Intermittent Generator Forum

Friday 22nd February 2019

Welcome and Introduction

Neale Scott

Our facilitators

MELBOURNE

Neale Scott

Rob Selbie

Petar Pantic

SYDNEY

Ross Gillett

Lucy Cooper (ARENA)

Agenda Session 1:
Intermittent Generator Forum

Time	Duration (min)	Item	Presenter and location
10.00 am - 10.05 am	5	Welcome and Introduction	Neale Scott/Melbourne
10.05 am - 10.20 am	15	ECM & AWEFS/ASEFS Registration	Petar Pantic/Melbourne
10.20 am - 10.30 am	10	Availability Submissions	Petar Pantic/Melbourne
10.30 am - 10.40 am	10	Participant Web Portal and Data	Ross Gillett/Sydney
10.40 am - 10.50 am	10	Other Business and Questions	Ross Gillett/Sydney
10.50 am - 11.00 am	10	Break	

Agenda Session 2:
Participant Dispatch Self-Forecasting

Time	Duration (min)	Item	Presenter and location
11.00 am - 11.10 am	10	Self-Forecast Project - Overview	Lucy Cooper/Sydney
11.10 am - 11.25 am	15	System Changes and Self-Forecast Registration	Rob Selbie/Melbourne
11.25 am - 12.10 pm	45	Self-Forecast Assessment	Ross Gillett/Sydney
12.10 pm - 12.30 pm	20	Questions and Resources	Ross Gillett/Sydney
12.30 pm - 1.00 pm	30	Lunch (provided)	

Session 1: Intermittent Generator Forum

Petar Pantic, Ross Gillett

Forum objectives

- **Inform stakeholders** on AWEFS/ASEFS generator registration and changes to the Energy Conversion Model
- **Inform stakeholders** on changes to availability submissions and the participant web portal
- **Invite feedback** on potential enhancements to the availability submission process or portal in general
- **Inform stakeholders** on the participant dispatch self-forecast project and how to register
- **Inform stakeholders** on the dispatch self-forecast assessment process

Energy conversion model and AWEFS/ASEFS registration

Petar Pantic

Energy Conversion Model (ECM)

The ECM is a model that defines how the intermittent input energy source (such as wind or solar insolation) is converted by the Semi-Scheduled generating unit into electrical output.

The ECM template is required to be submitted by all Semi-Scheduled and some Non-Scheduled intermittent generators as part of the generator registration process. It includes static and variable information about the Semi-Scheduled plant in order to produce forecasts across different timeframes.

The ECM sign-off process involves:

- Completion of the ECM according to the guidelines on the AEMO solar and wind forecasting webpage
- Inclusion of all mandatory ECM SCADA signals (see SCADA requirements) in the SCADA signal list
- Iterative review by AEMO and its external modelers - there is up to a 2 week turnaround each time an ECM is submitted

ECM example – Wind (AWEFS)

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Energy Conversion Model for Wind Farms:							Please submit completed ECM to op.forecasting@aemo.com.au
Data Parameter	Valid Range	Mandatory	Interval	Value	Units	Comments	Description
Farm Level				***Specify one distinct value per cell.*** ***If variants or a range exists, specify the most relevant value.***			
Wind farm identification							
Power Station name	n/a	Yes	n/a		n/a		Name of the wind farm. To be same as specified in the 'Application for Registration as a Generator in the NEM' document, section C.
Region	n/a	Yes	n/a		n/a		Name of NEM region of the facility. To be same as specified in the 'Application for Registration as a Generator in the NEM' document.
Wind farm nominal data							
Nameplate Rating	>0	Yes	n/a		MW		The total installed capacity of the Wind Farm (MW) as outlined in the Performance Standard. This equals the sum of the nameplate rating of all turbines installed. This Item corresponds to "Nameplate Rating of Generating System" in sections C of the "Application for Registration as a Generator in the NEM" document.
Maximum Capacity	>0	Yes	n/a		MW		Maximum generation to which the semi-scheduled generating unit may be dispatched as outlined in the Performance Standard, rounded down to the nearest whole MW. This definition can be found in section C of the "Application for Registration as a Generator in the NEM" document. The Maximum Capacity value must reference the same measurement point as the SCADA Wind Farm Active Power signal.
Wind farm location & terrain data							
Facility Latitude	(-90,90)	Yes	n/a		Decimal degrees		Defined at the centre of the collector area
Facility Longitude	(-180,180)	Yes	n/a		Decimal degrees		Defined at the centre of the collector area
Wind Farm Altitude	(-15,2228)	Yes	n/a		m ASL		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.
Facility Map	n/a	Yes	n/a		pdf file		Given as a map with marked wind turbines position (high resolution image/ PDF file). Please submit as separate pdf.
Air Density	>0	Yes	n/a		kg/m^3		The typical air density at the level of this Wind Farm (yearly average). In case of multiple power curves the one that corresponds to this density is considered.
Wind farm other							
Number of Clusters	>0	Yes	n/a		n/a		Number of clusters of the facility, for cross-checking
NSP MW Control Schemes in Operation	n/a	Yes	n/a		n/a		Provide details of NSP MW Control Schemes used to down regulate the wind farm at wind farm and/or cluster level.
Any other restrictions	n/a	Yes	n/a		n/a		Provide details of any other limitations imposed on the Wind Farm. This should be consistent with information provided in Power System Design Data Sheets section 6.1.2 (tab S-6), and Data Sheets section 7.1.2 (tab: S-7).
Wind Farm SCADA to AEMO:							Instantaneous measurements are required, unless otherwise agreed by AEMO. Instantaneous means values updated at least every 4-10 seconds, with 4 seconds or faster preferred. If only averages are available, a maximum 15-second average update is required.
Data Parameter	Valid Range	Mandatory	Interval	Provision - Yes/No	Units	Comments	Description
Wind Farm Active Power	(<0,>=0)	Yes	4-10 secs		MW		Total wind farm active power. The SCADA Wind Farm Active Power measurement must reference the agreed point of dispatch.
Control System Set-Point	(0, 2.5 x Nameplate Rating)	Yes	4-10 secs		MW		MW Set-Point applied in the wind farm's control system to limit (down regulate) its output. At other times when no limit applies, the set-point to be set to above the wind farm's *Nameplate Rating*, but below 250% of it. SCADA MW Set-Point must reference the same measurement point as the SCADA Active Power signal.
Local Limit	(0, Max Capacity)	Yes	4-10 secs		MW		In MW, the SCADA Local Limit for a wind farm is the lower of its *plant availability* and all technical limits on the capacity of its connection assets to export energy

AEMO-use Only | Submission Guideline | Cluster Definition Guideline | **ECM Wind Farm** | ECM Wind Farm Cluster | Turbine Curves Table

ECM example – Solar (ASEFS)

Energy Conversion Model for non-concentrating PV farms — **Please submit completed ECM to op.forecasting@aemo.com.au**

Data Parameter	Data type	Valid range	Mandatory	Interval	Value	Units	Comments	Description
Farm Level	***Parameters that apply to the solar farm.***				***Specify one distinct value per cell.*** ***If variants or a range exists, specify the most relevant value.***			
Solar farm identification								
Power Station name	Descriptive string	n/a	Yes	n/a		n/a		Name of the Solar farm. To be same as specified in the 'Application for Registration as a Generator in the NEM' document, section C.
Region	Descriptive string	n/a	Yes	n/a		n/a		Name of NEM region of the facility. To be same as specified in the 'Application for Registration as a Generator in the NEM' document.
Solar farm nominal data								
Nameplate Rating	Scalar decimal number	>0	Yes	n/a		MW		The total installed capacity of the Solar Farm (MW) as outlined in the Performance Standard. This equals the sum of the AC power rating of all inverters. This item corresponds to "Nameplate Rating of Generating System" in section C of the "Application for Registration as a Generator in the NEM" document.
Maximum Capacity	Scalar integer number	>0	Yes	n/a		MW		Maximum generation to which the semi-scheduled generating unit may be dispatched as outlined in the Performance Standard, rounded down to the nearest whole MW. This definition can be found in section C of the "Application for Registration as a Generator in the NEM" document. The Maximum Capacity value must reference the same measurement point as the SCADA Solar Farm Active Power signal.
Solar farm location and terrain data								
Facility latitude	Scalar decimal number	(-90,90)	Yes	n/a		Decimal degrees		Defined at the centre of the collector area
Facility longitude	Scalar decimal number	(-180,180)	Yes	n/a		Decimal degrees		Defined at the centre of the collector area
Facility altitude	Scalar decimal number	(-15,2228)	Yes	n/a		metres ASL		Defined at the centre of the collector area
Facility map	PDF / high resolution image	n/a	Yes	n/a		pdf file		Terrain map file with positions of receivers, strings, measuring devices marked. Please submit as separate pdf.
Solar farm other								
Number of clusters	Scalar positive integer	>0	Yes	n/a		n/a		Number of clusters of the facility, for cross-checking
List of measurement devices (Device ID)	Descriptive string, e.g. a device type and model number e.g. "TSP-700 Pyranometer"	n/a	Yes	n/a		n/a		Provide list of measurement devices.
NSP MW Control Schemes in operation	String	n/a	n/a	Yes		n/a		Provide details of NSP MW Control Schemes used to down regulate the solar farm at solar farm and/or cluster level.
Any other restrictions	String	n/a	n/a	Yes		n/a		Provide details of any other limitations imposed on the Solar Farm. This should be consistent with information provided in Power System Design Data Sheets section 6.1.2 (tab S-6), and Data Sheets section 7.1.2 (tab S-7).
Solar farm SCADA to AEMO:								Instantaneous measurements are required, unless otherwise agreed by AEMO. Instantaneous means values updated at least every 4-10 seconds, with 4 seconds or faster preferred. If only averages are available, maximum 15-second average update is required

Data Parameter	Data type	Valid range	Mandatory	Interval	Provision - Yes/No	Units	Comments	Description
Solar Farm Active Power	Scalar decimal number	(<0, >=0)	Yes	4-10 secs		MW		Total solar farm active power. The SCADA Solar Farm Active Power measurement must reference the agreed point of dispatch.
Control System Set-Point	Scalar non-negative decimal number	(0, 2.5 x Nameplate Rating)	Yes	4-10 secs		MW		MW Set-Point applied in the solar farm's control system to limit (down regulate) its output. At other times when no limit applies, the set-point to be set to above the solar farm's Nameplate Rating, but below 250% of it.

AEMO-use Only | Submission Guideline | Cluster Definition Guideline | **ECM PV** | ECM PV Cluster | ECM CPV | ECM CPV Cluster | ECM CST | ECM CST Cluster | Spectral Response example | Inverter Res ...

2018 ECM Consultation

In November 2018, AEMO consulted the industry on improvements to the ECM.

These improvements are intended to simplify and expedite the ECM approval process.

Summary of changes:

- Cosmetic and formatting updates.
- Correction of valid range errors.
- Improved consistency of definitions.
- Removal of redundant fields.
- Addition of Possible Power as an optional SCADA signal.
- Removal of Estimated Power SCADA signal.

AEMO also now provides a guide to data requirements for AWEFS and ASEFS

Implementing the AWEFS/ASEFS forecasting model

Following registration, a semi-scheduled generator will commence hold point testing (commissioning) and will require an AWEFS/ASEFS model to be implemented.

The following requirements apply to wind and solar farms during commissioning:

For wind farms:

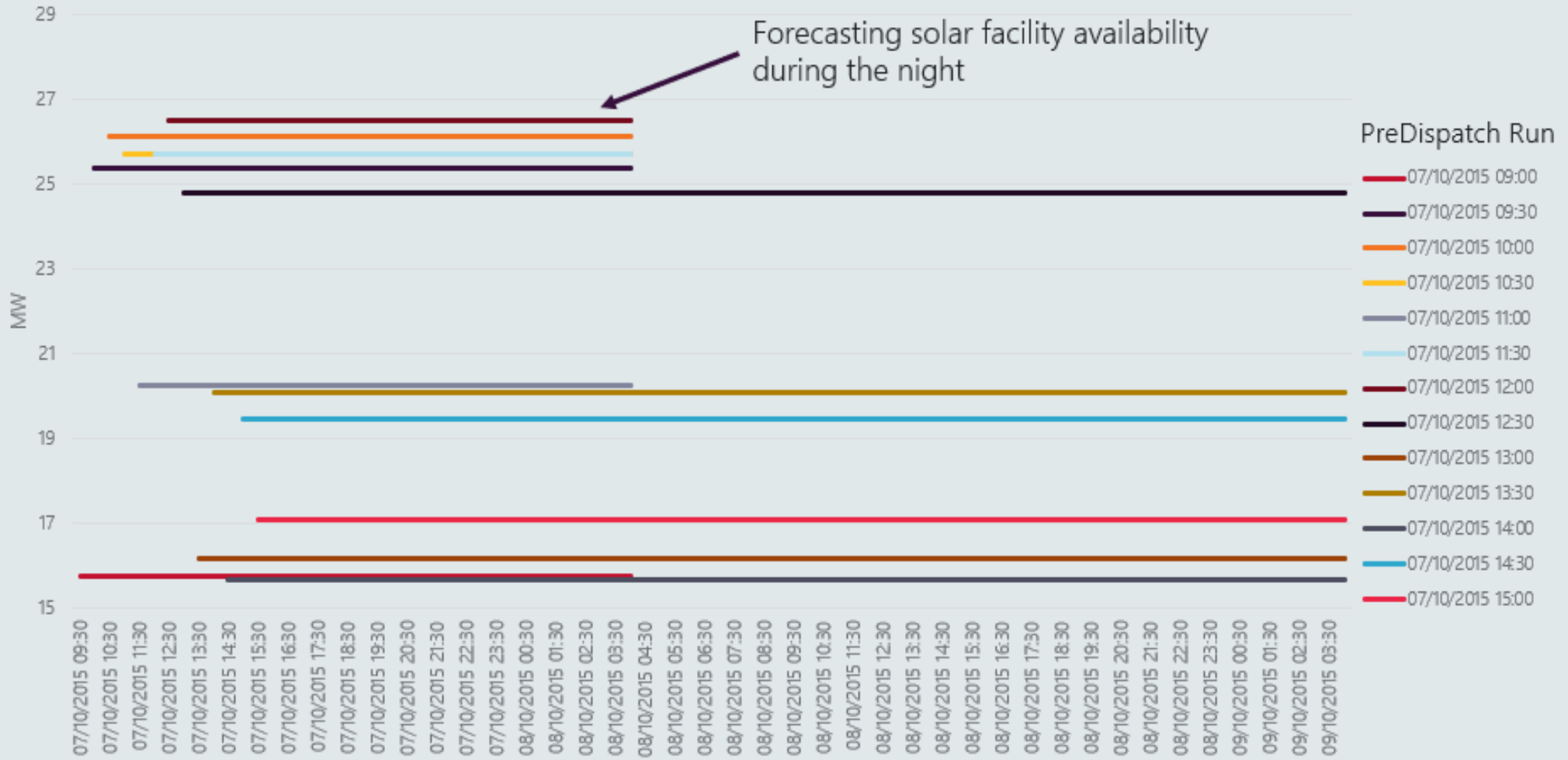
- An expedited forecasting model will be implemented in parallel to compliance testing activities following critical ECM SCADA signals working as expected with good quality tags.

For solar farms:

- An expedited forecasting model will be implemented prior to commissioning commencement to avoid delays and thus, does not require working ECM SCADA signals.

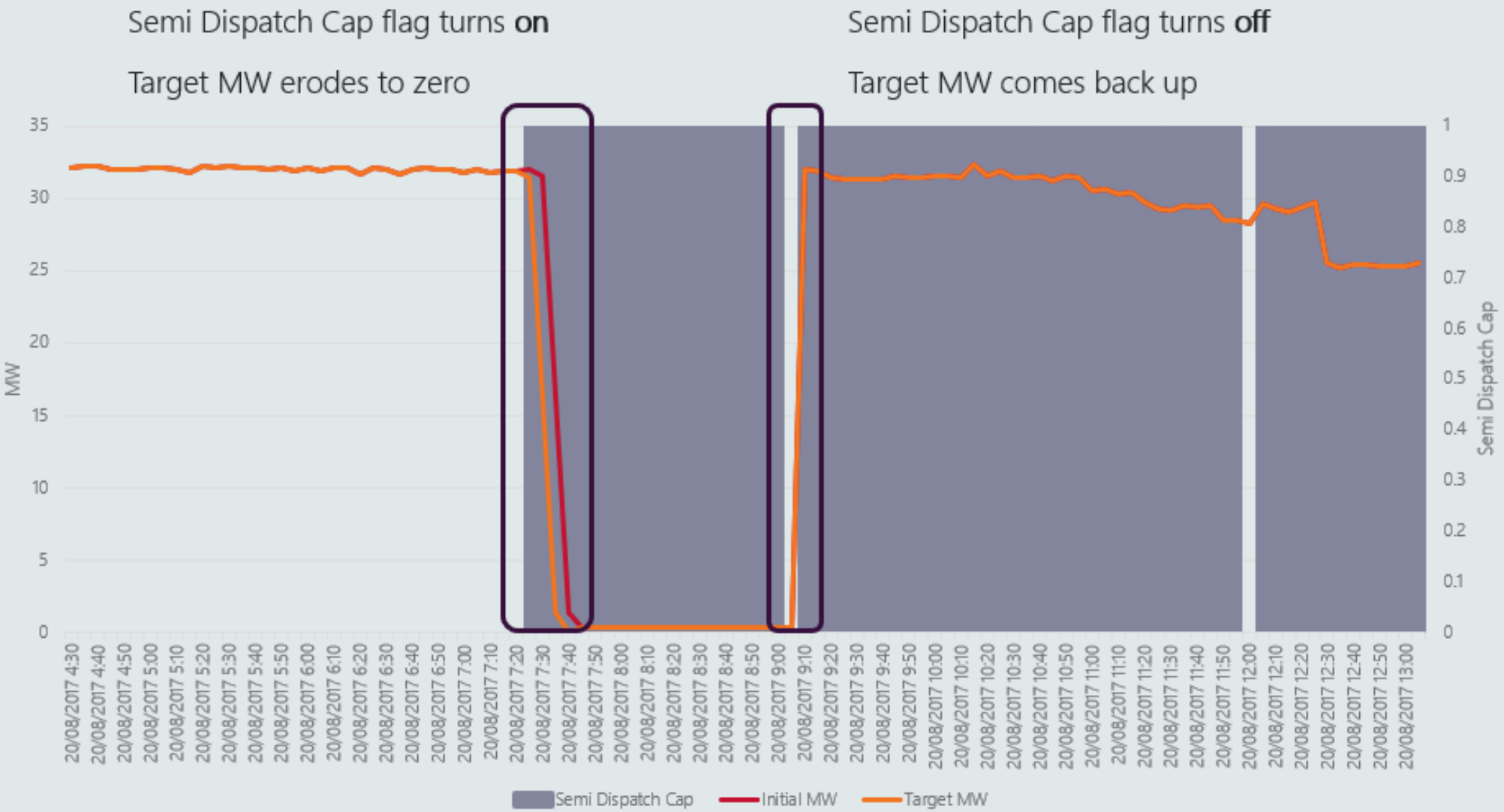
To aid AEMO in matching supply and demand, and manage system frequency and security, expedited models are implemented to ensure a degree of forecasting accuracy is available during commissioning.

Why we need an expedited (ASEFS) forecasting model: **Pre-Dispatch (PD)**



For 5-minute PD and PD runs, where there is no forecast available, the actual MW SCADA at the start of the run is used as the forecast for every period, producing a horizontal line forecast. Obviously this is incorrect for solar in overnight periods if the run is during the day. The impact to PD runs will be reduced by implementing the expedited solar forecasting model prior to commissioning commencement.

Why we need an expedited (AWEFS) forecasting model: **Dispatch**



Without an expedited dispatch forecast model, the forecast defaults to actual MW. When the unit operates slightly below the semi-dispatch cap, this can result in the forecast (and hence semi-dispatch cap) slowly eroding to 0 MW over time

Availability submissions

Petar Pantic

Reporting of availability submissions

Under clause 3.7B(b), a Semi-Scheduled Generator must submit its plant availability via the MMS portal.

From January 2019, participants can subscribe to receive a report with the upper MW limit and elements unavailable information provided in their availability submission.

Separate reports for:

- Half-hourly availability submissions (for Pre-dispatch, STPASA)
- Daily availability submissions (for MTPASA)

Do you think it would be beneficial for AEMO to publish all availability submissions for the previous trading day?

Use of availability submissions

- AWEFS/ASEFS caps the Unconstrained Intermittent Generation Forecast (UIGF) at the availability for the relevant trading intervals in the trading day submission.
- If there is no availability submission for a particular trading day, AWEFS/ASEFS uses the availability in latest submission for the latest trading day by default.
- This requires the participant to make a full availability submission for the trading day immediately following a trading day with reduced availability. This could be due to a number of factors, which could include a planned outage.
- AEMO has found that participants sometimes do not provide full availability

Do you think the portal should provide an option to automatically re-set the availability to the registered Maximum Capacity for the next trading day following a reduced availability period?

Participant web portal

Ross Gillett

Recent portal changes

- **Jan 2019**: changes to the Intermittent Gen > Availability interfaces Energy Availability & MTPASA Availability.
  - Removal of MW availability column.
  - For solar, relabel strings to inverters.
- **Dec 2018**: updated Guide to Intermittent Generation v5
  - Reflect above changes.
  - Obligations to provide availability information.
  - Structure and validation of availability submissions.
  - How to manage availability over dispatch, 5MPD, pre-dispatch, STPASA, MTPASA timeframes.
  - How availability used in AWEFS/ASEFS.
  - Changes to viewing of dispatch and MTPASA forecasts.
- **Web Portal located at**: https://portal.prod.nemnet.net.au

How can the portal be improved?

Reporting of forecasts

Ross Gillett

How can forecast reporting be improved?

- AEMO has received requests from multiple participants to split the UIGF in the Region Solution reports into separate wind and solar components.
- The UIGF in these reports is a regional aggregated Unconstrained Intermittent Generation Forecast of Semi-Scheduled generation (MW).
- AEMO is supportive of the proposal given it will increase the transparency of intermittent generation forecasts

Should AEMO split the UIGF into separate regional aggregated semi-scheduled wind and solar generation forecasts?

Other business and questions

Ross Gillett

Session 2: Participant Dispatch Self-Forecasting

Lucy Cooper, Rob Selbie, Ross Gillett

Agenda Session 2:
Participant Dispatch Self-Forecasting

Time	Dur (min)	Item	Presenter and location
11.00 am - 11.10 am	10	Self-Forecast Project - Overview	Lucy Cooper/Sydney
11.10 am - 11.25 am	15	System Changes and Self-Forecast Registration	Rob Selbie/Melbourne
11.25 am - 12.10 pm	45	Self-Forecast Assessment	Ross Gillett/Sydney
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12.30 pm - 1.00 pm	30	Lunch (provided)	

Self-Forecast Project - Overview

Lucy Cooper

Work Overview

2015 - 2017

- 2015: **AWEFS/ASEFS UIGF scheduling error identified**; proposed improvements to the process for developing Dispatch forecast
- 2016: **Market Participant 5-minute ahead Forecast,** or **MP5F** included as an **optional signal** in the ECM (formerly Estimated Power)
- 2017: **AWEFS and ASEFS working group established** - AEMO worked with industry on development & implementation of wind & solar projects to produce their own output forecasts

2018

- AEMO: **Market Participant 5-minute ahead Forecast (MP5F)** industry discussions and work program established
- ARENA: **Short-term Forecasting funding initiative announced,** allocating up to $10 million towards activities focused on 5-minute ahead self-forecasting for wind and solar farms operating in the National Electricity Market (NEM)

2019

- AEMO: **MP5F capability enabled** for semi-scheduled generators to submit forecasts for potential market dispatch
- ARENA: **Short-term Forecasting portfolio finalised,** enabling a trial to explore the potential benefits of self-forecasting. Includes a range of data collection and prediction technologies, such as sky-cam and satellite-based solar forecasting, LIDAR and SODAR wind forecasting, and machine-learning approaches

Program Overview

- This program is a **collaboration between AEMO and ARENA** within their Memorandum of Understanding (MOU) established in May 2017.
- It seeks to **explore the potential of forecasting technologies to provide accurate site-specific forecasts**, via a series of proof-of-concept demonstrations at operating renewable energy generators in the NEM.
- There have been two key elements of work:

1 Build AEMO systems

- **Design and build API to validate and accept participant dispatch self-forecasts** into AEMO's systems.
- **Establish robust processes** to support the validation and integration of 5-minute ahead forecasts from participants.

AEMO-led

2 Build industry capability

- **Enable a set of proof-of-concept projects** implementing reliable self forecasts into AEMO systems.
- **Encourage a collective effort** to improve forecasts for intermittent generators.
- **Involve a mix of forecasting technologies** and generator sizes and types.

ARENA-led

Motivation

- **Misalignment of NEM accountabilities**
- **Financial impacts on renewable generators**
- **System security challenges**

Benefits

- **Greater industry capability**
- **Improved system security**
- **Reduced FCAS costs**
- **More efficient market outcomes**

System changes and self-forecast registration

Rob Selbie

Self Forecasting – System Changes

PREVIOUS STATE	CURRENT STATE
AEMO uses the AWEFS/ASEFS forecasting systems to produce unconstrained intermittent generation forecasts for SS units over Dispatch, 5MPD, Pre-Dispatch and STPASA	As previous
Dispatch forecasts largely based on SCADA provided by participant	As previous, PLUS: **Participant can optionally submit their dispatch self-forecast**
AEMO validates the AWEFS/ASEFS forecast: ● Use AWEFS/ASEFS forecast if valid; else ● Use Active Power if valid; else ● Use Previous Target	AEMO validates **dispatch self-forecast** and AWEFS/ASEFS forecast: ● **Use latest valid dispatch self-forecast with highest priority; else** ● Use AWEFS/ASEFS forecast if valid; else ● Use Active Power if valid; else ● Use Previous Target
AEMO can manually disable the AWEFS/ASEFS dispatch forecast and use Active Power	As previous, PLUS: **AEMO can manually disable the dispatch self-forecast and use the AWEFS/ASEFS dispatch forecast or Active Power as required based on ongoing comparative assessment**

Dispatch self-forecast registration

1. Submit self-forecast application form to Operational Forecasting
   - Contact details, forecast model descriptions, trading manager authority, SCADA Possible Power use
2. Establish secure access to submit via API
   - Whitelist participant IP address (both internet and MarketNet)
   - Issue SSL certificate
   - Participant Administrator grants access in MSATS User Rights Management
   - Involves multiple teams at AEMO, and can take several weeks
3. Test in Pre-Production environment
4. Notify AEMO
   - Start date to begin initial assessment of self-forecast performance in Production environment

Submit via API

Participants can:

- Submit forecasts for next 5-minute dispatch interval only
- Submit updates to forecasts as often as required (throttling limits apply)
- Submit multiple model forecasts for each DUID and allocate each forecast a unique priority
- Submit forecasts no later than 70 seconds before start of 5-minute dispatch interval to which forecast applies, to guarantee use in dispatch (as measured from when AEMO **received** the submission)

What happens next?

- All valid submissions are retained and published via data interchange
- AEMO will use the highest priority forecast in dispatch, as long as that forecast has not been suppressed by participant or AEMO

Self-Forecast Data

New data sets available from the MMS Data Model:

Data Set	Confidentiality	MMS Data Model Table
Intermittent dispatch self-forecasts submitted and AWEFS_ASEFS forecasts	Same day private / next day public	INTERMITTENT_DS_PRED INTERMITTENT_DS_RUN
Tracking of which intermittent forecast was used in the 5-minute dispatch process		INTERMITTENT_FORECAST_TRK

Data Specification:

- MMS Data Model Report
- MMS Data Model – January 2019 Technical Specification
- MMS Data Model Table to File to Report Relationships workbook v4.28

Would participants like additional notification of suppression events via SMS/Email?

Self-forecast assessment

Ross Gillett

What is a self-forecast?

Participant's forecast of unconstrained intermittent generation from a semi-scheduled generating unit at the end of the next dispatch interval

- Same definition as the AWEFS/ASEFS forecast
- Subject only to technical factors affecting operation of its generation and connection assets
- Referenced to agreed dispatch point (location of active power signal used in AWEFS and ASEFS and defined in the Energy Conversion Model (ECM))
- Excludes the effect of distribution or transmission network constraints and may exclude other limits normally managed by AEMO

Why assess self-forecasts?

- AEMO assesses the relative performance of self-forecast against AWEFS/ASEFS forecast to provide reasonable assurance that self-forecast will not provide materially worse inputs to dispatch than AWEFS/ASEFS
- Participants develop self-forecasting models and independently assess relative performance
- AEMO's self-forecast assessments will not differentiate between different model forecasts

Development of assessment procedure

- **Jul 2018:**
  - AEMO releases initial draft for feedback.
  - In preparing the draft, AEMO considered feedback received following self-forecasting technologies workshop in February 2018
  - There were five respondents
- **Nov 2018:**
  - AEMO revised the initial draft, and released the second draft and determination for feedback
  - There were five respondents
- **Dec 2018:**
  - AEMO revised the second draft, and released the final procedure and determination

Semi-Scheduled Generation Dispatch Self-Forecast – Assessment Procedure

Reliability assessment

For at least 95% of dispatch intervals over the current assessment window, AEMO received a self-forecast of at least 70 seconds prior to the gate closure for the dispatch interval.

- **Procedure:** “Minimum DIs for Reliable SF”
- Only conducted during the initial assessment stage
- Self-forecast can be suppressed or unsuppressed by participant

Pre-condition for performance assessment

AEMO only conducts a self-forecast performance assessment if at least 80% of dispatch intervals over the assessment window satisfy the following:

- Self-forecast was used in dispatch, or AEMO received an unsuppressed self-forecast at least 70 seconds prior to gate closure.
- Energy target ≥ UIGF (unit not constrained off), unless a good quality SCADA Possible Power is available for use in performance assessment.

- **Procedure:** "Minimum DIs for SF Performance Assessment"
- Conducted prior to all performance assessments during initial and ongoing assessment stages
- Self-forecast must be unsuppressed by participant

Performance assessment

- Self-Forecast must pass the “Minimum DIs for SF Performance Assessment” test before performance can be assessed
- Both self-forecast and AWEFS/ASEFS performance measured as Mean Absolute Error (MAE) & Root Mean Squared Error (RMSE)
- Self-forecast performance **must be no worse** than AWEFS/ASEF performance on **both measures** before AEMO will enable (unsuppress) the self-forecast for use in dispatch:

$$MAE_{SF} \leq MAE_{AWEFS\_ASEFS}$$

AND

$$RMSE_{SF} \leq RMSE_{AWEFS\_ASEFS}$$

Prior to initial assessment

- AEMO initially suppresses unassessed self-forecasts for all Dispatchable Unit Identifiers (DUIDs) to prevent their pre-mature use in dispatch
- Participant starts to automatically submit self-forecasts to AEMO
- Participant provides advance notice of the start date for:
  - Initial assessment of self-forecasts
  - Use of SCADA Possible Power in performance assessments
    - Use is optional, and participant can opt-in at any time
    - If SCADA Possible Power is not used, periods of constrained-off operation might prevent an assessment of self-forecast performance and delay its use in dispatch

Assessment Process (1)

- Every Tuesday (unless otherwise advised), AEMO conducts all initial and ongoing assessments
  - Assessment windows cover full calendar weeks
  - Assessment windows end at midnight AEST Mondays
  - Assessment window for a solar DUID only includes dispatch intervals ending 0405 to 2100 AEST inclusive, to minimise assessment bias during night-time
- After running assessments, AEMO checks the results and prepares an assessment summary report for each participant unit

Assessment Process (2)

- AEMO emails the self-forecast assessment summary report to the relevant participant contact, advising:
  - Current dispatch status of self-forecast prior to assessments (suppressed/unsuppressed)
  - New dispatch status of self-forecast after the assessments (suppressed/unsuppressed)
  - Reason that the self-forecast remains or will change to “suppressed”
    - Failed the Minimum DIs for Reliable SF” test (initial assessment stage only)
    - Failed the “Minimum DIs for SF Performance Assessment” test
    - Fail the Performance Assessment test
- On request, AEMO can provide a spreadsheet with a detailed breakdown of data used to perform the assessments

Initial Assessments

- Assessment window initially 8 weeks, but extends each week by one week (to a maximum 16 weeks) until both assessments pass.
- Self-forecast must pass **both** the Reliability and Performance assessments before AEMO unsuppresses the self-forecast for its first time use in dispatch
- If self-forecast passes both assessments:
  - AEMO unsuppresses self-forecast for use in dispatch
  - Automatic reports to participant when AEMO unsuppresses
  - AEMO progresses the self-forecast to ongoing assessment stage

Ongoing Assessments

- Ongoing performance is assessed over a rolling one, four and eight week assessment window
- If the self-forecast passes the performance assessment **for any of these windows**
  - AEMO unsuppresses self-forecast that day (if not already unsuppressed)
  - Automatic report when AEMO unsuppresses the self-forecast
- If the self-forecast does not pass the performance assessment **for all of these windows**
  - AEMO suppresses self-forecast that day (if not already suppressed)
  - Automatic report when AEMO suppresses the self-forecast, with reason

AEMO Control Room

- AEMO control room monitors for gross forecast errors
- Control room may suppress the current forecast used in dispatch (regardless of source) if causing, or could cause, market or power system security issues:
  - AEMO might not contact the participant prior to suppressing its self-forecast due to time constraints
  - **If AEMO suppresses the self-forecast,** dispatch uses AWEFS/ASEFS
  - **If AEMO also suppresses AWEFS/ASEFS,** dispatch uses SCADA MW
  - Automatic report to participant when AEMO unsuppresses or suppresses the self-forecast (latter with a reason)
- AEMO operational forecasting team reassesses all self-forecasts next week (Tuesday) as part of its weekly assessment process

Self-Forecast Assessment Summary report

Column	Description
DUID	DUID
FUEL_TYPE	WIND or SOLAR
RUN_TYPE	SF_RELIABILITY, SF_PERF_INITIAL or SF_PERF_ONGOING Assessment
RUN_WINDOW_WKS	Assessment Window (full weeks). Min 8, Max 16 (for SF_RELIABILITY, SF_PERF_INITIAL); 1, 4 and 8 weeks (for SF_PERF_ONGOING)
RUN_DATETIME	Date Time of Assessment Run in EST; usually Tuesday
DI_FROM	First DI ending; 0005 HRS on Tuesday AM
DI_TO	Last DI ending; 0000 HRS on Tuesday AM
DIS_WINDOW	Count of DIs over Run Window
DIS_TOTAL	Count of DIs over Run Window with a dispatch solution and excluding Night for SOLAR (DIs 2105 to 0400 incl)
DIS_INCLUDED	Count of DIs included in Assessment (as part of DIS_TOTAL) because: (SF on time OR used in Dispatch) AND (Unit target not constrained off below UIGF OR good SCADA Possible Power)
DIS_INCLUDED_ON_TIME_SF	Count of DIs (as part of DIS_INCLUDED) where the SF was on time OR was used in Dispatch. The latter is only relevant to SF_PERF_ONGOING
DIS_EXCLUDED_COFF_NOPOSP	Count of DIs excluded from Assessment because Unit target constrained off below UIGF AND no SCADA Possible Power
DIS_EXCLUDED_MISSING_LATE_SF	Count of DIs excluded from Assessment because the SF was missing or late
DIS_EXCLUDED	Count of DIs excluded from Assessment because: (SF missing or late) OR (Unit target constrained off below UIGF AND no SCADA Possible Power)
DIS_REQUIRED	Count of Minimum DIs required to meet Reliability test (SF_RELIABILITY) & pre-condition for Performance Assessment (SF_PERF_INITIAL, SF_PERF_ONGOING)
DO_PERF_ASSESSMENT	“YES” if (DIS_INCLUDED ≥ DIS_REQUIRED); else “NO”
SF_MAE_MW	SF MAE; or NULL if DO_PERF_ASSESSMENT = "NO"
SF_RMSE_MW	SF MAE; or NULL if DO_PERF_ASSESSMENT = "NO"
AWEFS_ASEFS_MAE_MW	AWEFS/ASEFS MAE; or NULL if DO_PERF_ASSESSMENT = "NO"
AWEFS_ASEFS _RMSE_MW	AWEFS/ASEFS RMSE; or NULL if DO_PERF_ASSESSMENT = "NO"
SF_PERF_PASS	“YES” if (SF MAE ≤ AWEFS/ASEFS MAE and SF RMSE ≤ AWEFS/ASEFS RMSE); else “NO”. "NOT ASSESSED" if DO_PERF_ASSESSMENT = “NO”

Future review

- In late 2019, AEMO intends to further engage with stakeholders to review the effectiveness of the Self-Forecast Assessment Procedure after gaining sufficient experience with the use of self-forecasts in dispatch

- Review will cover:
  - Performance Metrics, Benchmarks, Thresholds, Exclusions, Windows
  - Switching between forecasts
  - Assessment Reporting
  - Process automation
  - Other Process enhancements

Questions and Resources

Ross Gillett

Questions and Resources

- Registration and Assessment
  - AEMO website – Participant Forecasting
  - Self-Forecast Application Form
- API Access
  - Guide to AEMO's e-Hub APIs
  - Self-Forecast API details
  - API Portal
- Data
  - MMS Data Model Report
  - MMS Data Model – January 2019 Technical Specification

In summary

- AEMO to run Intermittent Gen forums every 6 months, with the next forum in August 2019.
- AEMO will publish forum minutes (see the Intermittent Generator Forum webpage)
- General feedback or questions: email op.forecasting@aemo.com.au

Thank you for your valued participation !

- **General AWEFS & ASEFS info**: Solar and wind energy forecasting webpage
- **Participant Self-Forecasting info**: Participant Forecasting webpage