

MARKET PROCEDURE: BALANCING MARKET FORECAST

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VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
1.0	Balancing Market Commencement Day	Market Procedure for Balancing Market Forecasts
2.0	30 November 2015	Changes resulting from the transfer of functions from the IMO to AEMO
<u>3.0</u>	<u>18 April 2017</u>	<u>Changes resulting from the transfer of System Management functions to AEMO</u>

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CHAPTER 1. PROCEDURE OVERVIEW

1.1. Relationship with the Market Rules

- 1.1.1. This Balancing Market Forecast Procedure (Procedure) should be read in conjunction with sections 7A.3.15 to 7A.3.21 of the Wholesale Electricity Market (WEM) Rules (Market Rules).
- 1.1.2. Reference to particular Market Rules within the Procedure in bold and square brackets **[Clause XX]** are current as of ~~the Balancing Market Commencement Day 10 October~~ December 2016. These references are included for convenience only, and are not part of this Procedure.

1.2. Purpose of this Procedure

- 1.2.1. This Procedure sets out the processes the Australian Energy Market Operator (AEMO) must follow in:
- (a) Preparing ~~and providing the~~ Forecast Balancing Merit Order (BMO) ~~to System Management~~ in accordance with clauses 7A.3.16 ~~and 7A.3.17(b)~~;
 - (b) Assigning priority to Facilities in the case where there is a tie in the Forecast BMO; and
 - (c) Preparing and publishing the Balancing Forecast in accordance with clauses 7A.3.19 to 7A.3.21 including the Balancing Quantities expected to be provided by each Market Participant **[Clause 7A.3.17(a)]**.

1.3. Application of this Procedure

- 1.3.1. This Procedure applies to AEMO in relation to the processes it must follow in preparing and publishing the Forecast BMO, the Balancing Forecast and the Balancing Quantities expected to be provided by each Market Participant.
- 1.3.2. In this Procedure where obligations are conferred on a Rule Participant, as outlined in step 1.3.1, that Rule Participant must comply with the relevant obligations in accordance with clauses 2.9.6, 2.9.7, 2.9.7A, 2.9.7B, 2.9.7C and 2.9.8, as applicable.

Note that prior to the Balancing Market Commencement Day, AEMO will have regard to the specific transition provisions for the new Balancing and Load Following markets, outlined in clause 1.10 of the Market Rules, with respect the processes outlined in this Procedure, as applicable.

1.4. Associated Market Procedures

- 1.4.1. The following AEMO Market Procedures are associated with this Procedure:
- (a) IMS Interface Market Procedure.

1.5. Conventions Used

- 1.5.1. In this Procedure the conventions specified in clauses 1.3 – 1.5 of the Market Rules apply.

1.6. Terminologies and Definitions

- 1.6.1. A word or phrase defined in the Market Rules, the Electricity Industry Act or the Regulations has the same meaning when used in this Procedure. In addition the following defined terms have the meaning given.

Term	Definition
Market Participant Interface	The Market Systems maintained by AEMO for the purpose of enabling interactions between Market Participants and AEMO systems

1.6.2. For clarity throughout this Procedure the:

- (a) Forecast BMO refers to the BMO for future Trading Intervals in the Balancing Horizon; and
- (b) BMO refers to the last Forecast BMO generated for a Trading Interval before the Trading Interval commences, using the most recent valid Balancing Submissions available. Note that AEMO must provide determine a BMO to for use in its capacity as System Management in accordance with clause 7A.3.6 between 15 to 30 minutes before the start of the Trading Interval to which the BMO relates.

CHAPTER 2. BALANCING FORECASTS

2.1. Background

2.1.1. AEMO is required to:

- (a) determine a Forecast BMO for each future Trading Interval in the Balancing Horizon **[Clause 7A.3.16]**;
- (b) determine the Balancing Quantities expected to be provided by each Market Participant for each future Trading Interval in the Balancing Horizon whenever it prepares a Forecast BMO **[Clause 7A.3.17(a)]**;
- (c) determine the Balancing Forecast for each Trading Interval in the Balancing Horizon, where sufficient information has been made available **[Clause 7A.3.19]**;
- (d) update the Balancing Forecast using, to the extent practicable, the latest information available to AEMO **[Clause 7A.3.20(a)]**;
- (e) by the end of every half hour, publish on the Market Website a Balancing Forecast for each future Trading Interval in the Balancing Horizon **[Clause 7A.3.21(b)]**; and
- (f) as soon as practicable, publish any aggregate forecast output of Non-Scheduled Generators which is determined by AEMO (in its capacity as System Management) received from System Management **[Clause 7A.3.21(c)]**.

2.1.2. The Forecast BMO for a Trading Interval is the BMO determined from the latest Balancing Submissions available to AEMO for the Trading Interval. The purpose of the Forecast BMO is to enable:

- (a) ~~AEMO System Management~~ to develop and assess the implications, including system security and system constraints, of likely generation dispatch schedules in future Trading Intervals of the Balancing Horizon;
- (b) Market Participants, in preparing their Balancing Submissions, to take account of the Balancing Quantities expected to be dispatched in future Trading Intervals of the Balancing Horizon (including to meet their obligations in accordance with clauses 7A.2.8(a) and 7A.2.9(a)(i));
- (c) Market Participants, in preparing their Balancing Submissions, to take account of aggregated Balancing Price-Quantity supply curves for future Trading Intervals of the Balancing Horizon (including to meet their obligations in accordance with clauses 7A.2.8(a) and 7A.2.9(a)(i));
- (d) ~~AEMO System Management~~, for a Trading Interval for which the BMO is not available, to determine the appropriate levels of dispatch for Balancing Facilities **[Clause 7.6.2B]**; and
- (e) AEMO, for a Trading Interval for which the Pricing BMO and the BMO are not available, to determine the Balancing Price from the most recent Forecast BMO **[Clause 7A.3.13(b)]**.

2.1.3. The Balancing Forecast includes forecasts, for each Trading Interval during the Balancing Horizon, of the:

- (a) Relevant Dispatch Quantity, in MW, at the end of the Trading Interval (as ~~provided by System Management~~ determined by AEMO (in its capacity as System Management) under clause 7A.3.15);
- (b) aggregate output, in MW, at the end of the Trading Interval, of all Non-Scheduled Generators which are Balancing Facilities (~~as provided by System Management under clause 7A.3.15~~); and
- (c) Balancing Price.

2.1.4. The purpose of the Balancing Forecast is to provide Market Generators with information upon which to make an assessment regarding the making or updating of a Balancing Submission in accordance with clauses 7A.2.8(a) and 7A.2.9(a)(i).

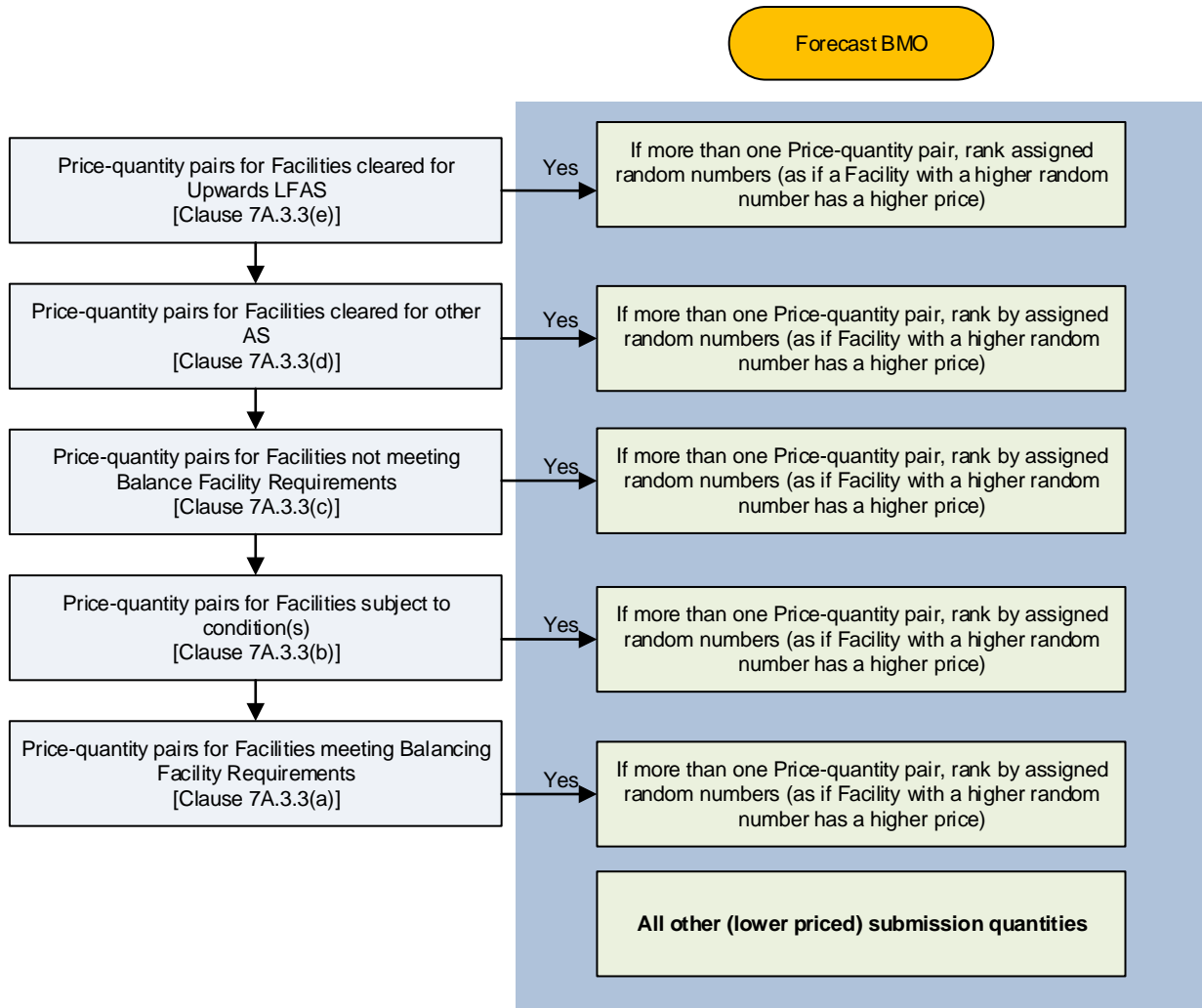
2.2. Preparation of the Forecast BMO

2.2.1. Each half hour, AEMO must determine the Forecast BMO for each future Trading Interval in the Balancing Horizon by:

- (a) converting the price in each Balancing Price-Quantity Pair for a Balancing Facility that is not in the ~~Verve Energy~~ Balancing Portfolio to a Loss Factor Adjusted Price;
- (b) ~~where System Management provides a forecast~~ AEMO (in its capacity as System Management) prepares a forecast End of Interval (EOI) Quantity in accordance with clause 7A.3.15 for a Non-Scheduled Generator that is the subject of a Facility Balancing Submission, altering the quantity in that Balancing Submission to the most recent forecast value ~~provided by System Management to~~ determined by AEMO;
- (c) creating a table of all of the quantities from Balancing Submissions in steps 2.2.1(a) and 2.2.1(b), with corresponding Loss Factor Adjusted Prices, and all of the quantities and corresponding prices from ~~Verve Energy~~ Balancing Portfolio Balancing Submissions;
- (d) sorting the table of quantities and corresponding prices created in step 2.2.1(c) in order of lowest to highest price; and
- (e) where any Price-Quantity pairs in the table created in step 2.2.1(d) have an identical price, breaking the tie in accordance with clause 7A.3.3 as follows:
 - (i) ~~where that price equals either the Alternate Maximum STEM Price or the Maximum STEM Price, sorting the affected Price-Quantity pairs in the order shown in Figure 1 as if the Facility with the highest random number had the highest price;~~

- (ii) where that price equals the Minimum STEM Price, sorting the affected Price-Quantity pairs in the following order shown in Figure 2 as if the Facility with the lowest random number had the lowest price;
- (iii) where that price does not equal the Minimum STEM Price, the Maximum STEM Price or the Alternate Maximum STEM Price, sorting the affected quantities in ascending order using the random number assigned to the Facility by AEMO in step 2.8 of this Procedure as if the Facility with the lowest random number had the lowest price.

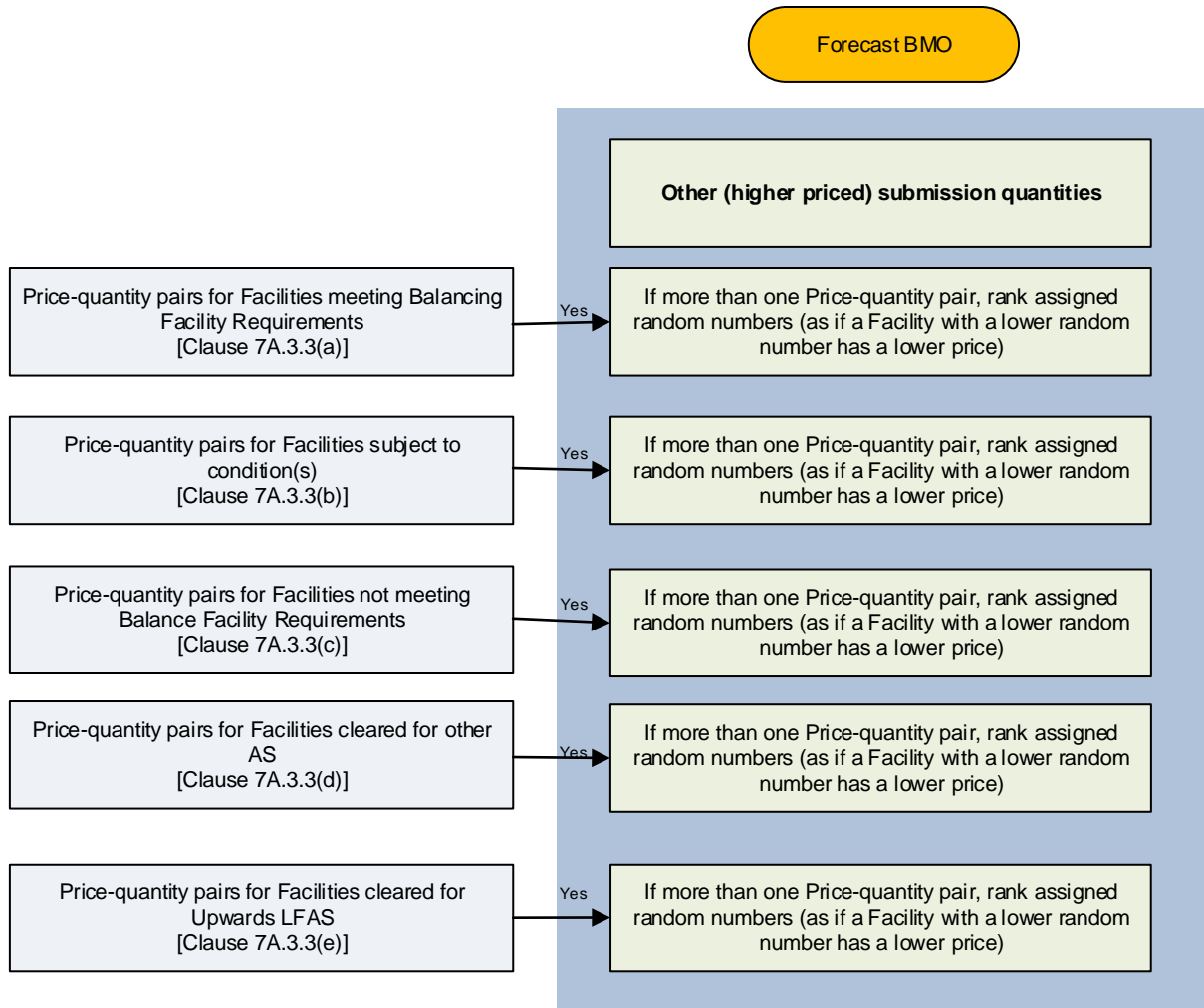
Figure 1 Ranking Quantities priced at the [Alternate] Maximum STEM Price¹



~~(ii)(i) where that price equals the Minimum STEM Price, sorting the affected Price-Quantity pairs in the following order shown in Figure 2 as if the Facility with the lowest random number had the lowest price:~~

¹ Random numbers in this table are assigned as per section 2.8 of this Market Procedure.

Figure 2 Ranking Quantities priced at the Minimum STEM Price²



~~(iii) where that price does not equal the Minimum STEM Price, the Maximum STEM Price or the Alternate Maximum STEM Price, sorting the affected quantities in ascending order using the random number assigned to the Facility by AEMO in step 2.8 of this Procedure as if the Facility with the lowest random number had the lowest price.~~

2.2.2. In preparing the Forecast BMO, AEMO must to the extent practical use the most recent Balancing Submissions available to it **[Clause 7A.3.20(a)]**.

² Random numbers in this table are assigned as per section 2.8 of this Market Procedure.

2.3. Forecast Non-Scheduled Generation Quantities

- 2.3.1. AEMO will ~~receive-prepare~~ forecast EOI Quantities of Non-Scheduled Generators for each future Trading Interval in the Balancing Horizon ~~from System Management~~ in accordance with clause 7A.3.15.

2.4. Forecast Relevant Dispatch Quantities

- 2.4.1. AEMO (in its capacity as System Management) will ~~receive-prepare~~ forecast Relevant Dispatch Quantities for each future Trading Interval in the Balancing Horizon ~~from System Management~~ in accordance with clause 7A.3.15.

2.5. Preparation of Forecast Balancing Prices and Quantities

- 2.5.1. AEMO must determine the forecast Balancing Price for each future Trading Interval in the Balancing Horizon by:
- calculating the forecast marginal dispatch quantity by increasing by 1 MW the most recent forecast Relevant Dispatch Quantity supplied by System Management determined by AEMO (in its capacity as System Management);
 - iterating through the Forecast BMO from the lowest Price-Quantity pair upwards, summing the MW quantities until the total equals or exceeds the forecast marginal dispatch quantity determined in step 2.5.1(a); and
 - setting the forecast Balancing Price to the price of the last Price-Quantity pair in the Forecast BMO determined in step 2.5.1(b) or, if the forecast marginal dispatch quantity exceeds the MW sum of all the Price-Quantity pairs, the highest price in the Forecast BMO.
- 2.5.2. AEMO must determine forecast Balancing Quantities for each future Trading Interval in the Balancing Horizon by:
- iterating through the Forecast BMO from the lowest Price-Quantity pair upwards, summing the MW quantities, or part thereof, until the total equals the most recent forecast Relevant Dispatch Quantity supplied by System Management determined by AEMO (in its capacity as System Management); and
 - calculating a forecast Balancing Quantity for each Balancing Facility by summing the Price-Quantity pairs, or part thereof, from step 2.5.2(a) for the relevant Facility; or
 - where in step 2.5.2(a) the MW sum of all the Price-Quantity pairs in the Forecast BMO is less than the forecast Relevant Dispatch Quantity, setting the forecast Balancing Quantity to the sum of all of the Facility's quantities within the Forecast BMO.
- 2.5.3. AEMO must exclude Ramp Rate Limits and SOI Quantities from the calculations described in steps 2.5.1 and 2.5.2 of this Procedure.

2.6. ~~Provision of the Forecast BMO to System Management~~ **[Blank]**

- 2.6.1. ~~AEMO must provide to System Management, in accordance with the IMS Interface Market Procedure, for each future Trading Interval of the Balancing Horizon:~~
- ~~the Forecast BMO determined in Section 2.2 of this Procedure, but excluding price information for each Price-Quantity pair;~~
 - ~~the applicable Facility Ramp Rate Limit associated with each Price-Quantity pair; and~~

- ~~(c) any other information which AEMO is required to provide to System Management in accordance with the IMS interface Market Procedure.~~

2.7. Publication of Balancing Forecast Information to Market Participants

2.7.1. AEMO must publish the following information on the Market Participant Interface for each future Trading Interval in the Balancing Horizon:

- (a) the Forecast BMO prepared in Section 2.2 of this Procedure in the form of anonymous Price-Quantity supply curves;
- (b) the most recent forecast Relevant Dispatch Quantity ~~provided by System Management to~~ determined by AEMO (in its capacity as System Management) in accordance with clause 7A.3.15;
- (c) the sum of the most recent forecast EOI Quantities for Non-Scheduled Generator Facilities ~~provided by System Management determined by~~ AEMO (in its capacity as System Management) in accordance with clause 7A.3.15 or, if no forecasts have been provided, the sum of all Non-Scheduled Generator Facility quantities in applicable Balancing Submissions;
- (d) the forecast Balancing Price determined in Section 2.5 of this Procedure; and
- (e) the forecast Balancing Quantities determined in Section 2.5.2 of this Procedure for Facilities owned or operated by the Market Participant in accordance with clause 7A.3.17(a).

2.8. Random number assignment

2.8.1. Prior to the start of each Trading Day, AEMO must assign a unique random number to each Balancing Facility, including the ~~Verve Energy~~ Balancing Portfolio. AEMO must use this number as described in step 2.2.1(e) of this Procedure to determine the order of identically priced Price-Quantity pairs in the Forecast BMO.

2.9. Unavailable information

2.9.1. In the event that ~~System Management does not provide~~ AEMO (in its capacity as System Management) does not determine with a forecast Relevant Dispatch Quantity for a Trading Interval, AEMO must continue to publish forecasts of Balancing Prices and Balancing Quantities based on previously issued forecasts for the Trading Interval. If no previously issued forecasts are available for the relevant Trading Interval, then AEMO must cease publication of forecast Balancing Prices and Balancing Quantities.