

MAC Workshop:

**RC_2017_02: Implementation of 30-Minute Balancing
Gate Closure**

6 September 2019

Workshop Purpose

- Consideration of the main issues and options to address them:
 - Comparing reduced Balancing Gate Closure (**BGC**) options;
 - Addressing the existing aggregate ramping issue.
 - Options for amending Synergy's gate closure;
 - Options for amending LFAS gate closure;
 - Strawman proposal;
 - Enhancement of information used in trading decisions; and
 - How to quantify the possible effects of the proposal.
- Provide input to Draft Rule Change Report.
- Discuss next steps.

Purpose of RC_2017_02

Amend clause 7A.1.16 to reduce the current BGC period from two hours to no more than 30 minutes before the relevant Trading Interval (TI).

- AEMO publishes updated Balancing Forecasts every 30 minutes but BGC is 2 hours before the TI.
- Bids are based on forecasts 2.5 hours ahead of delivery.
- Forecasts are more accurate closer to real time.
- Increasing intermittent generation is leading to greater forecasting error.
- Allowing Market Participants to respond to changing market conditions and bid closer to real time will provide the opportunity to bid based on more accurate information, creating efficiencies.
- Allows Market Participants to return to service from an outage sooner.

Assessment Criteria

- Wholesale Market Objectives (clause 1.2.1)
- Balancing Market Objectives (clause 7A.1.3).
- Practicality in the context of the SWIS, given the generation mix and use of manual processes by System Management.
- A short-term change (until Government reforms are implemented):
 - Looking for simple solutions that do not involve system redesign – this limits the scope of the solutions.

Context

Design Characteristic ¹	Historic Design	Current WEM Design	Benchmark RE Design
Demand shape	Stable	Duck Curve	Duck Curve
Time horizon of power system operations	Gate closure hours/days ahead	2-hour gate closure	Shortened gate closure (e.g. 1-hour ² or ETIU's 30 min, 15 min, 0 min gate closure)
Mode of operation of coal	Baseload, mid-merit	Baseload, mid-merit	Mid-merit, peaking
Generation mix	Coal, gas, diesel, DSM	Coal, gas, diesel, some DSM, renewables, contemplating storage	Retiring old coal, gas, DSM, storage, interconnection (where possible), renewables
Cross market integration and dispatch process	Non-co-optimized energy and Ancillary Services with largely manual dispatch processes	Non-co-optimized energy and Ancillary Services with largely manual dispatch processes	Co-optimized energy and Ancillary Services with automatic dispatch
Required Ancillary Services	LFAS, SRAS, LRR, System Restart, NCAS, DSS for islanding	Sculpted LFAS, SRAS, LR, System Restart, NCAS, contemplating DSS for inertia	Additional Ancillary Services such as inertia, fast frequency response, generator ramping capability

1. This context does not suggest scenarios or packages for discussion.

2. Recommended for all European System Operators by the Agency for the Cooperation of Energy Regulators in 2015.

Issue 1: Comparing Options

How close can gate closure get to the start of the relevant TI whilst also allowing System Management a reasonable period to ensure that system security is maintained?

BGC	Last Forecast before BGC	System Management View	
30 minutes	1 hour	<ul style="list-style-type: none">• Would experience technical problems.	✗
60 minutes	1.5 hours	<ul style="list-style-type: none">• Would require some complementary changes to dispatch and settlement.• Difficulty moving coal in time in some TIs.	?
90 minutes	2 hours	<ul style="list-style-type: none">• Can administer this BGC with no system security issues.	✓
120 minutes	2.5 hours	<ul style="list-style-type: none">• Currently administers this BGC.	✗

60-Minute BGC and Synergy's Portfolio

AEMO's submission (2017):

- Concern about System Management's ability to effect the chosen Balancing Portfolio Dispatch Plan when longer lead time actions are required to position the Balancing Portfolio for the start of the TI:
 - Starting/stopping coal mills and slow ramping of coal units (in the same or opposite direction) into desired position to provide the required energy, aggregate ramp rate, or Ancillary Services. This can take 45-60 minutes.
 - Start up of OCGT. This can take up to 15 minutes.
- *"In the extreme cases, it is possible that the movements of the Balancing Portfolio may not be completed prior to the start of the TI, leading to the potential for increased Constrained On/Off Compensation"* (page 8).

Existing Issue – Aggregate Ramping

Aggregate ramping of IPPs in early minutes of TI requires “*preparatory scheduling of the Balancing Portfolio to balance the ramping without materially eroding Ancillary Service quantities within a TI*” (page 9).

- System Management advised that it uses LFAS and LRR to cover this issue when it is required. Synergy’s Muja plant provides LRR along with HEGTs and Pinjar units, which also provide LFAS.
- System Management dispatch according to Synergy dispatch guidelines and must minimise changes to Synergy Dispatch Plan.
- ‘Must run’ of Synergy’s coal plant determines the time horizon of power system operation and outcomes:
 - Is this appropriate – market volatility, price signals and investment?
 - Is this necessary – what are the risks to system security if coal plant are not used to address the ramping issue?
 - Can the ramping issue be managed using gas? What is Synergy’s view of the impact if gas plant is deployed instead of coal, with a 60-minute BGC?

Existing Issue – Aggregate Ramping

- System Management has indicated that aggregate ramping will become a problem with 60-minute but not 90-minute BGC.
 - Can System Management please explain why?
 - What would AEMO do under a 90-minute BGC?
 - What would AEMO do under a 60-minute BGC?
 - Why is there a need to do something different in each case?

Existing Issue – Aggregate Ramping

AEMO's current position (2019):

- System Management has identified reductions in the available quantities of Ancillary Services due to the aggregate ramping issue.
 - Synergy must make its capacity available to provide Ancillary Services to a standard 'sufficient to enable System Management to meet its obligations' in accordance with the Market Rules (clause 3.11.7A). **Is coal plant sufficient?**
 - System Management:
 - Must procure adequate Ancillary Services where Synergy cannot meet Ancillary Service Requirements (clause 2.2.2). **Can someone else provide the service?**
 - Determines the requirements in accordance with the SWIS Operating Standards and Ancillary Service Standards; updates the requirements annually, based on the facilities and configuration expected in the coming year; and can reassess the level of the requirements if a considerable shortfall is likely before the next update (clause 3.11). **Options for DSS or updates to requirements?**
- LFAS can only be used for '*uninstructed*' output fluctuations from Scheduled Generators (clause 3.10.1 (a)(ii)). **Why the change now?**

Options to Address Aggregate Ramping

In assessing the options to address the aggregate ramping issue – will the option:

- provide energy and ancillary services at the lowest economic cost;
- appropriately reflect short-term system operation costs;
- foster development of flexibility;
- create a level playing field;
- avoid creating wealth transfers that are unsustainable in the long-term; and
- exclude unnecessary risks (e.g. revenue, regulatory)?

Option – Linear Ramping

AEMO's submission (2017):

- Linear ramping or staggered ramping may allow a move to 60-minute BGC.

AEMO's current position (2019):

- Will implement linear ramping to address the existing aggregate ramp issue – *irrespective* of gate closure (i.e. at current 2-hour BGC);
- AEMO currently does this in Emergency Operating States;
- ETS is moving towards co-optimised energy and Essential System Services, and is considering linear ramping; and
- Removes System Management's concerns about having to move coal prior to start of Trading Interval. Can implement:
 - 90-minute BGC with manual management of linear ramping; or
 - 60-minute BGC with automated management of linear ramping.

Option – Linear Ramping

Is it necessary to introduce linear ramping to consider a change to BGC?

Could we:

- Change clause 3.10.1(a)(ii) to include ‘instructed’ output fluctuations from Scheduled Generators; and
- Continue to use LFAS when required to address the aggregate ramping issue until the ETS changes are implemented?
 - What constraints would be needed on the LFAS requirement if we increase LFAS for this purpose?

If linear ramping is employed to address the aggregate ramp issue?

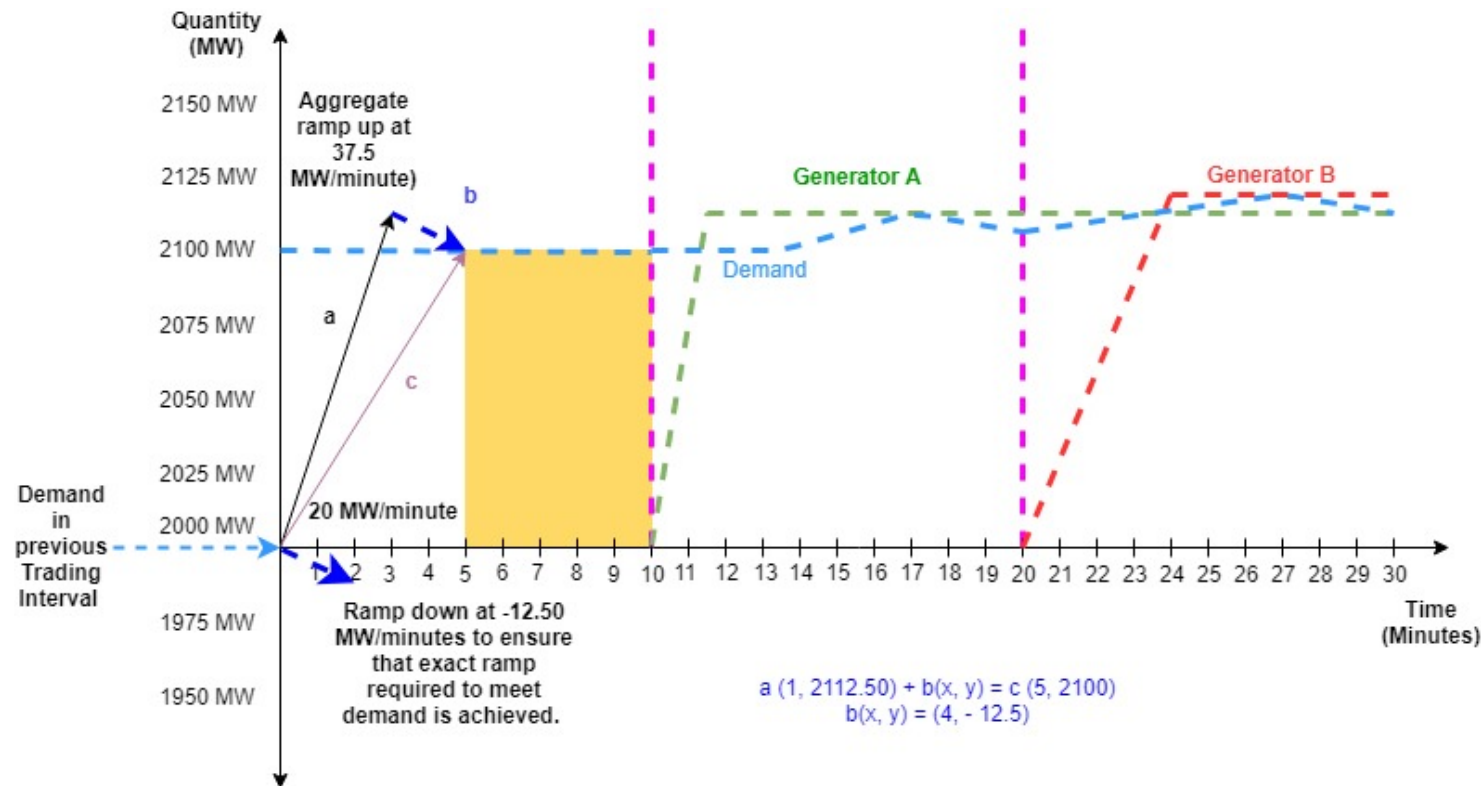
- How will it work in ‘non-emergency’ conditions – who is moderated, when and by how much?
- Are system changes required for System Management and/or Market Participants to allow for moderated ramping – cost and time to implement?
- Are there implications for TES and constrained off compensation?
- What are the risks?

Option – Staggered Ramping

AEMO's 2017 submission "*AEMO is currently able to stagger the start times of Dispatch Instructions*" (page 10).

- Could staggered ramping be used to ensure that there is not too much concurrent upward ramp by IPPs?
- How will it work?
 - System Management delays dispatch for IPPs, holding them back in the BMO until System Management are ready to dispatch them.
 - Would use a Retrospective Operating Instruction so that they are not paid \$1,000/MWh for constrained off payments.
 - Requirements to remove the ability of System Management to exercise discretion in dispatch decisions. For example:
 - Set a threshold for when staggered ramping is required (e.g. net ramp greater than a set threshold or required movement by Synergy greater than 100 MW).
 - Dispatch priority based on efficiency (e.g. using the BMO). **What other options are there?**

Market and Participant Outcomes



- Is staggered ramping a suitable way to address the aggregate ramp issue?
 - Effect on marginal generator?
 - IT system changes – cost and timeframe for implementation?
 - Are there implications for TES and constrained off compensation?
 - What are the risks?

Issue 2: Synergy's Gate Closure

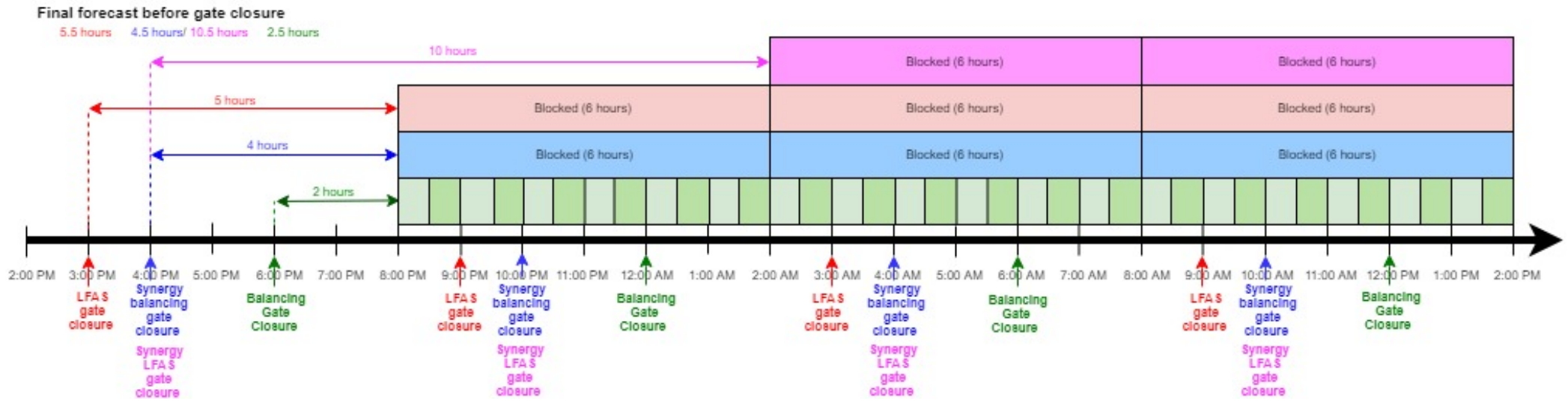
Allowing Synergy to bid closer to real-time will allow it to bid based on more accurate information, creating efficiency (same as for IPPs).

- Synergy's gate closure is prior to BGC:
 - reduces Synergy's ability to exercise dominance because IPPs can revise submissions beyond Synergy's gate closure; and
 - provides IPPs with sight of where Balancing Portfolio is so that can bid without risk of infeasible dispatch, which would lead to requirements to pay refunds.
- Reduce horizons and/or gate closure period?
 - What time is needed by IPPs and why?
 - What time is needed by Synergy and why?
- Introduce rolling gate closure, like IPPs?
- Make Synergy's gate closure the same as for IPPs?

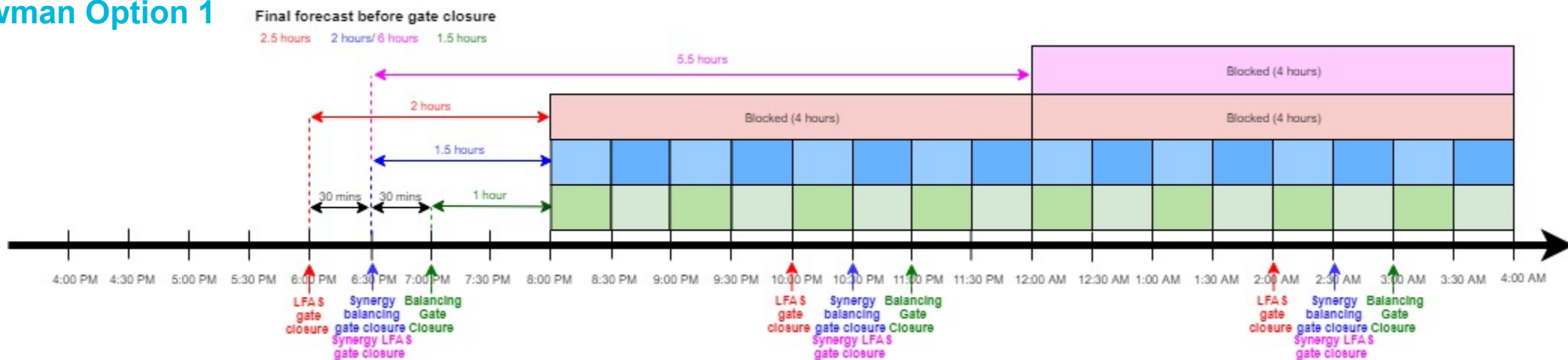
Issue 3: Load Following Gate Closure

- Interplay between LFAS, Synergy and BGCs:
 - LFAS Gate Closure is 3 hours before BGC.
 - Clause 7B.2.4 states that Synergy 'may' submit an updated LFAS Submission in respect of the balancing portfolio...(aA) for one or more TIs in the Balancing Horizon for which LFAS Gate Closure has not occurred; and (b) at the time it makes an updated Balancing Submission under clause 7A.2.9(d) i.e. within one hour after LFAS Gate Closure.
 - Last forecast 10.5 to 16.5 hours ahead of TI.
- Providing Market Participants with more accurate forecasts and allowing them to bid closer to real time will improve efficiency.
- Reduce horizons and/or gate closure period?
 - What time is needed by IPPs and why?
 - What time is needed by Synergy and why?
- Introduce a rolling gate closure?

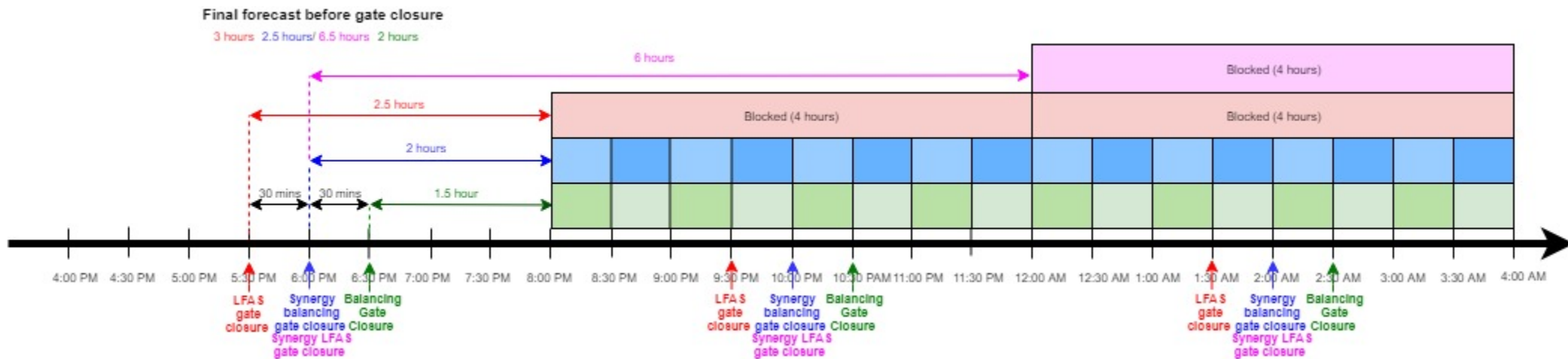
Current Gate Closure Timeframes



Strawman Option 1



Strawman Option 2



Strawman Option 3



Issue 4: Enhancement of Information used in Trading Decisions

- Alinta's submission – allow, but not require, Market Generators to update their wind forecasts after gate closure.
 - Approved as part of RC_2014_06 on 29 October 2018 and commenced on 1 July 2019.
- Bluewaters submission – require AEMO to publish intermittent generators' actual output information on a timely basis, in real time if possible?
- Is there any other information that would be useful (noting that Consequential Outage information is being considered as part of RC_2014_03)?

Issue 5: Quantifying Effects of Change

Affected parties (AEMO (System Management), Market Participants, ERA, Consumers)?

Estimation

Example: Estimates were employed in quantifying the costs and benefits in the NZ market when they reduced gate closure to 60-minutes. Participants were asked to give examples.

What Questions can be Answered?

- System Operator: (one-off) system implementation costs?
- Market Participants (ongoing): Will one-hour BGC affect behavior, reducing cost of production and by how much? For example, market scenarios:
 - If we displace 150MW of CCGT (SRMC = \$70/MWh) with generation (SRMC = \$30/MWh) for 1 hour five times/year = \$30,000/year.
- ERA Compliance monitoring: Will one-hour BGC increase time and resources needed for monitoring and by how much?

What can't it do?

- Simulate operation of power system to provide an indication of outcomes for the market.

Production cost Model – Unit Commitment and Dispatch

Example: Plexos

What does it do?

Simulates operation of power system over a year, for example, at a relatively high resolution (e.g. 30 mins).

What questions can be answered?

- What is least cost dispatch to meet load in TIs?
- What are operation and resource adequacy impacts of the retirement of coal?

Possible outputs

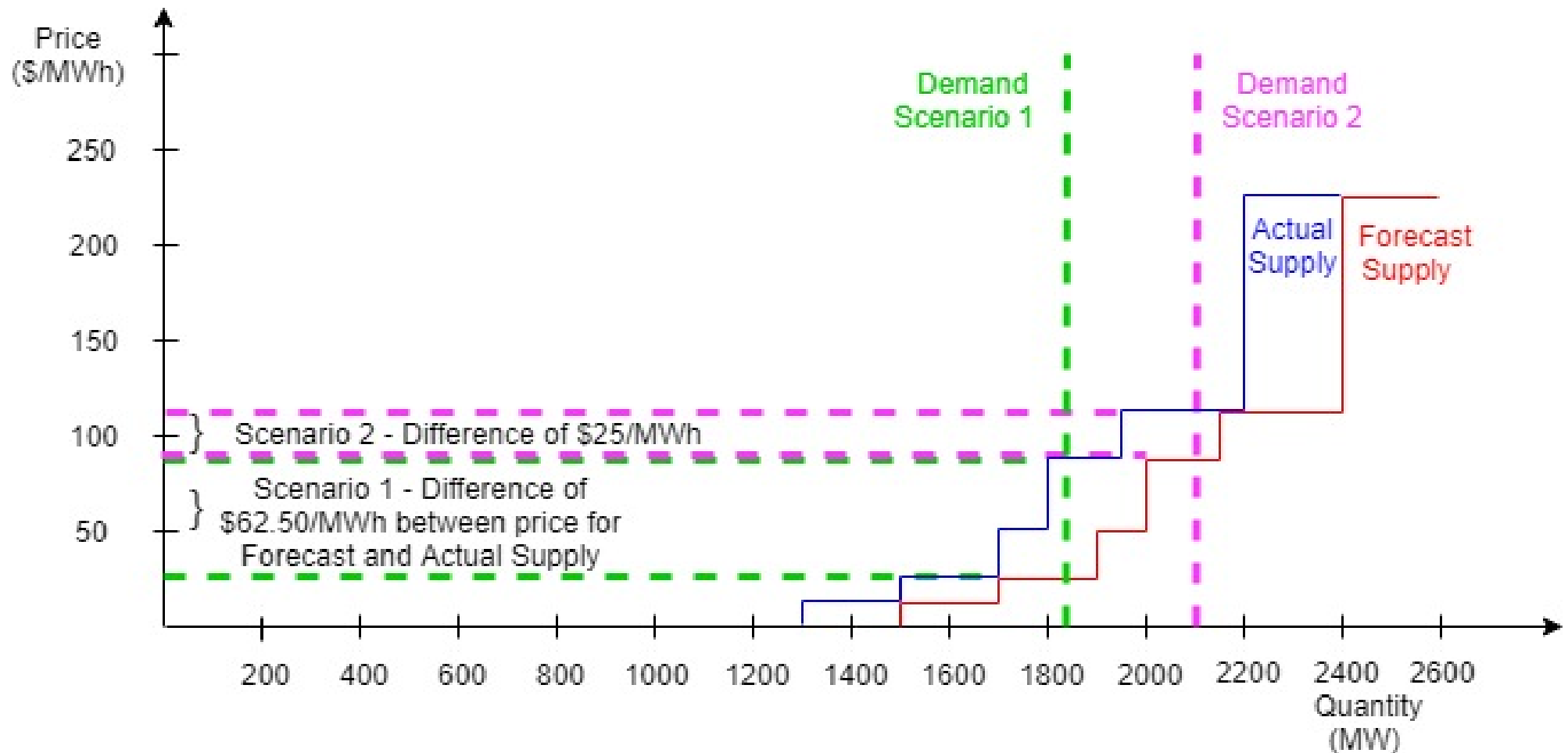
- Unit level generation, marginal prices, ancillary service prices, curtailments.

What can't it do?

- Simulate transmission networks to address specific situations occurring in very short periods (30 seconds to a minute) and assess aspects of reliability – transmission adequacy, generator or transmission contingencies, frequency stability or voltage stability or control.
- Model the portfolio.

In either case, outputs are accurate only to the extent that inputs are accurate (e.g. assumptions about how participants will behave or changes in premiums).

Forecasting Accuracy



In this example there is an over forecast of supply. The effect of demand on price is not linear. It also depends on the mix of available generation.

Intended Approach

- Assessment and identification of preferred options will draw from:
 - stakeholder feedback in first submission period;
 - MAC meetings;
 - this workshop; and
 - One-on-one stakeholder discussions.
- Assessment of proposal against:
 - the Wholesale Market Objectives; and
 - Balancing Market Objectives,
with consideration given to the economic principles underlying these objectives.
- Will not conduct a market simulation using a production cost model.

Intended Approach

- Qualitative analysis – will consider costs and benefits:
 - The main costs are:
 - Risks to system security.
 - Potential increased use of gas and decreased use of coal.
 - Increased LFAS costs and/or impact of staggered or linear ramping.
 - Implementation costs (particularly for AEMO).
 - Are there any other costs?
 - How can these costs be estimated?
 - The main benefits are:
 - Increased efficiency from BGC closer to the TI.
 - Are there any other benefits?
 - How can these benefits be estimated?

Next Steps

- RCP Support to develop a Draft Rule Change Report for the Rule Change Panel's consideration.
 - Will continue to consult using one-on-one discussions.
- Rule Change Panel to publish Draft Rule Change Report, targeting October 2019.

Questions?