ST PASA Replacement Project

Stakeholder Workshop #3 – PASA Run Types

Aug 2022

Agenda

- Background of ST PASA Replacement Project
- Determination of Reliability
- Determination of LOR levels
- Other runs
- Frequency of LOR runs
- Next Steps
- Project timeline
- Glossary

Background

ST PASA Replacement Project

- **Objective**: To do a holistic review of the PD/ST PASA methodology and develop a system that would serve the NEM now, and into the future.
- Details and updates can be found on ST PASA Webpage

Progress to date

- Phase 1 completed
  - ✓Initiate industry consultation
  - ✓High level business requirements
  - ✓High level design (HLD)
  - ✓Proof of Concept (PoC)
- Phase 2A commenced
  - AEMC published the final rule change on 5th May
  - Tasks progressing in parallel:
    - Development of detailed business requirements including stakeholder consultations
    - Further development of uncertainty margins
    - Request For Proposal (RFP) for the SCED engine

Business requirements – Stakeholder Consultation

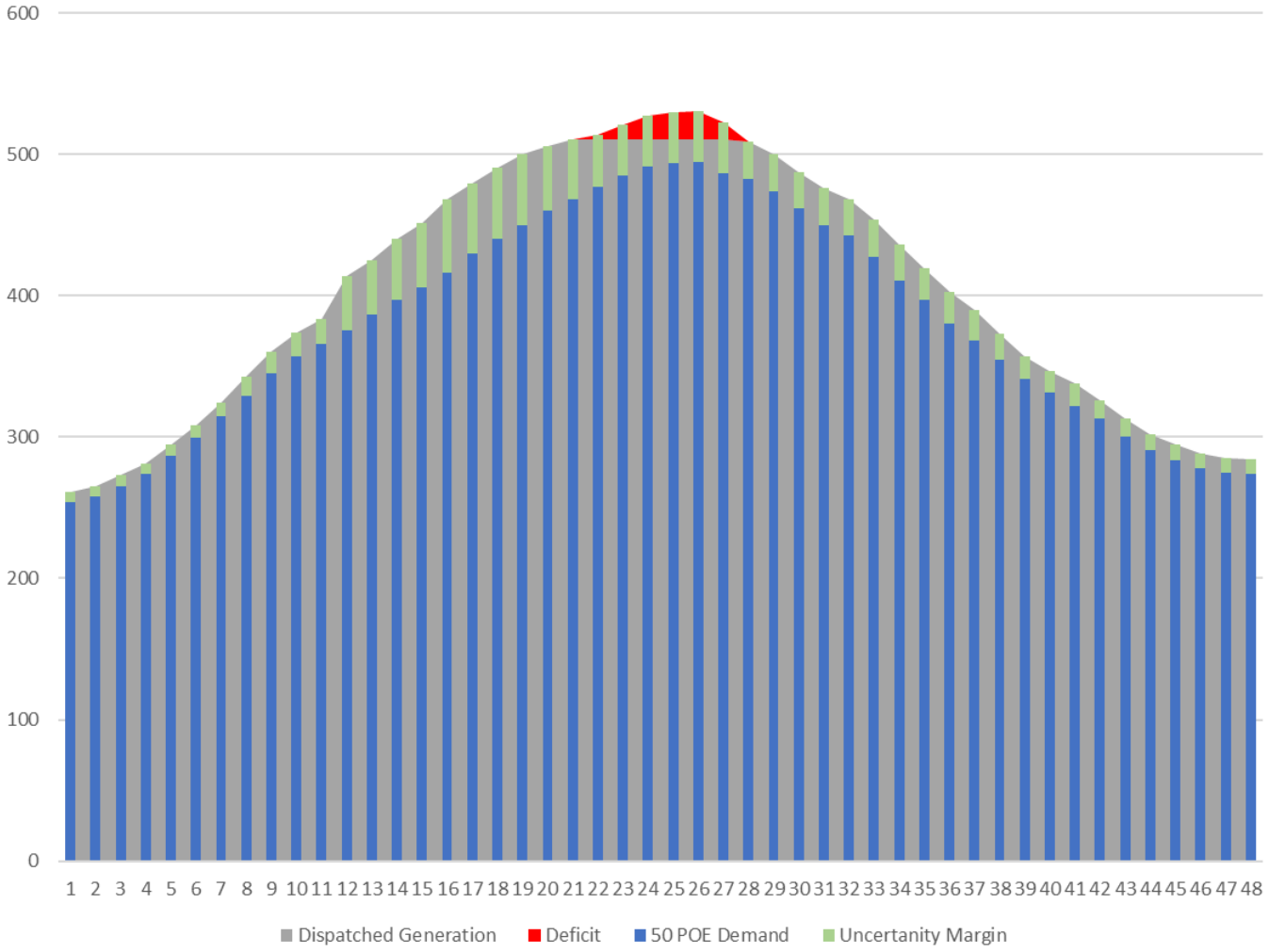
- Detailed business requirements are now being developed
- A series of stakeholder workshops to work through key technical concepts in detail
- Formal procedure consultation to commence once the key technical concepts have been addressed – most likely early 2023. The procedures will include:
  - ST PASA Process description (*the ST PASA procedure*)
  - Reserve Level Declaration Guidelines (RLDG)
  - Reliability Standard Implementation Guidelines (RSIG)
  - Spot Market Timetable (for frequency of PASA runs)

Determination of Reliability

Determination of Reliability – the new paradigm

	Current ST PASA	Proposed System
Objective	Create generation profile that maximises reserve by maximising supply to RRN	Create generation profile that meets the demand at each node
Subject to	n-1 security constraints for predefined network configurations (Transmission contingencies only)	n-1 security constraints for any network configuration and set of contingencies (Transmission and generator contingencies)
Demand Used	50% POE demand	50% POE demand + Uncertainty Margin – Grid Losses
Supply Side (Generation)	Max Availability or UIGF	(Max Avail or UIGF) – UM – Aux Load
Reliability Measure	Reserve = Generation – Demand	Deficit = Demand - Generation
LOR Declared	LOR 3 if Reserve < 0 LOR 2 if Reserve <= LOR 2 level LOR 1 if Reserve <= LOR 1 level LOR2/1 level = Max (LCR/LCR2, FUM) where LCR represents either a generator or interconnector contingency	Deficit > 0 The determination of the three LOR levels discussed in detail in following slides

Determination of Reliability



Determination of LOR levels

LOR Levels

- As per NER Clause 4.8.4A(3), the RLDG must specify at least three probability levels at which AEMO will declare LOR, indicating an increasing probability of load shedding
- The three levels proposed for the new system
  - LOR YELLOW – 'Warning' run - forecasting probability of shedding load after occurrence of a credible contingency using higher Uncertainty Margins than the other runs. This is to provide information to stakeholders that we are approaching a situation where AEMO may need to intervene.
  - LOR ORANGE – 'Reliability' run - forecasting probability of shedding load after occurrence of any credible contingency. AEMO may intervene if there is no market response to alleviate this condition.
  - LOR RED – 'Base' run – forecasting probability of shedding load without any credible contingency occurring. AEMO may intervene if there is no market response to alleviate this condition.

Comparison with current LOR levels

Current ST PASA		Proposed System	
Current LOR Levels	**Intervene in Market?**	**Proposed LOR levels**	**Intervene in Market?**
LOR 1 - Cannot meet demand if we have a credible network contingency OR a trip of the largest and the second largest generator (in that region) (FUM is also considered at this point)	N	LOR YELLOW – Cannot meet demand if we have a credible network contingency OR a credible generation contingency in the NEM Demand = 50 POE demand plus a higher (than ORANGE) Uncertainty Margin	N
LOR 2 – Cannot meet demand if we have a credible network contingency OR a trip of the largest generator (in that region) (FUM is also considered at this point)	Y	LOR ORANGE – Cannot meet demand if we have a credible network contingency OR a credible generator contingency in the NEM 50 POE forecasts with Uncertainty Margins at x% confidence level	Y
LOR 3 – Cannot meet demand if we have a credible network contingency	Y	LOR RED – no contingencies 50 POE forecasts with Uncertainty Margins at x% confidence level	Y

‘Base’ Run

- Aim is to check if there are any deficits without any contingencies.
  - Deficit (with some sensibility thresholds*) in this run will be LOR RED
- State of Network
  - System normal including any planned network outages
  - No contingencies (network or generation)
  - Ratings used - continuous
- Supply side
  - Maximum Availability/50 POE UIGF
  - Uncertainty Margin (with x_s% confidence level**)
- Demand side
  - 50 POE demand
  - Uncertainty Margin (with x_d% confidence level**)

* Sensibility thresholds to ensure LOR does not trigger excessively. This could include Deficits > threshold; number of nodes in deficit in a region etc.

** The confidence levels used in the supply side will be different to the demand side. They may also vary according to fuel type. Additionally, the confidence levels may vary across the intervals. This needs to fleshed out as further analysis is done on uncertainty margins.

‘Reliability’ Run

- Aim is to check if there are any deficits due to any credible contingency.
  - Deficit (with some sensibility thresholds*) in this run will be LOR ORANGE
- State of Network
  - System normal including any planned network outages
  - All credible contingencies (network and generation)
    - Includes any non-credible contingencies that have reclassified as credible during that period
    - May exclude some small generators (to improve performance of run)
  - Ratings used – short term
- Supply side
  - Maximum Availability/ 50 POE UIGF
  - Uncertainty Margin (with x_s% confidence level** – same level as the ‘Base’ run)
- Demand side
  - 50 POE demand
  - Uncertainty Margin (with x_d% confidence level** - same level as the ‘Base’ run)

* Sensibility thresholds to ensure LOR does not trigger excessively. This could include Deficits > threshold; number of nodes in deficit in a region etc.

** The confidence levels used in the supply side will be different to the demand side. They may also vary according to fuel type. Additionally, the confidence levels may vary across the intervals. This needs to fleshed out as further analysis is done on uncertainty margins.

‘Warning’ Run

- Aim is to check if there are any deficits due to any credible contingency using higher Uncertainty Margins
  - Deficit (with some sensibility thresholds*) in this run will be LOR YELLOW
- State of Network
  - System normal including any planned network outages
  - All credible contingencies (network and generation)
    - Includes any non-credible contingencies that have reclassified as credible during that period
    - May exclude some small generators (to improve performance of run)
  - Ratings used – short term
- Supply side
  - Maximum Availability/ 50 POE UIGF
  - Uncertainty Margin (larger than Reliability run)
- Demand side
  - 50 POE demand
  - Uncertainty Margin (larger than Reliability run)

* Sensibility thresholds to ensure LOR does not trigger excessively. This could include Deficits > threshold; number of nodes in deficit in a region etc.

LOR Conditions

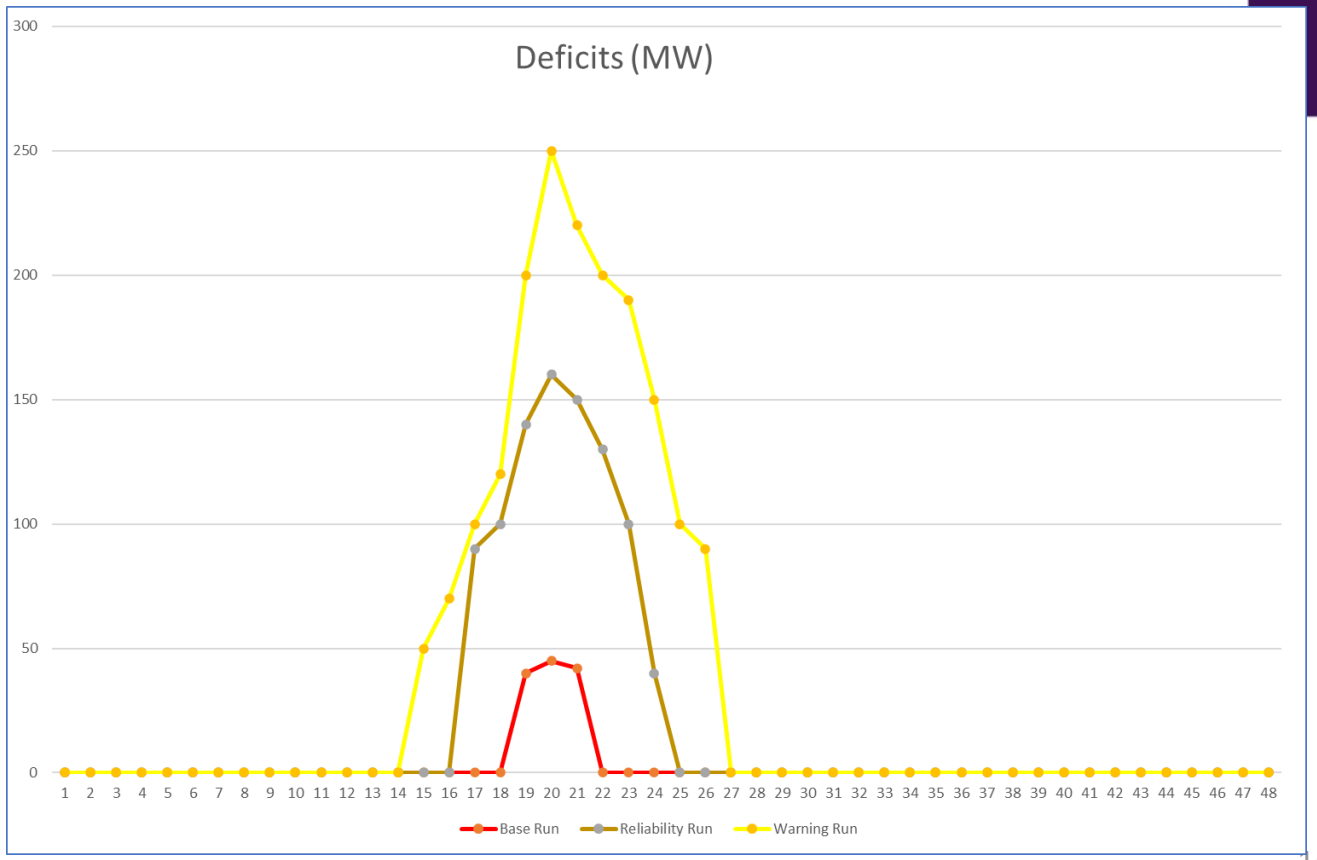
- The three runs are in parallel, and results are collated
- The worst case will be taken for each run

  In this example

  LOR RED: Intervals 19 -21

  LOR ORANGE: Intervals 17-18, 22-24

  LOR YELLOW: Intervals 15-16, 25-26



Confidence levels

- As discussed previously, the value of confidence levels used in each of the runs has not yet been determined
- AEMO will be proposing the levels after conducting back-casting exercises once we have system ready
  - Detailed discussions about uncertainty margins and confidence levels were covered in the previous workshop

Other runs

‘PASA Availability Recall’ Run

- Aim of this run is to provide information about extra capacity available in the market based on ‘PASA Availability’ offers
- It will only be activated if there are any LOR RED or ORANGE conditions flagged
- A full contingency run will be activated, with ‘Maximum Availability’ replaced with ‘PASA Availability’ for units with a defined recall time less than that required to address any deficits, with greater weighting applied to PASA Availability with shorter recall time
- The ‘cost’ associated with PASA Availability will be higher than the highest price band offered by the unit.
- Note: The information from this run is only part of the information that will be used by AEMO in making intervention decisions as those decisions will also take into account RERT costs. AEMO would like to understand if stakeholders consider this run useful for their decision making.

'RERT' Run

- Aim of this run is to provide AEMO with a potential lowest cost RERT schedule
  - Due to confidentiality issues, the results of this run will not be published externally
- It will only be triggered if there are any LOR RED or ORANGE conditions flagged
- This will be for information only purposes and AEMO may take this into consideration when determining intervention options and latest time to intervene.

‘Ad-hoc’ runs

- The ST PASA system will have a module which will allow AEMO to simulate various scenarios
- This is mainly for situational awareness for AEMO
  - AEMO may choose to publish the results from these runs if it thinks that it may assist the market

Frequency of LOR runs

Frequency of runs

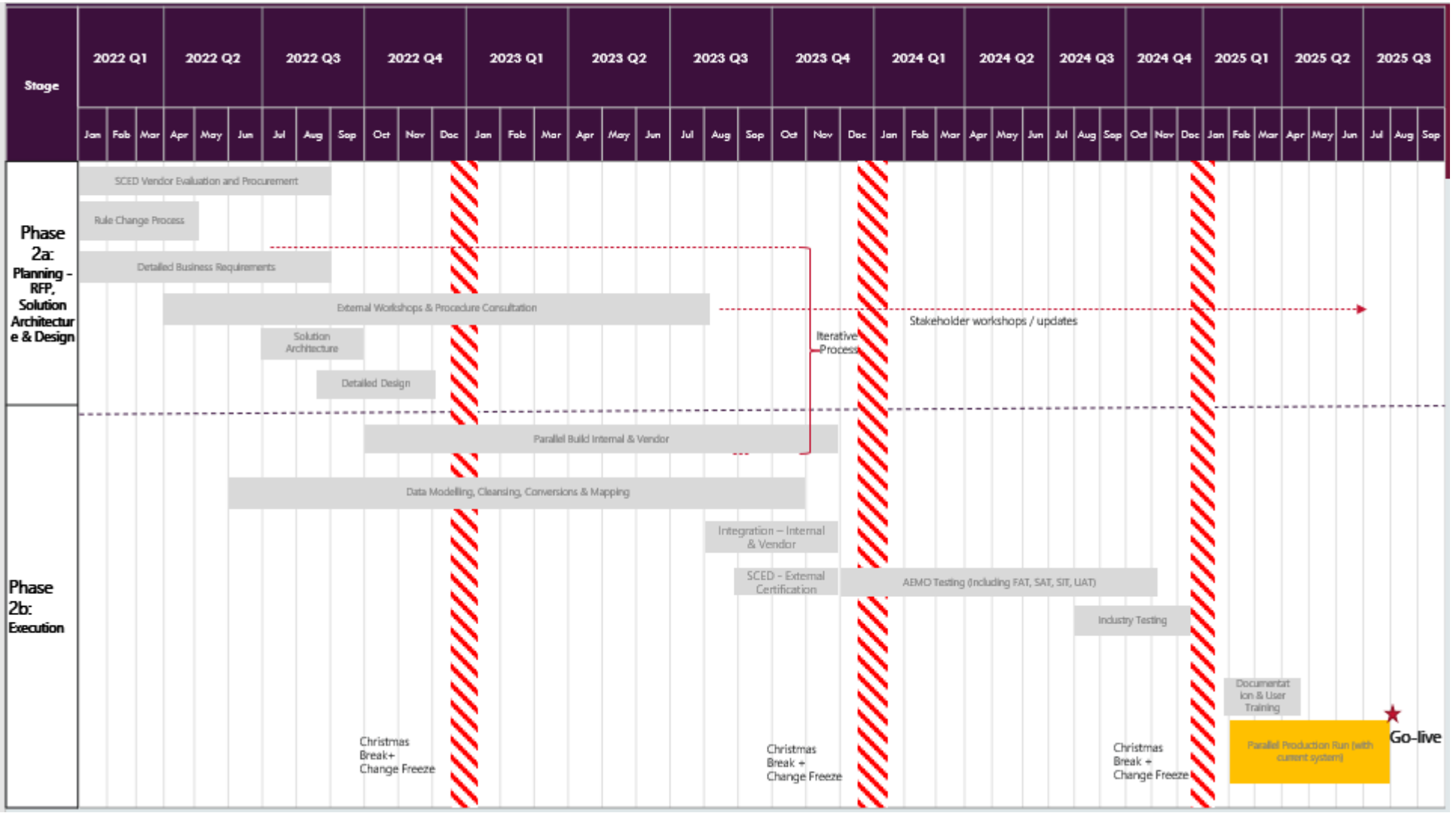
- Due to the complexity and amount of data involved, the new ST PASA may take longer to run than the current system
- This may mean in order to provide timely information to stakeholders, ST PASA may be run at different frequencies for different time horizons
  - For example, a run covering the current and next 2 days might be run every hour and the run covering the full 7-day horizon might be run less frequently
- More information of timing will be known once AEMO commences developing the SCED and the overall ST PASA system

Next Steps

Workshop timetable

Workshop	Topic	Proposed Date
1	Generator Recall Process – current and future	Thursday 7 April 2022
2	Overview of the new process	Thursday 19 May 2022
3	Rescheduled - PASA Run types	Thursday 4 Aug 2022
4	Demand Forecast, Uncertainty Margin and Confidence Levels	Thursday 21 July 2022
5	Information to be made publicly available	Friday 26 August 2022

High level project time line



Glossary

Term	Definition
LCR	Largest Credible Risk
LOR	Lack of reserve
PASA	Projected assessment of system adequacy
PD	Pre-dispatch time frame
POE	Probability of exceedance. A 50% PoE load forecast is one which will be exceeded 50% of the time
ST	Short term time frame