Operating Procedure

Dispatch

Prepared by: Power System Operations

Document Number: SO_OP3705

Issue Date: v67 - 20/01/2011

Disclaimer

(a) Purpose – This Guide has been produced by the Australian Energy Market Operator Limited (AEMO) to provide information about power systems operations, as at the date of publication.

(b) No substitute – This Guide is not a substitute for, and should not be read in lieu of, the National Electricity Law (NEL), the National Electricity Rules (Rules) or any other relevant laws, codes, rules, procedures or policies. Further, the contents of this Guide do not constitute legal or business advice and should not be relied on as a substitute for obtaining detailed advice about the NEL, the Rules, or any other relevant laws, codes, rules, procedures or policies, or any aspect of the national electricity market or the electricity industry.

(c) No Warranty – While AEMO has used due care and skill in the production of this Guide, neither AEMO, nor any of its employees, agents and consultants make any representation or warranty as to the accuracy, reliability, completeness or suitability for particular purposes of the information in this Guide.

(d) Limitation of liability - To the extent permitted by law, AEMO and its advisers, consultants and other contributors to this Guide (or their respective associated companies, businesses, partners, directors, officers or employees) shall not be liable for any errors, omissions, defects or misrepresentations in the information contained in this Guide, or for any loss or damage suffered by persons who use or rely on such information (including by reason of negligence, negligent misstatement or otherwise). If any law prohibits the exclusion of such liability, AEMO's liability is limited, at AEMO's option, to the re-supply of the information, provided that this limitation is permitted by law and is fair and reasonable.

Version Control

VER	DATE	REVISION DESCRIPTION	AUTHOR	CHECKED	RESPONSIBLE MANAGER [1]	APPROVED
V67	20/01/11	Included OCD workflow in section 7.1	Pablo Uribe	Basilisa Choi Vonny Wijaya	Ross Garroway	Henry Gorniak
V66	08/12/10	Changes to price revision trigger levels for Tasmania and Heywood Interconnector to apply from 0000 hrs 15/12/10	R. Rigoni	T. Van der Walt	R. Rigoni	Henry Gorniak
V65	01/09/10	Section 17.1 updated for clarification	Pablo Uribe	Shivani Mathur	Shivani Mathur	Paul Ryan
V64	04/08/10	Deleted section 7.3 to remove the topic regarding binding network constraint (BNC) reruns because BNC runs are no longer required and revised section 17 to apply APC to all market ancillary services if APP is triggered in relation to any maket ancillary service Disclaimer added	Shivani Mathur Juan Duque	Basilisa Choi Taryn Maroney Ross Gillett Evy Papadopoulos Peter Ernst-Russell	Shivani Mathur Tjaart van der Walt	Henry Gorniak Henry Gorniak
V63	01/07/10	Updated the Negative Residue trigger level (Sec 19) & CPT (Sec 17). Changes to Compliance Monitor (Sec 5.6 & A1.4)	Shivani Mathur	Pablo Uribe	Ignazio Ranno	Henry Gorniak
v62	02/03/10	Added new section 11.4 “Minimum Safe Operating Level” Amended section 13.1	Ignazio Ranno	Paul Ryan	Ignazio Ranno	Ignazio Ranno
v61	29/07/09	Removed topics related to power system security duplicated in SO_OP3715. Document now focused on dispatch issues only. Revised Price revision triggers for VIC -NSW interconnection	Robert Rigoni	Chris Brownlee	Chris Brownlee	Martin Hoarau
v60	15/07/09	Revised Section 16.3.AEMO will not utilise NER 3.14.2 (c) (3). Updated Section 4.6 and Attachment 5: Gross error trigger removed Added section 4.6.1 Conditions for Semi-Dispatch Compliance	Pablo Uribe	Shivani Mathur	Chris Brownlee	Chris Brownlee

Note 1: The Responsible Manager is aware of the document content and has verified that the changes in this revision have been checked against the “PSO Standard TPA Checklist”.

Table of Contents

1. Purpose

This Power System Operating Procedure provides instructions and guidelines covering market operations in relation to the operation of the power system.

2. Definitions

Refer to the Glossary Document SO_OP2000 and Chapter 10 of the NER for definitions.

AFP: Administered Floor Price

APC: Administered Price Cap

AWEFS: Australian Wind Energy forecasting System

FCAS: Frequency Control Ancillary Services

MII: Manifestly Incorrect Input

MMS: Market Management System

MPC: Market Price Cap

NCAS: Network Control Ancillary Service

NER: National Electricity Rules

PSO: AEMO Power System Operations

ROC: Rate of Change

SRAS: System Restart Ancillary Service

UIGF: Unconstrained Intermittent Generation Forecast

3. References

National Electricity Rules

Operations Procedure: Pre-dispatch SO_OP3704

Operations Procedure: Frequency Control Ancillary Services SO_OP3708A and Non Market Ancillary Services SO_OP3708

Operations Procedure: Demand Forecasting SO_OP3710

Operations Procedure: Market Reporting SO_OP4000

Operations Procedure: Generic Constraints due to Network Limitations SO_OP3709

Final Report on the Consultation on Demand Side Participation, dated 29 May 2002

4. Dispatch Instructions

Dispatch targets for all scheduled generators, semi scheduled generating units, scheduled network services and scheduled loads are derived by NEMDE after co-optimising the energy market with the FCAS market.

Where possible, dispatch instructions will be issued electronically via the automatic generation control (AGC) system or the AEMO Market Management System (MMS) interfaces.

Generating units with bid dispatch inflexibility profiles will receive commitment and dispatch instructions via the AEMO MMS interfaces. Dispatch instructions may also be issued via AGC if available.

Semi-scheduled generating units will receive semi-dispatch flag status and dispatch instructions via the AEMO MMS interfaces.

AEMO may issue dispatch instructions in some other form if in its reasonable opinion the normal processes are not available.

4.1 Automatic Generation Control

The AGC system serves two purposes in the NEM. They are:

1. Energy market dispatch of generating units which are on remote control

   Dispatch results from the NEMDE run are ramped into the AGC (to prevent any large step change in MW output). In general any generating unit not dispatched for regulation FCAS will be ramped to its energy dispatch target.

2. Regulating FCAS dispatch

Actual frequency and time error values are compared to the desired frequency and time error to calculate the Area Control Error (ACE). This value is then used by the AGC to determine the desired MW outputs of generating units dispatched for regulation FCAS.

4.2 Semi-scheduled Generating Units

Semi-scheduled generating units are those generating units registered in accordance with NER 2.2.7. Generally these generating units will be

- Greater than 30MW and
- Intermittent generation (wind farms)

A semi-scheduled generating unit is required to follow the dispatch target set by AEMO only when the semi-dispatch flag is set to ‘TRUE’. Under these conditions the semi-scheduled generating unit is subject to the same conformance obligations as a scheduled generating unit. When the semi-dispatch flag is set to ‘FALSE’ the semi-scheduled generating unit is free to generate at any level.

4.3 Dispatch of Non Market Ancillary Services

AEMO is responsible for specifying regional ancillary service requirements for voltage control, network loading control and system restart. Suitable ancillary services are enabled to maintain power system security or where a market benefit exists.

Market participants are responsible for providing and updating the availability of ancillary services to AEMO (providing re-offers).

Refer to *SO_OP3708A: Frequency Control Ancillary Services* and *SO_OP3708: Non Market Ancillary Services* for details on the management and dispatch of ancillary services in the NEM.

5. Non-Conformance with Dispatch Targets

5.1 Principles of Compliance Monitoring (Energy Market)

Compliance Monitoring is a process that AEMO applies to scheduled generating units, semi scheduled generating units, scheduled loads and scheduled network services. The aim of the process is to identify and implement corrective measures if a market participant fails to follow a Dispatch Instruction.

Two trigger mechanisms are utilised to identify the severity of Non-Compliance. These are the Small Error Trigger and the Large Error Trigger. Corrective measures are then taken depending on the severity and duration of the Non-Compliance event. The corrective measures are a logical defined sequence of actions aimed at resolving the mismatch between actual and total dispatched generation in the NEM.

- The Non-Compliance Calculations and Process Overview, including worked examples, are detailed in Attachment 1 of this document.
- Refer SO_OP 3708 for details of compliance monitoring in FCAS markets.

5.1.1 Conditions for Semi-Dispatch Compliance

The Dispatch process determines for each semi-scheduled generating unit both a dispatch cap and an associated “semi-dispatch compliance” requirement flag, and electronically issues these quantities confidentially to the relevant Semi-Scheduled Generator.

A semi-scheduled generating unit only needs to comply with its dispatch cap (as a maximum generation limit) for dispatch intervals where the “semi-dispatch compliance” requirement flag for that dispatch interval is also set.

The “semi-dispatch compliance” requirement flag is set when either one of the following conditions is satisfied:

1. Dispatch Cap limited by Binding or Violated Network Constraint

The generating unit's forecast output (its dispatch cap) is explicitly limited by any binding or violated network constraint equation, and if the actual output were to exceed the dispatch cap value this would result in violating (or further violating) that network constraint equation;

OR

2. Dispatch Cap otherwise below the Unit's Unconstrained Intermittent Generation Forecast

   The generating unit's forecast output (its dispatch cap) is not explicitly limited by a binding or violated network constraint equation

   BUT

   The generating unit's dispatch cap is less than its "unconstrained intermittent generation forecast" as a result of either a purely inter-regional limitation, or an offer or market-related limitation, the latter including:

   - Unit Ramp Rate
   - Unit Fixed Loading Level
   - Non-dispatch of uneconomic price bands
   - Marginal dispatch of economic price bands

When one of the above "semi-dispatch compliance" conditions is met for a particular semi-scheduled generating unit, its "semi-dispatch compliance" requirement flag is set for that dispatch interval (called a "semi-dispatch interval") and the generating unit is "semi-dispatched".

For all other dispatch intervals where neither of the above conditions is met for a particular semi-scheduled generating unit, its "semi-dispatch compliance" requirement flag is reset for that dispatch interval (called a "non-semi-dispatch interval") and the generating unit is "non-semi-dispatched".

The AEMO Compliance Module, automatically flags non-responsive scheduled generating units, semi scheduled generating units, scheduled loads and scheduled network services based on the SCADA quantities used by the dispatch process. Non Compliance action then follows in a Manual or Automated manner with the Automated option only applying to generating units.

In addition to the communication steps set out in this section, participants should contact the AEMO control room when clarification of compliance status is necessary.

Following the requirements of the Final Report on the Consultation on Demand Side Participation, dated 29 May 2002, the process for managing non-conforming scheduled loads will be different to that for scheduled generators, semi scheduled generators or scheduled network services.

5.2 Generating Units and Network Services

Plant in this category may be processed by AEMO in a Manual or Automated manner. The Compliance Data Report indicates the mode of operation at any time. Manual and Automated processing are as follows:

5.2.1 Manual Processing

If a non-conformance exists but does not cause system security violations, the following actions are to be taken.

- Identify non-responsive scheduled generating unit, semi scheduled generating unit or scheduled network service using AEMO Compliance Module.
- Contact participant and request a reason for the non-compliance to the dispatch instruction. Log the reason given. Note that the Compliance Data Report is available to the participant each Dispatch Interval, so any non-response issue should have already been observed. The Compliance Status at this point will be Non-Responding. Note that in Manual operating mode, the Compliance Status as reported by the Compliance Module will not advance beyond Non-Responding. All subsequent actions are manually applied and involve phone communication between AEMO and the participant.
- If modification to the bid is necessary to achieve a realistic real-time dispatch, request the participant to submit a rebid to reflect the current performance of the plant.
- If the participant fails to follow the dispatch targets or to submit a rebid within two dispatch intervals, the scheduled generator or semi scheduled generator is to be declared non-conforming. If required, AEMO will set the unit at an output determined by AEMO so that a physically realisable dispatch is achieved. This will be achieved by AEMO applying a non-conformance constraint. The constraint violation penalty factor for this constraint will be set at 360 x MPC.
- The participant will be advised that the scheduled generating unit, semi scheduled generating unit or scheduled network service has been declared non-conforming and that a non-conformance constraint has been applied. Note that the non conformance constraint action will result in the error being reduced, this may result in the reported Compliance Status returning to Normal. This is to be expected as the error has been corrected and the Non Conforming declaration is being processed manually.
- The scheduled generating unit, semi scheduled generating unit or scheduled network service is to remain at the loading determined by the non-conformance constraint until AEMO is advised by the Participant that it is now capable of following Dispatch Instructions.

5.2.2 Automated Processing

If a non-conformance exists but does not cause system security violations, the following actions are to be taken.

- Observe non-responsive scheduled generating unit, semi scheduled generating unit or scheduled network service using the AEMO Compliance Module. The participant will be in an informed position as the Compliance Data Report is published each Dispatch Interval.
- The Compliance Status change observed in the AEMO Compliance Module is identical to the Compliance Data Report content. The participant also receives a message corresponding to the Compliance Status in each Report. The sequence of Compliance Status change and message content is as follows:
- Off Target

  Participant Message: Please move to dispatch target or re-bid.
- Non Responding

  Participant Message: Please move to dispatch target or re-bid.
- NC Pending

  Participant Message: Unit not responding to dispatch target. Non Conformance action pending
- Non Conforming

  Participant Message: Unit declared Non Conforming. Non Conformance Constraint is applied. Please contact AEMO.
- Note that the non conformance constraint application mentioned in this automated process is the same as that applied for the manual process.
- If the participant has not contacted AEMO in a reasonable time following the Non Conformance Declaration then AEMO will contact the participant and request a reason for the non-compliance to the dispatch instruction. AEMO will log the reason given.
- The scheduled generating unit, semi scheduled generating unit or scheduled network service is to remain at the loading determined by the non-conformance constraint until AEMO is advised by the Participant that it is now capable of following Dispatch Instructions.

5.3 Scheduled Loads

Plant in this category will be processed by AEMO in a Manual manner only. The Compliance Data Report will indicate Manual mode of operation at all times. Manual processing is as follows:

If a non-conformance exists but does not cause system security violations, the following actions are to be taken.

- Identify non-responsive scheduled load using the AEMO Compliance Module.

- Contact participant and request a reason for the non-compliance to the dispatch instruction. Log the reason given. Note that the Compliance Data Report is available to the participant each Dispatch Interval, so any non-response issue should have already been observed. The Compliance Status at this point will be Non-Responding.
- If modification to the bid is necessary to achieve a realistic real-time dispatch, request the participant to submit a rebid to reflect the current performance of the plant.
- If the participant fails to follow the dispatch targets or to submit a rebid within two dispatch intervals, the scheduled load is to be declared non-conforming.
- AEMO will then consider the viability of the previous daily bid accepted by AEMO prior to the non-conforming bid currently in use. AEMO will determine whether the bid is viable or not and, if it is viable, the bid should be submitted by AEMO.
- If the previous bid is not viable, AEMO will set the load at a fixed output determined by AEMO so that a physically realisable dispatch is achieved. This will be realised by AEMO applying a non-conformance constraint. The constraint violation penalty factor for this constraint will be set at 360 x MPC.
- The participant will be advised that a non-conformance constraint has been applied. Note that the non conformance constraint action will result in the error being reduced, this may result in the reported Compliance Status returning to Normal. This is to be expected as the error has been corrected and the Non Conforming declaration is being processed manually.
- The scheduled load is to remain at the loading determined by the non-conformance constraint until AEMO is advised by the Participant that it is now capable of following Dispatch Instructions.

5.4 Conditions to apply to Fast Start registered generating units

Registered Fast Start units will immediately be declared non conforming if

1. A unit has synchronised and increased its generation level greater than 0MW without having received a dispatch instruction from AEMO, OR
2. A unit has received a dispatch instruction to reduce to 0MW and fails to meet that dispatch instruction.

The declaration of non-conformance will remain in place until such time that AEMO is satisfied that the relevant generating unit will accurately respond to future dispatch instructions. The Non-Conformance Declaration may be implemented in an Automated or Manual manner by AEMO depending on the current operating mode of the Compliance Module. In either case AEMO will initiate communication with the participant for any accelerated Non-Conformance Declaration.

Appropriate participant staff should contact AEMO when the unit is able to follow dispatch targets.

These provisions enable units to decommit if they receive a start signal but decide not to generate.

5.5 Non Conformance constraints

When scheduled plant is declared as non-conforming, AEMO may apply a constraint.

In most cases this will be a dynamic constraint where the Right Hand Side equals the telemetered generation, consumption or transfer.

However, in some cases this dynamic constraint is not appropriate (eg. it may cause or not remove a security violation), AEMO may apply a different constraint formulation or may determine not to apply a specific non-conformance constraint.

5.6 Market Reporting of Non Conformance

If a declaration of non-conformance is made then this must be advised to all the market participants before the end of next day. This notice to the participants should include the following details:

- identity of the scheduled generating unit, semi scheduled generating unit, scheduled load or scheduled network service
- trading intervals affected
- magnitude of non-conformance (the difference between the actual generation and the dispatch target)

Refer to the Operations Procedure: Market Reporting SO_OP4000 for details.

5.7 Accelerated non conformance process

It is to be noted that at any stage of pursuing the non-conformance, if the participant who owns the scheduled generating unit, semi scheduled generating unit, scheduled load or scheduled network service clearly indicates that the plant will not be conforming to dispatch instructions, the details of the discussion / communication will be logged and the scheduled generating unit, semi scheduled generating unit, scheduled load or scheduled network service may be declared immediately as non-conforming. Then the listed actions above for non-conformance will be taken.

6. Commitment and De-commitment of Scheduled Generating Units

6.1 Self Commitment

A scheduled generating unit is self-committing if it has a self dispatch level of greater than 0 MW, where the self-dispatch level equals the sum of all energy bid in offloading (that is, negatively priced) price bands in its dispatch offer .

National Electricity Rules clauses 4.9.6(a)(1) and 4.9.7(a) require a Scheduled Generator to confirm with AEMO the expected synchronising time and de-synchronising time at least 1 hour before, and update this advice 5 minutes before synchronising or de-synchronising.

Scheduled generating units that are self-committing are not required to further inform AEMO of their expected synchronising or de-synchronising times providing the relevant bid has been received by AEMO at least 1 hour prior to the expected synchronising or de-synchronising time, unless specifically requested by AEMO.

6.2 Fast-Start Generators that choose not to Self-Commit

Fast-start generators that choose not to self-commit, are subject to the same obligations as all the generators in relation to PASA (NER clause 3.7.2 and 3.7.3). They are not, however, subject to the requirement in NER clause 4.9.6(a) to confirm expected synchronisation times with AEMO. Those generators are subject to dispatch instructions from AEMO under NER clause 4.9.6(b). Those instructions must include a synchronisation time nominated by AEMO. This will be via the normal dispatch process.

NER clause 4.9.6(b)(3) requires a generator that receives such a dispatch instruction to advise AEMO promptly if it cannot meet the nominated synchronisation time set out in that instruction.

However if a fast-start generator chooses to self-commit then that generating unit is subject to the same requirements in relation to advice to AEMO regarding synchronising or de-synchronising times as other self committing units.

7. Dispatch Re-Runs

There are a number of conditions that could trigger an automatic re-run of the dispatch solution.

The automatic re-run solution is completed and published within the original dispatch interval.

7.1 Over Constrained Dispatch (OCD) Re-Runs

The automation of this process detects, adjusts, re-runs and reports an adjusted energy price for a high percentage of over-constrained dispatch intervals thereby allowing the automatic publishing of correct dispatch prices in real time.

An interconnector, intra-regional network or FCAS requirement constraint is violated.

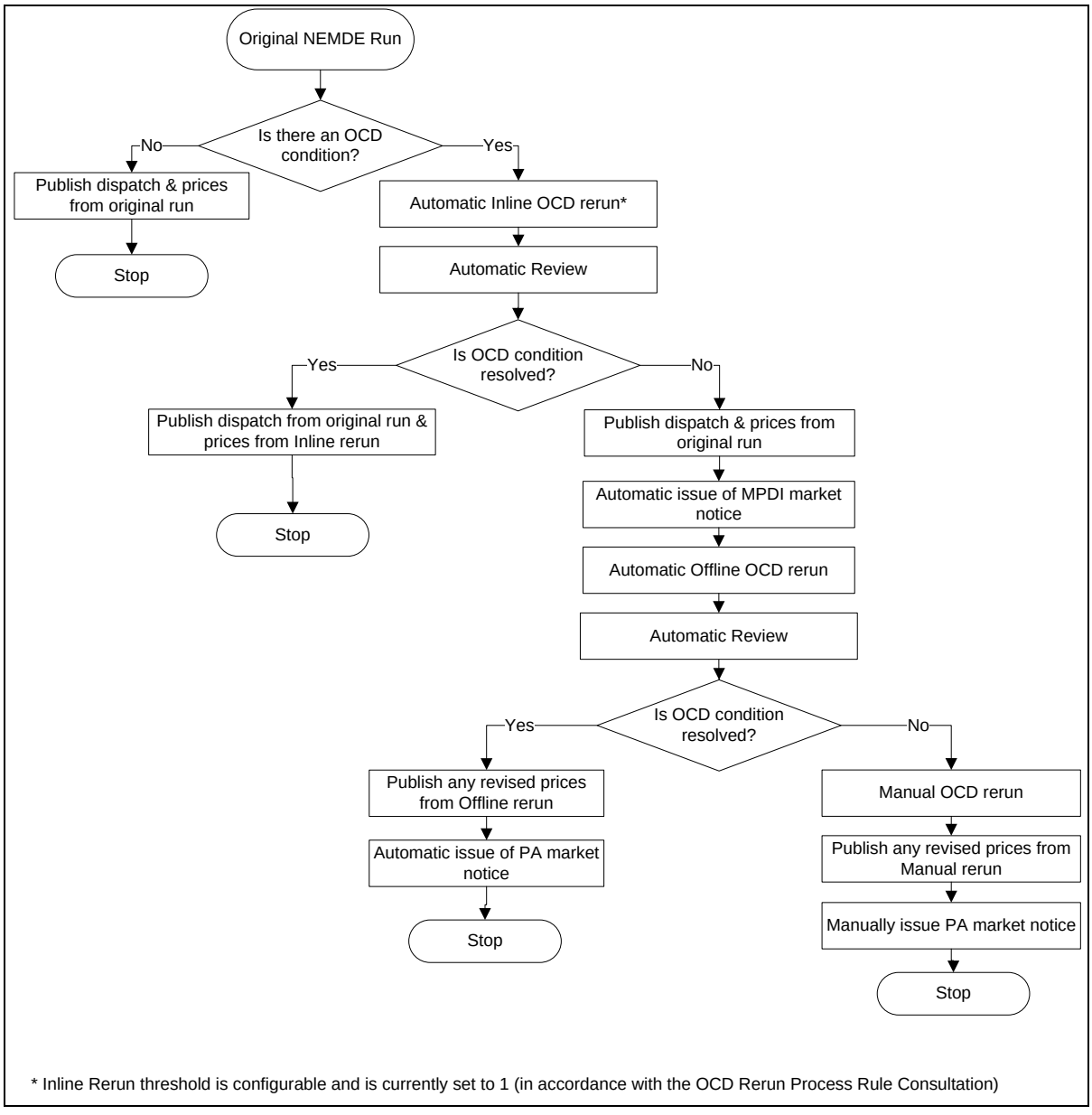
AND

- An energy dispatch price is greater than or equal to MPC or;
- An energy dispatch price is less than or equal to the Market Floor Price or
- Any market ancillary service price is greater than or equal to MPC.

The OCD re-run process is run with relaxed violated constraint inputs to determine adjusted dispatch prices. In such cases all regional energy and market ancillary service prices are revised from the OCD re-run.

Commitment of fast start plant is determined on the basis of the unit commitment undertaken prior to the initial unrelaxed pricing run.

If an automatic OCD re-run has occurred and any regional energy price is still either at MPC or at the Market Floor Price or any market ancillary service still at MPC then AEMO will issue a market notice declaring a manual priced dispatch interval (MPDI) and declaring that prices for that dispatch interval will be reviewed. Before the end of the next working day a manual re-run (also based upon the principles set out above) will be undertaken. The results of this manual re-run will be advised through a second market notice. Please refer to the flowchart below for further clarification of the OCD process.



Note that if an automatic OCD re-run occurs then the original run prices (greater than MPC or less than the MPF) are not published.

7.2 NEMDE second run for Basslink dispatch

There are two important characteristics of Basslink that can cause NEMDE to be unable to find the optimal solution in a significant number of Dispatch Intervals:

- No-go Zone - NEMDE is a linear program, and will attempt to produce dispatch targets anywhere in the no-go zone if demanded by the market conditions.
- FCAS Transfer Capability - When operating at levels greater than 50MW in either direction, Basslink has the capability to transfer FCAS from one region to another. This allows, for example, the FCAS requirement for the Tasmanian region to be met in part by scheduling additional FCAS on the mainland, if it is economical to do so.

NEMDE performs two runs for every dispatch interval. The first run uses the SCADA indication for the status of the Basslink frequency controller, and for the additional NEMDE run the input status of the Basslink frequency controller is assumed to be switched off. i.e. if the Basslink frequency controller is turned off, the two runs are identical.

The final solution, and the associated NEMDE input status of the Basslink frequency controller is decided by selecting the run with the lease cost objective function.

This allows:

- NEMDE to increase the set of allowable dispatch outcomes that satisfy the complex model of Basslink available to NEMDE so that it can maximise the value of spot market trade, as required under NER clause 3.8.1(a).
- A reduction in unnecessary counter price flows across the Basslink HVDC interconnector.

7.3 Non Physical Loss Re-Runs

Non-physical loss runs are required by the NEM dispatch systems to cater for negative prices and their affects on inter-connector loss models. When non-physical losses are detected by AEMO's dispatch systems, a second dispatch run is triggered in which piecewise linear loss models on inter-connectors are replaced by static loss factors. In order to minimise any errors arising from the static loss factors in this second run, hard limits are conditionally placed on inter-connectors in the market.

8. Aggregate Dispatch Error

8.1 Background

Aggregate Dispatch Error is an adjustment to the Dispatch regional demand forecast. This adjustment is based on the following calculation for each unit not performing regulation duty

ADE = Target value – Actual Value

ADE will be positive when units are operating below targets and negative when units are operating above targets. The ADE for each unit in a region is summed to produce an ADE for that region.

The resulting ADE value for each region is then added to the respective region demand forecast in the next dispatch interval

8.2 ADE calculation

30-minute time weighted average

Using a 30-minute time weighted average for the region ADE provides a more accurate predictor of the level of sustained dispatch error that should apply as a forecast demand adjustment in the next dispatch interval.

The following calculation of each region ADE is performed.

The calculation is based on 6 data samples at 5 minute intervals with the most recent sample being given a weight of 6 and the oldest a weight of 1.

Time Weighted Average ADE = ((Sample 1 * Weight1) + (Sample2 * Weight2) +..(Sample6 * Weight6)) / (Weight1 + Weight2 +. …Weight6)

This calculation will be performed on a regional basis rather than on an individual generating unit basis.

Frequency element in ADE

To ensure that any frequency deviation is not caused by or exacerbated by the ADE a frequency element is introduced into the ADE calculation. This ensures that if a frequency deviation occurs only ADE in a direction that would help to restore frequency is passed to the market systems.

IF Frequency > high dead band value AND ADE > 0 THEN
ADE = 0
ELSE ADE = ADE

Conversely
If Frequency < low dead band value AND ADE < 0 THEN
ADE = 0
ELSE ADE = ADE

To ensure short duration frequency excursions are not passed to the ADE calculation the frequency input is a 60 second time weighted average.

The calculation is based on 6 data samples at 10 second intervals with the most recent sample being given a weight of 6 and the oldest a weight of 1.

Time Weighted Average Hz = ((Sample 1 * Weight1) + (Sample2 * Weight2) +..(Sample6 * Weight6)) / (Weight1 + Weight2 +. …Weight6)

A separate calculation is performed for each NEM region.

The frequency dead bands are:

Tasmania + / - 0.05Hz

Other regions + / - 0.025Hz

8.2.1 ADE cap values

To ensure excessive ADE values do not compromise power system security the ADE for each region is capped to the following values:

- Queensland, New South Wales and Victoria = +/- 50 MW
- South Australia +/- 25MW
- Tasmania +/- 25MW.

9. Directions and Intervention Pricing

NER clause 3.9.3 (a) states, “In respect of a dispatch interval where a AEMO intervention event occurs AEMO must declare that dispatch interval to be an intervention price dispatch interval”

Under these conditions AEMO may initiate ‘intervention’ or ‘What If’ pricing if the RRN test is passed. If the RRN test is passed and AEMO applies intervention pricing NEMDE will do an intervention price run after completion of the dispatch or outturn run. The first dispatch run (outturn run) which includes the reserve contract or direction in the form of a constraint is used to determine dispatch targets. The second dispatch run (intervention price or what if run) is used to determine dispatch prices and does not contain the reserve contract or direction constraint.

For more information regarding Directions and Intervention Pricing refer to *SO_OP3707 Intervention, Direction and Clause 4.8.9 Instructions*.

10. Review of Constraints

Constraints that are binding or violating and are identified as being overly conservative can unnecessarily constrain the market.

Overly conservative constraint equations can be removed from dispatch. This can be done by either blocking the constraint equation or removing it from the constraint set. Only constraints associated with thermal limits and not transient or voltage stability constraints will be removed.

Until the constraints are revised, the power system will be managed by Contingency Analysis, Constraint Automation and/or discretionary constraints.

11. Ramp Rate Requirements

A scheduled generator, Semi-scheduled generator or Market Participant with generating units, scheduled network services and/or scheduled loads must provide Up and Down Ramp Rates, and Maximum Ramp Rates as outlined below.

11.1 Up and Down Ramp Rate Requirements

- For a scheduled network service or scheduled load;

  Minimum = 3MW/minute

- For a scheduled generating unit;

  Minimum = Lowest of 3MW/minute or 3% of the registered full load (MW generated)

- For a semi-scheduled generating unit;

  Minimum = Lowest of 3MW/minute or 3% of the registered capacity.

- All values provided must be rounded down to the nearest whole number greater than or equal to 1 MW/minute.

- Ramp Rates cannot be greater than the relevant Maximum Ramp Rate.

11.2 Ramp Rate Less than Requirements

A Ramp Rate less than the minimum requirements specified above may be provided if an event physically prevents or makes it unsafe for the relevant plant to operate. In this case:

- The Ramp Rate provided must be the maximum the plant can safely attain at that time.

- The participant must simultaneously provide a brief, verifiable and specific reason why the ramp rate is below the requirements. This is to be included in the ‘reason’ field in the participant bid.

11.3 Maximum Ramp Rate Less than Requirements

A Maximum ramp rate less than the minimum requirements specified above may be provided if an event physically prevents or makes it unsafe for the relevant generating unit, scheduled load or scheduled network service to operate. In this case:

- The Maximum Ramp Rate provided must be the maximum the relevant plant can safely attain at that time.

- The participant must provide a brief, verifiable and specific reason why the Maximum Ramp Rate is below the requirements.

- In this instance the participant has reported on the limitation of the Maximum Ramp Rate value, hence there is no requirement for the participant to report on the limitation in the Ramp Rate value.

11.4 Minimum Safe Operating Level

As generating units approach the lowest output they can sustain without becoming unstable, a rebid may need to be submitted to ensure that the unit does not receive an even lower dispatch target. This is required to ensure safe operation of the plant.

For clarity, the minimum safe operating level is assumed to be the level below which the unit would become unstable, after other technical responses have been exhausted (for example, auxiliary firing). The minimum safe operating level does not reflect commercial issues, only technical and plant safety issues. Plant availability reflecting commercial considerations should still be managed through the normal price-band bidding dispatch process.

In instances where a Scheduled Generator or Semi-Scheduled Generator has reached its minimum safe operating level and can not safely follow a dispatch instruction to vary its output downwards, it is appropriate for a zero down ramp rate to be provided to AEMO, as long as the zero ramp rate can be justified on the basis of a technical limitation.

This approach should be used in preference to submitting an inflexible bid, as it provides greater flexibility to ensure the market remains in a secure operating state.

As soon as the output of the unit moves materially above the minimum safe operating level, a rebid must be submitted to provide a ramp rate compliant with clause 3.8.3A.

The complete “Rebidding and Technical Parameters Guideline” can be found on the AER website.

12. Dispatch of generation under Network Support Agreements

NER clause 5.6.2(m) allows a NSP to use generation to provide a network support function. The NSP must advise AEMO of any network support agreements entered into. To ensure that a generating unit that is the subject of a network support agreement is dispatched at the agreed level AEMO will constrain the generating unit on and as such the generating unit will not be eligible to set spot prices when constrained on in accordance with NER clause 3.9.7. The constraint will normally take the form GenID >=XMW (where X is the MW amount subject to the network support agreement) and will have a constraint violation penalty (CVP) of 20.

13. Outages and Work on Market Related SCADA

13.1 Impact on Market Processes

Failed, suspect or incorrect SCADA has the potential to adversely affect dispatch targets, constraint outcomes and AEMO’s power system security monitoring applications. Participants and NSPs should inform AEMO in advance of any SCADA work that has the potential to affect market processes (eg. work on generator SCADA). Participants and NSPs should report any SCADA failures to AEMO as a matter of urgency. When AEMO

becomes aware of suspect or failed SCADA, AEMO will take appropriate action to ensure the integrity of the market processes and its security monitoring applications. This may involve using alternate data sources or replacing failed or suspect values with estimated or hand dressed values.

14. Mandatory Restrictions

Mandatory restrictions are defined as the restrictions imposed by a participating jurisdiction by a relevant law, other than the rules, on the use of electricity in a region. The jurisdictions can decide to use mandatory restrictions whenever supply scarcities are predicted, to achieve desired levels of load reductions in regions while minimising overall impact to the customers by avoiding involuntary load shedding.

The NER clause 3.12A gives the obligations of AEMO and the registered participants with regards to the management of mandatory restrictions. Refer to the Operating Procedure SO_OP 3713 Mandatory Restriction Offers for the details of the processes to be followed by AEMO and the registered participants in the event of jurisdictions imposing mandatory restrictions.

15. Scheduling Errors

A scheduling error is one of the following circumstances (clause 3.8.24)

1. the dispute resolution panel determined under clause 8.2 that AEMO has failed to follow the central dispatch process set out in clause 3.8
2. AEMO declares that it failed to follow the central dispatch process as set out in clause 3.8
3. AEMO determines under clause 3.9.2B(d) that a dispatch interval contained a manifestly incorrect input

15.1 Process followed when AEMO identifies that it failed to follow central dispatch process

Whenever AEMO identifies that it has failed to follow the central dispatch process set out in NER clause 3.8, AEMO would declare that a scheduling error has occurred and a market notice would be issued to advise market participants of the event.

Refer the Operations Procedure: Market Reporting SO_OP4000 for reporting requirements associated with such situations.

16. Setting MPC Override

16.1 Load shed under instruction from AEMO

- If AEMO reasonably believes that the **central dispatch process would determine** that there would be insufficient supply options to meet all the demand in a region and
- AEMO issues an instruction to load shed in that region then from the time that the AEMO instruction is to apply
- Set the dispatch price to MPC for that region

Note: If the dispatch algorithm has already set the dispatch price then that price must remain.

16.2 Resetting of MPC Override

The MPC override dispatch price for a region must be removed when clearance is given to restore the final block of shed load in that region.

17. Administered Price Periods

An administered price period is determined to apply separately for each region.

17.1 Triggers for an Administered Price Period

Under clause 3.14.2(c) of the NER, an administered price period for a region is triggered if:

(1) **Spot price:**

The sum of the uncapped spot prices for that region over the previous 336 trading intervals (7 days) exceeds the cumulative price threshold; or

(2) **Market ancillary service price:**

The sum of the uncapped market ancillary service prices for any market ancillary service in that region in the previous 2016 dispatch intervals (7 days) exceeds 6 times the cumulative price threshold; or

(3) Trading Day:

Once an administered price period is declared for a region, the remaining trading intervals for that trading day will also be administered price periods; or

(4) Next Trading Day:

If the last trading interval at the end of a trading day is an administered price period, AEMO may, with the AER's consent, exercise its discretion to declare an administered

price period for the next trading interval if AEMO forecasts that either trigger (1) or (2) is likely to be satisfied in one or more trading intervals in the next business day.

It should be noted that, because of the uncertainty involved in predicting whether a future trading interval will be an administered price period, AEMO is unlikely to exercise this discretion.

17.2 Dispatch during Administered Price Period

During administered price periods AEMO will continue dispatching generation and loads in accordance with the central dispatch process.

17.3 Administered Price Cap & Cumulative Price Threshold

The administered price cap (APC) sets the maximum price and the administered floor price (AFP) sets the minimum price that can apply while an administered price period is in place.

- The APC is $300/MWh.
- The AFP is set to the negative of the APC.

Note: the AFP does not apply to market ancillary service prices, those prices are limited by the $0 offer restriction.

The cumulative price threshold is $187 500.

17.4 Pricing during Administered Price Periods

17.4.1 Triggered by Spot Prices exceeding CPT

If the sum of the uncapped spot prices in a region has triggered an administered price period, from the next trading interval:

- dispatch prices in that region will be set so they do not exceed the APC or fall below the AFP; and
- market ancillary service prices for all market ancillary services in that region will be set so they do not exceed the APC. (There is no AFP for market ancillary service prices)

17.4.2 Triggered by Market Ancillary Service Prices exceeding 6 times CPT

If the sum of the uncapped market ancillary service prices for a market ancillary service in a region has triggered an administered price period, from the next dispatch interval, the market ancillary service prices for all market ancillary services in that region will be set so they do not exceed the APC.

18. Manifestly Incorrect Input/s (MII) and Price Review

18.1 Dispatch intervals that are subject to review (clause 3.9.2B (b), (c))

AEMO has developed an automated method of monitoring and identifying dispatch intervals that are subject to review. Refer to Attachment 2 for the details of this method and the trigger thresholds used. The dispatch outputs associated with all the regions are independently monitored for this purpose.

A Price Status flag of *"Not Firm"* is published to indicate dispatch intervals for which all the prices associated with those dispatch intervals are subject to review, pending the identification of manifestly incorrect inputs. A Price_Status flag of *"Firm"* is published for all other dispatch intervals.

(Note that the Price_Status flag may not be set to *"Not Firm"* for dispatch intervals affected by MII/s where there are violated prices (MPC) that were not resolved by the automatic over-constrained dispatch (OCD) process. In these cases an MPDI Market Notice will be issued, as is currently done.)

18.2 Determine if the dispatch interval contained a MII (clause 3.9.2B (d)) and revision of prices

Whenever a dispatch interval is identified as subject to review, AEMO control room staff will check whether the inputs used in that dispatch interval contained a MII. The inputs to dispatch mean any value used by NEMDE including:

- SCADA measurements of power system
- Five minute demand forecast values
- Constraint equations entered by AEMO
- Software setup

If AEMO staff determine that the dispatch interval in question was affected by a MII, all the published prices for the "affected" dispatch intervals will be rejected (energy and all FCAS prices, for all regions) and will be replaced using the corresponding prices of the last correct dispatch interval. The last correct dispatch interval is the previous dispatch interval that was not affected by a MII (that is, preceding the "affected" dispatch interval).

After the original publication of prices for a dispatch interval identified as subject to review, there is a time limit of 30 minutes within which AEMO can subsequently reject those prices and automatically replace them with the corresponding set of prices from the last correct dispatch interval.

Once AEMO has followed the price revision process for the dispatch interval identified as subject to review the Price_Status flag for that dispatch interval will change to *"Firm"*. If 30 minutes has expired since the publication of prices for the dispatch interval identified as subject to review and AEMO have not taken any action to either reject or accept prices for that dispatch interval, then the prices for that and all subsequent dispatch intervals will automatically be accepted and their Price_Status flags will change to *"Firm".*

18.3 Dispatch intervals following a dispatch interval identified as subject to review

When ever a dispatch interval is identified as subject to review, the dispatch interval immediately following that interval may also be identified as being subject to review if AEMO considers that it is likely to be subject to that same MII (clause 3.9.2B(c)).

AEMO's automatic "subject to review" monitoring system is such that whenever a dispatch interval is identified as subject to review, the Price_Status of the following dispatch interval(s) will continue to be automatically flagged internally to AEMO as either subject to review or indeterminate (externally, these are flagged as "*Not Firm"*) until AEMO rejects and/or accepts all the preceding subject to review or indeterminate ("*Not Firm"*) dispatch intervals. Since there is a time limit of 30 minutes for the price revision of the first interval identified as subject to review, potentially there could be up to five dispatch intervals with Price_Status flag "*Not Firm*" following the first dispatch interval until AEMO completes the price review process.

18.4 Dispatch intervals identified as subject to review that had successful Over-constrained Dispatch (OCD) re-runs

Where an automatic OCD re-run has occurred for a dispatch interval identified as "subject to review", AEMO will review that dispatch interval for the presence of a MII and, if found, the prices will be rejected and then automatically replaced using the corresponding prices from the last correct dispatch interval.

18.5 Dispatch intervals identified as subject to review following a dispatch interval declared as Manually Priced Dispatch Interval (MPDI)

The last correct dispatch interval available for price revision could be an interval declared as a MPDI following an unsuccessful OCD re-run (refer section 7.2.1). AEMO will reject and automatically replace prices of the dispatch interval identified as subject to review (if a MII is found) with the prices from the last correct interval (i.e. the MPDI). The prices of the original MPDI as well as the following, rejected dispatch interval (which inherits the MPDI prices) would now both be considered MPDIs. The standard MPDI Market Notice would be issued covering both dispatch intervals and the manual price revision process for MPDIs will be followed.

19. Negative Settlement Residues

General Approach

If the accumulation of negative residues over the period of counter-price flows is forecast to reach a value of **$100 000** then AEMO would use reasonable endeavours to apply constraints to prevent the accumulation provided system security can be maintained. These constraints would remain in place until, in AEMO's reasonable opinion, the constraints could be revoked without creating counter-price flows.

AEMO will treat each occurrence individually and the billing period accumulation will not be used to offset the trigger. (i.e. will not use the amount of positive residue accumulated during the billing period to offset the trigger).

AEMO will monitor negative residues on all interconnectors, in both directions.

If negative residues began to occur due to a binding fully co-optimised constraint in dispatch at a material rate but had not been forecast in pre-dispatch then AEMO would take action to halt the further accumulation of negative residues when the total negative residue was estimated to have accumulated to $100,000 and advise the Market via Market Notices. In order to ensure a response within a Trading Interval such estimates of negative residue accumulation will be made on the basis of dispatch interval quantities.

In reviewing likely situations where accumulation management will be necessary for a binding network constraint, AEMO has identified two general categories that will require different approaches:

I. Constraints involving only a single interconnector. In these situations the method to halt further accumulation will be to begin to constrain the interconnector flow ("interconnector capping") at a rate no greater than that which applies for a planned outage. This ramping would cease at the point at which counter price flows were halted. From that point on periodic adjustment of the level of the constraint might be necessary due to changing market conditions by

   • Increasing the level of constraint if counter-price flows re-emerged OR

   • Relaxing the level of constraint if significant positive inter-regional settlements accumulations indicated that current level of constraint was excessive.

II. Constraints involving multiple interconnectors. In these more unusual cases, the situation is more complex and the standard approach used in the simpler case of one interconnector may not meet the requirements set down above. For these reasons AEMO may adopt a modified approach depending upon the circumstances.

19.1 Constraints applied in dispatch and predispatch

The above arrangements apply in dispatch and predispatch.

Application of the constraint in the predispatch timeframe gives the market the most accurate information in relation to AEMO's actions in managing the negative residue event.

AEMO will use the Back-up Dispatch System (BUDS) to determine when the negative residue constraint can be revoked. AEMO will, via Market Notices, provide details of the actions taken to manage negative residues and provide indicative timings.

19.1.1 Application to other Existing Situations

There will be instances where counter-price flows can arise due to binding network constraints that are not of the fully co-optimised type formulation. In such cases, provided Power System Security can still be maintained, AEMO will attempt to minimise negative residue accumulation. Two specific examples are discussed in more detail below.

19.1.2 FCAS Islanding Risk Constraints

For FCAS islanding risk constraints that co-optimise between local FCAS and interconnector flow, AEMO will adopt the same trigger for negative residues as set out above to determine the point at which an additional constraint should be placed upon the interconnector to halt or prevent the accumulation of negative residues.

19.1.3 Process

Cease further co-optimisation of FCAS and Interconnector flow and invoke a discretionary constraint (leaving the FCAS constraint invoked) to reduce flows on the interconnector (suggest 50 MW steps) until either,

1. Counter price flow on the interconnector no longer exists

   i.e. the energy price in the exporting region is less than the importing region energy price or the interconnector is at zero

   OR
2. The limit of available regional local FCAS to support the flow at risk has been reached**.**

19.1.4 Contributing Units

This section applies where the limit of available local FCAS has been reached (19.2.2 ii) above, and negative residues are still accumulating. If not bid inflexible, generating units contributing to the interconnector flow, (but not the risk) will be constrained off by invoking quick constraints until either,

- the accumulation of negative residues has stopped or
- until the technical minimum of the unit is reached

19.1.5 Restoration Process

The decision on when to restore full co-optimisation will be based on changes to region prices and / or interconnector flows. If in AEMO's reasonable opinion negative residues are not likely to occur then revoke interconnector generic constraint and resume full co-optimisation.

Attachment 1: Non-Compliance Calculations and Process Overview

A 1.1 Overview

AEMO operates Compliance Monitoring software (Compmon) to assist with the management of the Non-Compliance process. Compmon operates continuously in AEMO control rooms. The Compliance calculations are initiated immediately following each dispatch calculation. This Compliance calculation is relevant to the previous dispatch interval but calculated at a time when both the targets for that DI and the final actual MW values for that DI are known.

The Compliance calculation includes all applicable items of plant in the NEM, these are:

- Scheduled Generating Units
- Semi Scheduled Generating Units
- Scheduled Network Services
- Scheduled Loads

The following abbreviations are used in this Attachment:

- MW = Actual Generation.
- MWB = Dispatch Target; Dispatch Level for a Semi Scheduled Unit.
- MWO = Bid Unit Availability; UIGF for a Semi Scheduled Unit.
- ROC = Rate of Change or Ramp Rate of a Unit.
- FCR = FCAS Raise Regulation Band (enabled).
- FCL = FCAS Lower Regulation Band (enabled)

A1.2 Compliance Calculations

Detection of Non-Compliance is based on two error thresholds. The Small Error Trigger and the Large Error Trigger are defined in Compmon.

Small error trigger threshold:

Trigger level (MW) is: MAX (6, MIN [3% MWO, 2*ROC])

Large error trigger threshold:

Trigger level (MW) is: MAX (6, MIN [5% MWO, 4*ROC])

Note that 6MW is the minimum Small error trigger threshold and 6MW is the minimum Large error trigger threshold.

After every DI run, the Compmon application compares the difference between the MWB of the previous DI and the MW of the current DI with the error trigger thresholds. In addition to MWB, a compensation for FCAS is included to allow for regulating plant movement.

The Small and Large Error Triggers each have an associated counter. The counters each increment on detection of error and are used to progress Non-Compliance action.

The counters are incremented if any of the following conditions are true

- For error detection above MWB

  If MW - (MWB + FCR) > Small Trigger Threshold

  Then Increment Small Error Counter

  If MW - (MWB + FCR) > Large Trigger Threshold

  Then increment Large Error Counter

- For error detection below MWB

  If (MWB - FCL) - MW > Small Trigger Threshold

  Then increment Small Error Counter

  If (MWB - FCL) - MW > Large Trigger Threshold

  Then increment Large Error Counter

The Small Error Trigger is measured over 6 consecutive dispatch intervals and the Large Error Trigger is measured over 3 consecutive dispatch intervals. These error counter values will progress the Non-Compliance action. The error counters reset to ‘zero’ if no error is apparent or reset to ‘one’ if the direction of error reverses.

In the case of Semi Scheduled generating units the error counters reset to ‘zero’ under defined conditions. The defined conditions for semi-scheduled units are:

- If SemiDispatchCap status = False

  Then reset small and large error counters to zero.

- If MW < MWB (Unit operating below Dispatch Level)

  Then reset small and large error counters to zero.

This leaves the one remaining condition where a Semi-Scheduled unit is operating at or above Dispatch Level and SemiDispatchCap status = True. For this case there is no reset of the error counters and the process is the same as a Scheduled unit.

A 1.3 Compliance Status

Following the Compliance calculation, each item of plant is allocated a Compliance Status. An item of plant can only have one Compliance Status allocated to it in a DI. Possible Compliance Status states and explanations of each are:

- Normal

  Plant is following Target within Error thresholds.

- Off Target

  Plant is not following Target. MW Error exceeds detection thresholds.

- Non Responding

  A number of Dispatch Intervals has passed and plant is still not following target. The number of dispatch intervals depends on the severity of error.

- NC Pending

  The non-response has reached a stage where the plant will be declared Non-Conforming.

- Non Conforming

  The plant is Declared Non-Conforming and a Non-Conformance constraint is applied.

- Suspended

  The plant is not included in the Compliance Process.

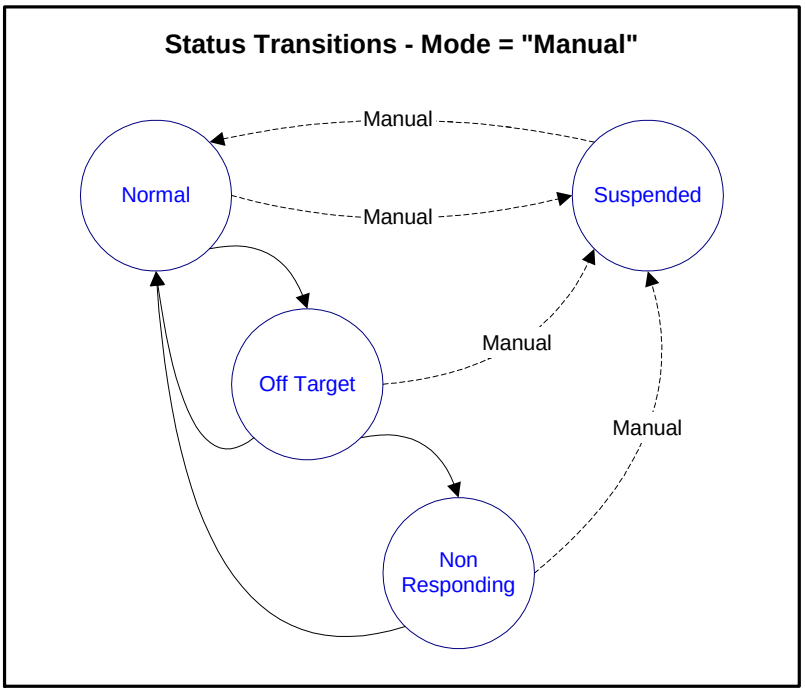
Compliance Status change for an item of plant may be achieved by:

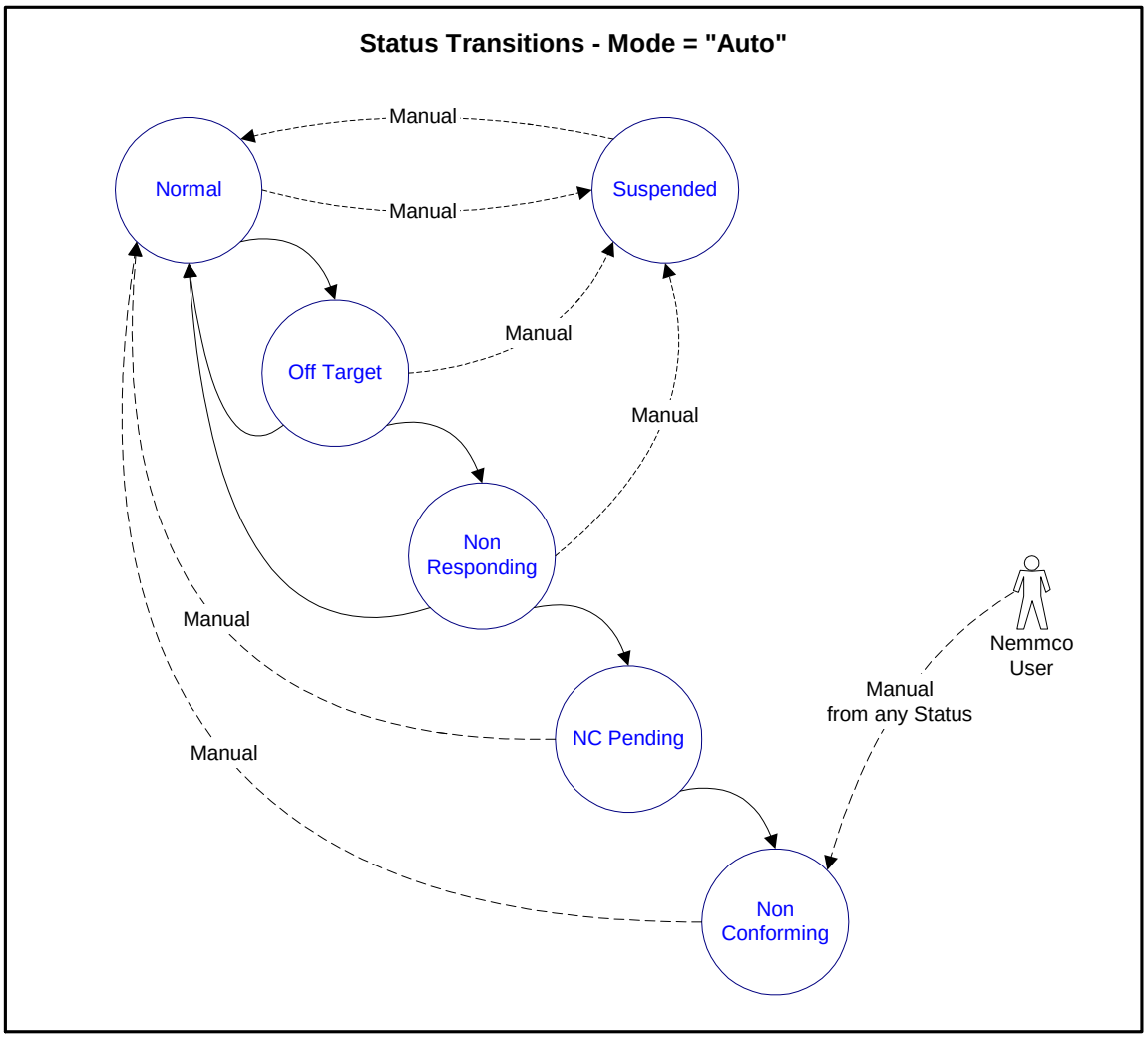
- An automated process based on the error counters.
- An AEMO user initiated action.

Additionally two operating modes exist for Compmon, these are:

- Auto, where all Compliance Status changes through to Non-Conforming are based on error counters. Phone communication is required once plant has been declared Non Conforming. AEMO will make phone contact at an earlier stage as a matter of courtesy if resources permit when operating in this mode. There is an optional “Verify Non-Conformance Declaration” function available to the AEMO user when operating in this mode. This will hold the process at the NC Pending Compliance Status until the AEMO user confirms the Non-Conformance Declaration. This option may be applied or not at the AEMO users discretion.
- Manual, where Compliance Status changes up to the Non Responding stage only are determined on an automated basis. Any further action to declare plant Non Conforming is based on AEMO user actions. These actions include initiating phone calls to plant operations staff, Non Conformance and Conformance Declarations, Constraint application, manual logging and Market Notice publication. In Manual mode, Compmon is used only as an alarm mechanism for AEMO operations staff to take manual action.

Possible status changes in Manual and Auto operating modes are illustrated below. Note that the solid lines (arrows) represent a Compliance Status change based on error counters with no AEMO user input. The dotted lines (arrows) represent possible AEMO user initiated Compliance Status change.


Status Transitions - Mode = "Manual"
Manual
Normal
Suspended
Manual
Manual
Off Target
Manual
Non
Responding



As can be seen from the illustrations above and the previous descriptions of Compliance Status, plant following target within the error thresholds will have a Compliance status of Normal.

In Manual mode, this will change to Off Target then to Non Responding based on error counters. Non Conformance Declaration by AEMO will then be a manual AEMO user action in this mode. This includes constraint application, logging, market notice issue, and phone conversations with plant control staff regarding the declaration of Non-Conformance. The severity of the Compliance status indicated by the AEMO Compliance Module will be limited to Non-Responding while the manual action takes place. Note that if plant is manually declared Non Conforming and a non conformance constraint is applied then it is likely that the reported Compliance Status will revert to Normal as a result of the constraint action.

In Auto mode, the Compliance Status will change to Off Target, Non Responding, NC Pending and Non Conforming based on error counters.

In either mode, the AEMO user may accelerate the process and declare Non Conformance at any time or Suspend a unit from taking part in the Compliance process.

The criteria for Compliance Status change in Manual and Auto operating modes is presented in the following two tables. In addition to this information, the AEMO user initiated changes illustrated in the diagrams above are available at the users discretion in line with current policy.

PREVIOUS STATUS	CRITERIA FOR COMPLIANCE STATUS CHANGE IN MANUAL OR AUTO MODE	RESULTING STATUS CHANGE
Normal	Large Error Count ≥ 1	Off Target
Normal	Small Error Count ≥ 1	Off Target
Off Target	Large Error Count ≥ 3	Non Responding
Off Target	Small Error Count ≥ 6	Non Responding
Off Target or Non Responding	Large Error Count = 0 and Small Error Count = 0	Normal

PREVIOUS STATUS	CRITERIA FOR COMPLIANCE STATUS CHANGE IN AUTO MODE	RESULTING STATUS CHANGE
Non Responding	Large Error Count ≥ 5	NC Pending
Non Responding	Small Error Count ≥ 8	NC Pending
NC Pending	The Status in the next dispatch interval will be Non Conforming.	Non Conforming

A 1.4 Information to Participants

A Compliance Data Report will be published to applicable plant following each Compliance Module calculation, once per DI. As well as the relevant unit and time information, the report will contain the following information.

Status:

The status of the particular unit following the last compliance module calculation. That is, Normal, Suspended, Off Target, Non Responding, NC Pending, Non Conforming.

Action Message:

An action message is included on the report corresponding to each status as follows:

- Normal

  No action required. Unit is following dispatch target.

- Suspended

  No action required. Unit is excluded from the Compliance process at this time.

- Off Target

  Please move to dispatch target or re-bid.

- Non Responding

  Please move to dispatch target or re-bid.

- NC Pending (Possible in Auto mode only)

  Unit not responding to dispatch target. Non Conformance action pending.

- Non Conforming (Possible in Auto mode only)

  Unit declared Non Conforming. Non Conformance Constraint is *invoked.* ***AEMO is requesting a reason for the non-conformance.***

Energy values relevant to the specific compliance calculation:

- MWB

  NEMDE Dispatch Target or Dispatch Level for the DI.

- MW

  Actual plant MW at the end of the DI.

- MW Error

  Difference between MWB and MW values with allowance for FCR and FCL.

- Max MW Error

  Max absolute MW Error since error counters were last zero.

Mode:

- "Manual" (AEMO is currently operating in Manual mode)
- "Auto" (AEMO is currently operating in Auto mode)

This Compliance Data Report is expected to be used by plant operating staff during normal operation.

Note that if AEMO is operating in Manual mode, the Compliance Status of NC Pending and Non Conforming does not exist. As previously discussed, the Declaration of Non Conformance and Conformance is carried out via phone communication initiated by AEMO.

A 1.5 Worked Examples

Large Error Example:

A hypothetical generating unit A has a bid unit availability of 200 MW and a ramp rate of 2 MW/min.

The large error trigger is determined as follows:

The term representing 5% of the bid unit availability is 5/100 x 200 = 10 MW.

The term representing 4* [ramp rate] is 4 x 2 = 8 MW.

The minimum of these two terms (10 MW and 8 MW) is 8 MW.

The minimum allowable error is 6 MW.

The maximum of these two terms (6 MW and 8 MW) is 8 MW.

Therefore the large error trigger is 8 MW.

This means that if the generation or load of the plant differs from its dispatch target by more than 8 MW the Compliance Status will be Off Target. If this occurs for 3 consecutive dispatch intervals the Compliance Status will be Non Responding. If this occurs for five consecutive dispatch intervals the Compliance Status will be NC Pending (only if in Auto mode). The result for the following DI will be Non Conforming (only if in Auto mode).

Small Error Example:

The small error trigger is determined as follows:

The term representing 3% of the bid unit availability is 3/100 x 200 = 6 MW.

The term representing 2* [ramp rate] is 2 x 2 = 4 MW.

The minimum of these two terms (6 MW and 4 MW) is 4 MW.

The minimum allowable error is 6 MW.

The maximum of these two terms (6 MW and 4 MW) is 6 MW.

Therefore the small error trigger is 6 MW.

This means that if the generation or load of the plant differs from its dispatch target by more than 6 MW the Compliance Status will be Off Target. If this occurs for 6 consecutive dispatch intervals the Compliance Status will be Non Responding. If this occurs for 8 consecutive dispatch intervals the Compliance Status will be NC Pending (only if in Auto mode). The result for the following DI will be Non Conforming (only if in Auto mode).

Attachment 2: Logic used in identifying dispatch intervals as subject to review and the trigger thresholds

Trigger logic used to identify dispatch intervals as subject to review (S):

For each Region

IF {Unusual change in Region Energy Price}
AND

{Unusual change in any connected Interconnector Cleared Flow}

THEN

Set DI Price Status flag = 'SUBJECT TO REVIEW' (S)

ELSE

IF Previous DI Price Status is either 'SUBJECT TO REVIEW' (S) or

'INDETERMINATE' (I)

THEN
Set Current DI Price Status to 'INDETERMINATE' (I)

Note: The following table explains the AEMO internal and external flagging of dispatch intervals identified as subject to review with the progress of price revision process:

AEMO INTERNAL FLAGGING	EXTERNAL FLAGGING
'SUBJECT TO REVIEW' and AEMO action pending (up to 30 minutes from the publication of the price for the dispatch interval)	NOT FIRM
.'INDETERMINATE' and AEMO action pending	NOT FIRM
'SUBJECT TO REVIEW' was flagged and AEMO has 'Rejected" the published price due to the presence of MII	FIRM
'SUBJECT TO REVIEW' was flagged and AEMO has 'Accepted" the published price since AEMO determined that the dispatch interval was not affected by a MII	FIRM

Trigger for unusual change in the Energy Price of a region:

IF EITHER

- The lesser of the absolute values of both the current DI energy price and the previous DI energy price of Region 'R' is greater than threshold $\$X_R$
  AND
  The absolute difference between the current & previous DI energy prices of Region 'R'

expressed as an absolute percentage change over the lesser of the current & previous DI energy prices, is greater than percentage threshold Y_R

OR

- The lesser of the absolute values of both the current DI energy price and the previous DI energy price of Region 'R' is less than or equal to threshold $\$X_R$
  AND
  The absolute difference between the current & previous DI energy prices of Region 'R' is greater than threshold $\$X_R$ multiplied by percentage threshold $Y_R/100$

THEN
An unusual change in Region ''R' Energy Price has occurred.

Trigger for Unusual change in the Cleared Flow of any Interconnector associated with the region:

IF EITHER

For any interconnector 'I' connected to region 'R'

- The absolute difference between the current & previous DI Cleared Flow is greater than threshold $Q_{(R,I)}$

OR

For all interconnectors 'I' connected to the Region 'R'

- Cleared Flow = zero MW for both the current & previous DIs.

THEN
An unusual change in connected Interconnector Cleared Flow has occurred.

Trigger Thresholds:

REGION ENERGY PRICE CHANGE TRIGGERS	DEFAULT VALUES	
	$X_R ($/MWH)	**Y_R (%)**
QLD1	20	300
NSW1	20	300
VIC1	20	300
SA1	20	300
TAS1	20	300

Table 1: Region Energy Price Trigger Thresholds to apply until 2400 hrs 14/12/2010

REGION ENERGY PRICE CHANGE TRIGGERS	DEFAULT VALUES	
	$X_R ($/MWH)	$Y_R (%)
QLD1	20	300
NSW1	20	300
VIC1	20	300
SA1	20	300
TAS1	20	400

Table 2: Region Energy Price Trigger Thresholds to apply from 0000 hrs 15/12/2010

REGION-INTERCONNECTOR FLOW CHANGE TRIGGER $Q_{R,I}$ (MW)	QNI	TERRANORA	VIC-NSW	HEYWOOD	MURRAYLINK	BASSLINK
QLD1	240	80				
NSW1	450	80	500			
VIC1			500	120	80	190
SA1				120	80	
TAS1						190

Table 3: Region-Interconnector Flow Change Trigger Thresholds to apply

Until 2400 hrs 14/12/2010

REGION-INTERCONNECTOR FLOW CHANGE TRIGGER $Q_{R,I}$ (MW)	QNI	TERRANORA	VIC-NSW	HEYWOOD	MURRAYLINK	BASSLINK
QLD1	240	80				
NSW1	450	80	500			
VIC1			500	130	80	190
SA1				130	80	
TAS1						190

Table 4: Region-Interconnector Flow Change Trigger Thresholds to apply

From 0000 hrs 15/12/2010