RCP PAPER NO.	:	**EMC/RCP/xxx/2024/RC387**
SUBJECT	:	**ENHANCEMENT TO FALLBACK MECHANISMS FOR STARTGENERATION AND PRIORSCHEDULEDPURCHASE**
FOR	:	**CONSULTATION**
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DATE OF MEETING	:	**TBC**

Executive Summary

This paper proposes rule modifications to enhance the fallback mechanisms for StartGeneration and PriorScheduledPurchase, thereby enhancing scheduling resiliency.

Relying on the latest available Short-Term Schedule and Pre-Dispatch Schedule for fallback values of StartGeneration and PriorScheduledPurchase will be more reflective of actual physical conditions, thus resulting in more accurate dispatch schedules.

EMC would like to seek industry views on the proposed rule modifications. We appreciate receiving comments by **Friday, 3rd May 2024**.

1. Introduction

This paper assesses proposals related to enhancing the fallback mechanisms for two parameters used in market clearing (i.e., StartGeneration and PriorScheduledPurchase), in order to enhance scheduling resiliency.

2. Background

2.1 What is StartGeneration, and what is it used for?

StartGeneration is a parameter within the Market Clearing Engine (MCE), typically provided by the PSO to EMC via automatic transmission of the Network Status File 10 minutes before each half-hour dispatch period[1]. StartGeneration reflects the instantaneous MW output of every Generation Registered Facility (GRF) subject to dispatch, as of T-10 minutes.

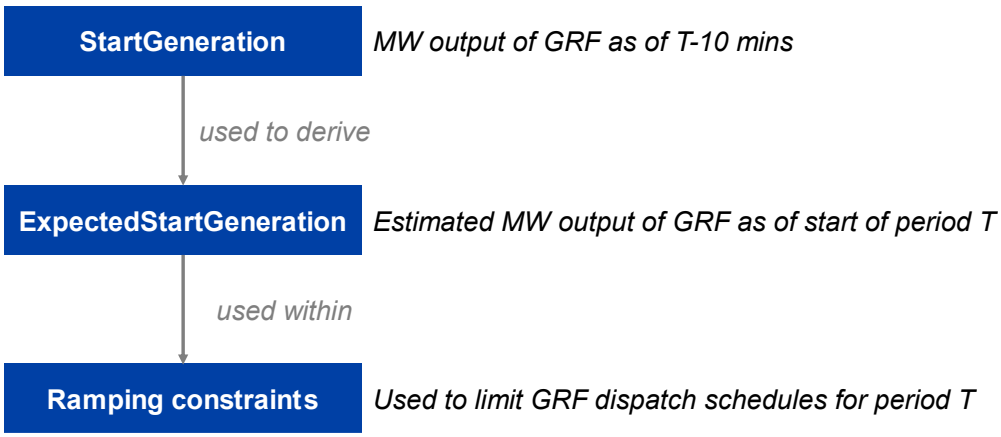
Subsequently, ExpectedStartGeneration is estimated based on StartGeneration. ExpectedStartGeneration represents an estimate of the instantaneous MW output of every GRF, as of the start of each period T (i.e., T-0 minutes).[2]

Subsequently, ExpectedStartGeneration is used as a parameter within ramping constraints, to make sure that scheduled quantities (at the end of each period) are feasible and do not require excessive ramping up/down of GRFs from their start-of-period ExpectedStartGeneration levels. In particular,

- GenerationEndMax = ExpectedStartGeneration + (UpRampRate x 30 mins)
- GenerationEndMin = ExpectedStartGeneration – (DownRampRate x 30 mins)[3]

A broad overview of the relationship between StartGeneration, ExpectedStartGeneration and ramping constraints is illustrated in Figure 1 below.

Figure 1: Relationship between StartGeneration, ExpectedStartGeneration and ramping constraints



In sum, StartGeneration is a parameter within the MCE that eventually feeds into ramping constraints, which may affect dispatch schedules. StartGeneration values are typically provided by the PSO to EMC 10 minutes before every period.

[1] StartGeneration is defined in Market Rules Appendix 6D Table D.3 Parameters

[2] The derivation of ExpectedStartGeneration based on StartGeneration is specified in Market Rules Appendix 6D Section D.12.5

[3] These calculations are specified in Market Rules Appendix 6D Sections D.12.6 and D.12.7

2.2 What is PriorScheduledPurchase, and what is it used for?

Similar to ExpectedStartGeneration that applies to GRFs, there is an analogous parameter for Load Registered Facilities (LRFs) participating in Demand Response – the PriorScheduledPurchase parameter reflects the starting MW consumption of an LRF, as of the start of each period[4].

Subsequently, PriorScheduledPurchase is used as a parameter within ramping constraints, to make sure that scheduled quantities (at the end of each period) are feasible and do not require excessive ramping up/down of LRFs[5].

2.3 Dispatch schedules published by EMC

On a regular basis, EMC produces the following dispatch schedules in accordance with the Market Rules, as detailed in Table 1 below.

TABLE 1: Schedules published by EMC

Referred to in the Market Rules as	Real Time Schedule (RTS)	Short-Term Schedule (STS)	Pre-Dispatch Schedule (PDS)	Market Outlook Scenario (MOS)
Also known as	*Dispatch Run (DPR)*	*Look Ahead Run (LAR)*	*Day Ahead Run (DAR)*	*Week Ahead Run (WAR)*
Horizon	1 period (Period T)	12 periods (6 hours)	24-72 periods (12-36 hours)	288 periods (6 days)
Frequency of publication	Every half hour	Every half hour	Every 2 hours	Every day
Starts running at	5 minutes before the period	34 minutes before the first forecasted period	135 before the first forecasted period	2am of each day
Type of schedule	Binding dispatch schedule	Forecast schedule	Forecast schedule	Forecast schedule

To derive each of RTS/STS/PDS/MOS, initial values for StartGeneration and PriorScheduledPurchase are required.

2.4 Current fallback mechanisms for StartGeneration and PriorScheduledPurchase

2.4.1 StartGeneration for RTS and the first period involved in the calculation of STS[6]

Each GRF's StartGeneration parameter to be used for RTS and the first period involved in the calculation of STS is currently based on:

(1) the value provided by PSO within the Network Status File 10 minutes before each period;

(2) otherwise, scheduled end-of-period generation in the prior period's RTS;

(3) otherwise, a value of zero for that GRF.

[4] Comparing against StartGeneration, there is no analogous parameter that reflects instantaneous MW consumption of every LRF, as of T-10 minutes.

[5] These calculations are specified in Market Rules Appendix 6D Sections D.12.8 and D.12.9

[6] Detailed in Market Rules Appendix 6D, Sections D.8.3 and D.12.1.

2.4.2 StartGeneration for the first period involved in the calculation of PDS[7]

Meanwhile, each GRF's StartGeneration parameter to be used for the first period involved in the calculation of PDS is currently based on:

(1) scheduled end-of-period generation in the prior period's RTS;

(2) otherwise, scheduled end-of-period generation in the RTS 2 periods prior[8].

2.4.3 PriorScheduledPurchase for RTS and the first period involved in the calculation of STS[9]

Each LRF's PriorScheduledPurchase parameter to be used for RTS and the first period involved in the calculation of STS is currently based on:

(1) scheduled end-of-period consumption in the prior period's RTS;

(2) otherwise, the sum of energy bid quantities for the first period of the respective RTS/STS.

2.4.4 PriorScheduledPurchase for the first period involved in the calculation of PDS[10]

Meanwhile, each LRF's PriorScheduledPurchase parameter to be used for the first period involved in the calculation of PDS is currently based on:

(1) scheduled end-of-period consumption in the prior period's RTS;

(3) otherwise, the sum of energy bid quantities for the first period of the PDS.

3. Analysis

3.1 Drawbacks of current fallback mechanisms for StartGeneration and PriorScheduledPurchase

3.1.1 StartGeneration – fallback values of zero are unlikely to reflect actual generation levels

Based on Section 2.4.1 above, a final fallback value for StartGeneration of zero is always available to the MCE in the RTS and STS, even when there are no Network Status Files or preceding real-time schedules. This would ensure that the MCE will always have the required parameters to produce a schedule, and the RTS/STS run will not fail due to unavailable input parameters.

However, a StartGeneration value of zero is unlikely to reflect physical conditions (i.e., the actual generation level of a GRF), resulting in inaccurate dispatch schedules. For example, using zero as the StartGeneration value for a particular GRF will likely result in an unrealistically low ExpectedStartGeneration value, which may severely restrict its scheduled energy quantity[11], and likely cause the GRF to be ineligible to provide regulation[12].

3.1.2 PriorScheduledPurchase – fallback values based on sum of energy bid quantities may not reflect actual start-of-period consumption levels

[7] Detailed in Market Rules Appendix 6D, Sections D.8.4 and D.12.2.

[8] As detailed in Market Rules Section D.8.4, this fallback mechanism is not specified for initial values of StartGeneration for PDS for multi-unit facilities.

[9] Detailed in Market Rules Appendix 6D, Sections D.12.10.1 and D.12.10.4.

[10] Detailed in Market Rules Appendix 6D, Sections D.12.10.2 and D.12.10.4.

[11] Due to ramping constraints explained in Section 2.1 earlier.

[12] Market Rules Appendix 6D, Section D.13A.1.2 states that to be dispatched for regulation, the GRF's ExpectedStartGeneration needs to be greater than or equal to the RegulationMin parameter for that GRF, which is typically a positive MW value (except for ESS, which may have RegulationMin = 0).

Based on Sections 2.4.3 and 2.4.4 above, fallback values for PriorScheduledPurchase are based on the sum of energy bid quantities for period T, which are certainly available to the MCE, as LRFs always need to have bids submitted for every period (bid quantity can equal to zero).

However, a PriorScheduledPurchase value equal to the sum of energy bid quantities may not reflect physical conditions (i.e., the actual start-of-period consumption level of an LRF), resulting in inaccurate dispatch schedules.

3.1.3 StartGeneration and PriorScheduledPurchase – fallback values depend on RTS

All the fallback mechanisms in Section 2.4 above have a dependency on a prior period's RTS, which may not always be available. For example, on 30 January 2024, due to NEMS system maintenance (Disaster Recovery Preparedness exercise), RTS could not be produced for periods 39 and 40. When the PDS with starting period 45 was triggered to run, this PDS schedule could not be produced as RTS for periods 39 and 40 were unavailable.

3.1.4 StartGeneration and PriorScheduledPurchase – additional four leading periods need to be calculated for PDS

Furthermore, as the PDS starts running 135 minutes before period T, the PDS needs to calculate schedules for an additional 4 leading periods. This is illustrated for StartGeneration in the example below.

- The PDS for periods starting 10pm onwards has to start being generated at 7.45pm (135 minutes beforehand, as indicated in Table 1 earlier).
- As of 7.45pm, end-of-period generation for RTS has only been generated up to 8pm (i.e., period spanning 7.30 to 8pm).
- In order to derive StartGeneration for the period starting 10pm, end-of-period generation has to be forecast for additional periods ending at 8.30pm, 9pm, 9.30pm and 10pm (this last end-of-period value is the StartGeneration value to be used for the first period of the PDS starting 10pm).

The calculation of an additional 4 leading periods for every PDS takes up valuable IT resources (i.e., server run time), with limited benefits (i.e., they are not published; they are solely to attain StartGeneration and PriorScheduledPurchase values for the PDS).

3.2 Proposed solution

3.2.1 StartGeneration for RTS and the first period involved in the calculation of STS

In order to decrease the likelihood of StartGeneration values defaulting to zero, the fallback mechanism can be augmented (i.e., adding steps 3 and 4 below) to be based on:

(1) the value provided by PSO within the Network Status File 10 minutes before each period;

(2) otherwise, scheduled end-of-period generation in the prior period's RTS;

(3) otherwise, scheduled end-of-period generation for the prior period based on the latest available STS[13];

(4) otherwise, scheduled end-of-period generation for the prior period based on the latest available PDS;

(5) otherwise, a value of zero for that GRF.

[13] Medium load scenario

3.2.2 StartGeneration for the first period involved in the calculation of PDS

In order to remove the dependency of PDS on RTS, and remove the need for unpublished leading periods when generating PDS, the fallback mechanism can be amended to be based on:

(1) scheduled end-of-period generation for the prior period based on the latest available STS[14];

(2) otherwise, scheduled end-of-period generation for the prior period based on the latest available PDS;

(3) otherwise, a value of zero for that GRF.

3.2.3 PriorScheduledPurchase for RTS and the first period involved in the calculation of STS

In order to reduce the likelihood of relying on the sum of bid quantities, the fallback mechanism for PriorScheduledPurchase can be augmented (i.e., adding steps 2 and 3 below) to be based on:

(1) scheduled end-of-period consumption in the prior period's RTS;

(2) otherwise, scheduled end-of-period consumption for the prior period based on the latest available STS[15];

(3) otherwise, scheduled end-of-period consumption for the prior period based on the latest available PDS;

(4) otherwise, the sum of energy bid quantities for the first period of the respective RTS/STS.

3.2.4 PriorScheduledPurchase for the first period involved in the calculation of PDS

In order to reduce the likelihood of relying on sum of bid quantities, the fallback mechanism for PriorScheduledPurchase can be amended to be based on:

(1) scheduled end-of period consumption for the prior period based on the latest available STS[16];

(2) otherwise, scheduled end-of-period consumption for the prior period based on the latest available PDS;

(3) otherwise, the sum of energy bid quantities for the first period of the PDS.

3.3 Benefits of proposed solution

There are three main benefits to the proposed solution in Section 3.2 above, as elaborated upon below.

3.3.1 Enhanced scheduling resiliency

Referring to Sections 3.2.1 (and 3.2.3) above, the proposed fallback mechanisms make it much less likely for StartGeneration (or PriorScheduledPurchase) values to default to zero (or to the sum of energy bid quantities).

Referring to Sections 3.2.2 (and 3.2.4) above, the proposed fallback mechanisms remove the dependency of PDS on RTS, instead relying on the latest available forecast schedules of the prior period (i.e., previous STS and PDS runs). As each forecast run covers multiple periods, there are

[14] Medium load scenario

[15] Medium load scenario

[16] Medium load scenario

multiple forecast runs containing any single period. Thus, it becomes highly unlikely that StartGeneration (or PriorScheduledPurchase) values cannot be obtained from previously generated dispatch schedules. This is also in line with generator operations in practice, where GRFs are expected to follow the latest available STS or PDS when the DPR is unavailable.

Lastly, a final fallback value of zero for StartGeneration will also be extended to the PDS, to ensure that the PDS run will not fail due to unavailability of StartGeneration values.

3.3.2 Streamlined scheduling process

Referring to Sections 3.2.2 and 3.2.4 above, the proposed fallback mechanisms no longer require the calculation of an additional 4 leading periods' schedules for every PDS. This would reduce the solve time and improve MCE performance.

3.3.3 Alignment of fallback mechanisms for StartGeneration and PriorScheduledPurchase

The proposed solution introduces greater consistency in fallback values used for both parameters.

4. Rule Modifications Required

Table 2 below provides a summary of proposed rule modifications to enhance the fallback mechanisms for StartGeneration and PriorScheduledPurchase.

Detailed modifications are set out in Annex 1.

TABLE 2: Summary of Proposed Modifications

S/N	Chapter / Section	Proposed Modifications	Reasons for Modifications
1	Chapter 6, Section 7.5.1.5	Make reference to Appendix 6D for how StartGeneration and PriorScheduledPurchase are determined (with fallback mechanisms) for the first period of each forecast schedule.	Avoid repeating fallback mechanism for StartGeneration and PriorScheduledPurchase.
2	Chapter 6, Section 7.6.1A	Specify that the PDS no longer includes unpublished leading periods.	Remove the need to calculate additional leading periods' schedules for every PDS.
3	Appendix 6D, Section D.3	Reference Sections D.12.10 to D.12.13 for determination of PriorScheduledPurchase.	Update section reference.
4	Appendix 6D, Section D.8.3	Augment fallback mechanism for multi-unit facilities' StartGeneration for RTS and the first period involved in the calculation of STS, to include the latest available results from STS/PDS.	Augment the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Value provided in Network Status File 2) Scheduled end-of-period generation in the prior period's real-time schedule

S/N	Chapter / Section	Proposed Modifications	Reasons for Modifications
			3) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 4) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 5) Zero
5	Appendix 6D, Section D.8.4	Amend fallback mechanism for multi-unit facilities' StartGeneration for the first period involved in the calculation of PDS, to include the latest available results from STS/PDS.	Amend the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 2) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 3) Zero
6	Appendix 6D, Section D.12.1	Augment fallback mechanism for other GRFs' StartGeneration for RTS and the first period involved in the calculation of STS, to include latest available results from STS/PDS.	Augment the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Value provided in Network Status File 2) Scheduled end-of-period generation in the prior period's real-time schedule 3) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 4) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 5) Zero
7	Appendix 6D, Section D.12.2	Amend fallback mechanism for other GRFs' StartGeneration for the first period involved in the calculation of PDS, to include latest available results from STS/PDS.	Amend the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 2) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 3) Zero
8	Appendix 6D, Section D.12.10	Augment fallback mechanism for PriorScheduledPurchase for RTS and the first period involved in the calculation of STS, to include latest available results from STS/PDS.	Augment the fallback mechanism for PriorScheduledPurchase, such that the order of preference is as below: 1) Scheduled end-of-period consumption in the prior period's real-time schedule

S/N	Chapter / Section	Proposed Modifications	Reasons for Modifications
			2) Scheduled end-of-period consumption for the prior period based on the latest available short-term schedule 3) Scheduled end-of-period consumption for the prior period based on the latest available pre-dispatch schedule 4) Sum of energy bid quantities
9	Appendix 6D, Section D.12.11	Augment fallback mechanism for PriorScheduledPurchase for the first period involved in the calculation of PDS, to include latest available results from STS/PDS.	Amend the fallback mechanism for PriorScheduledPurchase, such that the order of preference is as below: 1) Scheduled end-of-period consumption for the prior period based on the latest available short-term schedule 2) Scheduled end-of-period consumption for the prior period based on the latest available pre-dispatch schedule 3) Sum of energy bid quantities
10	Appendix 6D, Section D.12.12	Align wording of fallback mechanism for PriorScheduledPurchase for the first period involved in the calculation of MOS.	Shifted section determining PriorScheduledPurchase to be used in the first period involved in the calculation of market outlook scenarios, and aligned wording with other sections.
11	Appendix 6D, Section D.12.13	Shift section without word modifications.	Shifted section determining PriorScheduledPurchase for periods that are not the first dispatch period of forecast schedules.

5. Implementation Effort Estimate

If the proposed modifications in this paper are implemented together with the system changes relevant to MCE modelling of ESS[17], EMC does not expect the implementation timeline to be further extended.

Having said that, implementing the proposed modifications in this paper involves additional costs (and man-days). A summary of estimated incremental implementation costs is provided in the rightmost column of Table 3 below.

TABLE 3: Implementation Effort Estimate

S/N	Work Item	Without enhancements to StartGeneration & PriorScheduledPurchase	With enhancements to StartGeneration& PriorScheduledPurchase	Difference
1	Internal EMC Manpower (Including Backfill)	$221,665	$253,623	$31,958
2	External Resource to Support (Vendor)	$322,910	$358,204	$35,294
3	Audit	$60,000	$60,000	$0
	Total One-Off Cost	**$604,575**	**$671,827**	**$67,252**
4	Recurring Cost (Annual Opex)	$48,412	$56,316	$7,904
	Total Recurring Cost	**$48,412**	**$56,316**	**$7,904**

6. Conclusion

This paper proposes rule modifications to enhance the fallback mechanisms for StartGeneration and PriorScheduledPurchase, thereby enhancing scheduling resiliency.

We consider that relying on the latest available STS and PDS for fallback values of StartGeneration and PriorScheduledPurchase will be more reflective of actual physical conditions, thus resulting in more accurate dispatch schedules.

7. Consultation

EMC would like to seek industry views on the proposed enhancement to the fallback mechanisms for the ExpectedStartGeneration and PriorScheduledPurchase parameters, with the associated rule modifications as set out in Annex 1. We appreciate receiving comments by **Friday, 3rd May 2024**.

[17] Kindly refer to RC383: Modelling of Energy Storage Systems and RC386: Incorporation of State-of Charge within MCE Modelling of ESS.

ANNEX 1: Proposed Modifications to Market Rules

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
CHAPTER 6 – MARKET OPERATION	**CHAPTER 6 – MARKET OPERATION**	

7.5 INFORMATION USED IN EACH SCENARIO OR SCHEDULE 7.5.1 The *EMC* shall use the most current valid information on the following to determine and revise each of the scenarios or schedules referred to in sections 7.3, 7.4 and 7.4A: … 7.5.1.5 the initial loading of each *generation facility* and *import registered facility*, determined: a. in the case of each mar*ket outlook scenario*, on the basis of the end of the last *dispatch period* represented in the most recently *published pre-dispatch schedule* which was determined using the same *nodal load forecast* and that contains the applicable *dispatch period*; and b. in the case of each *pre-dispatch schedule*, on the basis of the later of the *real-time dispatch schedule* for the period after the current *dispatch period* (if available) and the *real-time dispatch schedule* for the current *dispatch period*;	**7.5 INFORMATION USED IN EACH SCENARIO OR SCHEDULE** 7.5.1 The *EMC* shall use the most current valid information on the following to determine and revise each of the scenarios or schedules referred to in sections 7.3, 7.4 and 7.4A: … 7.5.1.5 the initial loading of each *generation facility*, *load registered facility*, and *import registered facility*, determined in accordance with section D.8 and D.12 of Appendix 6D.~~:~~ ~~a. in the case of each mar*ket outlook scenario*, on the basis of the end of the last *dispatch period* represented in the most recently *published pre-dispatch schedule* which was determined using the same *nodal load forecast* and that contains the applicable *dispatch period*; and~~ ~~b. in the case of each *pre-dispatch schedule*, on the basis of the later of the *real-time dispatch schedule* for the period after the current *dispatch period* (if available) and the *real-time dispatch schedule* for the current *dispatch period*;~~	Avoid repeating fallback mechanism for StartGeneration and PriorScheduledPurchase.

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
7.6 SOLVING EACH SCENARIO OR SCHEDULE 7.6.1A When preparing each *pre-dispatch schedule*, the *market clearing engine* shall be run for each *dispatch period* from the end of the relevant *dispatch period* for which the *real-time dispatch schedule* used in section 7.5.1.5(b) applies, until the end of the *pre-dispatch horizon* to which such *pre-dispatch schedule* relates. **Explanatory note: This means that for pre-dispatch schedules, the market clearing engine is always run from the best current estimates of data. However, when reporting the actual schedule, only the dispatch periods in the schedule are reported – the initial periods that are run in order to get to the start of the pre-dispatch horizon are not reported.**	**7.6 SOLVING EACH SCENARIO OR SCHEDULE** 7.6.1A When preparing each *pre-dispatch schedule*, the *market clearing engine* shall be run for each *dispatch period* from the start ~~end of the relevant *dispatch period* for which the *real-time dispatch schedule* used in section 7.5.1.5(b) applies,~~ until the end of the *pre-dispatch horizon* to which such *pre-dispatch schedule* relates. ~~**Explanatory note: This means that for pre-dispatch schedules, the market clearing engine is always run from the best current estimates of data. However, when reporting the actual schedule, only the dispatch periods in the schedule are reported – the initial periods that are run in order to get to the start of the pre-dispatch horizon are not reported.**~~	Remove the need to calculate additional leading periods' schedules for every PDS.
APPENDIX 6D – MARKET CLEARING FORMULATION	**APPENDIX 6D – MARKET CLEARING FORMULATION**	

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.3 PARAMETERS PriorScheduledPurchase$_p$ — The MW quantity of scheduled *energy* withdrawal for the *LRF with REB* associated with *energy bid p* for the immediately preceding *dispatch period*. Determined in accordance with section D.12.10.	**D.3 PARAMETERS** PriorScheduledPurchase$_p$ — The MW quantity of scheduled *energy* withdrawal for the *LRF with REB* associated with *energy bid p* for the immediately preceding *dispatch period*. Determined in accordance with sections D.12.10 to D.12.13.	Update section reference

D.8	**REPRESENTATION OF MULTI-UNIT FACILITIES**	**D.8**	**REPRESENTATION OF MULTI-UNIT FACILITIES**
D.8.3	In the case where the *dispatch period* is being produced for a *real-time dispatch schedule*, or where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule*, then the initial generation levels $StartGeneration_g$ for *multi-unit facilities* shall be calculated from the initial generation levels of the constituent *generating units*, subject to section D.8.3.1, in accordance with the following table:	D.8.3	In the case where the *dispatch period* is being produced for a *real-time dispatch schedule*, or where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule*, then the initial generation levels $StartGeneration_g$ for *multi-unit facilities* shall be calculated from the initial generation levels of the constituent *generating units*, subject to sections D.8.3.1 to D.8.3.4, in accordance with the following table:
…		…	
D.8.3.1	In the event that the time difference between the start of the *dispatch period* and the time at which the *PSO* compiled the most recently received status data on the network elements referred to in section D.6.1.2 is greater than StatusDataLifeMax, or in the event that a value $StartGeneration_u$ for any *generating unit* of a *multi-unit facility* is not included in the most recently received status data on the network elements referred to in D.6.1.2, then the initial generation level $StartGeneration_g$ for the corresponding *multi-unit facility* shall be the same as the corresponding value $Generation_g$ for the same *generation registered facility* in the *real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *real-time dispatch schedule* commences. In the event that no such *real-time dispatch schedule* is available, then the *EMC* shall use a value of zero for that $StartGeneration_u$ for that	D.8.3.1	In the event that the time difference between the start of the *dispatch period* and the time at which the PSO compiled the most recently received status data on the network elements referred to in section D.6.1.2 is greater than StatusDataLifeMax, or in the event that a value $StartGeneration_u$ for any *generating unit* of a *multi-unit facility* is not included in the most recently received status data on the network elements referred to in D.6.1.2, then the initial generation level $StartGeneration_g$ for the corresponding *multi-unit facility* shall be the same as the corresponding value $Generation_g$ for the same *generation registered facility* in the *real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. ~~In the event that no such real-time *dispatch schedule* is available, then the EMC shall use a value of zero for that~~
			Augment the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Value provided in Network Status File 2) Scheduled end-of-period generation in the prior period's real-time schedule 3) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 4) Scheduled end-of-period

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
generating unit in the calculations of this section D.8.3.	~~StartGeneration$_g$ for that *generating unit* in the calculations of this section D.8.3.~~ D.8.3.2 In the event that no such *real-time dispatch schedule* is available, the initial generation level StartGeneration$_g$ for the *multi-unit facility* shall be the same as the corresponding value of Generation$_g$ for the same *generation registered facility* in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* current at the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. D.8.3.3In the event that no such *short-term schedule* is available, the initial generation level StartGeneration$_g$ for the *multi-unit facility* shall be the same as the corresponding value of Generation$_g$ for the same *generation registered facility* in the latest available *pre-dispatch schedule* for the *dispatch period* current at the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. D.8.3.4In the event that no such *pre-dispatch schedule* is available, then the *EMC* shall use a value of zero for StartGeneration$_g$ for the *multi-unit facility.*	generation for the prior period based on the latest available pre-dispatch schedule 5) Zero

D.8.4 In the case where the *dispatch period* is involved in the calculation of a *pre-dispatch schedule* and is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *pre-dispatch schedule*, then the initial generation levels $StartGeneration_g$ for *multi-unit facilities* shall be the same as the corresponding values $Generation_g$ for the same *generation registered facility* in the *real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences.	D.8.4 In the case where the *dispatch period* is involved in the calculation of a *pre-dispatch schedule* and is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *pre-dispatch schedule*, then the initial generation levels $StartGeneration_g$ for *multi-unit facilities* shall be the same as the corresponding values $Generation_g$ for the same *generation registered facility* in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* immediately preceding the first *dispatch period* of the *pre-dispatch schedule.* ~~*real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences.~~ D.8.4.1 In the event that no such *short-term schedule* is available, then the value of $StartGeneration_g$ for the *multi-unit facility* shall be the corresponding value $Generation_g$ in the latest available *pre-dispatch schedule* for the *dispatch period* immediately preceding the first dispatch period of the *pre-dispatch schedule* to be calculated in D.8.4. D.8.4.2 In the event that no such *pre-dispatch schedule* is available, then the value of $StartGeneration_g$ for the *multi-unit facility* shall equal to zero.	Amend the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 2) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 3) Zero
D.12 RAMPING CONSTRAINTS	**D.12 RAMPING CONSTRAINTS**	Augment the fallback

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.12.1.1 In the event that a value of StartGeneration$_g$ for any *generating unit* that is not part of a *multi-unit facility* is not updated by the *PSO* or provided to the *EMC* during the *dispatch period* for the time being when the calculation of the *real-time dispatch schedule* or the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule* commences, the initial generation level of StartGeneration$_g$ for the *generation registered facility* shall be the same as the corresponding value of Generation$_g$ for the same *generation registered facility* in the *real-time dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* commences. In the event that no such *real-time dispatch schedule* is available, then the *EMC* shall use a value of zero for StartGeneration$_g$ for the *generation registered facility*.	D.12.1.1 In the event that a value of StartGeneration$_g$ for any *generating unit* that is not part of a *multi-unit facility* is not updated by the *PSO* or provided to the *EMC* during the *dispatch period* for the time being when the calculation of the *real-time dispatch schedule* or the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule* commences, the initial generation level of StartGeneration$_g$ for the *generation registered facility* shall be the same as the corresponding value of Generation$_g$ for the same *generation registered facility* in the *real-time dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. ~~In the event that no such *real-time dispatch schedule* is available, then the *EMC* shall use a value of zero for StartGeneration$_g$ for the *generation registered facility*.~~ D.12.1.2 In the event that no such *real-time dispatch schedule* is available, the initial generation level of StartGeneration$_g$ for the *generation registered facility* shall be the same as the	mechanism for StartGeneration, such that the order of preference is as below: 1) Value provided in Network Status File 2) Scheduled end-of-period generation in the prior period's real-time schedule 3) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
	corresponding value of $Generation_g$ for the same *generation registered facility* in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. D.12.1.3 In the event that no such *short-term schedule* is available, the initial generation level of $StartGeneration_g$ for the *generation registered facility* shall be the same as the corresponding value of $Generation_g$ for the same *generation registered facility* in the latest available *pre-dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time schedule* or the *short-term schedule* commences. D.12.1.4 In the event that no such *pre-dispatch schedule* is available, then the *EMC* shall use a value of zero for $StartGeneration_g$ for the *generation registered facility.*	4) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 5) Zero

D.12.2 In the case where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *pre-dispatch schedule*, then the values of StartGeneration$_g$ for each *generation registered facility*, except *multi-unit facilities*, shall be the corresponding values of Generation$_g$ in the *real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences, or, if this *real-time dispatch schedule* is not available, the *real-time dispatch schedule* for the *dispatch period* immediately preceding that which is current at the time when the calculation of the *pre-dispatch schedule* commences.	D.12.2 In the case where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *pre-dispatch schedule*, then the values of StartGeneration$_g$ for each *generation registered facility*, except *multi-unit facilities*, shall be the corresponding values of Generation$_g$ in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* immediately preceding the first *dispatch period* of the *pre-dispatch schedule*. ~~*real-time dispatch schedule*~~ for the dispatch period ~~current at the time when the calculation of the *pre-dispatch schedule* commences, or, if this *real-time dispatch schedule* is not available, the *real-time dispatch schedule* for the *dispatch period* immediately preceding that which is current at the time when the calculation of the *pre-dispatch schedule* commences~~. D.12.2.1 In the event that no such *short-term schedule* is available, then the values of StartGeneration$_g$ for each *generation registered facility*, except *multi-unit facilities*, shall be the corresponding values of Generation$_g$ in the latest available *pre-dispatch schedule* for the *dispatch period* immediately preceding the first dispatch period of the *pre-dispatch schedule* to be calculated in D.12.2. D.12.2.2 In the event that no such *pre-dispatch schedule* is available, then the values of StartGeneration$_g$ for each *generation*	Amend the fallback mechanism for StartGeneration, such that the order of preference is as below: 1) Scheduled end-of-period generation for the prior period based on the latest available short-term schedule 2) Scheduled end-of-period generation for the prior period based on the latest available pre-dispatch schedule 3) Zero

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
	registered facility, except *multi-unit facilities*, shall equal to zero.	

D.12.10 In respect of an *LRF with REB* associated with *energy bid p*, the value of PriorScheduledPurchase$_p$ to be used in the calculation of: D.12.10.1 a *real-time dispatch schedule* or the first *dispatch period* of a *short-term schedule* shall be the value of Purchase$_p$ in the *real-time dispatch schedule* for the immediately preceding *dispatch period*; D.12.10.2 the first *dispatch period* of a *pre-dispatch schedule* shall be the value of Purchase$_p$ in the *real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences; D.12.10.3 the first *dispatch period* of a *market outlook scenario* shall be the value of Purchase$_p$ in the most recently released *pre-dispatch schedule* with a *nodal load forecast* corresponding to the *market outlook scenario* being calculated, and shall be taken from the *dispatch period* in such *pre-dispatch schedule* immediately preceding the first *dispatch period* required in the calculation of the *market outlook scenario*, provided that such *pre-dispatch schedule* contains the appropriate *dispatch period*; and D.12.10.4 each *dispatch period* that is not the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a	D.12.10 In respect of an *LRF with REB* associated with *energy bid p*, the value of PriorScheduledPurchase$_p$ to be used in ~~the calculation of~~ a *real-time dispatch schedule* or the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule sh*all be the value of Purchase$_p$ in the *real-time dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. D.12.10.1 In the event that no such *real-time dispatch schedule* is available, the value of PriorScheduledPurchase$_p$ for the LRF shall be the corresponding value of Purchase$_p$ in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences. D.12.10.2 In the event that no such *short-term schedule* is available, the value of PriorScheduledPurchase$_p$ for the LRF shall be the corresponding value of Purchase$_p$ in the latest available *pre-dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences.	Augment the fallback mechanism for PriorScheduledPurchase, such that the order of preference is as below: 1) Scheduled end-of-period consumption in the prior period's real-time schedule 2) Scheduled end-of-period consumption for the prior period based on the latest available short-term schedule 3) Scheduled end-of-period consumption for the prior period based on the latest

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
short-term schedule, *pre-dispatch schedule* or *market outlook scenario* shall be the corresponding value of Purchase_p for the immediately preceding *dispatch period* in the *short-term schedule*, *pre-dispatch schedule* or *market outlook scenario* respectively. In the event of the unavailability of the *real-time dispatch schedule* or the *pre-dispatch schedule* from which the value of Purchase_p is to be derived for section D.12.10.1, D.12.10.2 or D.12.10.3, then the value of $\text{PriorScheduledPurchase}_p$ shall be the total MW quantities in all *price-quantity pairs* of the *energy bid* for that *LRF with REB* for the first *dispatch period* mentioned in such section D.12.10.1, D.12.10.2 or D.12.10.3 as the case may be, calculated as: $\sum_{j \in \text{PURCHASEBIDBLOCKS}_p} \text{PurchaseBlockMax}_{p,j}$.	D.12.10.3 In the event that no such *pre-dispatch schedule* is available, the value of $\text{PriorScheduledPurchase}_p$ for the LRF shall be the total MW quantities in all *price-quantity pairs* of the *energy bid* for that *LRF* with *REB* for the *real-time dispatch schedule* or the first *dispatch period* of the *short-term schedule*, as the case may be, calculated as: $\sum_{j \in \text{PURCHASEBIDBLOCKS}_p} \text{PurchaseBlockMax}_{p,j}$. ~~D.12.10.1 a *real-time dispatch schedule* or the first *dispatch period* of a *short-term schedule* shall be the value of Purchase_p in the *real-time dispatch schedule* for the immediately preceding *dispatch period*;~~ ~~D.12.10.2 the first *dispatch period* of a *pre-dispatch schedule* shall be the value of Purchase_p in the *real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences;~~ ~~D.12.10.3 the first *dispatch period* of a *market outlook scenario* shall be the value of Purchase_p in the most recently released *pre-dispatch schedule* with a *nodal load*~~	available pre-dispatch schedule 4) Sum of energy bid quantities

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
	~~*forecast* corresponding to the *market outlook scenario* being calculated, and shall be taken from the *dispatch period* in such *pre-dispatch schedule* immediately preceding the first *dispatch period* required in the calculation of the *market outlook scenario*, provided that such *pre-dispatch schedule* contains the appropriate *dispatch period*; and~~ ~~D.12.10.4 each *dispatch period* that is not the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule*, *pre-dispatch schedule* or *market outlook scenario* shall be the corresponding value of $Purchase_p$ for the immediately preceding *dispatch period* in the *short-term schedule*, *pre-dispatch schedule* or *market outlook scenario* respectively.~~	

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
	~~In the event of the unavailability of the *real-time dispatch schedule* or the *pre-dispatch schedule* from which the value of $Purchase_p$ is to be derived for section D.12.10.1, D.12.10.2 or D.12.10.3, then the value of $PriorScheduledPurchase_p$ shall be the total MW quantities in all *price-quantity pairs* of the *energy bid* for that *LRF with REB* for the first *dispatch period* mentioned in such section D.12.10.1, D.12.10.2 or D.12.10.3 as the case may be, calculated as:~~ $\sum_{j \in PURCHASEBIDBLOCKS_p} PurchaseBlockMax_{p,j}$ ~~.~~	

[New Section]	D.12.11 In respect of an *LRF with REB* associated with *energy bid p*, the value of $PriorScheduledPurchase_p$ to be used in the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *pre-dispatch schedule* shall be the value of $Purchase_p$ in the latest available *short-term schedule* (based on normal load forecast) for the *dispatch period* immediately preceding the first *dispatch period* of the *pre-dispatch schedule.* D.12.11.1 In the event that no such *short-term schedule* is available, the value of $PriorScheduledPurchase_p$ for the LRF shall be the corresponding value of $Purchase_p$ in the latest available *pre-dispatch schedule* for the *dispatch period* immediately preceding the first dispatch period of the *pre-dispatch schedule* to be calculated in D.12.11. D.12.11.2 In the event that no such *pre-dispatch schedule* is available, the value of $PriorScheduledPurchase_p$ for the LRF shall be the total MW quantities in all *price-quantity pairs* of the *energy bid* for that *LRF* with *REB* for the first *dispatch period* of the *pre-dispatch schedule*, calculated as: $\sum_{j \in PURCHASEBIDBLOCKS_p} PurchaseBlockMax_{p,j}$.	Amend the fallback mechanism for PriorScheduledPurchase, such that the order of preference is as below: 1) Scheduled end-of-period consumption for the prior period based on the latest available short-term schedule 2) Scheduled end-of-period consumption for the prior period based on the latest available pre-dispatch schedule 3) Sum of energy bid quantities

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
[New Section]	D.12.12In respect of an *LRF with REB* associated with *energy bid p*, the value of $PriorScheduledPurchase_p$ to be used in the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *market outlook scenario* shall be the value of $Purchase_p$ in the latest available *pre-dispatch schedule* with a *nodal load forecast* corresponding to the *market outlook scenario* being calculated, and shall be taken from the *dispatch period* in such *pre-dispatch schedule* immediately preceding the first *dispatch period* required in the calculation of the *market outlook scenario*, provided that such *pre-dispatch schedule* contains the appropriate *dispatch period*. D.12.12.1 In the event that no such *pre-dispatch schedule* is available, the value of $PriorScheduledPurchase_p$ for the LRF shall be the total MW quantities in all *price-quantity pairs* of the *energy bid* for that *LRF* with *REB* for the first *dispatch period* of the *market outlook scenario*, calculated as: $\sum_{j \in PURCHASEBIDBLOCKS_p} PurchaseBlockMax_{p,j}$.	Shifted section determining PriorScheduledPurchase to be used in the first period involved in the calculation of market outlook scenarios, and aligned wording with other sections.

Existing Market Rules (1 Jan 2024)	Proposed Rule Changes (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
	D.12.13 In respect of an *LRF with REB* associated with *energy bid p*, the value of $PriorScheduledPurchase_p$ to be used in each *dispatch period* that is not the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule*, *pre-dispatch schedule* or *market outlook scenario* shall be the corresponding value of $Purchase_p$ for the immediately preceding *dispatch period* in the *short-term schedule*, *pre-dispatch schedule* or *market outlook scenario* respectively.	Shifted section determining PriorScheduledPurchase for periods that are not the first dispatch period of forecast schedules.