Stakeholder Workshop

Random Outage Parameters and Generator status and recall times

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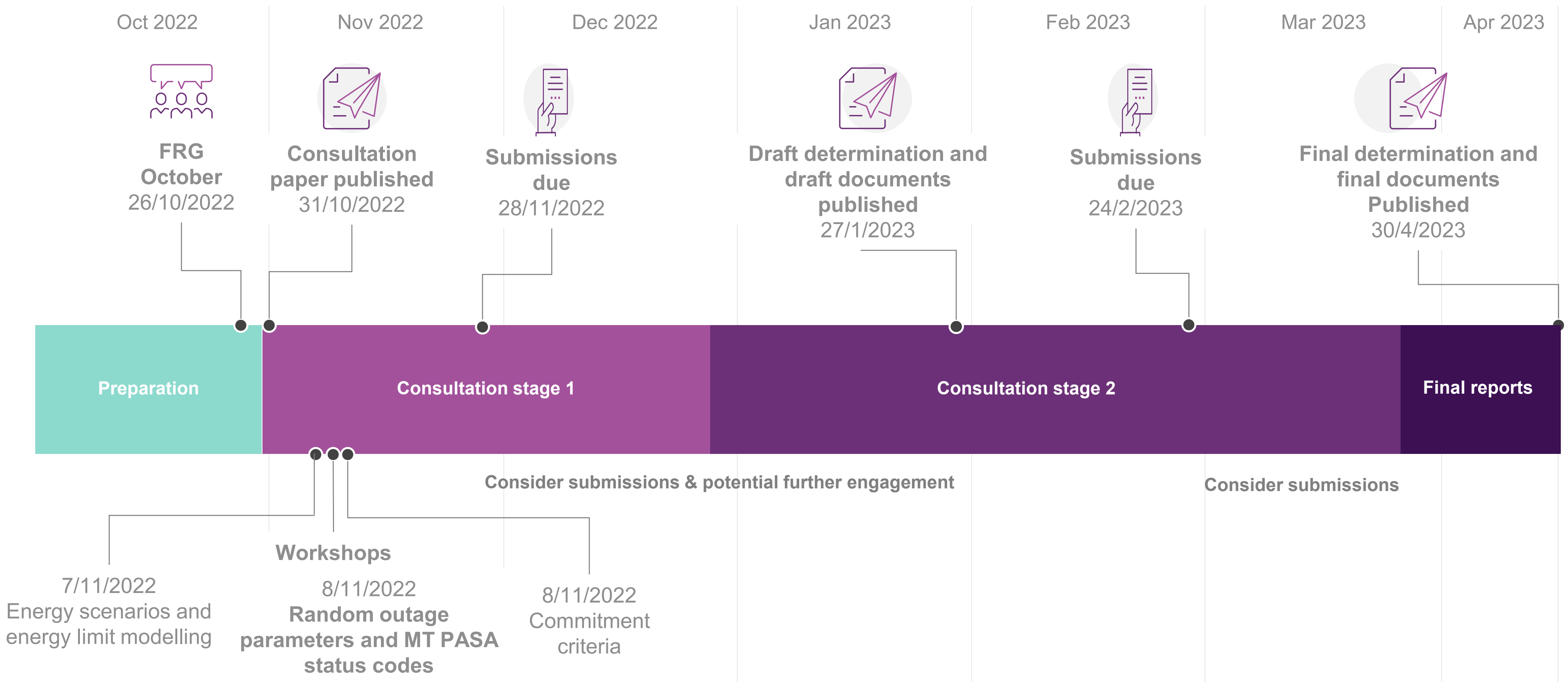
Purpose and consultation timeline

The purpose of this workshop is to *collaborate* with participants and interested parties to better inform stakeholder submissions and outcomes of AEMO's consultation on reliability forecasting guidelines and methodologies.



Random Outage Parameters

Generator and integrated resource system random outage parameters

AEMO uses random outage parameters to simulate a variety of outage categories for scheduled generators and integrated resource systems.

The process was designed to include outage categories that are random, or outside the control of the operator. Outages that are within the control of the operator are excluded from the calculation on the basis that operators are assumed to schedule these outages outside periods of supply scarcity.

The current process excludes certain outage categories which have been key contributors to the June 2022 market event and other recent actual market events, thereby demonstrating that those outage categories are not within the control of the operator.

To more accurately forecast reliability risks, AEMO proposes to include these outage categories in its reliability forecasts, and collect additional outage parameters from participants to enable this inclusion.

Current process

AEMO collects the following outage data

Outage category	Description
Full forced outage, committed state	An unplanned outage where the unit is fully unavailable, that occurred when the unit was in operation.
Full forced outage, available but not committed state	An unplanned outage where the unit is fully unavailable, that occurred when the unit was available for operation, but not actually in operation.
Partial forced outage, committed state	An unplanned outage where the unit is only partially unavailable, that occurred when the unit was in operation.
Partial forced outage, available but not committed state	An unplanned outage where the unit is only partially unavailable, that occurred when the unit was available for operation, but not actually in operation.
Failed start	An unplanned outage where the unit is unavailable because it failed to start.

AEMO then applies only outages that occurred in a committed state, and those during a failed start.

It is unclear if participant submissions include all unplanned outages, or just those that were forced.

Current process

$$\text{Full Unplanned Outage Rate}$$
$$= \frac{\text{Total hours in (full forced outage, committed state + failed start state)}}{\text{Total hours in (committed state + full forced outage, committed state + failed start state)}}$$

$$\text{Partial Unplanned Outage Rate}$$
$$= \frac{\text{Total hours in (partial forced outage, committed state)}}{\text{Total hours in (committed state + partial forced outage, commited state)}}$$

$$Long\ Duration\ Outage\ Rate = \frac{\sum \text{Long Duration outage hours}}{\sum \text{Total Hours in all states}}$$

Issues in current approach

The approach has generally sought to include outages that were unavoidable, while excluding outages where schedulable outside periods of supply scarcity. The rates calculated are applied in AEMO models only when the plant is forecast to be committed.

In practise, outages currently excluded by AEMO's approach continue to occur in patterns that show they are not schedulable. This includes the following outages categories:

- Unplanned outages that occur when the plant was uncommitted.
- Maintenance outages that occur on short notice.
- Plant issues identified during planned outages that result in prolonged extensions to the original planned outage.

Issues in current approach

Continued exclusion of these outage categories leads AEMO to over-forecast generator availability over reliability forecast horizons.

1. **Generator changed availability while in maintenance**

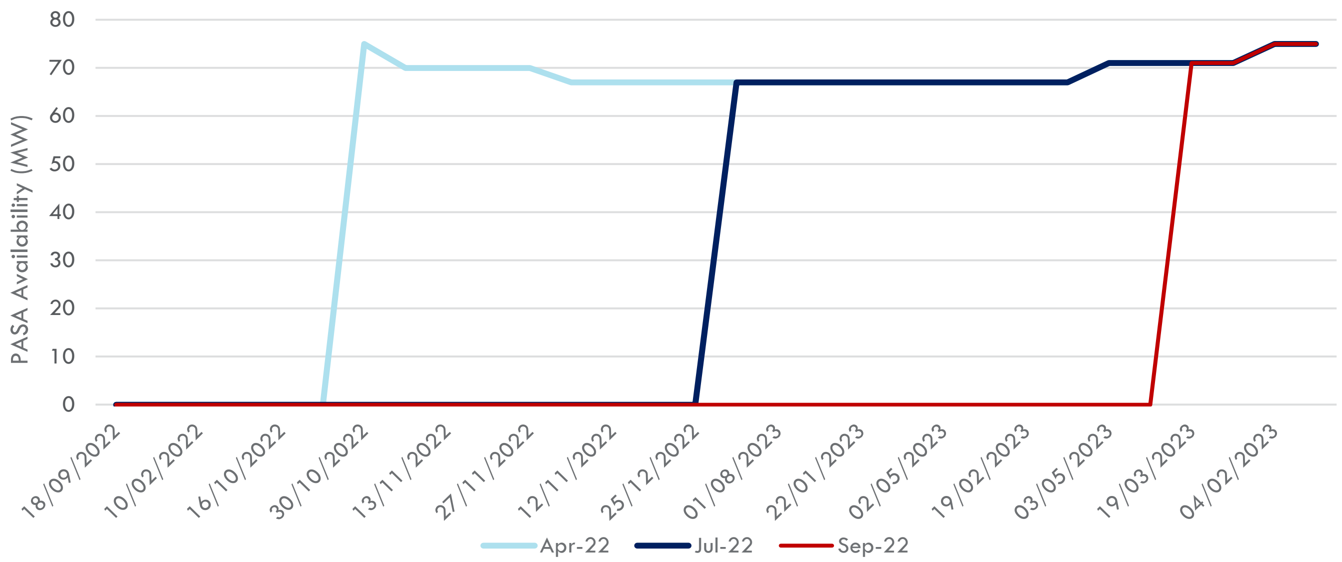


Chart shows PASA Availability which assumed generator becoming available in October, this was extended twice and return expected in March after key summer months.

Because this outage started as while the plant was not committed, it would not be included in the current outage rate by the current methodology leading to a potential over-forecast of supply availability.

Proposed process

AEMO proposes to collect the following outage data

Outage category	Description
Unplanned outage, committed state	An unplanned outage where the unit is fully unavailable, that occurred when the unit was in operation.
Unplanned outage, available but not committed state	An unplanned outage where the unit is fully unavailable, that occurred when the unit was available for operation, but not actually in operation.
Partial unplanned outage, committed state	An unplanned outage where the unit is only partially unavailable, that occurred when the unit was in operation.
Partial unplanned outage, available but not committed state	An unplanned outage where the unit is only partially unavailable, that occurred when the unit was available for operation, but not actually in operation.
Failed start	An unplanned outage where the unit is unavailable because it failed to start.
Full planned outage extension	Periods where a planned outage has been extended.
Partial planned outage extension	Periods where a planned derating has been extended.

AEMO proposes to use all outages categories, and to clarify that all unplanned outages should be provided, not just forced outages.

Proposed process

$$\text{Full Unplanned Outage Rate} =$$

$$\frac{\text{Total hours in (full unplanned outage, committed state + failed start state)}}{\text{Total hours in (committed state + full unplanned outage, committed state + failed start state)}}$$

$$+ \frac{\text{Total hours in (full unplanned outage, available but not commited state + full planned outage extension state)}}{\text{Total hours in year}}$$

$$\text{Partial Unplanned Outage Rate} =$$

$$\frac{\text{Total hours in (partial unplanned outage, committed state)}}{\text{Total hours in (committed state + partial unplanned outage, commited state)}}$$

$$+ \frac{\text{Total hours in (partial unplanned outage, available but not committed state + partial planned outage extension state)}}{\text{Total hours in year}}$$

$$Long\ Duration\ Outage\ Rate = \frac{\sum \text{Long Duration outage hours}}{\sum \text{Total Hours in all states}}$$

Consultation questions

- Do you agree that AEMO’s current outage rate methodology requires revision?
- Does AEMO’s proposed generator and integrated resource system outage rate methodology appropriately capture reliability risks?
- Does AEMO’s inter-regional transmission outage rate methodology appropriately capture reliability risks?
- Are there any other outage categories AEMO should consider in its reliability forecasts?
- Are there any other issues AEMO should consider in its outage rate methodology?

Generator status and recall times

Rule change requires two additional fields in MT PASA submissions

The following must be provided for all scheduled generators for between seven days and 36 months into the future:

- **Unit state –** that is, a scheduled generating or integrated resource system's availability or unavailability and the reason for its availability or unavailability.

- **Unit recall time –** to indicate the period in which the plant could pre-emptively be made available under normal conditions after a period of unavailability.

The rule commences from 9 October 2023.

AEMO proposes status codes consistent with IEEE 762-2006

Reason code	Definition
Inactive reserve	Unavailable for service but can be brought back in a relatively short period of time, typically measured in days
Mothballed	Unavailable for service but can be brought back with appropriate notification, typically weeks or months
Retired	Unavailable for service and not expected to return to service in the future.
No deratings	Available with no deratings, or only seasonal deratings.
Basic planned deratings	Planned derating as originally scheduled and with a predetermined duration.
Extended planned deratings	Planned derating that is an extension of the basic planned derating beyond a predetermined duration.
Unplanned forced deratings	Unplanned derating that cannot be deferred beyond the end of the next weekend
Unplanned maintenance deratings	Unplanned derating that can be deferred beyond the end of the next weekend but required before next planned derating.
Basic planned outage	Planned outage as originally scheduled and with a predetermined duration.
Extended planned outage	Planned outage that is an extension of the basic planned outage beyond a predetermined duration.
Unplanned forced outage	Unplanned outage that cannot be deferred beyond the end of the next weekend.
Unplanned maintenance outage	Unplanned outage that can be deferred beyond the end of the next weekend but required before next planned outage.

AEMO proposes status codes consistent with IEEE 762-2006

Reason code category	Reason code	Economic or physical	Recall time requirements
Deactivated shutdown	Inactive reserve	Economic	Mandatory
Deactivated shutdown	Mothballed	Economic	Mandatory
Deactivated shutdown	Retired	Economic	None
Available	No deratings	Not applicable	None
Available	Basic planned deratings	Physical	Mandatory if available
Available	Extended planned deratings	Physical	Mandatory if available
Available	Unplanned forced deratings	Physical	Mandatory if available
Available	Unplanned maintenance deratings	Physical	Mandatory if available
Unavailable	Basic planned outage	Physical	Mandatory if available
Unavailable	Extended planned outage	Physical	Mandatory if available
Unavailable	Unplanned forced outage	Physical	Mandatory if available
Unavailable	Unplanned maintenance outage	Physical	Mandatory if available

AEMO proposes status codes consistent with IEEE 762-2006

Use of a pre-existing standard should:

- Provide clarity and reduce ambiguity for determining status codes.
- Minimise the number of codes available, while providing sufficient explanatory power.
- Distinguish between economic and physical reasons.
- Provide sufficient detail to avoid repeated data collection for EAAP and Forecast Accuracy Report purposes.

Sample usage

CCGT with a 110 MW maximum capacity and a 100 MW dependable capacity in summer, considering seasonal deratings

- 31/12/2023 to 2/1/2024 – Plant expected to be fully available, considering summer derating.
- 3-5/1/2024 – Planned boiler maintenance, plant expected to be part-available as open-cycle gas turbine with two-day recall to full availability.
- 6-7/1/2024 – Plant expected to be fully available, considering summer derating.
- 8-9/1/2024 – Planned major plant upgrade, expected to be unavailable, no recall time required due to complex physical works.
- 10-12/1/2024 – Market conditions expected to be unfavourable, plant in reserve shutdown with two day recall.
- 13/1/2024 – Plant expected to be fully available, considering summer derating.

Trading date	PASA availability (MW)	Weekly energy limit (MWh)	Reason code	Recall time (days)
31/12/2023	100	3,408	No Derating	
01/01/2024	100		No Derating	
02/01/2024	100		No Derating	
03/01/2024	70		Basic Planned Derating (Physical)	2
04/01/2024	70		Basic Planned Derating (Physical)	2
05/01/2024	70		Basic Planned Derating (Physical)	2
06/01/2024	100		No Derating	
07/01/2024	100	960	No Derating	
08/01/2024	0		Basic Planned Outage (Physical)	
09/01/2024	0		Basic Planned Outage (Physical)	
10/01/2024	0		Inactive Reserve (Economic)	2
11/01/2024	0		Inactive Reserve (Economic)	2
12/01/2024	0		Inactive Reserve (Economic)	2
13/01/2024	100		No Derating	

Interaction with other AEMO data

Information on generator availability is required for a range of purposes:

- **ST PASA** is shorter horizon of approximately one week (no overlap).
- **Notification of closure obligation** is longer obligation of 42 months (no overlap).
- **Generation information:** will capture long-term mothballed units but doesn't have the granularity to capture short-term economic and physical shutdowns as it only has one capacity field per year. Also it is a ten-year horizon so can't be based on MT PASA. AEMO has plans to remove redundant fields from Generation Information to limit data requirements.
- **Energy Adequacy Assessment Projection (EAAP):** is also a two-year period, conducted once a year. EAAP information on scheduled outages is based on MT PASA availability. EAAP information on forced outages is based on information already collected for MT PASA, the ESOO, and the ISP. AEMO no longer plans to collect information on movable outages for EAAP.

AEMO will review EAAP and Generation Information guidelines to ensure this is reflected with a view to minimising duplicate data requirements.

Consultation questions

- Do the proposed reason codes and mandatory recall times appropriately balance market needs for information against the costs and challenges for generators in providing the information?
- Are there any other issues AEMO should consider when determining the reason codes and recall times?

AEMO

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