Intermittent Generation Session

30 July 2021

Welcome and Introduction

Mike Davidson
Manager Operational Forecasting

Our facilitators

Alicia Webb

Mike Davidson

Jack Fox

Petar Pantic

Kovin Naidoo

Rob Selbie

Ciaran Toomey

Leanna Tedesco

Agenda

Time (AEST)	Duration (min)	Item	Presenter
10:30 – 10:35	5	Welcome and Introduction	Mike Davidson
10:35 – 11:00	25	Changes and updates since previous forum (Nov 2020)	Rob Selbie Petar Pantic
11:00 – 11:10	10	Planned updates	Jack Fox
11:10 – 11:30	20	Recent observations of operational challenges	Petar Pantic
11:30 – 11:45	15	Other business	Kovin Naidoo Ciaran Toomey Leanna Tedesco
11:45 – 12:00	15	Further questions and discussion	

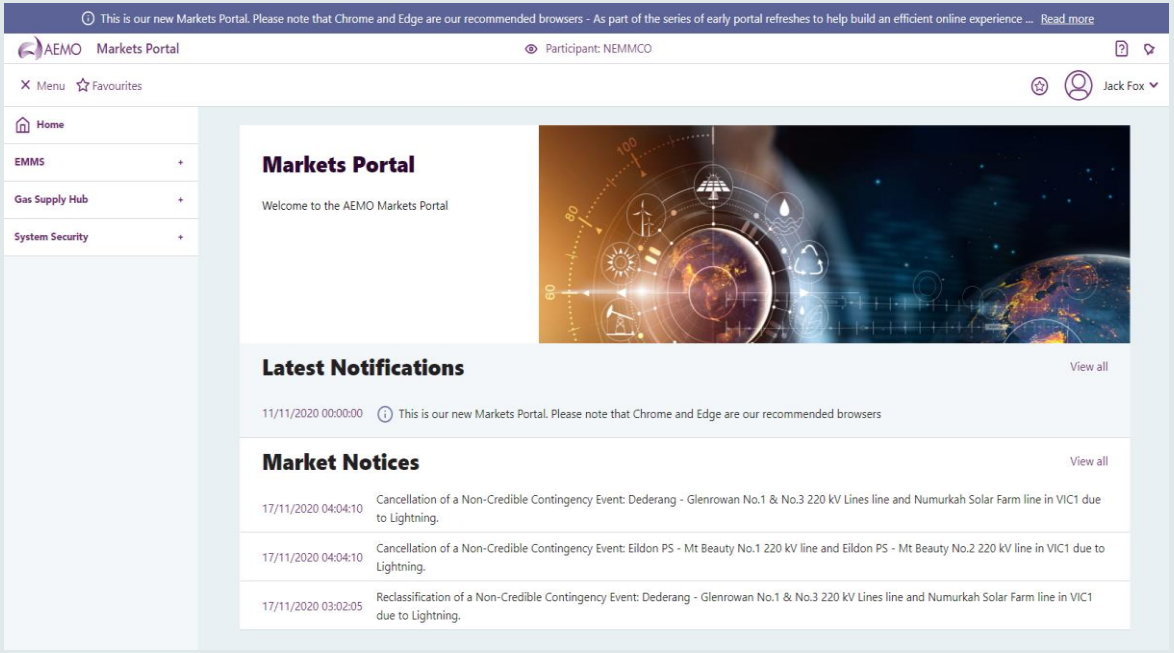
Session objectives

- Inform stakeholders on:
  - Updates and system enhancements made since the last intermittent generation forum in Nov 2020.
  - Planned updates to intermittent generator items.

- Inform stakeholders of recent operational challenges.

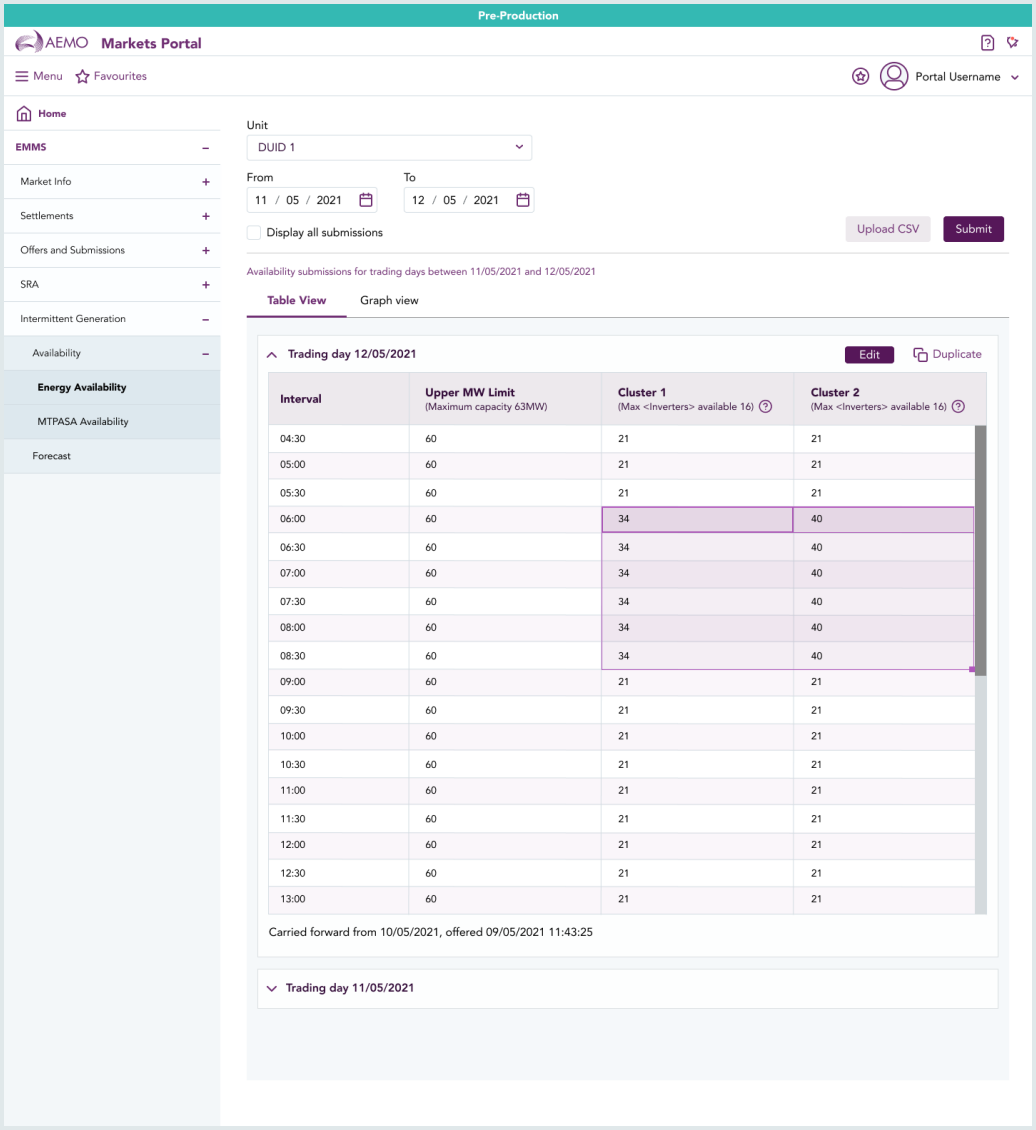
Changes and updates since previous forum (Nov 2020)

Updates to the EMMS Web Portal screens and availability submissions



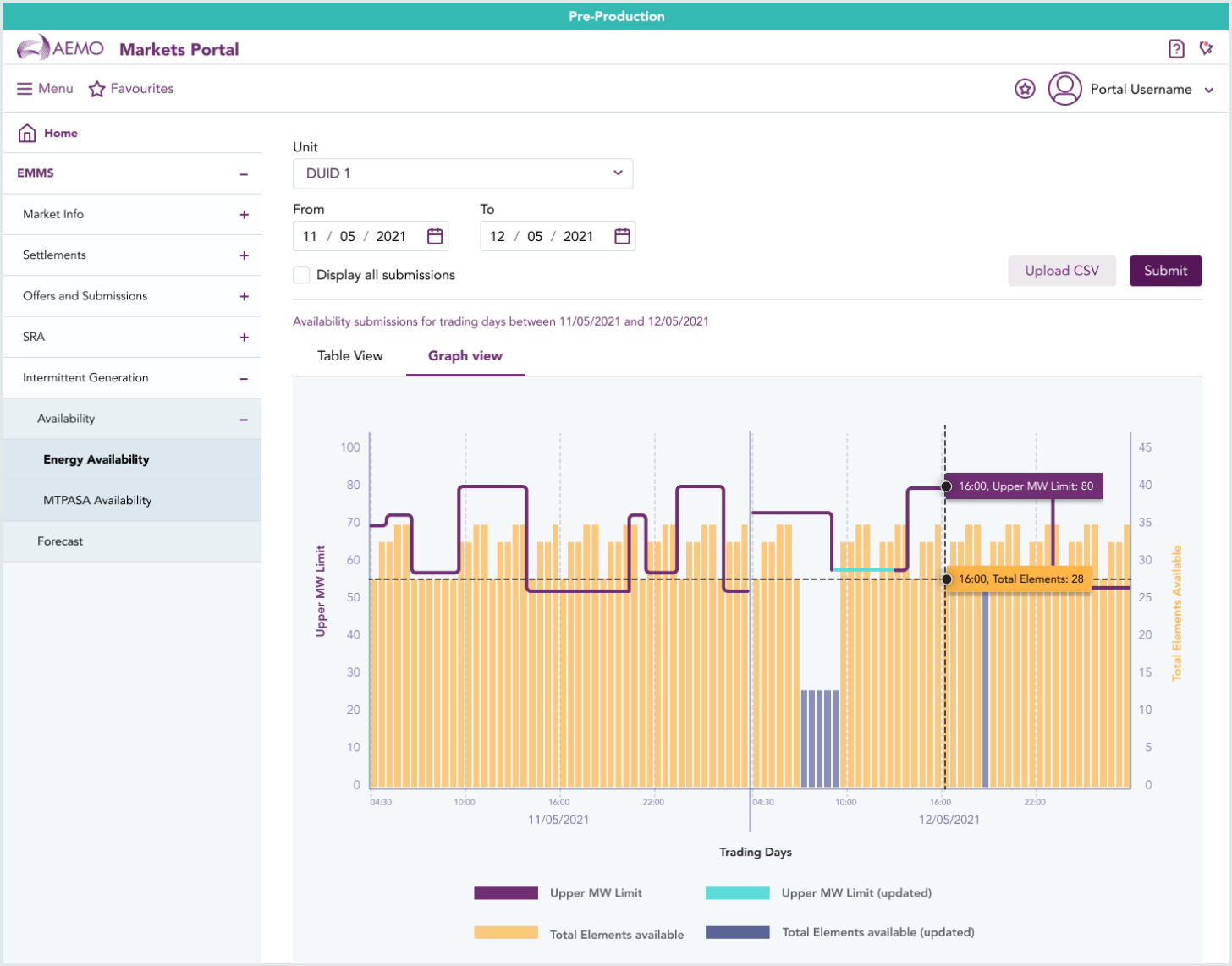
- AEMO is currently in the process of making changes to the usability of the intermittent generator screens and availability file submission method.
- The changes will improve the user experience of submitting intermittent generation availability via the portal.
- The current file submission method via FTP (aseXML format) will be updated to a JSON-based web API file submission method.
- Changes are expected to be effective in late November 2021.

Updates to the EMMS intermittent generation screens



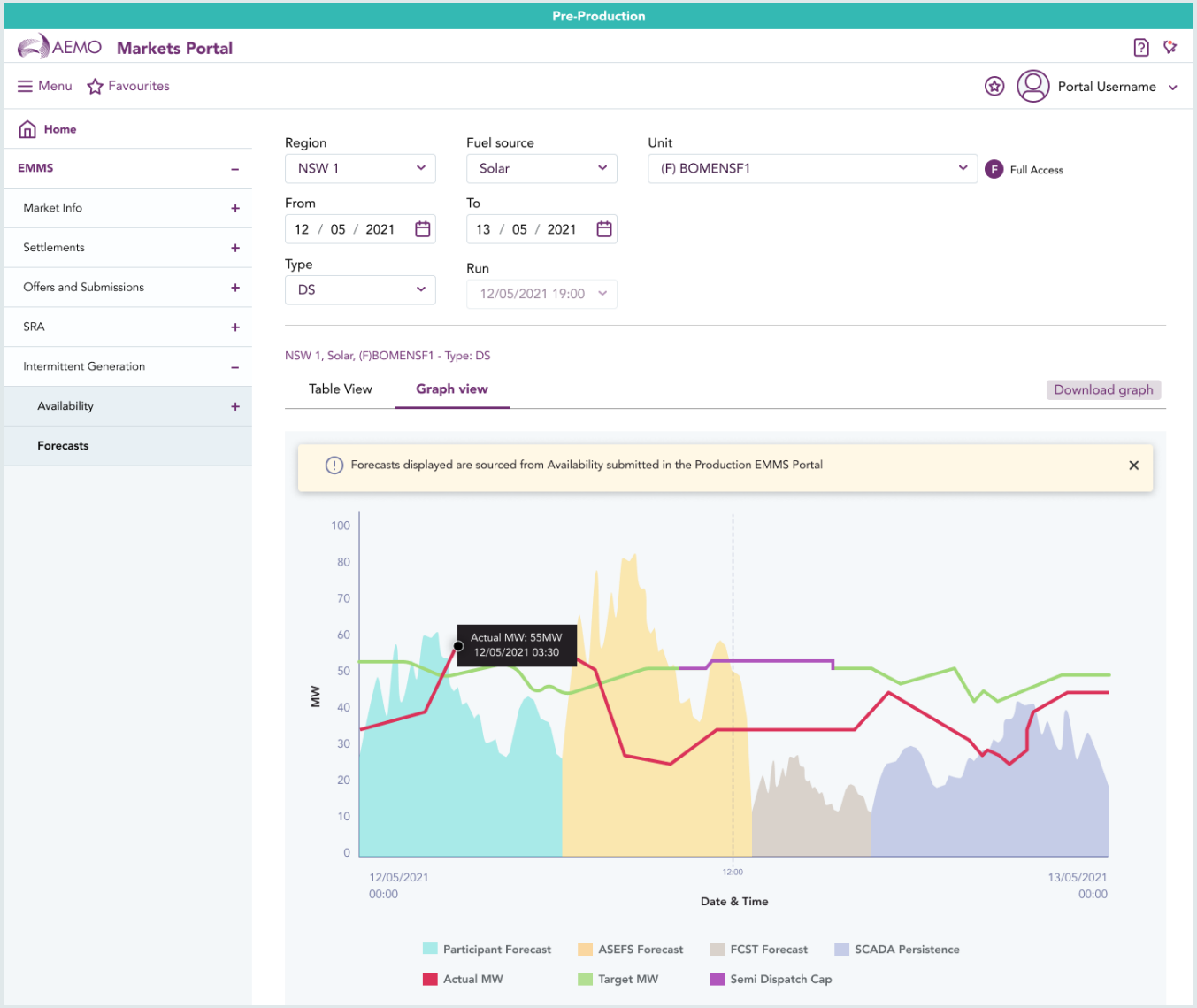
Viewing/editing intermittent generation availability in table

Updates to the EMMS intermittent generation screens



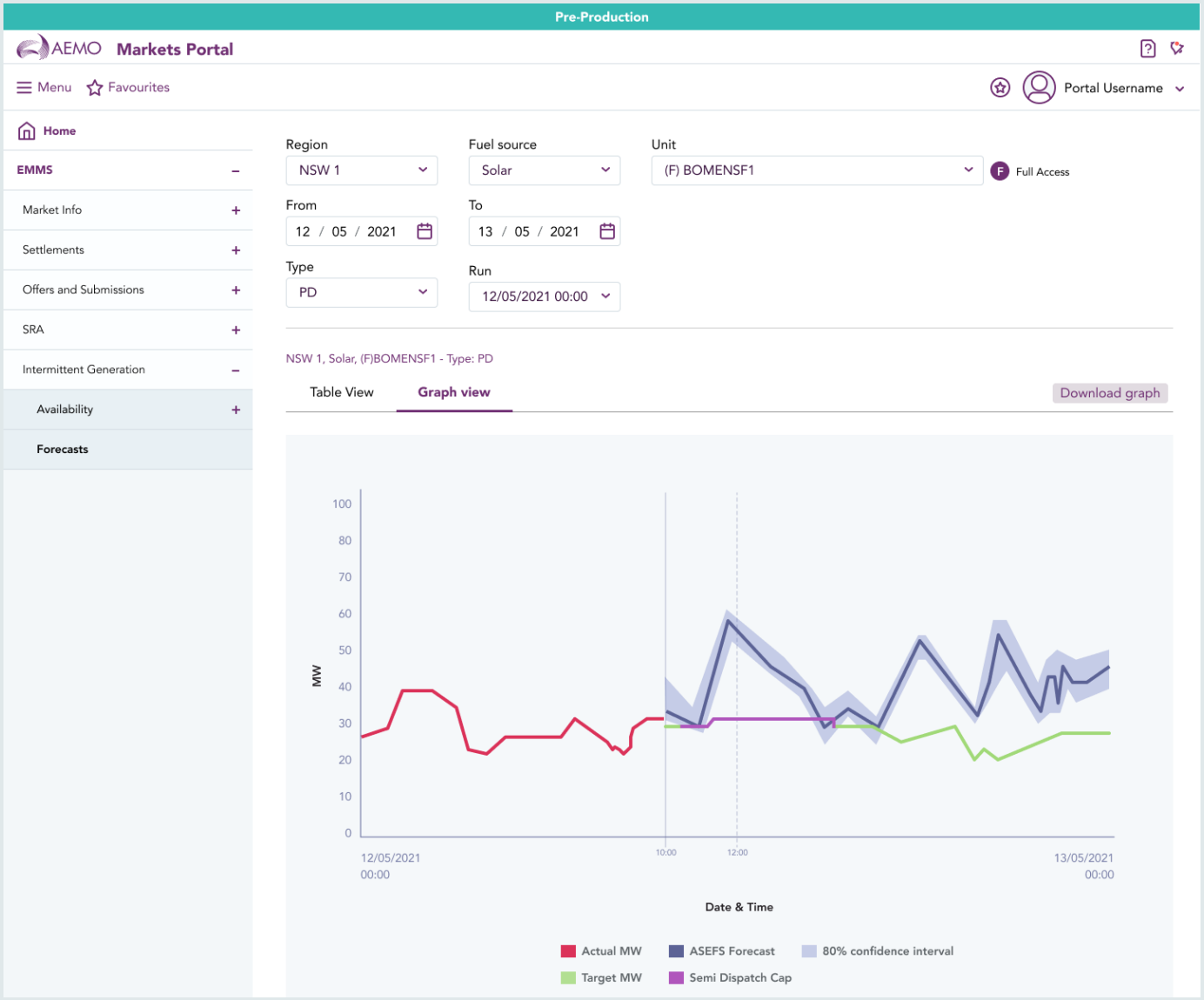
Viewing intermittent generation availability in graph

Updates to the EMMS intermittent generation screens



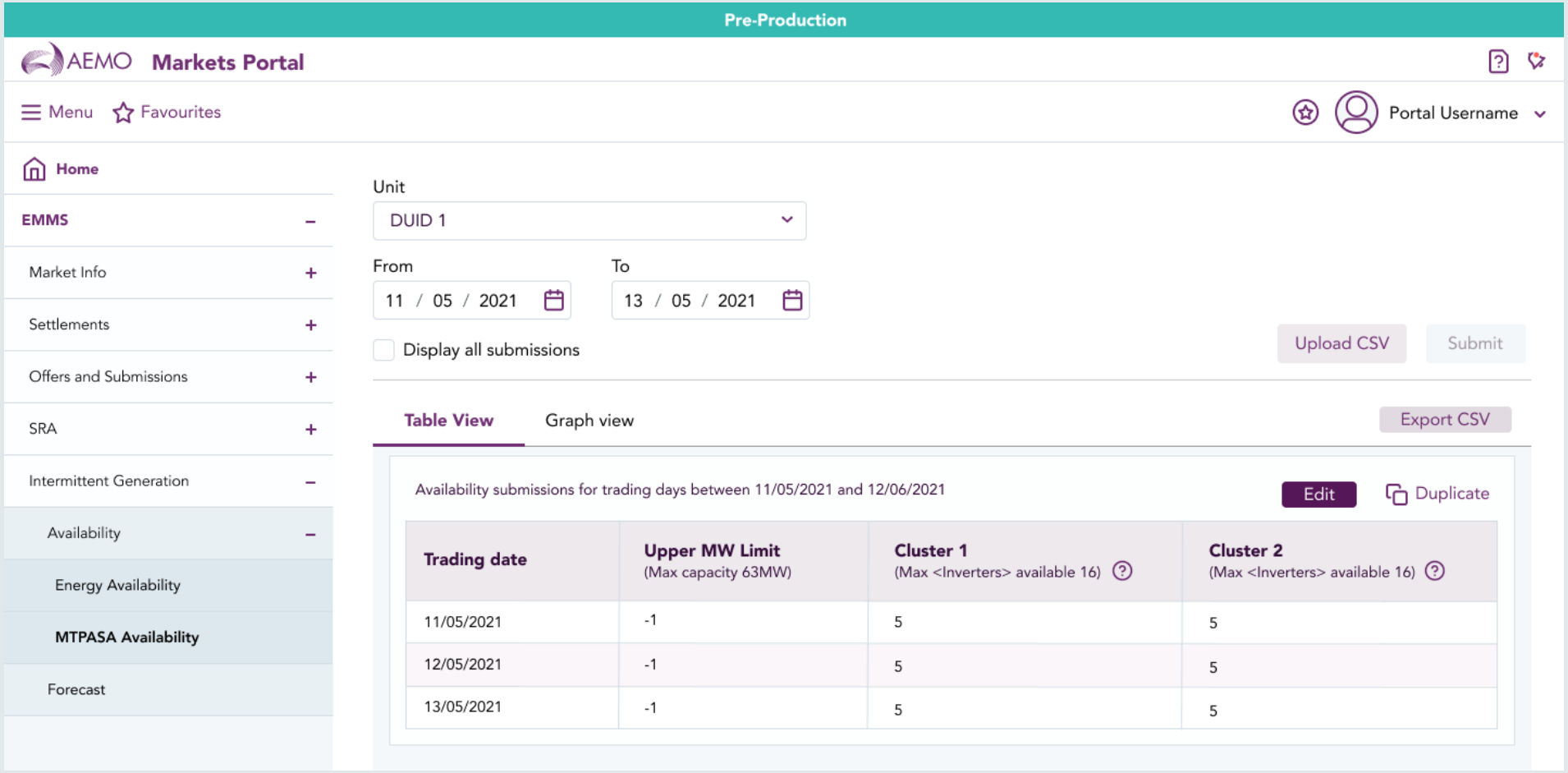
Viewing dispatch forecasts and sources in graph

Updates to the EMMS intermittent generation screens



Viewing Pre-dispatch forecasts in graph

Updates to the EMMS intermittent generation screens



Viewing/editing MTPASA availability in table

Updates to participant file server interface for submitting availability

- AEMO will be replacing the existing participant file server interface (aseXML) with a JSON-based web API for submitting intermittent generation availability (upper MW limits, turbines/inverters available).

- The JSON-based web API is expected to become available in Production in late November 2021. The aseXML file submission method will continue to be made available for participants during a transition period of 6 months post Production implementation (until May 2022).

- AEMO strongly urges all participants to migrate to the API interface within this timeframe to ensure a smooth transition.

- More information can be found in the EMMS Release Schedule and Technical Specification document via: https://www.aemo.com.au/energy-systems/market-it-systems/it-change-and-release-management

Updates to model requirements during the forecasting model development process

- AEMO schedules monthly updates to AWEFS/ASEFS forecasting models to develop new forecasting models or refine existing models post-registration.

- As part of this process, participants were required to submit intermittent generation availability (Upper MW Limit, Elements Unavailable) in both Pre-Production and Production environments.

- Following participant feedback in the last forum, AEMO has made system changes which no longer requires participants to submit availability in the Pre-Production environment.

- Participants are still required to submit and update availability in the Production environment as per NER 3.7B(b).

Updates to AEMO intermittent generation documents

- In February 2021, AEMO published the NEM Operational Forecasting and Dispatch Handbook for wind and solar generators.

- The handbook provides guidance to semi-scheduled generators, and non-scheduled generators with semi-scheduled obligations, on successfully registering and participating in the NEM from an operational forecasting and bidding perspective.

- The handbook specifically outlines the requirements and actions from an Operational Forecasting perspective to:
  - Achieve registration.
  - Facilitate the development and implementation of the AWEFS/ASEFS forecasting model.
  - Ensure inputs to AWEFS/ASEFS models reflect actual site availability and site conditions.
  - Register and participate in participant self-forecasting.

Updates to AEMO intermittent generation documents

- In April 2021, both the handbook and Guide to Data Requirements for AWEFS/ASEFS document were updated to remove the requirement for participants to submit intermittent generation availability information in Pre-Production during the forecasting model development process.

- The handbook can be found via: https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/dispatch/policy_and_process/nem-operational-forecasting-and-dispatch-handbook-for-wind-and-solar-generators.pdf

- The Guide to Data Requirements for AWEFS/ASEFS document can be found via: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Guide-to-Data-Requirements-for-AWEFS-and-ASEFS.pdf

Publishing of Frequency Indicator (FI) data to Nemweb

- To improve market transparency, AEMO has continued receiving requests to publish the Frequency Indicator (FI) data to the public web domain (Nemweb).

- AEMO implemented the publication of live FI data to Nemweb from 30 June 2021.

C	NORFCAS	CAUSER_PAYS_SCADA	AEMO	PUBLIC	12/07/2021	12:06:50	345342580
I	CAUSER_PAYS_SCADA	NETWORK	1	MEASUREMENTTIME	NETWORKID	FREQUENCYDEVIATION	FI
D	CAUSER_PAYS_SCADA	NETWORK	1	12/07/2021 11:30:00	MAINLAND	-0.001	-92.79999827
D	CAUSER_PAYS_SCADA	NETWORK	1	12/07/2021 11:30:00	TASMANIA	0.035999999	-0.800000012
D	CAUSER_PAYS_SCADA	NETWORK	1	12/07/2021 11:30:04	MAINLAND	0.011	-91.90000063
D	CAUSER_PAYS_SCADA	NETWORK	1	12/07/2021 11:30:04	TASMANIA	0.035999999	-0.600000024
D	CAUSER_PAYS_SCADA	NETWORK	1	12/07/2021 11:30:08	MAINLAND	0.014	-92.79999827
D	CAUSER_PAYS_SCADA	NETWORK	1	12/07/2021 11:30:08	TASMANIA	0.014	-0.600000024

- The FI data can now be accessed by non-registered participants, and can be found via: https://nemweb.com.au/Reports/CURRENT/Causer_Pays_Scada/

Generator Active Power recording limited to 0MW

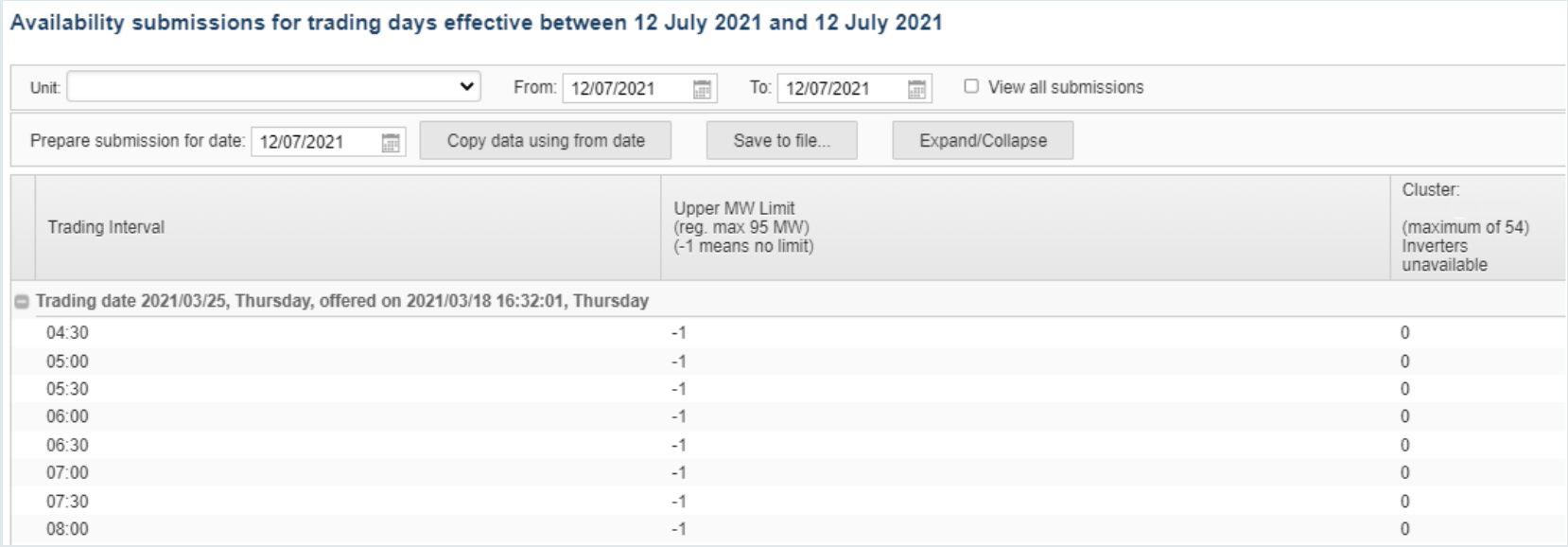
- In the previous forum, AEMO was notified of differences in the SCADA measurement of active power during specific situations across wind and solar generators.
- Some generators recorded <0MW readings whilst others had a minimum 0MW recording. Active Power <0MW is a result of generator self-consumption due to auxiliary loads.
- AEMO applied a minimum floor of 0MW to the measured SCADA Active Power for the majority of the remaining semi-scheduled generators. This became effective 1 April 2021 and will be trialled for the next 12 months in order to further assess any operational impact.
- The outstanding semi-scheduled generators are being resolved as a priority.

Note that revenue metering is not affected.

Planned updates

Publishing of plant availability data to Nemweb

- To further improve market transparency, AEMO has received requests from multiple parties to publish the *plant availability* entries (Upper MW Limit, Turbines/Inverters Unavailable) submitted by semi-scheduled and some intermittent non-scheduled generators to the public web domain (Nemweb).



Availability submissions for trading days effective between 12 July 2021 and 12 July 2021

Unit: | From: 12/07/2021 | To: 12/07/2021 | View all submissions

Prepare submission for date: 12/07/2021 | Copy data using from date | Save to file... | Expand/Collapse

Trading Interval	Upper MW Limit (reg. max 95 MW) (-1 means no limit)	Cluster: (maximum of 54) Inverters unavailable
Trading date 2021/03/25, Thursday, offered on 2021/03/18 16:32:01, Thursday		
04:30	-1	0
05:00	-1	0
05:30	-1	0
06:00	-1	0
06:30	-1	0
07:00	-1	0
07:30	-1	0
08:00	-1	0

- The *plant availability* submitted under NER 3.7B(b) is used as an input to produce the AWEFS/ASEFS Pre-dispatch and ST PASA forecasts.
- AEMO has scheduled the publication of this data to Nemweb by mid-August 2021.

Publishing real-time availability and enabling 'Max Avail' function for semi-scheduled generators

- In the previous forum, AEMO sought feedback from participants on the following items:

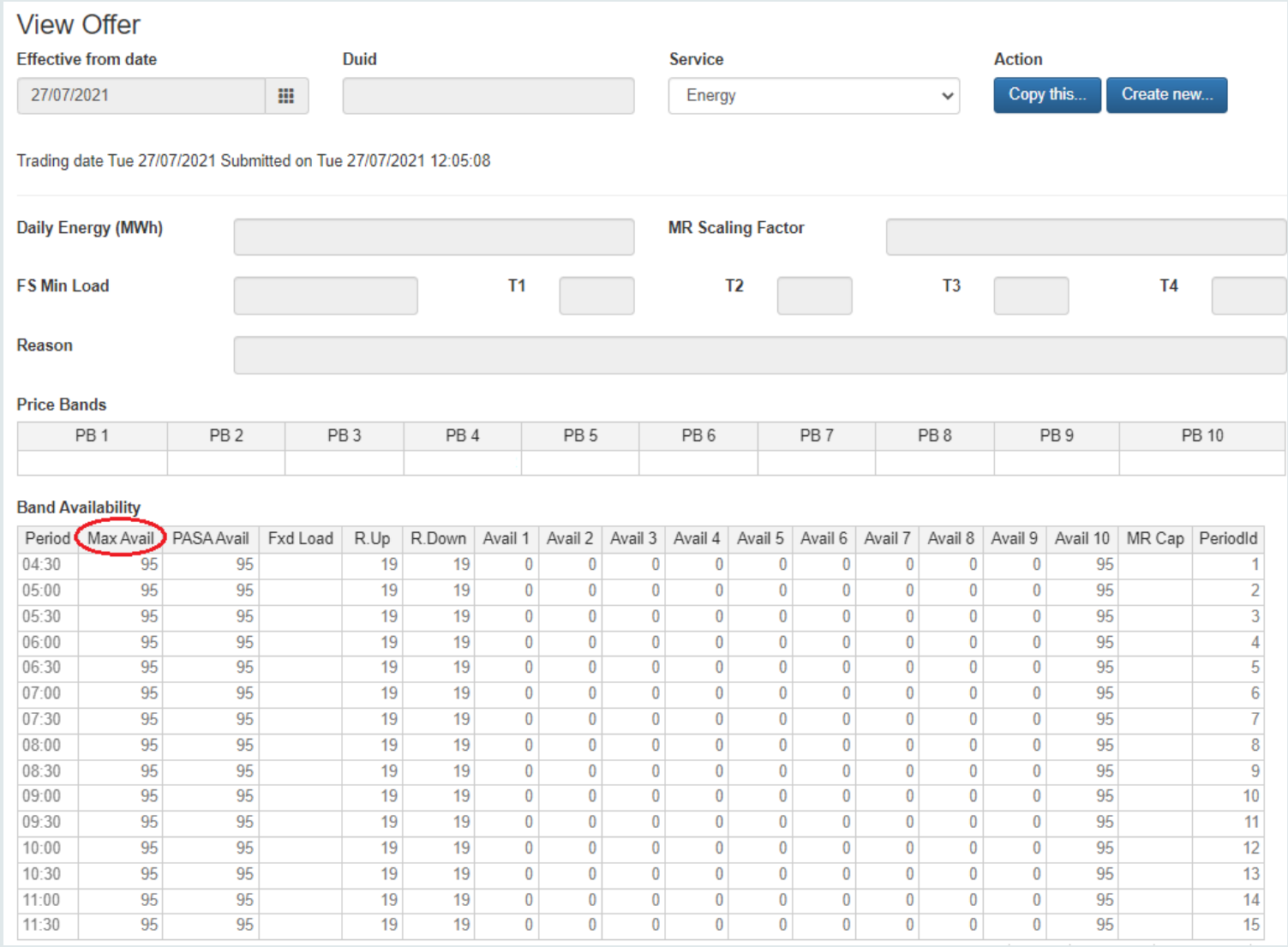
    1. Publishing actual plant availability (as measured via SCADA signals) on a next-day public basis – for market transparency.

    2. Level of support in pursuing changes to enabling the 'Max Avail' function for semi-scheduled generators – improving management of real-time plant availability.

- Following the forum, AEMO received support of these initiatives and is currently scoping and prioritising the necessary changes.

- AEMO is unable to provide an indicative date at this stage however, we intend to provide an update at the next Intermittent Generation Forum.

‘Max Avail’ function in energy offers



View Offer

Effective from date: 27/07/2021 | Duid: | Service: Energy | Action: Copy this... Create new...

Trading date Tue 27/07/2021 Submitted on Tue 27/07/2021 12:05:08

Daily Energy (MWh): | MR Scaling Factor:

FS Min Load: | T1: | T2: | T3: | T4:

Reason:

Price Bands

PB 1	PB 2	PB 3	PB 4	PB 5	PB 6	PB 7	PB 8	PB 9	PB 10

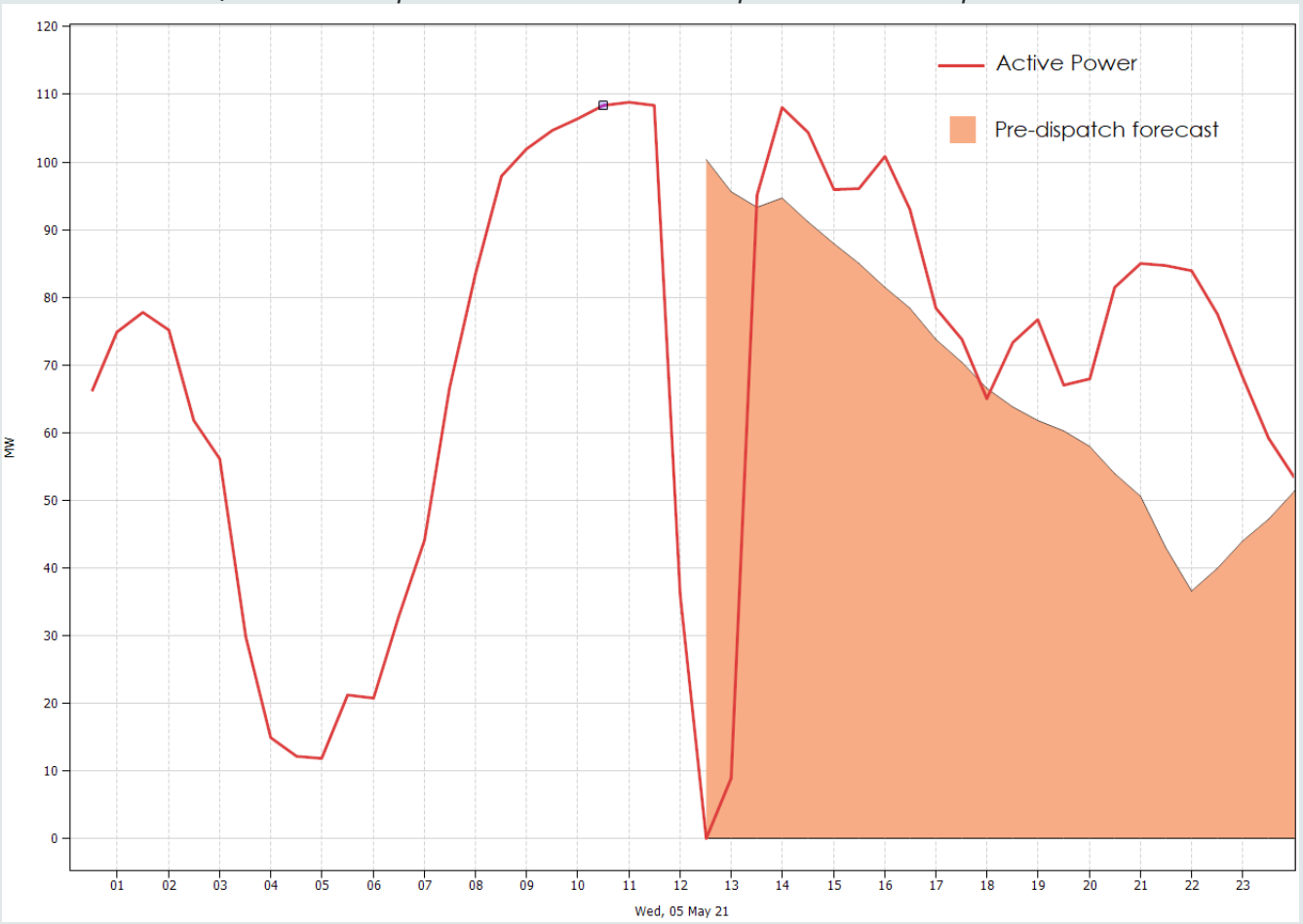
Band Availability

Period	Max Avail	PASA Avail	Fxd Load	R.Up	R.Down	Avail 1	Avail 2	Avail 3	Avail 4	Avail 5	Avail 6	Avail 7	Avail 8	Avail 9	Avail 10	MR Cap	PeriodId
04:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		1
05:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		2
05:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		3
06:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		4
06:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		5
07:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		6
07:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		7
08:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		8
08:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		9
09:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		10
09:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		11
10:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		12
10:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		13
11:00	95	95		19	19	0	0	0	0	0	0	0	0	0	95		14
11:30	95	95		19	19	0	0	0	0	0	0	0	0	0	95		15

Recent observations of operational challenges

Importance of submitting plant availability

Wind farm example: Active Power output vs Pre-dispatch



- Semi-scheduled and some non-scheduled intermittent generators must submit plant availability as per Clause 3.7B(b) in the NER.
- Pre-dispatch and ST PASA forecasts are impacted when plant availability doesn't reflect true availability.
- The AER's Compliance & Enforcement Priorities for 2021-22 are focused on generator compliance activities.

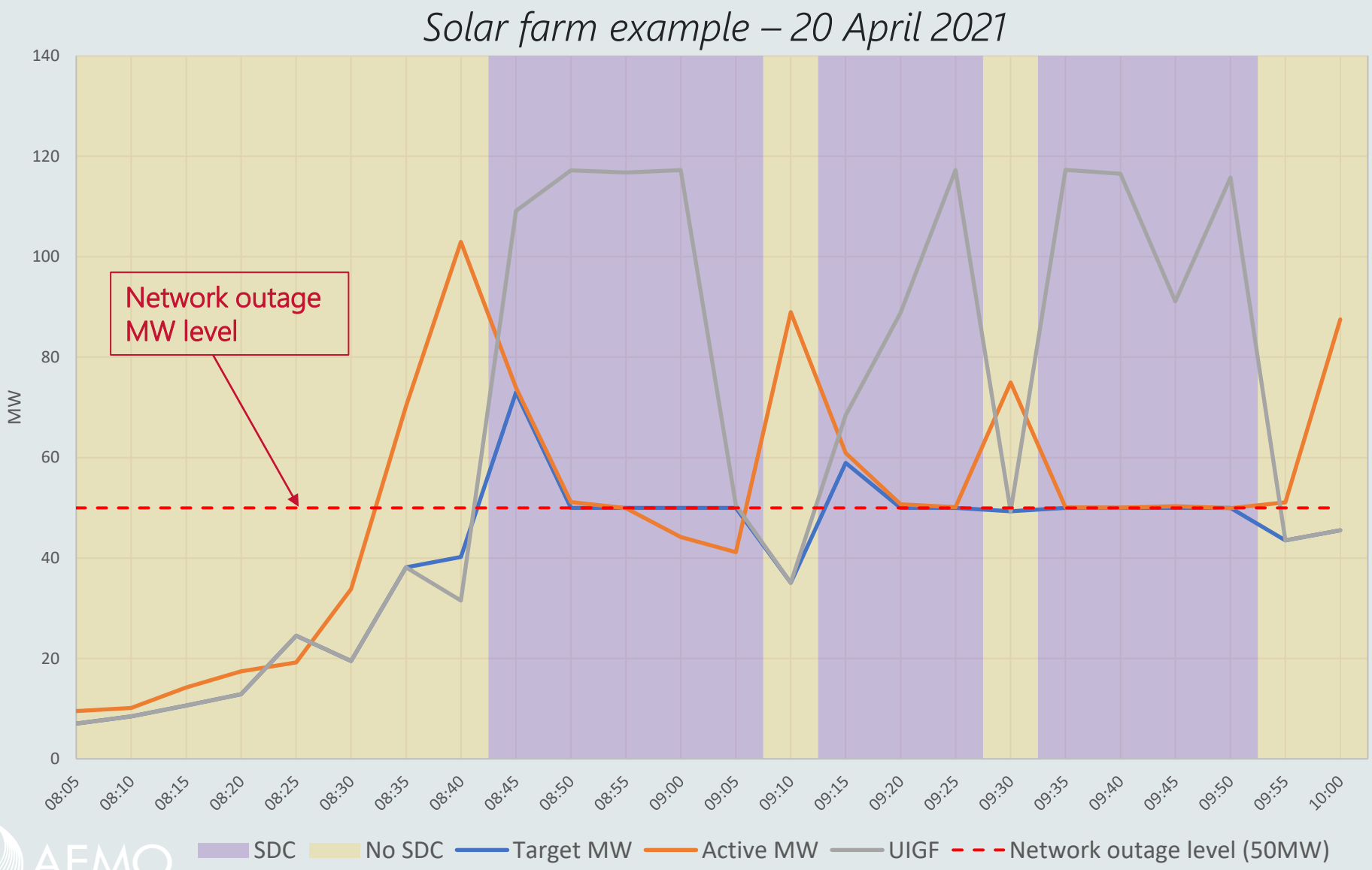
Generators exceeding network outage limits

- AEMO has identified instances of generators exceeding network outage limits invoked by a security constraint during periods when the constraint is non-binding.

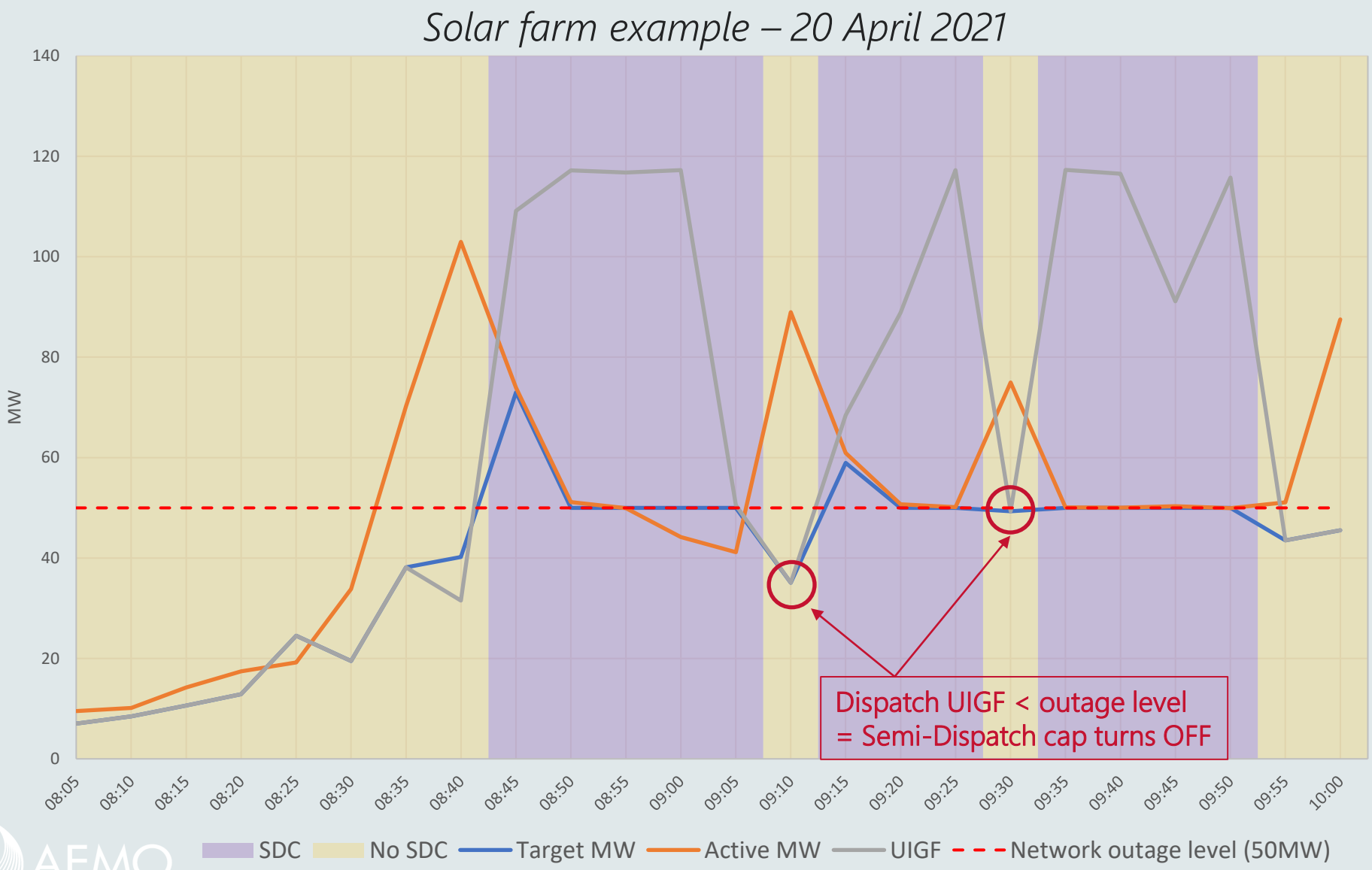
- When the generator dispatch forecast is less than the constraint/outage level, the semi-dispatch cap flag won't be set. This results in the generator's active power controller reverting to the maximum capacity, increasing output above the outage level.

- This occurs when a generator's control system is relying on the semi-dispatch cap flag to be set to ensure farm output remains at or below the network outage limit.

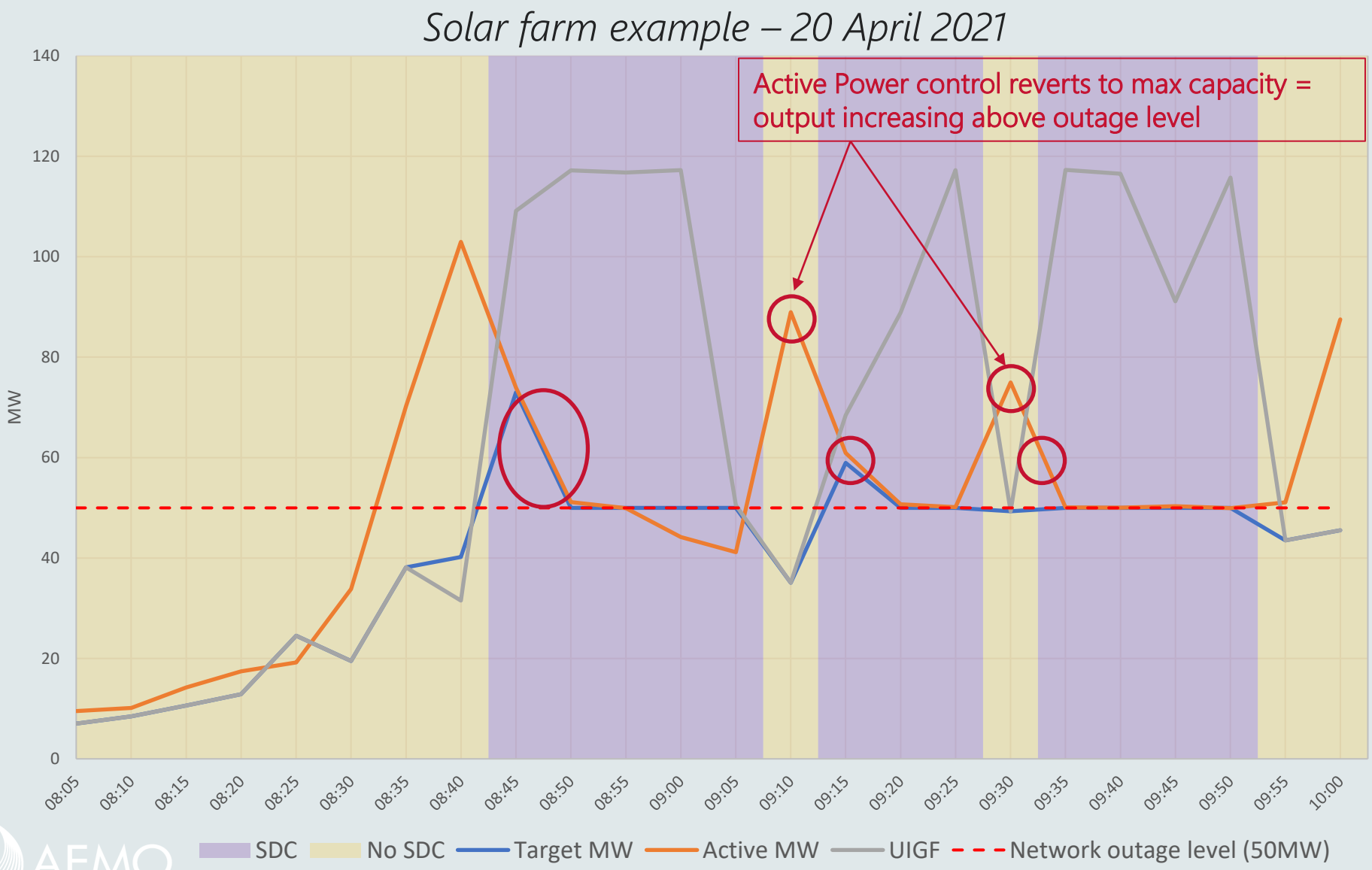
Generators exceeding network outage limits



Generators exceeding network outage limits



Generators exceeding network outage limits



Generators exceeding network outage limits

- These occurrences cause operational challenges to the AEMO Control Room, impacts efficient farm operation, and increases risks to power system security.
- Generators are advised to limit their active power controller to the outage level for the duration of the outage period.
- AEMO is intending to update the wind/solar handbook to clarify this requirement following review.

Other business

Update from the AEMO Control Room

1. Importance of good quality SCADA data
   - Failed SCADA of intermittent generation can compromise the ability of the control room to manage power system security.
   - Control room has limited visibility if units are following dispatch targets, or a unit has tripped.
   - Can lead to large dispatch errors and forecasting errors.
   - There is a requirement to resolve Data communication failures within 6 hours[i].
   - It's critical that failed SCADA, or incorrect SCADA indications be resolved as soon as possible.

2. Ensure operational contacts are up to date
   - Contacts should be updated via the AEMO Support Hub (supporthub@aemo.com.au).
   - Need to maintain compliance with the NEM Generator Connection Guidelines with two independent landlines to a 24/7 control room contact.
   - Awareness of NER compliance relating to verbal dispatch instructions (eg Clause 4.9.2(d)).

[i] https://aemo.com.au/-/media/Files/Electricity/NEM/Network_Connections/Transmission-and-Distribution/AEMO-Standard-for-Power-System-Data-Communications.pdf

Update from the AEMO Control Room

3. Know what to do if the control room calls – voltage control example:
   - AEMO will contact the windfarm operator/designated 24/7 contact to perform a voltage control function.
   - AEMO's contingency analysis application is constantly running and flags any contingencies that may result in high/low volts on the Transmission network, or if bus voltages and SVC's are within operational range.
   - The AEMO control room operator will request a change in voltage at the Transmission connection point.
   - E.g. Increase the voltage at the Murra Warra bus by 2 kV (from 222 kV to 224 kV). An acceptable timeframe to achieve this is 10-15 minutes.
   - The AEMO control room will expect to see a 2 kV change in voltage and change in the MVAR output of the semi scheduled unit.

4. Regularly check NOS to keep up to date with outage information for generators to action accordingly.
   - Constraints will be communicated from the NSP for planned transmission outages.
   - Constraints will be communicated via AEMO following forced transmission outages.

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

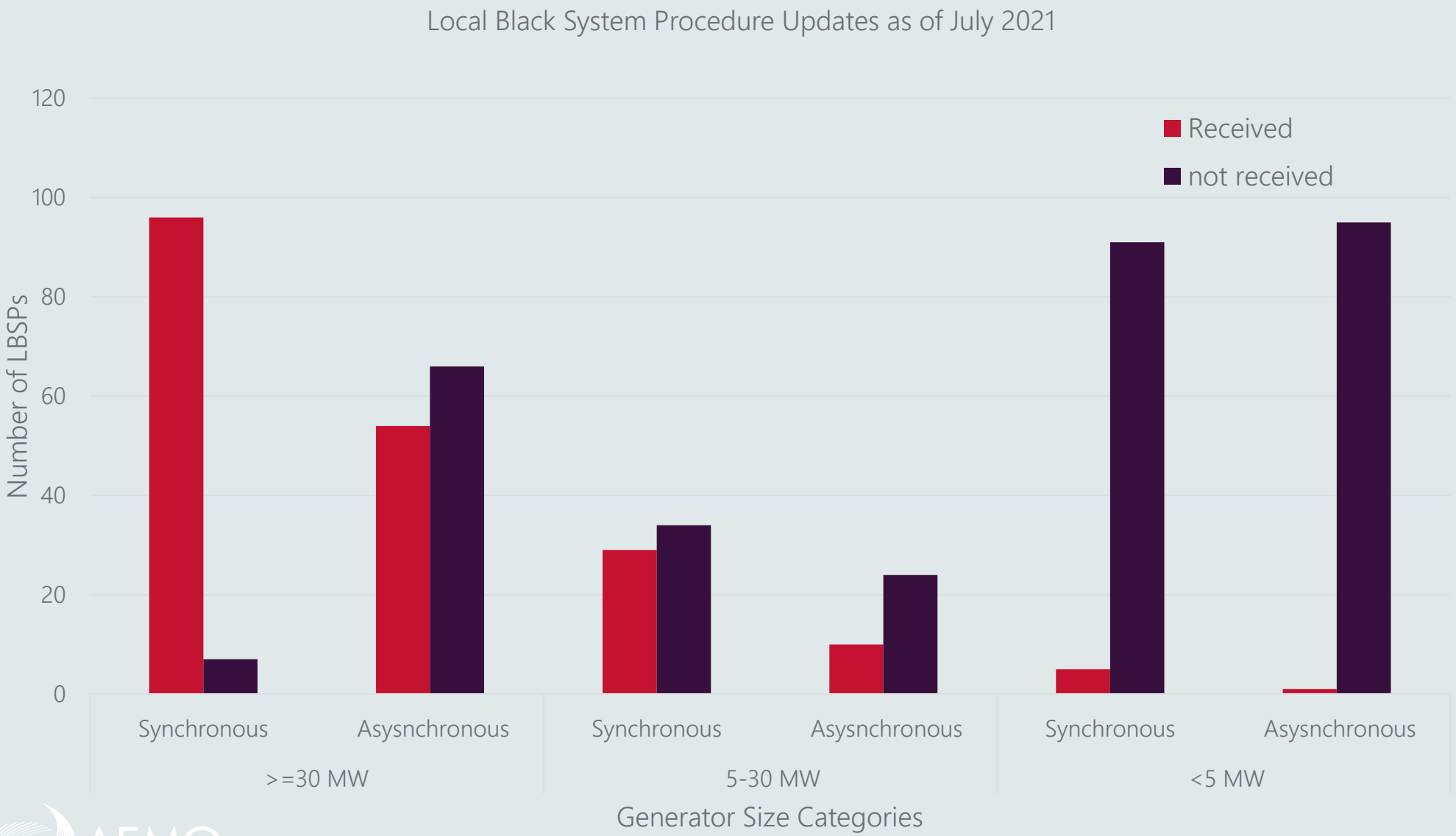
Information request – Local Black Start Procedure (LBSP)

1. What are the requirements for AEMO and for generators?
   - NER 4.8.12(a) requires AEMO to prepare and maintain a system restart plan for coordinating system restoration
   - NER 4.8.12(d) requires all registered generators to develop LBSPs in accordance with AEMO's published guidelines, and additionally to review and/or amend their LBSPs on request by AEMO or due to a change in circumstances
   - LBSP requirements include civil penalty provisions which may have financial implications

2. Why are accurate generator LBSPs important?
   - Understanding plant capabilities in black system conditions improves coordination and effective use of plant
   - Enables advance identification of issues and dependencies or workarounds to avoid setbacks in restart
   - This knowledge helps AEMO and NSPs restore the system as efficiently as possible (i.e. generators can start earning money sooner)

3. The guidelines for preparing & submitting LBSPs can be found here:
   - https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2019/lbsp-amendments/final-stage/guidelinesforpreparinglocalblacksystemprocedures.pdf
   - Last revised December 2019, updated LBSPs compliant with new requirements had to be submitted by 30 June 2020.
   - Support requests can be sent to system_restart_advice@aemo.com.au. For '*What is your enquiry regarding?*', include "*SRAS* or *LBSP*".

Information request – Local Black Start Procedure (LBSP)



Questions and discussion

Further information

Dispatch – Dispatch procedure providing instructions and guidelines covering market operations in relation to the operation of the power system.
https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3705---Dispatch.pdf

Energy Conversion Model (ECM) Guidelines – Current AWEFS and ASEFS ECM Guidelines.
https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/dispatch-information/policy-and-process-documentation#forecasting

Guide to Data Requirements for AWEFS and ASEFS - Supplementary Wind and Solar ECM material.
https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/dispatch/policy_and_process/guide-to-data-requirements-for-awefs-and-asefs.pdf

Guide to Intermittent Generation - Information regarding submitting intermittent generation availability to AEMO.
https://aemo.com.au/-/media/files/electricity/nem/it-systems-and-change/guide-to-intermittent-generation.pdf

NEM Operational Forecasting and Dispatch Handbook for wind and solar generators – A guide to key requirements of semi-scheduled generators and some non-scheduled intermittent generators for forecasting and dispatch in the National Electricity Market (NEM)
https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/dispatch/policy_and_process/nem-operational-forecasting-and-dispatch-handbook-for-wind-and-solar-generators.pdf

Network Outage Schedule (NOS) – Transmission network outage information on AEMO website
https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/network-data/network-outage-schedule

Participant Self-forecasting - Information and registration of semi-scheduled generators providing their own (self) dispatch forecast.
https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/operational-forecasting/solar-and-wind-energy-forecasting/participant-forecasting

Contact information

- AEMO Operational Forecasting

op.forecasting@aemo.com.au

- AEMO Support Hub

https://aemo.com.au/en/contact-us