AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Amendments to the Energy Conversion Model (ECM) Guidelines

December 2018

Report and Determination

Important notice

PURPOSE

This publication has been prepared by AEMO in response to submissions made regarding the proposed amendments to the existing Wind and Solar *Energy Conversion Model* Guidelines.

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VERSION CONTROL

Version	Release date	Changes
#1.0	21/12/2018	Initial publication

ABREVIATIONS

This document uses many terms that have meanings defined in the NER. The NER meanings are adopted unless otherwise specified.

Term	Definition
ASEFS	Australian Solar Energy Forecasting System
AWEFS	Australian Wind Energy Forecasting System
ECM	Energy Conversion Model
NER	National Electricity Rules
SCADA	Supervisory Control and Data Acquisition
UIGF	Unconstrained Intermittent Generation Forecast.

Executive summary

The publication of this Report and Determination concludes the Rules consultation process conducted by AEMO to amend the Wind and Solar *Energy Conversion Model* (ECM) Guidelines under the National Electricity Rules (NER).

In November 2018, AEMO commenced the consultation and published its summary of proposed changes to the Wind and Solar ECM Guidelines paper, which provided a detailed summary of AEMO's intended changes to the ECM Guidelines.

AEMO subsequently received two submissions in response to the summary of proposed changes to the Wind and Solar ECM Guidelines paper. These submissions were supportive of the proposed changes, however, raised two material issues and two minor issues.

In line with AEMO's consultation schedule outlined on the consultation webpage, AEMO has published this document outlining AEMO's responses and conclusions to the issues raised in the submissions. AEMO has accepted all changes suggested from the minor issues raised.

All submissions have been published on the consultation webpage[1].

In summary, the amendments to the Wind and Solar ECM Guidelines arising from this consultation are expected to improve the efficiency of the registration application process. In addition, they are expected to provide further clarity and understanding on how to correctly complete the ECM.

AEMO's final determination is to amend the Wind and Solar ECM Guidelines and publish them to the wind and solar energy forecasting webpage[2].

The effective date of amendments is 21 December 2018, which has been confirmed by email to National Electricity Market (NEM) Semi-Scheduled and intermittent Non-Scheduled generators, and relevant stakeholders.

[1] At http://aemo.com.au/Stakeholder-Consultation/Consultations/2018-Abridged-consultation-on-amendments-to-the-energy-conversion-model-guidelines.

[2] At https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Solar-and-wind-energy-forecasting.

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1. Stakeholder consultation process

AEMO is proposing changes to the Wind and Solar ECM Guidelines and has consulted with Semi-Scheduled and intermittent Non-Scheduled Generators, and relevant stakeholders on the changes as required by clause 2.2.7(d) of the NER.

The timeline for this consultation is outlined below.

Table 1 Consultation timeline

Deliverable	Date
Draft – Wind and Solar ECMs Guidelines released	Thursday 1 November 2018
Submissions closed	Friday 23 November 2018
Final Report and ECM Guidelines Published	Friday 21 December 2018

The publication of this Report marks the end of this consultation.

A glossary of terms used in this Report can be found at the beginning of this document.

2. Background

2.1 Context for this consultation

Since early 2017, a significant number of Semi-Scheduled Generators have applied and registered in the NEM.

With these registration applications, each Generator was required to submit the relevant Wind or Solar ECM for approval by AEMO. Following ECM submission, AEMO and the vendor for the Australian Wind Energy Forecasting System (AWEFS) and Australian Solar Energy Forecasting System (ASEFS) would review the ECM and provide feedback to participants to make the necessary changes to gain ECM approval. This back-and-forth process took some time before ECM approval.

AEMO identified elements of the ECM review process which caused the review to take longer than required, including:

- The amount of information requested for the farm and cluster level.
- The current ECM Guidelines causing participants to incorrectly fill in the ECM the first time.

To address these issues, AEMO updated the Wind or Solar ECM Guidelines in consultation with NEM Semi-Scheduled and intermittent Non-Scheduled Generators, and relevant stakeholders. A summary of the consultation is provided in Section 2.2 below, and a summary of the material issues raised by Consulted Persons is provided in Section 3 below.

2.2 Consultation process

AEMO commenced the consultation and notified all NEM Semi-Scheduled and intermittent Non-Scheduled Generators, and relevant stakeholders via email on 1 November 2018. At this time, AEMO published the 'Summary of Proposed Changes to the Wind and Solar ECM Guidelines' (Proposed Changes) paper outlining proposed changes to the ECM Guidelines, and published draft Wind and Solar ECMs based on the proposed changes.

AEMO received two written submissions to the Proposed Changes paper, from Infigen Energy and Tilt Renewables. These submissions were supportive of the proposed changes to the ECM Guidelines and included some minor suggestions to provide further clarity to the proposed ECMs. In addition, two material issues were raised which are presented below.

Copies of all written submissions have been published on the consultation webpage at http://aemo.com.au/Stakeholder-Consultation/Consultations/2018-Abridged-consultation-on-amendments-to-the-energy-conversion-model-guidelines.

3. Summary of material issues

The key material issues arising from the proposal and raised by Consulted Persons are summarised in the following table.

Table 2 Material issues raised from the consultation

No.	Issue	Raised by
1.	Use of Possible Power SCADA signal	AEMO, Infigen, Tilt Renewables
2.	Wind direction SCADA changes to existing wind farms	AEMO, Tilt Renewables

A detailed summary of material issues raised by Consulted Persons in submissions to the Proposed Changes paper, together with AEMO's responses, is in Section 4 below. Other minor issues raised can be found in Section 5 below.

4. Discussion of material issues

4.1 Use of Possible Power SCADA signal

4.1.1 AEMO's proposal

AEMO proposes to introduce a new Possible Power SCADA signal in the ECM as an optional provision item. AEMO would use this signal as the benchmark for assessing the performance of unconstrained intermittent generation forecasts submitted by the participant for use in dispatch, at times when the output of the semi-scheduled generating unit is constrained below that forecast[3]. AEMO would also use the signal to aid in its analytical activities with the aim of improving the AWEFS and ASEFS forecasting models.

4.1.2 Submissions

Infigen and Tilt Renewables made submissions in relation to the Possible Power SCADA signal.

Infigen's submission expressed concern with the use of Possible Power as a performance benchmark for assessing the accuracy of participant self-forecast, and considered this would have a material impact on their ability to participate in the Market Participant 5-Minute forecast (MP5F) program[3]. Infigen also stated that Possible Power will always be a theoretical, calculated metric which is impossible to standardise across assets due to manufacture and equipment differences. They strongly agreed that it should remain as optional provision. If the signal is provided, Infigen considered it should not be used to assess whether the participant self-forecasts are used in the dispatch process, and should only be used as complementary information for

[3] See https://www.aemo.com.au/Stakeholder-Consultation/Industry-forums-and-working-groups/Other-meetings/Market-Participant-5-Minute-Self-Forecast.

AEMO. Infigen also included their concern for Possible Power in the first and second draft of the self-forecasting procedure[3].

Tilt Renewables' submission referenced the more detailed submission in their response[4] to the second draft self-forecasting procedure on the use of benchmark Possible Power value in the assessment of self-forecast accuracy.

4.1.3 AEMO's assessment

AEMO's response to the feedback received from Infigen and Tilt Renewables can be found in the Final Determination Report of the Semi-Scheduled Generation Dispatch Self-Forecast Assessment Procedure Consultation[5].

4.1.4 AEMO's conclusion

AEMO will include optional SCADA Possible Power in the amended Wind and Solar ECMs. No changes required to the draft Wind and Solar ECMs.

4.2 Wind Direction SCADA changes to existing wind farms

4.2.1 AEMO's proposal

The current Wind Direction SCADA signal provides measurement of wind direction at a single point, either from a met-mast or anemometer from one turbine's nacelle. As the wind direction is measured at a single point, it is not representative of wind direction conditions at a farm-wide level. This can impact the accuracy of AWEFS models and, consequently, impact the accuracy of the UIGF.

AEMO has proposed the Wind Direction SCADA signal be provided as an average of all turbine nacelle wind direction measurements. This is analogous to the current Wind Speed SCADA signal, where it is provided as an average of all turbine nacelle wind speed measurements following the 2016 ECM consultation. The provision of this signal has significantly improved the accuracy of the AWEFS models and we expect an average wind direction calculation to also further improve the models.

4.2.2 Submissions

Tilt Renewables' submission requested clarification on whether the wind direction average changes and other changes in the Wind ECM are intended to be retrospective to existing wind farms.

4.2.3 AEMO's assessment

AEMO has observed relative improvements with AWEFS models following the use of average wind direction data compared with the current single point wind direction data. AEMO understands making changes to existing SCADA signals can be costly and time-consuming, however, AEMO recommends existing wind farms update their current single point wind direction signal to be an average wind direction calculation.

4.2.4 AEMO's conclusion

AEMO recommends and welcomes wind farms implementing an update to their current wind direction SCADA signal to be an average wind direction SCADA signal. At this stage, AEMO does not require existing wind farms to update their current wind direction SCADA signal to be an average wind direction SCADA signal. In addition, other changes in the ECM are not required to be applied retrospectively to existing wind and solar farms.

[4] Summarised in the Final Determination Report of the Semi-Scheduled Generation Dispatch Self-Forecast Assessment Procedure Consultation published on https://www.aemo.com.au/Stakeholder-Consultation/Industry-forums-and-working-groups/Other-meetings/Market-Participant-5-Minute-Self-Forecast.

[5] Ibid.

5. Other minor issues

5.1 Cosmetic and formatting changes

5.1.1 Issue summary and submissions

- The Wind Turbine Curves table displays the Speed vs Power relationship for a wind turbine. It requires participants to complete the turbine power output for each corresponding wind speed. The proposed display is not populated with 0.5 m/s increments up to the cut-out speed and the description states the wind speed increment should be 0.5 m/s.
  - Tilt Renewables' submission recommends the Wind Turbine Curves table be pre-filled from 0.0 to 25.0 m/s in 0.5 m/s increments to avoid confusion.
- The 'Provision' labelling located above the 'Yes/No' row is intended for the participant to state if the particular SCADA signal will be provided within this column.
  - Tilt Renewables' submission recommends the 'Provision' label be moved to the same row as the 'Yes/No' row so it isn't missed.

5.1.2 AEMO's assessment

- AEMO acknowledges that the 0.5 m/s wind speed incremental requirement is not clearly stated in the description and presented in the table.
- AEMO acknowledges that the 'Provision' label above the 'Yes/No' could be missed or misinterpreted.

5.1.3 AEMO's conclusion

- AEMO accepts Tilt Renewables' recommendation to populate the table up to 25 m/s with 0.5 m/s increments. In addition, AEMO has clarified the description by stating wind speed increments must be in the order of 0.5 m/s up to the cut-out speed.
- AEMO accepts Tilt Renewables' recommendation to re-locate "Provision" to the same row as "Yes/No". It is now "Provision – Yes/No".

6. Final Determination and effective date

Having considered the matters raised in submissions, AEMO's determination is to amend the Wind and Solar ECM Guidelines and publish them in accordance with clause 2.2.7(d) of the NER.

The effective date of amendments is 21 December 2018, which has been confirmed by email to NEM Semi-Scheduled and intermittent Non-Scheduled generators, and relevant stakeholders.