

PRE-DISPATCH

PREPARED BY: Systems Capability

PROCEDURE TYPE: System Operating Procedure

DOCUMENT REFERENCE: SO_OP_3704

FINAL APPROVER: Michael Gatt

DOC. VERSION: 15

DATE: 24 October 2021

This document is current to version 173 of the National Electricity Rules

History

Version	Date	Author	Checker	Endorser	Approver	Comments
15	24/10/2021	B Choi M Sanders	R Gillett	T van der Walt	M Gatt	Updated section 7.1.2 to reflect changes made for wholesale demand response. Updated terminology for five-minute settlement.
14	05/11/2016	P Ryan	J Wright	T van der Walt	D Sanford	Table 2
13	30/05/2016	T van der Walt	M Rositano	A Honecker	D Sanford	Updated Section 6.2.2.
12	01/05/2014	R Palmer T van der Walt A Yohannan	P Ryan T van der Walt	P Ryan	M Stedwell	Transferred content to new template. Updated Section 6.2.2. Changes made to reflect incorporation of ASEFS forecasts into market systems processes.
11	01/09/2010	M San	P Uribe	S Mathur	P Ryan	Changes to section 4.1 and disclaimer added
10	01/07/2009	A Stephens M Hoarau	P Uribe	C Brownlee	M Hoarau	Change to AEMO document.

Next Review

Next Review Date	Review Type
31/10/2022	Periodic

Important Notice

This document has been prepared by AEMO as required by clause 4.10.1 of the National Electricity Rules (Rules), and has effect only for the purposes set out in the Rules. The Rules and the National Electricity Law (Law) prevail over this document to the extent of any inconsistency.

No Reliance or warranty – This document might also contain information which is provided for explanatory purposes. That information does not constitute legal or business advice, and should not be relied on as a substitute for obtaining detailed advice about the Law, the Rules, or any other applicable laws, procedures or policies. While AEMO has made every effort to ensure the quality of the information in this document, neither AEMO, nor any of its employees, agents and consultants make any representation or warranty as to the accuracy, reliability, completeness, currency or suitability for particular purposes of that information.

Limitation of liability – To the maximum extent permitted by law, AEMO and its advisers, consultants and other contributors to this document (or their respective associated companies, businesses, partners, directors, officers or employees) are not liable (whether by reason of negligence or otherwise) for any errors, omissions, defects or misrepresentations in this document, or for any loss or damage suffered by persons who use or rely on the information in it.

© 2016 Australian Energy Market Operator Limited. The material in this publication may be used in accordance with the [copyright permissions](#) on AEMO's website

Contents

1	Introduction	7
2	Purpose.....	7
3	Application	7
4	Related Policies and Procedures	7
5	Pre-dispatch Overview	7
5.1	Pre-dispatch timing	8
6	Inputs	9
6.1	Participant Inputs	9
6.1.1	Registration data	9
6.1.2	Energy and FCAS dispatch offers/bids	9
6.2	AEMO Inputs.....	9
6.2.1	Forecast demand	9
6.2.2	Ancillary service requirements	9
6.2.3	Inter-regional and Intra-regional Limits	9
6.2.4	AWEFS and ASEFS Forecasts.....	10
6.3	SCADA	10
7	Outputs	10
7.1	Aggregate data.....	10
7.1.1	Pre-dispatch solution data	10
7.1.2	Region data.....	10
7.1.3	Network data	11
7.2	Unit Specific data	11
8	Management of Pre-dispatch	12
8.1	Demand forecast accuracy.....	12
8.2	AWEFS and ASEFS Forecast accuracy	12
8.3	Constraint formulation	12
8.4	Short notice outages	12
8.5	Unplanned outages	12
8.6	Re-bidding.....	12

Figures

Figure 1	Pre-dispatch process.....	8
----------	---------------------------	---

Tables

Table 1	Glossary.....	6
---------	---------------	---

Table 2 Related policies and procedures 7

Glossary

- a) In this document, a word or phrase *in this style* has the same meaning as given to that term in the NER.
- b) In this document, capitalised words or phrases or acronyms have the meaning set out opposite those words, phrases, or acronyms in the table below.
- c) Unless the context otherwise requires, this document will be interpreted in accordance with Schedule 2 of the *National Electricity Law*.

Table 1 Glossary

Term	Meaning
ASEFS	Australian Solar Energy Forecasting System
AWEFS	Australian Wind Energy Forecasting System
EMMS	Electricity Market Management System
EMS	Energy Management System
FCAS	Frequency Control Ancillary Service
NER	National Electricity Rules
NEM	National Electricity Market
NEMDE	NEM Dispatch Engine
NSP	Network Service Provider
UIGF	Unconstrained Intermittent Generation Forecast

1 Introduction

- a) This Pre-Dispatch procedure is made in accordance with clause 4.10 of the National Electricity Rules (NER).
- b) If there is any inconsistency between this Procedure and the NER, the NER will prevail to the extent of that inconsistency.

2 Purpose

The purpose of this Pre-Dispatch procedure is to provide an overview of the pre-dispatch process in terms of the inputs to the process and the outputs provided by the process. It does not attempt to describe in detail the functional design of the pre-dispatch process nor does it provide information on the 5-minute pre-dispatch process.

3 Application

This Procedure applies to *AEMO* and all *Registered Participants*

4 Related Policies and Procedures

Table 2 Related policies and procedures

Policies and Procedure	Title
	National Electricity Rules
SO_OP_3710	Load Forecasting

5 Pre-dispatch Overview

Pre-dispatch has two major purposes

- To provide market participants with sufficient unit loading, unit ancillary service response and pricing information to allow them to make informed business decisions.
- To provide AEMO with sufficient information to allow it to fulfil its duties in accordance with the Rules, in relation to system reliability and security.

This information is calculated by pre-dispatch and published to the market in the form of 30-minute period schedules of forecast unit loading, forecast unit ancillary service response and forecast regional prices.

Figure 1 below illustrates the pre-dispatch process in context of the inputs and outputs. The major inputs to the pre-dispatch process can be divided into two categories,

- Participant Inputs
 - Registration data
 - Energy & FCAS Dispatch offers/bids
- AEMO Inputs
 - Demand forecast
 - FCAS requirements
 - Network Constraints

- Wind generation forecasts from AWEFS
- Solar generation forecast from ASEFS

The major outputs of the pre-dispatch process are split into two categories

- Aggregate data
 - Pre-dispatch solution data
 - Regional data
 - Network data
- Unit specific data
 - Unit energy dispatch data
 - Unit ancillary service dispatch data

Each of these inputs and outputs is detailed in the sections below.

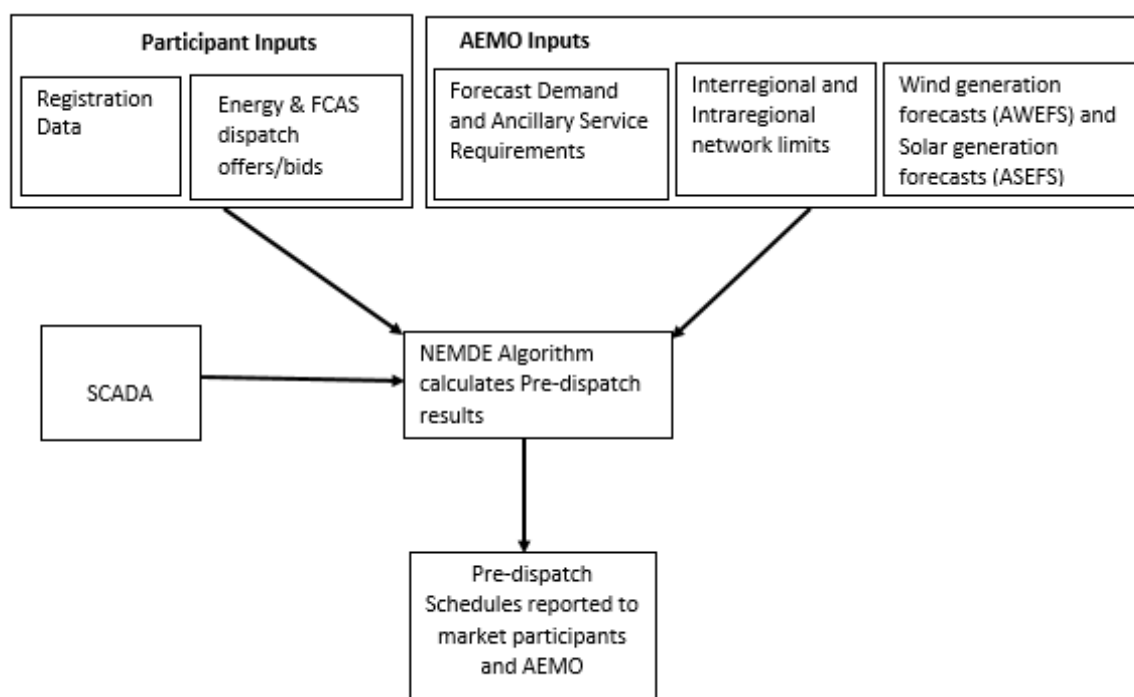


Figure 1 Pre-dispatch process

5.1 Pre-dispatch timing

As indicated in NER 3.8.20 AEMO must prepare and publish a pre-dispatch schedule in accordance with the Spot Market Operations Timetable. Currently AEMO runs pre-dispatch every half hour, on the half hour for each 30-minute period up to and including the last 30-minute period of the last trading day for which bid band prices have closed. As changes to bid band prices for the next trading day close at 1230 hours EST, AEMO will at 1230 hours, publish pre-dispatch for all 30-minute periods up to the end of the next trading day.

6 Inputs

6.1 Participant Inputs

6.1.1 Registration data

Unit registration data is standing data that is initially submitted by the market participant and subsequently authorised by AEMO as part of the dispatchable unit registration process for participation in energy and ancillary services dispatch.

6.1.2 Energy and FCAS dispatch offers/bids

Unit energy dispatch offer/bid data is price band and MW loading constraint information relating to a market participant's dispatchable unit(s) or load(s) which is submitted by market participants in accordance with NER 3.8. This data is used by pre-dispatch to forecast the MW loading for each dispatchable unit or load at the end of each 30-minute period of the pre-dispatch period.

FCAS dispatch offer/bid data is FCAS quantity, pricing and boundaries of operation information relating to a market participant's dispatchable unit(s) or load(s) which is submitted by market participants in accordance with NER 3.8. This data is used by pre-dispatch to forecast the dispatch of each FCAS service for each dispatchable unit or load, which has submitted an FCAS offer/bid, for each 30-minute period of the pre-dispatch period.

6.2 AEMO Inputs

6.2.1 Forecast demand

In accordance with NER 4.9.1 AEMO must produce the most probable (50% probability of exceedance) energy demand for each region for each 30-minute period. These forecasts are based on half-hourly historical metering records and expected weather patterns.

AEMO will regularly review the accuracy of the pre-dispatch demand forecast to ensure it reflects the actual demand trend. For details on load forecasting methodology refer to SO_OP_3710 (Load Forecasting)

6.2.2 Ancillary service requirements

In accordance with NER 3.11 AEMO is required to enter the regional FCAS requirements for each FCAS service for each 30-minute period. This is implemented in the form of FCAS type constraints. For details relating to calculation of FCAS requirements refer to AEMO's [Constraint Implementation Guidelines](#).

6.2.3 Inter-regional and Intra-regional Limits

Each interconnector has a defined flow direction, with positive interconnector flows out of the defined "From Region" into the "To Region" with the limits on the scheduled flow of energy over an interconnector defined for each direction.

Limits on the operation of dispatchable units and interconnectors are implemented in the NEMDE algorithm using constraint equations. These constraints may represent "system normal" type limits or may be invoked for planned outages of transmission equipment as advised by the relevant NSPs.

Constraints for planned outages may include both energy and FCAS requirements. For a full description on constraints refer to AEMO's [Constraint Implementation Guidelines](#).

NSPs or AEMO may also define certain intra-regional limits to control flows within a region. AEMO will use constraint equations to impose energy flow limits on intra-connectors.

6.2.4 AWEFS and ASEFS Forecasts

The Australian Wind Energy Forecast System (AWEFS) and the Australian Solar Energy Forecast System (ASEFS) provide the unconstrained intermittent generation forecasts (UIGF), or max availability, for semi scheduled wind farms and solar farms respectively. They are also used to calculate the forecasts for significant non-scheduled wind and solar generation.

6.3 SCADA

The following SCADA data is captured by the NEMDE process from the NEM SCADA database and is applied to the first 30-minute period calculation only, of the current pre-dispatch schedule.

- Unit data
 - Initial loading
- Network data
 - Initial interconnector flow
 - EMS limits
 - Other network quantities

7 Outputs

Pre-dispatch information is released to the market in two stages:

- Output results calculated from each run of the Pre-dispatch process are released after that Pre-dispatch run. Pre-dispatch data of an aggregate nature (both inputs and outputs) is published to the whole market, with data relating to a specific market participant only published to that participant; and
- All Pre-dispatch data (both input and output) is published to the whole market after the end of the trading day to which that data applies.

Details of the different data provided in each category can be found in the AEMO document, Pre-dispatch Process Description, available from the AEMO website.

7.1 Aggregate data

7.1.1 Pre-dispatch solution data

Provides an indication of the status of the pre-dispatch solution, whether the solution was successful or not and whether the solution is complete.

7.1.2 Region data

Provides the following information for each region for each 30-minute period within the pre-dispatch period:

- Spot prices for energy and FCAS
- Spot price sensitivities to pre-defined demand changes
- Interconnector flow sensitivities to pre-defined demand changes
- Forecast demand
- Daily energy requirement
- Available generation (available scheduled and semi-scheduled generation)
- Dispatchable generation (dispatched scheduled and semi-scheduled generation)

- Available load (available scheduled load)
- Dispatchable load (dispatched scheduled load)
- Wholesale Demand Response – Initial MW
- Wholesale Demand Response – Available
- Wholesale Demand Response - Dispatched
- Deficit/surplus generation
- Net interchange
- FCAS dispatch
- FCAS local dispatch
- FCAS global and local requirements

7.1.3 Network data

Provides the following information for each 30-minute period within the pre-dispatch period:

- Interconnector initial metered flow (MW)
- Interconnector target flow (MW)
- Interconnector flow export and import limits (MW)
- Constraint setting the interconnector flow export and import limits
- Interconnector flow losses (MW)
- Interconnector flow marginal loss factor
- Intra-regional network flow limit (MW)
- Intra-regional network flow limit status
- Constraint marginal value (\$/MW)
- Constraint violation degree (MW)

7.2 Unit Specific data

For each dispatchable unit or load the following information is provided for each 30-minute period within the pre-dispatch period,

- Initial metered loading (MW)
- Initial AGC status
- Energy market availability (MW)
- Energy market target (MW)
- Energy market ramp rate (MW/minute)
- Semi Dispatch Cap flag (semi-scheduled generating units only)
- FCAS raise response enabled (MW) (for each service)
- FCAS lower response (enabled MW) (for each service)
- FCAS availability (MW)
- FCAS available/trapped/stranded flags (for each service)

8 Management of Pre-dispatch

AEMO will review the results of pre-dispatch on a regular basis to ensure the accuracy and validity of the results. Accuracy and validity may be affected by a number of issues as described in the following sections.

8.1 Demand forecast accuracy

Demand forecast accuracy is highly dependent on weather forecast accuracy and customer behaviour.

AEMO will regularly review the accuracy of regional demand forecasts to ensure they reflect the actual demand trend. If the forecast error for a region is greater than a threshold limit for greater than two 30-minute periods AEMO may submit a revised forecast for that region.

8.2 AWEFS and ASEFS Forecast accuracy

AWEFS and ASEFS forecast wind and solar generation based on weather information and real time data. Plant availability and down regulation of semi-scheduled generators may affect the accuracy of wind and solar generation forecasts. AEMO will monitor AWEFS and ASEFS forecasts to ensure acceptable levels of accuracy are maintained.

8.3 Constraint formulation

The formulation used for the pre-dispatch calculation may differ from the dispatch formulation due to the number of assumptions that may need to be made relating to future system conditions. This may result in pre-dispatch giving a dissimilar outcome to dispatch. AEMO has a process in place to improve the pre-dispatch formulation of constraints where significant errors are observed.

8.4 Short notice outages

NSPs may submit short notice outages that require AEMO to apply a constraint at any time during the pre-dispatch or dispatch period. NSPs may also cancel planned outages at short notice. AEMO will invoke/revoke any relevant constraints as soon as is practicable after AEMO receives notification of a new or cancelled outage.

8.5 Unplanned outages

Generating units or network elements may fail at any time. The impact this may have on pre-dispatch is related to the size of the generating unit or location of the network element. AEMO will invoke any necessary constraints as soon as is practicable after AEMO is aware of the outage.

8.6 Re-bidding

Re-bidding by generators and loads may have a significant impact on the accuracy of pre-dispatch. AEMO has no control over the level of re-bidding.