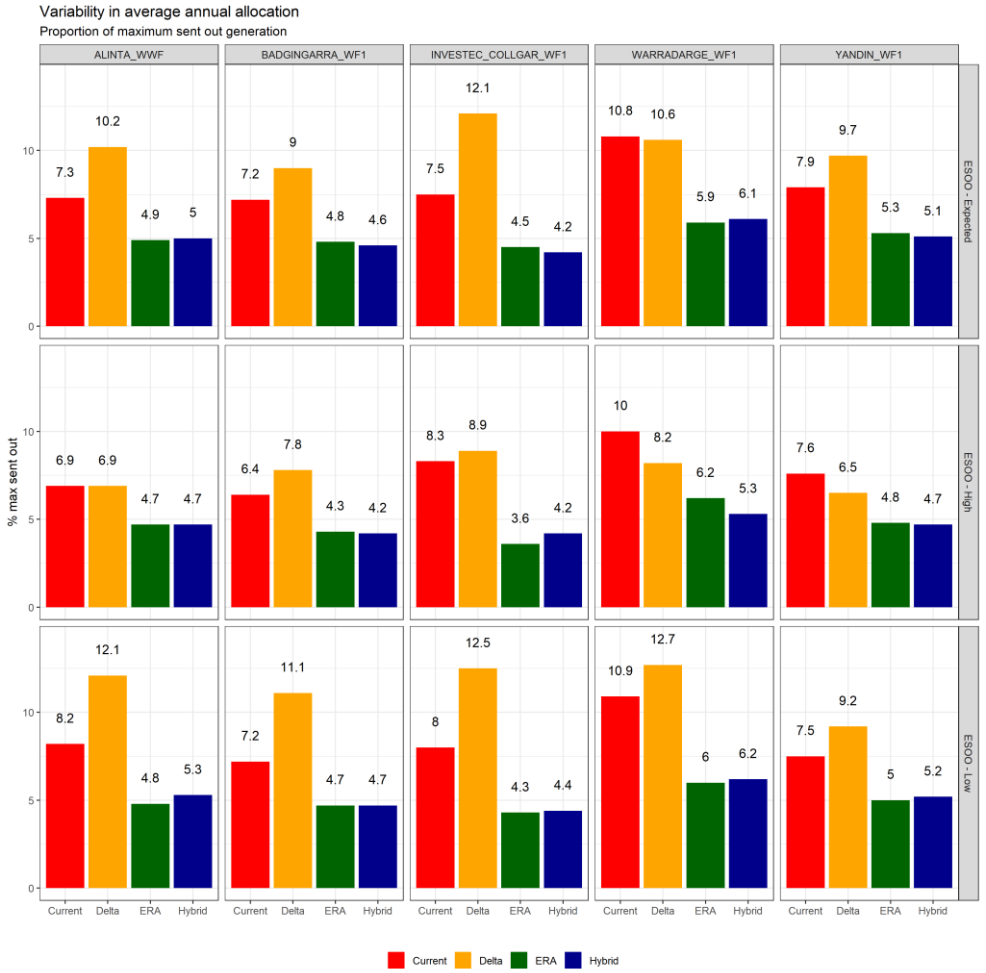


Facility-level capacity allocation is more stable under the hybrid method - Scaled by sent out generation

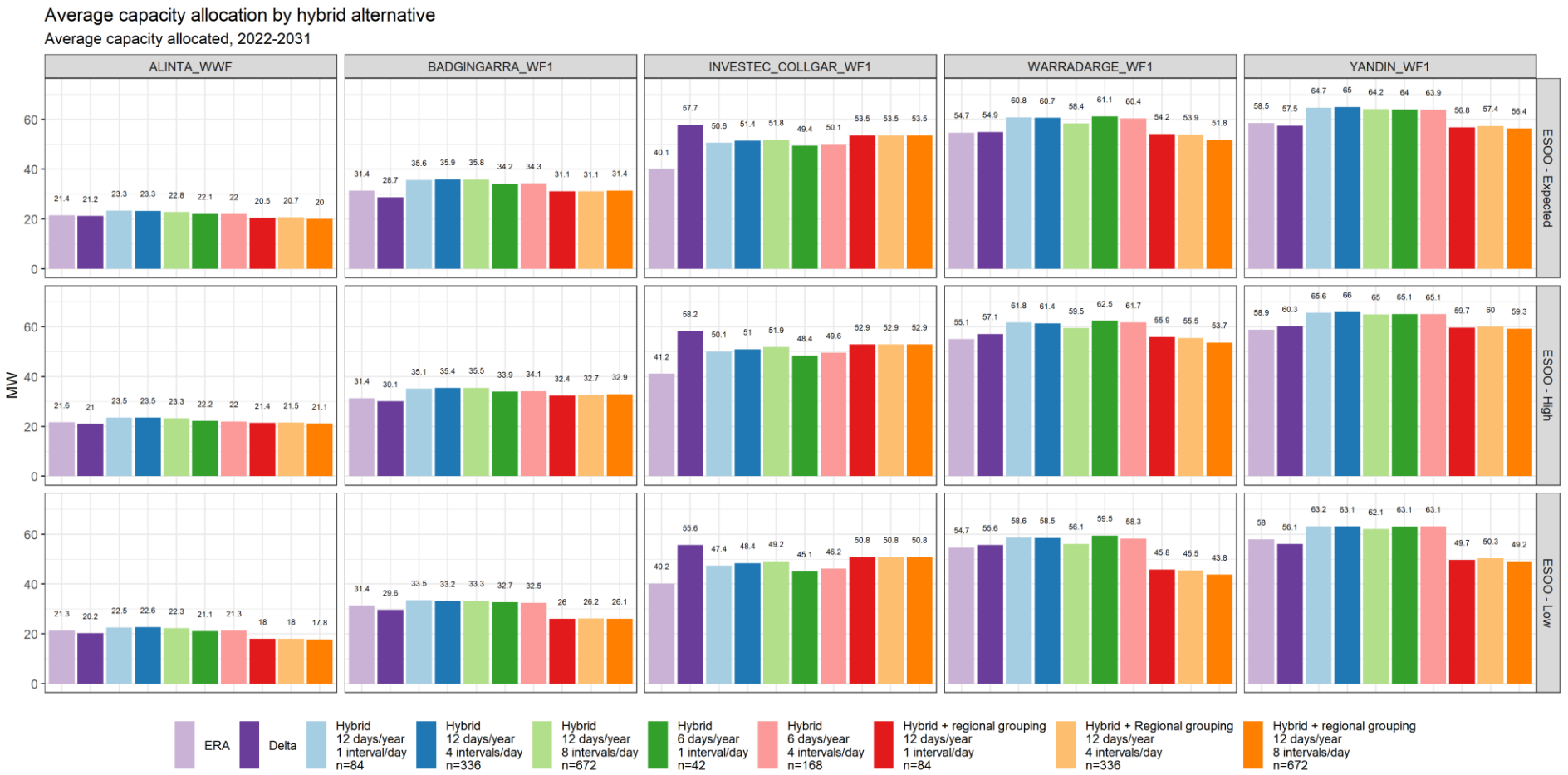


For most facilities, the hybrid option produces a higher capacity allocation at lower variability under all ESOO scenarios





How does the choice of parameters change the results?



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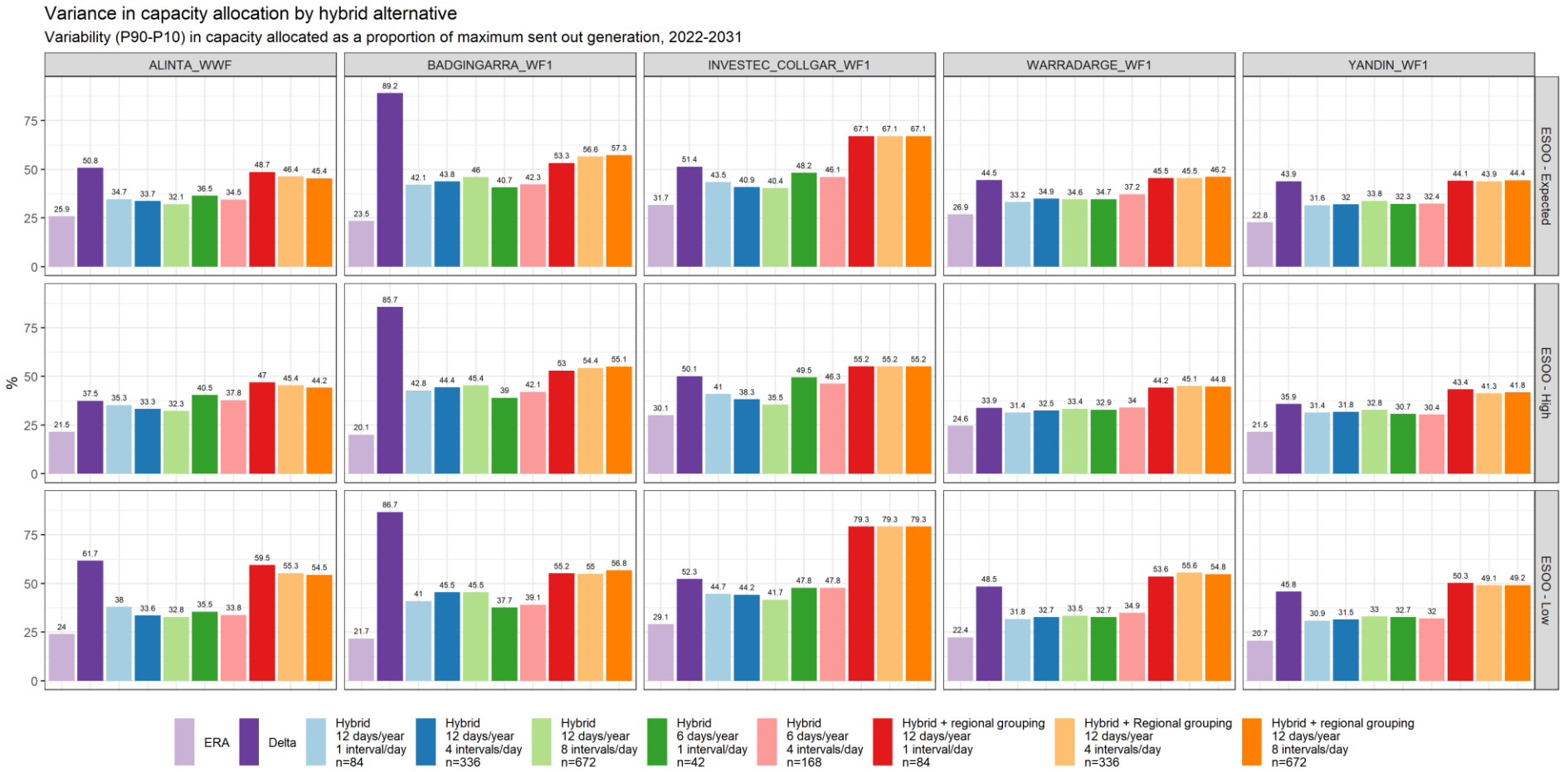

In summary

1. The hybrid method decreases volatility

2. Increasing intervals included is a benefit, until a point…

3. A regional allocation compensates resources for the value of their generation….but at the trade off of increasing volatility

Some options for consideration.

Thank you.