AMENDMENT TO THE ENERGY CONVERSION MODEL GUIDELINES ('THE ECM GUIDELINES') - DRAFT DETERMINATIONAND REPORT

PREPARED BY: Systems Capability

VERSION NO: 1

ISSUE DATE: 21 March 2013

FINAL

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NOTICE OF SECOND STAGE OF RULES CONSULTATION

[National Electricity Rules Clause 8.9]

AMENDMENT TO THE ENERGY CONVERSION MODEL GUIDELINES ('THE ECM GUIDELINES')

This Notice of Second State of Rules Consultation informs all Consulted Persons of the second stage of consultation on *Amendment to the Energy Conversion Model Guidelines ('the ECM Guidelines')*.

The consultation is being conducted under clause *2.2.7(d)* of the National Electricity Rules (**Rules**) in accordance with the Rules consultation requirements in clause 8.9 of the Rules.

Date of notice

This Notice of Second Stage of Rules Consultation was issued on *21 March 2013*.

First Stage of Consultation

AEMO issued the Notice of First Stage of Rules Consultation on *8 February 2013*, together with *an issues paper and Schedule A: Proposed Amended Energy Conversion Model Guidelines, February 2013*.

No submissions were received.

There were no requests for meetings.

AEMO has now produced a Draft Determination and Report.

The Draft Determination and Report is now available to all Consulted Persons for their consideration.

Objectives of the consultation

The objectives of the consultation are to:

- To provide Consulted Persons with the opportunity to be involved in amending the Energy Conversion Model Guidelines ('the ECM Guidelines').
- To ensure that Consulted Persons are properly informed about the proposed and the final outcome.

Background

On 13 April 2012 AEMO declared that a scheduling error had occurred as it determined it failed to follow the central dispatch process set out in clause 3.8 of the Rules. This was in relation to the unconstrained intermittent generation forecasts (UIGF) applied to the dispatch

of semi-scheduled wind generators. On 7 June 2012 AEMO published a report on this scheduling error informing the circumstances and time frames of the error, and to assist market participants who wished to apply to the dispute resolution panel for a determination for compensation under clause 3.16.2(a) of the Rules.

The real-time control system set point of semi-scheduled wind generators is a key input required by AWEFS to correctly calculate the UIGF. Submission of this input is not a mandatory requirement of the current ECM Guidelines, hence it had not been provided by the affected semi-scheduled generators resulting in the scheduling error.

Investigation of the causes of the scheduling error highlighted the importance of using the real-time control system set point of semi-scheduled wind generators as an input to AWEFS. Therefore AEMO contacted all affected semi-scheduled wind generators and requested them to provide this real-time input so that the UIGF could be correctly calculated. The semi-scheduled wind generators agreed and AEMO is currently receiving this input from all semi-scheduled wind generators. AEMO is seeking to update the ECM making the provision of control system set-point mandatory, so that semi-scheduled wind generators expecting to join the NEM will make this input available prior to their connection.

The scope of this consultation is to amend and publish the ECM Guidelines in accordance with clause 2.2.7(d) of the Rules, in order to address the issue described above. These Guidelines are only applicable for semi-scheduled generators.

Matter under consultation

The matter under consultation is identified in clause 2.2.7(d) of the Rules. This clause provides:

> "AEMO must develop and publish guidelines in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate setting out the information to be contained in energy conversion models. Any amendments to the guidelines are also to be made in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate."

"Energy conversion model" is defined in Chapter 10 of the Rules as:

> "The model that defines how the intermittent input energy source (such as wind) is converted by the semi-scheduled generating unit into electrical output. That model must contain the information set out in the guidelines published by AEMO in accordance with clause 2.2.7(d)."

The consultation process

The following table contains an outline of the consultation process, including key dates. Please note that some of these dates are proposed dates and may be subject to change by AEMO.

PROCESS	DATE
Closing date for submissions received in response to this Notice of Second Stage of Rules Consultation	10/5/2013
Publication of the draft determination and invitation to make submissions in response to the Draft Determination and Report	21/3/2013
Closing date for submissions received in response to the Draft Determination and Report	10/5/2013
Publication of the Determination and Report	21/6/2013

Invitation to make submissions

AEMO invites written submissions on *Amendment to the Energy Conversion Model Guidelines ('the ECM Guidelines')* from Consulted Persons. In particular, AEMO requests comments on:

- Amendments to the ECM guidelines to make the provision of real-time control set-point information via SCADA, including a SCADA quality flag, as mandatory provisions for all existing and future semi-scheduled generators.
- Additional clarifications and comprehensive descriptions to be included in the ECM guidelines

Comments are also invited on any other issues relating to the subject matter of the consultation.

Please identify any information in your submission that you consider to be confidential and provide the reasons why you wish that information to be treated as confidential. AEMO reserves the right to publish material that it does not consider to be confidential, despite your submission as to its confidentiality.

You should also note that material identified as confidential may be accorded less weight in the decision-making process than material that is published.

Closing date for submissions

Submissions in response to this Notice of Second Stage of Rules Consultation should reach AEMO by 5:00pm EST on *10 May 2013.*

AEMO has a discretion to consider late submissions. Any late submission should explain:

- the reason for the lateness; and
- the detriment to you if AEMO fails to consider your submission.

Contact details

AEMO prefers that submissions be forwarded in electronic format (both pdf and Word) as they will be published on the AEMO website.

Please send all e-mail submissions to *Pablo Uribe Gomez* at *pablo.uribe@aemo.com.au*.

Alternatively, you may post submissions to:

Attn. Pablo Uribe Gomez

AEMO. PO Box 7326, Baulkham Hills BC NSW 2153

1. Executive summary

On 21 March 2013 AEMO published the draft determination of a Rules consultation to amend and publish the ECM Guidelines in accordance with clause 2.2.7(d) of the Rules, in order to address the issues described in the issues paper. These Guidelines are only applicable for semi-scheduled generators.

No material issues were raised by the Consulted Persons.

AEMO determines the ECM guidelines in the format of Schedule A: Proposed Amended Energy Conversion Model Guidelines, February 2013 in accordance with clause 2.2.7(d) of the Rules.

2. Background

2.1 Matter under consultation

The matter under consultation is identified in clause 2.2.7(d) of the Rules. This clause provides:

> "AEMO must develop and publish guidelines in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate setting out the information to be contained in energy conversion models. Any amendments to the guidelines are also to be made in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate."

"Energy conversion model" is defined in Chapter 10 of the Rules as:

> "The model that defines how the intermittent input energy source (such as wind) is converted by the semi-scheduled generating unit into electrical output. That model must contain the information set out in the guidelines published by AEMO in accordance with clause 2.2.7(d)*."*

2.2 The consultation and decision-making process

The following table provides an outline of the consultation process to date:

PROCESS	DATE
Notice of First Stage of Rules Consultation issued	*8/2/2013*
Closing date for submissions received in response to the Notice of First Stage of Rules Consultation	*15/3/2013*
Publication of this Draft Determination and issue of Notice Of Second Stage of Rules Consultation inviting submissions in response to the Draft Determination	*21/3/2013*

AEMO issued a Notice of First Stage of Rules Consultation on 8 February 2013 (***First Stage Notice***). A copy of the *First Stage Notice* is contained in **Attachment 1**. The First Stage Notice invited submissions by 15 March 2013. No submissions were received and no meetings held.

AEMO also published an issues paper and Schedule A: Proposed Amended Energy Conversion Model Guidelines, February 2013, a copy of which is contained in **Attachment 2**.

The table below lists the remainder of the steps in the consultation process, together with the proposed dates for their completion. Please note that the proposed dates are subject to change by *AEMO*.

PROCESS	DATE
Closing date for submissions received in response to this Draft Determination	Currently, proposed date is *10/5/2013*
Publication of the Final Determination	Currently, proposed date is *21/06/2013*

3. Interpretation of the Rules

Clause ***2.2.7(d)*** of the National Electricity Rules (**Rules**) states:

> ***"AEMO must develop and publish guidelines in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate setting out the information to be contained in energy conversion models. Any amendments to the guidelines are also to be made in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate."***

4. Consideration of Submissions

4.1 List of submissions received

AEMO received no submissions in response to the *First Stage Notice*.

The following table contains a list of respondents:

RESPONDENT	PARTICIPANT TYPE OR OTHER ROLE
Nil	

No submissions were published on *AEMO's* website on the same date that this Draft Determination and Report was released.

Section 5 considers no material issues.

4.2 Meetings and forums

There were no requests for meetings and no forums were held.

5. Material issues raised by Consulted Persons

Consulted Persons raised the issues detailed in the following table:

ISSUE NUMBER	ISSUE	RAISED BY
1	Nil	

6. Determination

AEMO determines the ECM guidelines in the format of Schedule A: Proposed Amended Energy Conversion Model Guidelines, February 2013 in accordance with clause 2.2.7(d) of the *Rules*.

7. Glossary

The following table contains a glossary of terms and a description of the abbreviations, including acronyms, used in this document.

Note that italicised terms in this document have their meaning as defined in Chapter 10 of the National Electricity Rules. Capitalised terms bear the meaning given in the table below:

ABBREVIATION OR TERM	DEFINITION
AWEFS	Australian Wind Energy Forecasting System

8. References

- *Australian Energy Markets Commission National Electricity Rules, Version 54, 2013:* http://www.aemc.gov.au/rules.php
- *AEMO Generator Registration Guide:* http://www.aemo.com.au/en/About-AEMO/Energy-Market-Registration/Registering-in-Energy-Markets#electricity
- *AEMO Semi-Scheduled Energy Conversion Model Guidelines:* http://www.aemo.com.au/en/About-AEMO/Energy-Market-Registration/~/media/Files/Other/electricityops/0260-0004%20xls.ashx

Attachment 1 – Notice of First Stage of Rules Consultation

NOTICE OF FIRST STAGE OF RULES CONSULTATION

[National Electricity Rules – clause 8.9]

AMENDMENT TO THE ENERGY CONVERSION MODEL GUIDELINES ('THE ECM GUIDELINES')

This notice informs Semi-Scheduled Generators and any party having an interest in the ECM Guidelines (**Consulted Persons**) that AEMO is conducting a consultation on A*mendment to the Energy Conversion Model Guidelines ('the ECM Guidelines')*.

This consultation is being conducted under clause 2.2.7(d) of the National Electricity Rules (**Rules**) in accordance with the consultation requirements detailed in clause 8.9 of the Rules.

Date of Notice

This Notice of First Stage of Rules Consultation was issued on 8 *February 2013*.

Objectives of the Consultation

The objectives of the consultation are to:

- To provide Consulted Persons with the opportunity to be involved in amending *the Energy Conversion Model Guidelines ('the ECM Guidelines').*
- To ensure that Consulted Persons are properly informed about the proposed and the final outcome.

Background

On 13 April 2012 AEMO declared that a scheduling error had occurred as it determined it failed to follow the central dispatch process set out in clause 3.8 of the Rules. This was in relation to the unconstrained intermittent generation forecasts (UIGF) applied to the dispatch of semi-scheduled wind generators. On 7 June 2012 AEMO published a report on this scheduling error informing the circumstances and time frames of the error, and to assist market participants who wished to apply to the dispute resolution panel for a determination for compensation under clause 3.16.2(a) of the Rules.

The real-time control system set point of semi-scheduled wind generators is a key input required by AWEFS to correctly calculate the UIGF. Submission of this input is not a mandatory requirement of the current ECM Guidelines, hence it had not been provided by the affected semi-scheduled generators resulting in the scheduling error.

Investigation of the causes of the scheduling error highlighted the importance of using the real-time control system set point of semi-scheduled wind generators as an input to AWEFS. Therefore AEMO contacted all affected semi-scheduled wind generators and requested them to provide this real-time input so that the UIGF could be correctly calculated. The semi-scheduled wind generators agreed and AEMO is currently receiving this input from all semi-

scheduled wind generators. AEMO is seeking to update the ECM making the provision of control system set-point mandatory, so that semi-scheduled wind generators expecting to join the NEM will make this input available prior to their connection.

The scope of this consultation is to amend and publish the ECM Guidelines in accordance with clause 2.2.7(d) of the Rules, in order to address the issue described above. These Guidelines are only applicable for semi-scheduled generators.

Matter under Consultation

The matter under consultation is identified in clause 2.2.7(d) of the Rules. This clause provides:

> "AEMO must develop and publish guidelines in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate setting out the information to be contained in energy conversion models. Any amendments to the guidelines are also to be made in consultation with Semi-Scheduled Generators and such other person that AEMO, acting reasonably, considers appropriate."

"Energy conversion model" is defined in Chapter 10 of the Rules as:

> "The model that defines how the intermittent input energy source (such as wind) is converted by the semi-scheduled generating unit into electrical output. That model must contain the information set out in the guidelines published by AEMO in accordance with clause 2.2.7(d)*."*

The Consultation Process

The following table contains an outline of the consultation process, including key dates. Please note that these dates are proposed dates and may be subject to change by AEMO.

PROCESS	DATE
Closing date for submissions received in response to this Notice of First Stage of Rules Consultation	*15/3/2013*
Publication of the Draft Determination and Report and invitation to make submissions in response to the Draft Determination	16/4/2013
Closing date for submissions received in response to the Draft Determination and Report	10/5/2013
Publication of the Determination and Report	21/6/2013

Invitation to make Submissions

AEMO invites written submissions on *Amendment to the Energy Conversion Model Guidelines ('the ECM Guidelines')* from Consulted Persons. In particular, AEMO requests comments on:

- Amendments to the ECM guidelines to make the provision of real-time control set-point information via SCADA, including a SCADA quality flag, as mandatory provisions for all existing and future semi-scheduled generators.
- Additional clarifications and comprehensive descriptions to be included in the ECM guidelines

Comments are also invited on any other issues relating to the subject matter of the consultation.

Please identify any information in your submission that you consider to be confidential and provide the reasons why you wish that information to be treated as confidential. AEMO reserves the right to publish material that it does not consider to be confidential, despite your submission as to its confidentiality.

You should also note that material identified as confidential may be accorded less weight in the decision-making process than material that is published.

Closing Date for Submissions

Submissions in response to this Notice of First Stage of Rules Consultation should reach AEMO by 5:00pm EST on *15/3/2013.*

AEMO has a discretion to consider late submissions. Any late submission should explain:

1. the reason for the lateness; and

2. the detriment to you if AEMO fails to consider your submission.

Meetings

In your submission, you may request a meeting and specify the reasons why you consider such a meeting is necessary or desirable.

Please note that details of matters discussed at a meeting may be made available to other Consulted Persons.

Further Information

A paper "Energy Conversion Model Guidelines Consultation - Issues Paper" has been published with this Notice. Also attached are copies of the Schedule A: Proposed Amended Energy Conversion Model Guidelines, February 2013.

More information can be found on AEMO's website at:

http://www.aemo.com.au/Consultations/National-Electricity-Market/Open/Amendment-to-the-Energy-Conversion-Model-Guidelines

Information on the consultation that ended in April 2009 on development of the Energy Conversion Model (ECM) Guidelines can be found on AEMO's website at:

http://www.aemo.com.au/Electricity/Market-Operations/Dispatch/Energy-Conversion-Model-Guidelines

Contact Details

AEMO prefers that submissions be forwarded in electronic format (both pdf and Word) as they will be published on the AEMO website.

Please send all e-mail submissions to *Pablo Uribe Gomez* at *pablo.uribe@aemo.com.au*.

Alternatively, you may post submissions to:

Attn. Pablo Uribe Gomez

AEMO. PO Box 7326, Baulkham Hills BC NSW 2153

Attachment 2 – Copy of *issues paper and Schedule A: Proposed Amended Energy Conversion Model Guidelines, February 2013*

1 Introduction

1.1 Matter under consultation

This discussion paper and the Schedule A have been prepared as part of the National Electricity Rules (Rules) requirement for the amendment of the Energy Conversion Model Guidelines ('the ECM Guidelines').

The energy conversion model (ECM) is defined in Chapter 10 of the Rules as:

> The model that defines how the *intermittent* input energy source (such as wind) is converted by the *semi-scheduled generating unit* into electrical output. That model must contain the information set out in the guidelines *published* by *AEMO* in accordance with clause 2.2.7(d).

The current ECM Guidelines[1] were published and took effect on 28 April 2009. The ECM Guidelines outline the data required to develop forecasting modules for wind generators in the Australian Wind Energy Forecasting System (AWEFS) along with details on ECM submission timelines, and guidelines for wind turbine aggregation to turbine clusters.

The requirement to amend the ECM Guidelines stems from a recommendation of the AEMO investigation of a scheduling error in the NEM. This investigation report is available on the AEMO website[2]. A brief description of this scheduling error is given below.

On 13 April 2012 AEMO declared that a scheduling error had occurred as AEMO determined it failed to follow the central dispatch process set out in clause 3.8 of the Rules. This was in relation to the unconstrained intermittent generation forecasts (UIGF) applied to the dispatch of semi-scheduled wind generators.

On 7 June 2012 AEMO published a report on this scheduling error informing the circumstances and time frames of the error and to assist market participants who wished to apply to the dispute resolution panel for a determination for compensation under clause 3.16.2(a) of the Rules.

The real-time control system set point of semi-scheduled wind generators is a key input required by AWEFS to correctly calculate the UIGF. Submission of this input is not a mandatory requirement of the current ECM Guidelines, hence it had not been provided by the affected semi-scheduled generators resulting in the scheduling error.

Investigation of the causes of the scheduling error highlighted the importance of using the real-time control system set point of semi-scheduled wind generators as an input to the AWEFS. Therefore AEMO contacted all affected semi-scheduled wind generators and requested them to provide this real-time input so that the UIGF can be correctly calculated. The semi-scheduled wind generators agreed and AEMO is currently receiving this input from all semi-scheduled wind generators. AEMO is seeking to update the ECM making the

[1] Current ECM Guidelines: http://www.aemo.com.au/Electricity/Market-Operations/Dispatch/Energy-Conversion-Model-Guidelines

[2] The Scheduling Error Report – Incorrect UIGFs for Semi-Scheduled Generators is available at: http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/Market-Event-Reports/Scheduling-Error-Report_Incorrect-UIGFs-for-Semi-Scheduled-Generators

provision of control system set-point mandatory, so that semi-scheduled wind generators expecting to join NEM will make this input available prior to their connection.

1.2 The scope of the consultation

The scope of this consultation is to amend and publish the ECM Guidelines in accordance with clause 2.2.7(d) of the Rules, in order to address the issue described above. These Guidelines are only applicable for semi-scheduled generators.

Clause 2.2.7(d) of the Rules requires amendments to the ECM Guidelines to be made in consultation with the participants. The clause 2.2.7 (d) states the following:

> *AEMO* must develop and *publish* guidelines in consultation with *Semi-Scheduled Generators* and such other person that *AEMO,* acting reasonably, considers appropriate setting out the information to be contained in *energy conversion models*. Any amendments to the guidelines are also to be made in consultation with *Semi-Scheduled Generators* and such other person that *AEMO,* acting reasonably, considers appropriate.

AEMO has prepared the following documents for this consultation:

- this Issues Paper;
- amended draft ECM Guidelines (Schedule A of this Issues Paper).

The primary objective of this issues paper is to highlight the amendment proposed to the ECM Guidelines, specifically to make the provision of real-time control set-point via SCADA, including a SCADA quality flag, as mandatory provisions for existing and future semi-scheduled generators.

The secondary objective of this issues paper is to propose clarifications and comprehensive descriptions for some items of information included in the ECM guidelines.

The proposed amended ECM Guidelines in Schedule A retain the existing form of the ECM Guidelines, in terms of type, style and scope of content. Consulted persons are invited to comment on this issue, and to raise any other relevant issues.

1.3 Benefit of using Real-Time Control Set-Point input for AWEFS for the 5-minute dispatch time frame

The AWEFS produces wind generation forecasts for multiple time frames. The forecasts produced by the AWEFS are used in market processes in the NEM as the availability of semi-scheduled wind generators.

In the 5 minute dispatch time frame, the AWEFS forecasts are strongly correlated to the wind farm generation most recently measured.

There are two related issues relevant in the 5-minute dispatch time frame.

- Whenever the AWEFS observes generation reduction of a wind farm it is unable to differentiate whether a reduction of wind speed or other actions such as a binding network constraint caused reduction of the output of wind farm. The reduction of wind generation caused by other such actions is called down regulation. In such situations the AWEFS assumes that the reduction of wind generation was caused by reduced wind speed and produces wind generation

forecasts for the subsequent dispatch intervals accordingly. However when the cause of the down regulation has ceased, since the AWEFS does not use the change in down regulation as an input, unless the wind farm actually increases its generation, the AWEFS will continue to produce forecasts of relatively lower magnitudes. This may cause a wind farm to be ramped up slower than it may otherwise have been.

- A positive feedback can occur that progressively reduces wind generation to very low levels. When low priced wind generators are competing with high priced generators with low ramp rate to generate through the same transmission path, one outcome may be that the wind generators get some level of down regulation due to the power transfer limit of the transmission path. Both wind generators and the other generators move to the new dispatch targets by the end of the dispatch interval. Since the wind generator outputs drop because of the down regulation the AWEFS assumes that the wind speed has reduced causing the reduction of the wind generation. Since the AWEFS assumes a reduction in the wind speed, it would then derive further reduced wind generation forecasts for the next dispatch interval, resulting in further reduced wind generation even though the low priced wind generation should be displacing other higher priced generation.

Both problems can be addressed if the semi-scheduled wind generators provide their control system set point via SCADA to AWEFS. The AWEFS design uses the control system set point to indicate the reduced output is due to down regulation rather than due to a reduction in the wind speed. If this is the case, AWEFS system up-scales the wind generation to an adequate level so that AWEFS produces wind generation forecasts as if the wind generator was not down regulated.

2 Proposed amendments to ECM Guidelines

The ECM specifies two sets of data. They are the standing data for wind farms and a list of SCADA data that should be provided by the wind generators. This data is required to support the AWEFS forecasting modules. Some of the data is required for physical forecasting modules, while others are required for the statistical forecasting modules. SCADA data is also used for continuous tuning of the forecasting modules.

2.1 Provision of real-time control set-point via SCADA, including the SCADA quality flag, as mandatory provisions

In order to resolve the issue described in the section 1.3, AEMO proposes to make the following amendments to the ECM Guidelines by making the provision of data IDs 1.26, 2.26, and 2.32 as a mandatory requirement. The required amendments are depicted in table 1. New additions are shown in bold green font and the proposed deletions are shown with red strikethrough. AEMO invites submissions from consulted persons on these amendments.

TABLE 1: PROPOSED CHANGES TO THE ECM GUIDELINES

Amendment #	Id	Wind Farm Parameters	Mandatory	Description

Amendment #	Id	Wind Farm Parameters	Mandatory	Description
1	1.26	**Wind Farm Control System Set-Point (in MW)** ~~NSP MW Control Scheme Set points~~	**Yes** ~~No~~	**MW set-point applied in the wind farm's control system to limit (down regulate) its output to at or below the level required by AEMO or the NSP. At other times when no limit applies, the set-point to be set to above the wind farm's registered maximum capacity, but below 250% of it. Control system set-point quality flag and control system operation status (On/Off) is also to be provided via SCADA.** ~~To be provided if NSP MW Control Scheme setpoints are in place, e.g. GDL in SA. Operation status (On/Off) also to be provided via SCADA along with the MW set point values.~~
2	2.26	NSP MW Control Schemes in operation~~?~~	**Yes** ~~No~~	Provide details of NSP MW Control Schemes used to down regulate the wind farm **at wind farm and/or cluster level.** ~~e.g. GDL in SA.~~
3	2.32	**Wind Farm Control System Set-Point (in MW) at cluster level (if any)** ~~MW Control Scheme Set points available? - Yes/ No~~	**Yes (if any)** ~~No~~	**MW set-point applied in the cluster's control system to limit (down regulate) its output to at or below the level required by AEMO or the NSP, at cluster level. At other times when no limit applies, the set-point to be set to above the cluster's registered maximum capacity, but below 250% of it. Control system set-point quality flag and control system operation status (On/Off) is also to be provided via SCADA.**

Amendment #	Id	Wind Farm Parameters	Mandatory	Description
				~~To be provided if NSP MW Control Scheme setpoints are in place, e.g. GDL in SA. Operation status (On/Off) also to be provided via SCADA along with the MW set point values.~~

2.2 Additional clarifications and comprehensive descriptions

AEMO is proposing some additional clarifications and comprehensive descriptions to be included in the ECM guidelines. These additional clarifications and descriptions are not related to the issue as described in section 1.3.

The proposed additional clarifications and descriptions are depicted in table 2. New additions are shown in bold green font and the proposed deletions are shown with red strikethrough.

TABLE 2: PROPOSED ADDITIONAL CLARIFICATIONS TO THE ECM GUIDELINES

Amendment #	Id	Wind Farm Parameters	Mandatory	Description
4	**1.11**	Wind farm altitude (m ASL)	Yes	Representative value for the wind farm altitude (given as a unique value in m ASL [meters above sea level]). **It should be average of ground altitude for turbine locations.**
5	**1.16**	Meteorological mast (met mast) measuring height (m AGL)	Yes	If a met mast available, indicate the ~~measurements~~ height(s). (repeat line if several). **Please provide measuring heights for both the SCADA wind speed data (ID 1.23) and also wind Farm Historical measurements (ID 1.28 and 1.29).**
6	**1.17**	Met mast geographical coordinates (Lat/Lon)	Yes	If a met mast is available, indicate the geographical coordinates. (Repeat line if several). **Please provide geographical coordinates for both the**

Amendment #	Id	Wind Farm Parameters	Mandatory	Description
				SCADA wind speed data (ID 1.23) and also wind Farm Historical measurements (ID 1.28 and 1.29).
	Wind Farm SCADA to AEMO:			
7 **Wind Farm SCADA to AEMO**	**Unless otherwise stated, instantaneous measurements are required. Instantaneous means values sent every 2 seconds to AEMO, or more often.**			
8	**1.21**	Number of wind turbines available for generation data	Yes	As number of turbines available for generation. **This is the summation of:** • **Turbines operating** • **Turbines available to operate, but not operating due to ambient conditions (very low / high wind speeds, ambient temperature)** • **Turbines available to operate, but paused due to down regulation.** **This definition excludes all the following cases:** • **Turbines under maintenance or repair** • **Turbines with a fault or damage** • **Turbines not yet built** • **Transmission/distribution network not available**
9	**1.22**	Number of wind turbines **actively generating** ~~in operation data~~	Yes	As number of turbines in operation, i.e. generating

Amendment #	Id	Wind Farm Parameters	Mandatory	Description
10	1.23	Wind speed data	Yes	**Measurements from turbine nacelle anemometers much preferred over measurements from meteorological mast(s).** ~~Also provide the height at which this is measured. 10 min averages acceptable.~~
11	1.24	Wind direction data	Yes	**Measurements from turbine nacelle anemometers much preferred over measurements from meteorological mast(s).** ~~Also provide the height at which this is measured. 10 min averages acceptable.~~

3 References

- Australian Energy Markets Commission *National Electricity Rules*, Version 54, 2013: http://www.aemc.gov.au/rules.php
- AEMO Generator Registration Guide: http://www.aemo.com.au/en/About-AEMO/Energy-Market-Registration/Registering-in-Energy-Markets#electricity
- AEMO Semi-Scheduled Energy Conversion Model Guidelines: http://www.aemo.com.au/en/About-AEMO/Energy-Market-Registration/~/media/Files/Other/electricityops/0260-0004%20xls.ashx

4 Schedule

The following document is incorporated as a Schedule to this discussion paper.

- **Schedule A:** *Proposed Amended Energy Conversion Model Guidelines*, February 2013.