

# Pre-dispatch procedure

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## Current version release details

Version	Effective date	Summary of changes
<u>16</u>	<u>12/07/2023</u>	<u>Inclusion of bid energy Max Avail for semi-scheduled generating units.</u> <u>Conversion to new template and minor drafting updates for consistency and accuracy.</u>

**Note: There is a full version history at the end of this document.**

# 1. Introduction

## 1.1. Purpose and application

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.

This Pre-dispatch Procedure is a *power system operating procedure under made in accordance with* clause 4.10.1 of the National Electricity Rules (NER). If there is any inconsistency between this Procedure and the NER, the NER will prevail to the extent of that inconsistency.

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

## 1.2. Definitions and interpretation

### 1.2.1. Glossary

Terms defined in the National Electricity Law and the NER have the same meanings in [this Procedure](#) unless otherwise specified in the [table below](#).

Defined terms in the NER are intended to be identified in [this Procedure](#) by italicising them, but failure to italicise a defined term does not affect its meaning.

The words, phrases and abbreviations in the table below have the meanings set out opposite them when used in [this Procedure](#).

Term	Definition
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
<i>Max Avail</i>	<i>The maximum availability in a dispatch offer</i>
NER	National Electricity Rules
NEM	National Electricity Market
NEMDE	NEM Dispatch Engine
NSP	Network Service Provider
UIGF	Unconstrained Intermittent Generation Forecast

### 1.2.2. Interpretation

[This Procedure](#) is subject to the principles of interpretation set out in Schedule 2 of the National Electricity Law.

### 1.3. Related documents

Reference	Title	Location
SO_OP_37 10	Load Forecasting	<a href="https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/procedures/so_op_3710-load-forecasting.pdf">https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/procedures/so_op_3710-load-forecasting.pdf</a>
	National Electricity Rules	

## 2. Pre-dispatch Overview

*Pre-dispatch* has two major purposes:

- To provide *Market Participants* with sufficient information about unit loading, unit ancillary service response and pricing information to assist allow them to make informed business decisions about market participation.
- To assist provide AEMO with sufficient information to allow it to fulfil its power system responsibilities duties in accordance with the NER 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~~Figure 4~~ 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 ~~d~~*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.

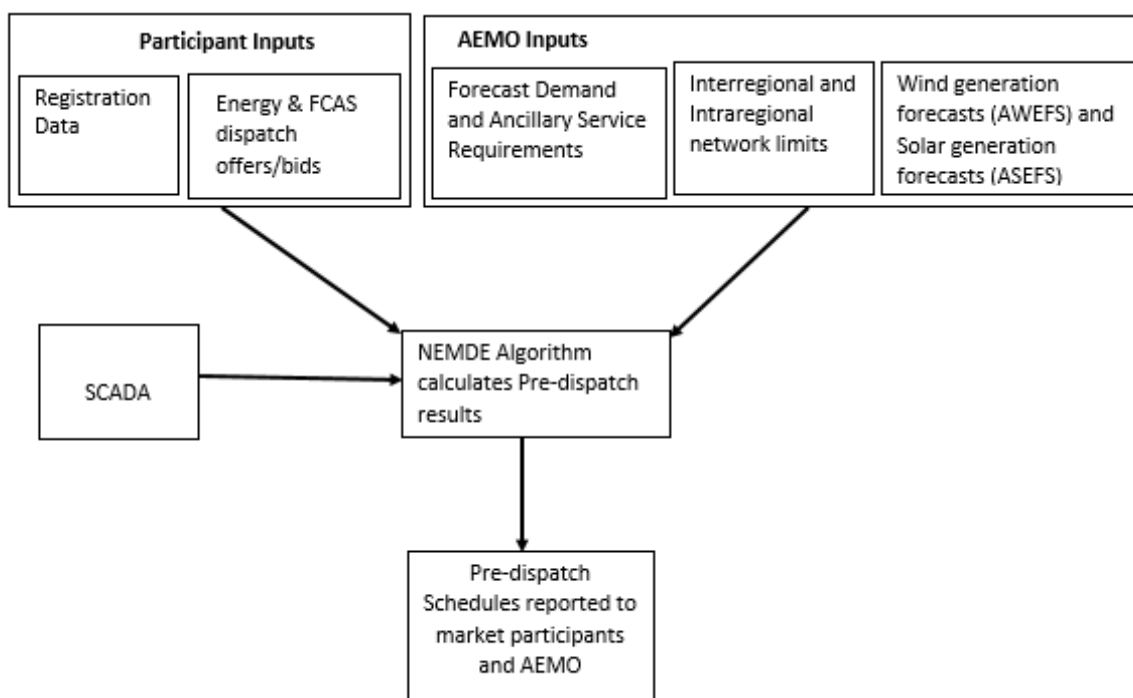


Figure 1: Pre-dispatch process

## 2.1. Pre-dispatch timing

As indicated in [NER 3.8.20](#), AEMO must prepare and publish a *pre-dispatch* schedule in accordance with the [sSpot mMarket oOperations tTimetable](#). 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, [at that time AEMO publishes will at 1230 hours, publish-pre-dispatch](#) for all *30-minute periods* up to the end of the next *trading day*.

## 3. Inputs

### 3.1. Participant Inputs

#### 3.1.1. Registration data

Unit registration data is standing data that is initially submitted by the [Mmarket Pparticipant](#) and subsequently authorised by AEMO as part of the dispatchable unit registration process for participation in *energy* and [FCASancillary services dispatch](#).

#### 3.1.2. Energy and FCAS dispatch offers/bids

Unit energy dispatch offer/bid data is [the price band](#) and MW [quantityloading constraint](#) information relating to a [Mmarket Pparticipant'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 ~~the market ancillary service 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 quantity* of each FCAS ~~service~~ for each dispatchable unit or load ~~with a valid, which has submitted an~~ FCAS offer/~~bid~~, for each *30-minute period* of the *pre-dispatch* period.

## 3.2. AEMO inputs

### 3.2.1. 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).

### 3.2.2. Ancillary service requirements

In accordance with NER 3.8.11 AEMO is required to enter the *regional market ancillary service 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](#).

### 3.2.3. 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.

### 3.2.4. AWEFS and ASEFS Forecasts

The Australian Wind Energy Forecasting System (AWEFS) and the Australian Solar Energy Forecasting System (ASEFS) provide [a forecast of available capacity, known as 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. The available capacity, or availability, used by the NEMDE process is the lower of the UIGF and ~~bid energy~~ Max Avail.

### 3.3. 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.

## 4. 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 *M*market *P*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.

### 4.1. Aggregate data

#### 4.1.1. 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.

#### 4.1.2. Region data

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

- *Spot prices* and ancillary service prices for energy and FCAS
- Spot pPrice sensitivities to pre-defined demand changes
- *Interconnector* flow sensitivities to pre-defined demand changes
- Forecast demand
- Daily *energy* requirement
- UIGF (semi-scheduled generating units)

- Available generation (~~available~~ *scheduled generating units* and *semi-scheduled generating units*)
- Dispatchable generation (~~dispatched~~ *scheduled generating units* and *semi-scheduled generating units*)
- 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

#### 4.1.3. 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)

## 4.2. 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)
- UIGF (~~forecast of available capacity for semi-scheduled generating units only~~)
- 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)

## 5. 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.

### 5.1. 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*.

### 5.2. 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 [intermittent generation 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.

### 5.3. 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* ~~having 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.

### 5.4. 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*.

### 5.5. 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*.

## 5.6. Re-bidding

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

## Version release history

Version	Effective Date	Summary of Changes
15	24/10/2021	Updated section 7.1.2 to reflect changes made for wholesale demand response. Updated terminology for five-minute settlement.
14	05/11/2016	Table 2.
13	30/05/2016	Updated Section 6.2.2.
12	01/05/2014	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	Changes to section 4.1 and disclaimer added.
10	01/07/2009	Change to AEMO document.