WA DER Market Participation Forum

5 April 2023

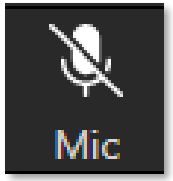
Welcome

Tom Butler – Manager, WA Distributed Markets

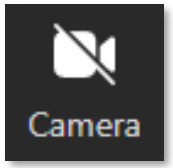
We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay respect to their Elders past, present and emerging.

Online forum housekeeping



Please mute your microphone during the presentation.



Please leave your camera off as well
but we'd love to see you during Q&A!

We are very interested in questions and feedback.

We will pause regularly to give you time to:

- comment in the chat; or
- raise your hand to ask a question.

We will share a copy of the presentation slides as a PDF after the meeting.

We welcome feedback via
WADERProgram@aemo.com.au

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Agenda

*Please note that this meeting will be recorded by AEMO and may be accessed and used by AEMO for **capturing meeting outcomes**. By continuing, you consent to AEMO recording the call and using the recording for this purpose. If you do not consent, you may exit the meeting. No other recording of the meeting is permitted.*

1. **Welcome and wrap up from the quarter, and upcoming priorities** by Tom Butler

2. **Energy Policy WA update** by Aden Barker, Director Network Regulation & Customer Participation

3. **Spotlight – DER Technology Integration** by Douglas Ferreira
   - DER Compliance update with AS/NZS4777.2:2020
   - System Restart Report

4. **Symphony update**
   - **PMO update** by Kim McArthur
   - **Update and Discussion Topics** by Bruce Redmond and Jason Hart

6. **Q&A**

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Wrap up from the quarter, and upcoming priorities

Tom Butler, Manager WA Distributed Markets

WA Distributed Markets

Our vision:

Enabling DER and new technologies to be **an integral part of the SWIS through the WEM** by supporting security and reliability, as we move towards a 100% instantaneous renewable energy power system.

Focus Last Period

- Project Symphony - Testing execution then pivoted to platform development in Feb and March 2023.
- Publication of Procedure Change Proposal, WEM DER Register Information in December 2022 and consultation period in January 2023.
- Publication of the VPP Guideline in January 2023.
- AS/NZS4777.2:2020 Compliance Review – National.
- System Restart Arrangements – Research Opportunities for DER in the restart process.
- Input into operational processes such as SRC and NCESS procurement.

Upcoming Focus

- Project Symphony – Test & Learn leading to development of recommendations for implementation of DER Aggregation arrangements in the WEM.
- Publication of Procedure Change Report: WEM DER Register Information Procedure in April 2023.
- Publication of Technical Report – AS/NZS4777.2:2020 Compliance.
- System Restart Report.
- Emergency Solar Management enhancements (increase visibility, compliance, monitoring).
- Cyber security arrangements for DER.
- Support – EPWA's Roles & Responsibilities Plan.

WA DER Market Participation Forum:

- 14 June 2023
- 13 September 2023
- 13 December 2023

View previous presentations on our forum web page:
WA DER Market Participation Forum

Contact us:
WADERProgram@aemo.com.au

Government of **Western Australia**
Energy Policy WA

Update by Energy Policy WA

Aden Barker
Director Electricity Networks & Customer Participation

Working together for a
brighter energy future.

AS/NZS4777.2:2020 Compliance

Report publication

Douglas Ferreira, Lead - DER Integration Engineering

Background to AS/NZS4777.2:2020

- AS/NZS4777.2:2020 (the 2020 Standard) is the current standard for small-scale inverters
  - became mandatory for all new distributed inverter installations in Australia on 18 December 2021

- Changes were aimed at raising performance requirements, with a particular focus on improving ride-through capabilities

- Given the importance of these new disturbance ride-through capabilities to future grid security, AEMO has an ongoing program of work to investigate the behaviour of DERs installed under the 2020 Standard at a National level

What is being done?

- Summary of program of work
  - In Early 2022, AEMO identified low levels of Compliance with the 2020 Standard
  - Led by AEMO, a series of engagements with stakeholders commenced, including Clean Energy Regulator, Clean Energy Council, UNSW, multiple DNSPs and OEMs, resulting in developing a report
- Purpose of Report
  - Collate evidence and provide an overview on the nature and scale of DER Compliance
  - Give an indication of the importance and urgency of improving DER Compliance
  - Share insights that may inform improvements to governance frameworks for managing DER Compliance

Quantifying Compliance

Five different methods were undertaken across industry to provide an understanding of compliance with DER technical settings

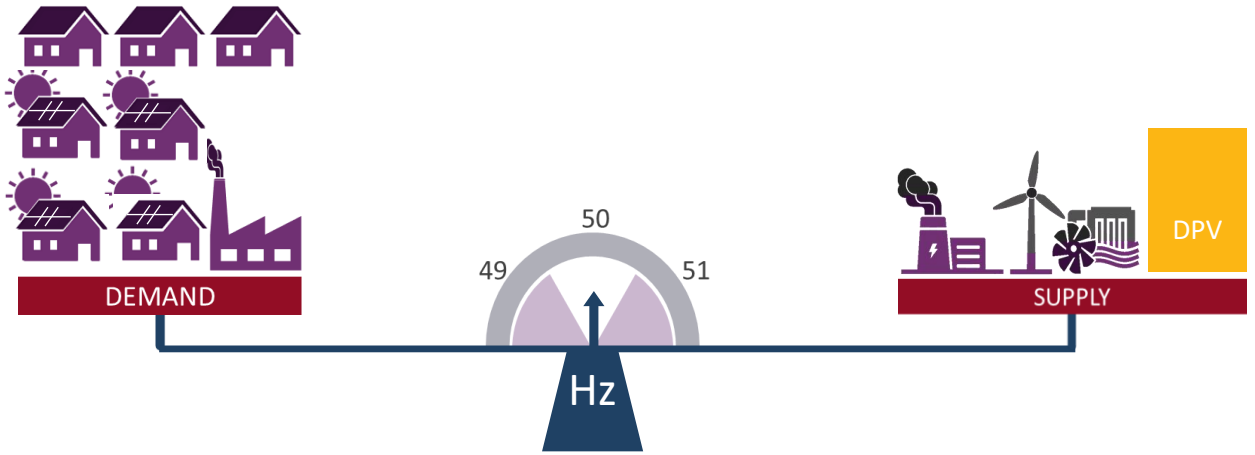
Lead stakeholder	Method	What was tested?	Results
DNSPs	Power quality assessment	Volt-Var response	Average 30% compliance
Clean Energy Regulator	On-site audits	2015 technical settings	28% compliance
AEMO	Post disturbance analysis	Multiple behaviours	30-50% compliance
OEMs	Remote data polling	2020 Standard selection	37% compliance
UNSW	Laboratory testing	Disturbance ride-through	100% compliance*

*When configured properly to the 2020 Standard

Key insights

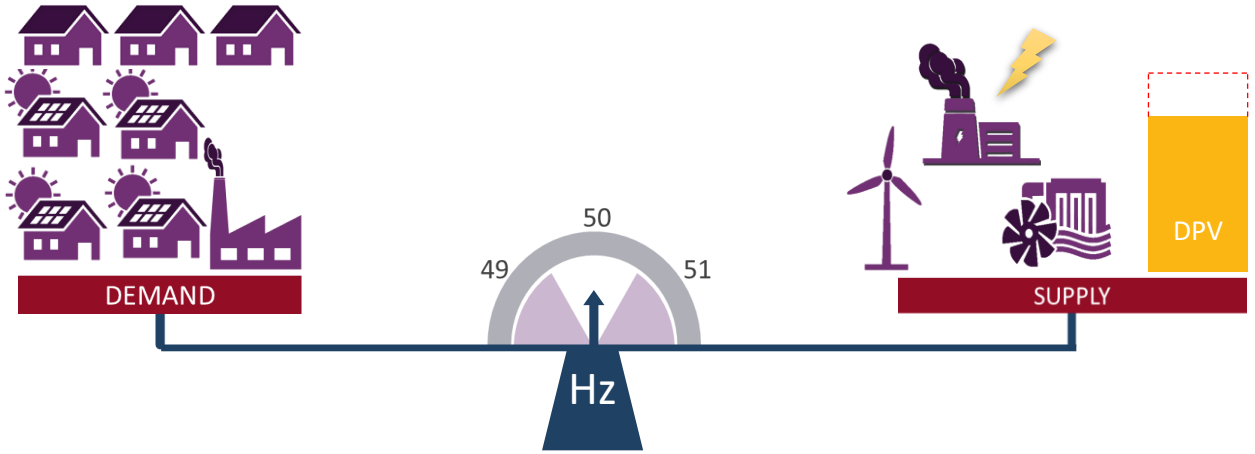
- When configured properly to the 2020 Standard, all 12 tested inverters deliver the disturbance ride-through behaviors necessary to support Power System Security
- In the field, compliance with technical settings is poor. This suggests significant deficiencies in governance frameworks for monitoring and enforcing compliance with technical settings in the field
- OEMs have considerable influence over the compliance of their products in the field
- Some DNSPs are already implementing significant programs of work to monitor and actively improve compliance in their networks
- In the absence of a clear definition for roles and responsibilities around technical standards compliance and given the substantial risk to system security, AEMO has been leading industry engagement nationally on this issue

Implications of poor DER Compliance



*Collectively DPV is now the largest generator

Implications of poor DER Compliance



*Collectively DPV is now the largest generator

Technical implications

- Following a contingency event (e.g. a sudden trip of a power plant)
  an additional proportion of DPV trips

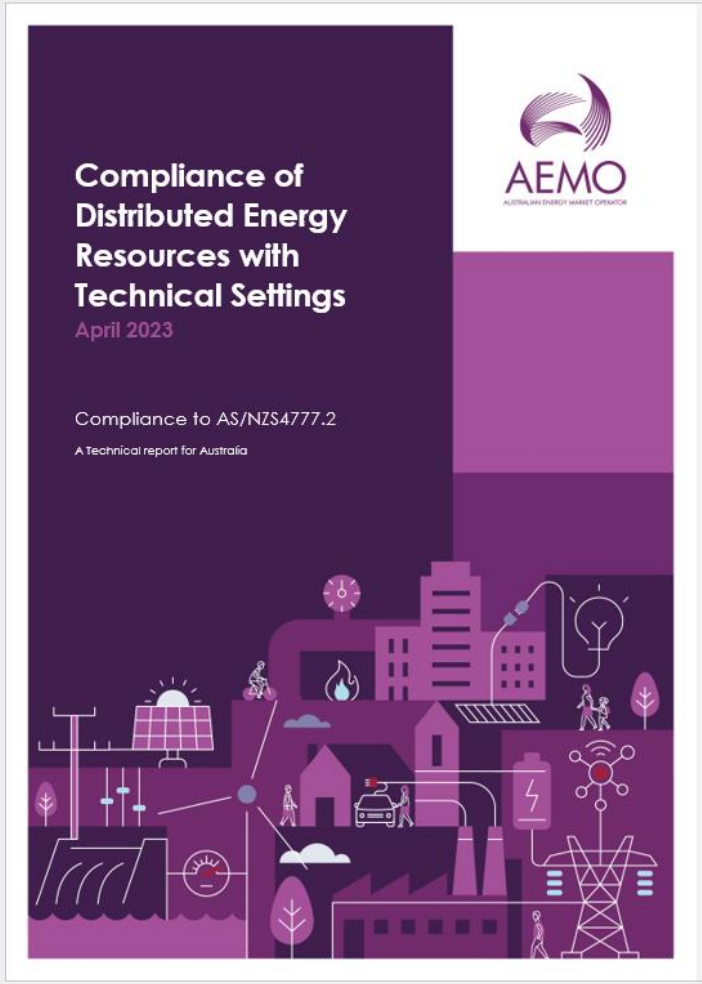
Market implications

- Increase of market costs related to the need for FCAS, Spinning Reserve, DPV curtailment
- Increase of risks related to non-credible contingencies, reducing windows for planned network outages
- Reduce DER hosting capacity of the network
- Other security implications beyond ride-through capabilities (e.g. frequency watt response) are affected

Potential solutions to improve DER Compliance

- AS/NZS4777.2:2020 amendment
  - Aiming to require that OEMs make only the current version of the Australian Standard accessible from product menus for the installer
- Enduring governance frameworks
  - Aiming for the implementation of clear frameworks that outline which parties are responsible for each of the aspects of DER compliance. AEMO has flagged the importance of including this in EPWA's R&R work
- Immediate rectification actions (~20 actions)
  - Industry collaboration to deliver a suite of immediate no-regrets actions that are achievable in the short term within the existing frameworks

Next Steps



- National Report to be published by AEMO in April 2023
- The issues with compliance is a multifaceted, complex and involves many stakeholders, solutions will need to be developed collaboratively
- We welcome your feedback on the data, analysis and insights via DERProgram@aemo.com.au

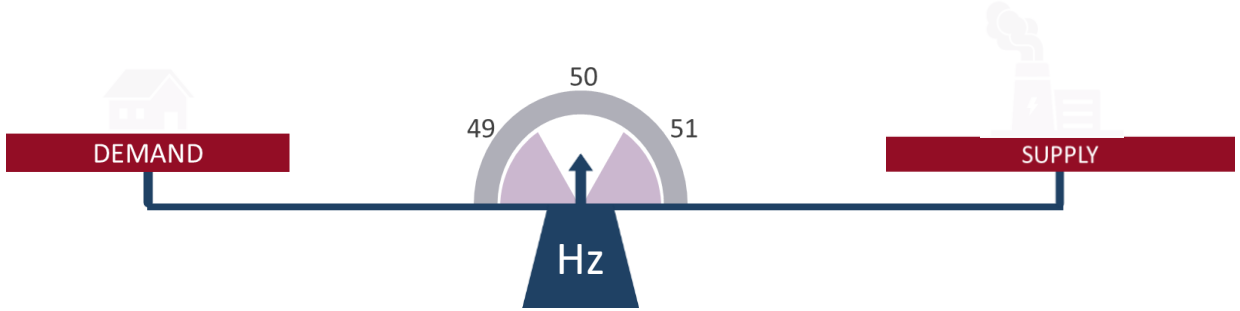
System Restart report

DER roles in the System Restart plan for the SWIS

Douglas Ferreira, Lead - DER Integration Engineering

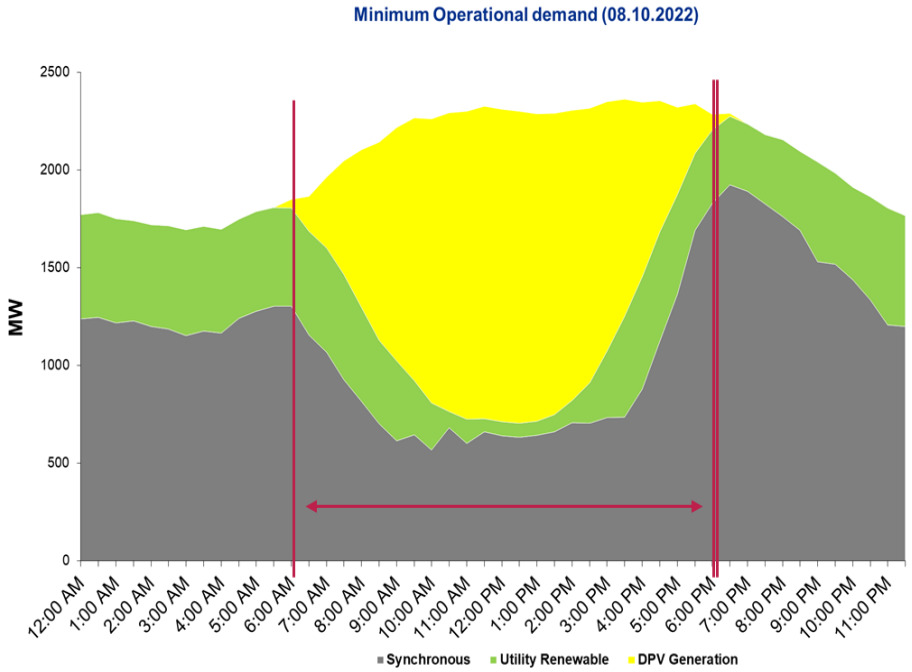
Background to System Restart

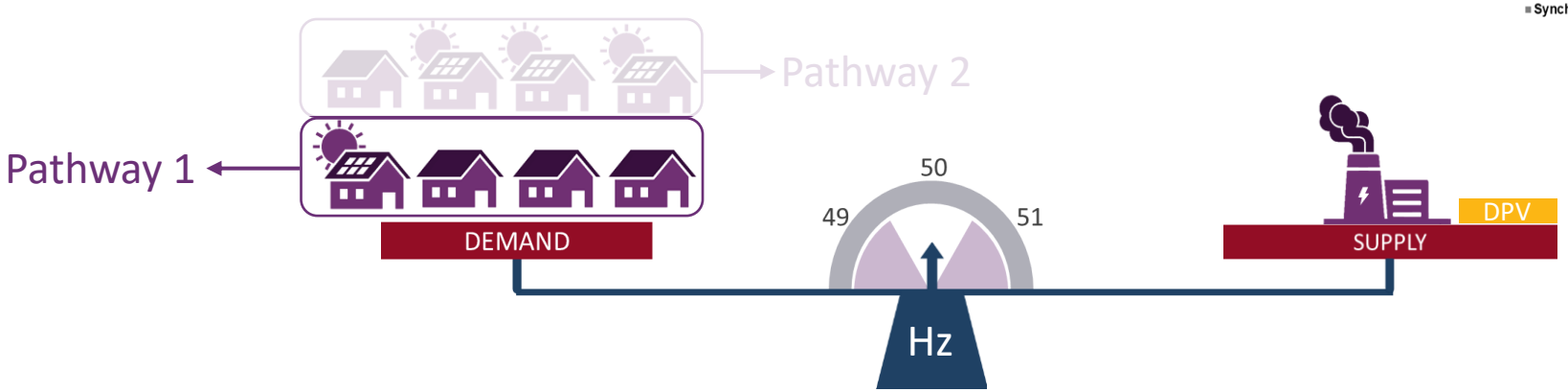
- *AEMO responsibilities*
  - AEMO is responsible for the preparation of operational plans and contingencies to restart the SWIS in the event of a system shutdown
  - To guide AEMO in this process, AEMO has a system restart plan in place, which outlines the actions AEMO takes in preparations to restart the power system in the event of a black event
- System Restart plan
  - The plan requires load to be picked up as parts of the network are energised and the balance must still be kept with tighter margins



Current Challenges

- Restart approaches were not designed for high DER penetration scenarios
- 2020 Restart plan review for the SWIS
  - Establishes pre-defined restart pathways
  - Pathways with less DPV are given priority to ensure greater certainty when picking up stable loads





2020 restart plan approach

- It works if we are to restart the system in the middle of the day, but will no longer be viable over time without extra capabilities as continuous DPV growth leads to fewer suitable restart pathways

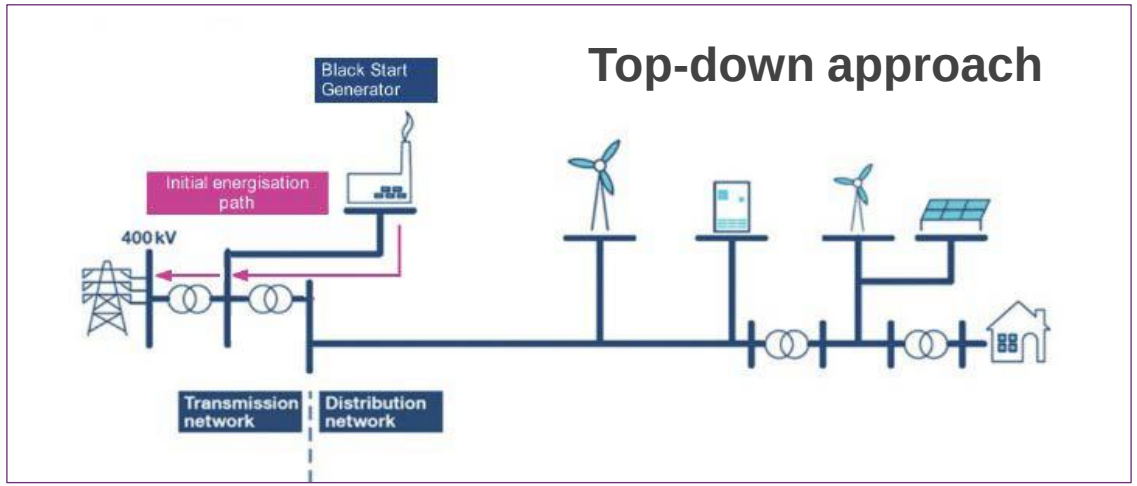
What is being done?

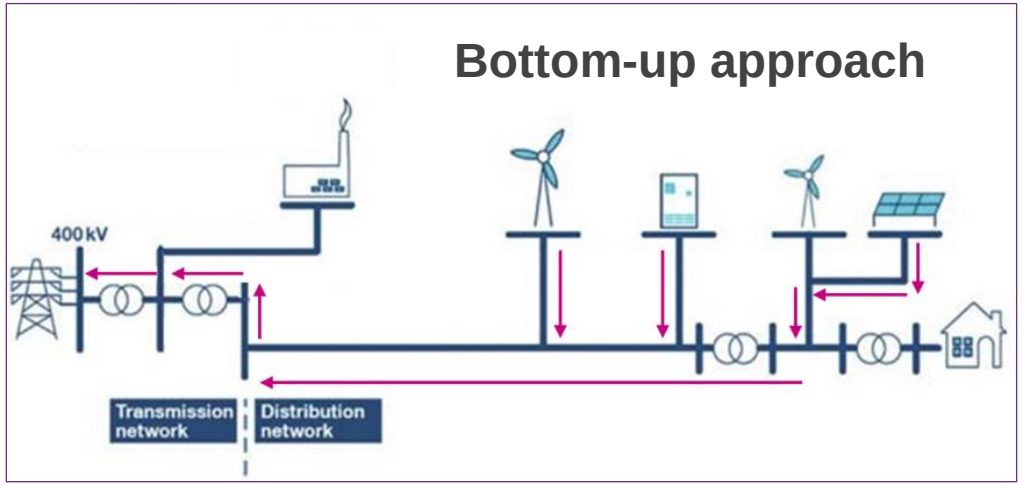
- AEMO started a piece of research in September 2022 to understand opportunities for restarting the system under high DER penetration
  - The research involves a global benchmarking to collect national and international stakeholders' views on the DER roles with regards to Power System Restart
  - It investigates alternative approaches to the Power System Restart

Global Benchmarking

Top-down vs bottom-up approaches

- System restart plans were traditionally built based on top-down approaches
- Bottom-up approach is a newer concept, under trial in the UK power grid





Key insights:

- No other jurisdictions have a similar sense of urgency
- The WEM has unique characteristics
- Other jurisdictions are watching us as a test case for how we integrate high penetration of renewables into our power system

Why is this important

- There is less confidence that System Restart plans built on top of top-down approaches will work under a high DPV penetration scenario
- This research piece allows AEMO to understand opportunities to maintain system reliability under extreme events
- Further work is needed to understand the impacts of the bottom-up restart concepts
- AEMO will further engage with key stakeholders to discuss report recommendations

Project Symphony

Our energy future

Project update by the PMO

Kim McArthur

Program Manager

Project Symphony

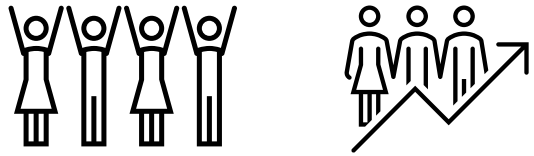
In partnership with:

western power synergy AEMO GOVERNMENT OF WESTERN AUSTRALIA Energy Policy WA

Project Symphony has received support from the Australian Renewable Energy Agency (ARENA) as part of ARENA's Advanced Renewables Program.

Project Symphony Success Criteria & Achievements to Date

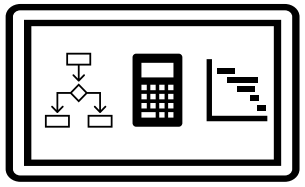
Customer participation



704
Signed Assets
+190 3PA

352
Signed Customers
+117 3PA

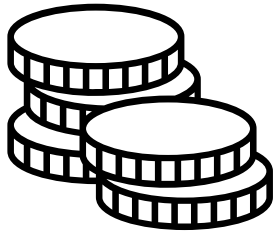
Technology solutions



Stability Period ‘Go-Live’ achieved.
A 90 day period during which no high severity defects on the technology platforms are to be incurred across the four must have scenarios.

NSS & BMO, CTZ and ESS scenarios are all now live.

Value



$1.4B
Potential economic value. Commercial process for CBA has been awarded with results to be delivered in mid August

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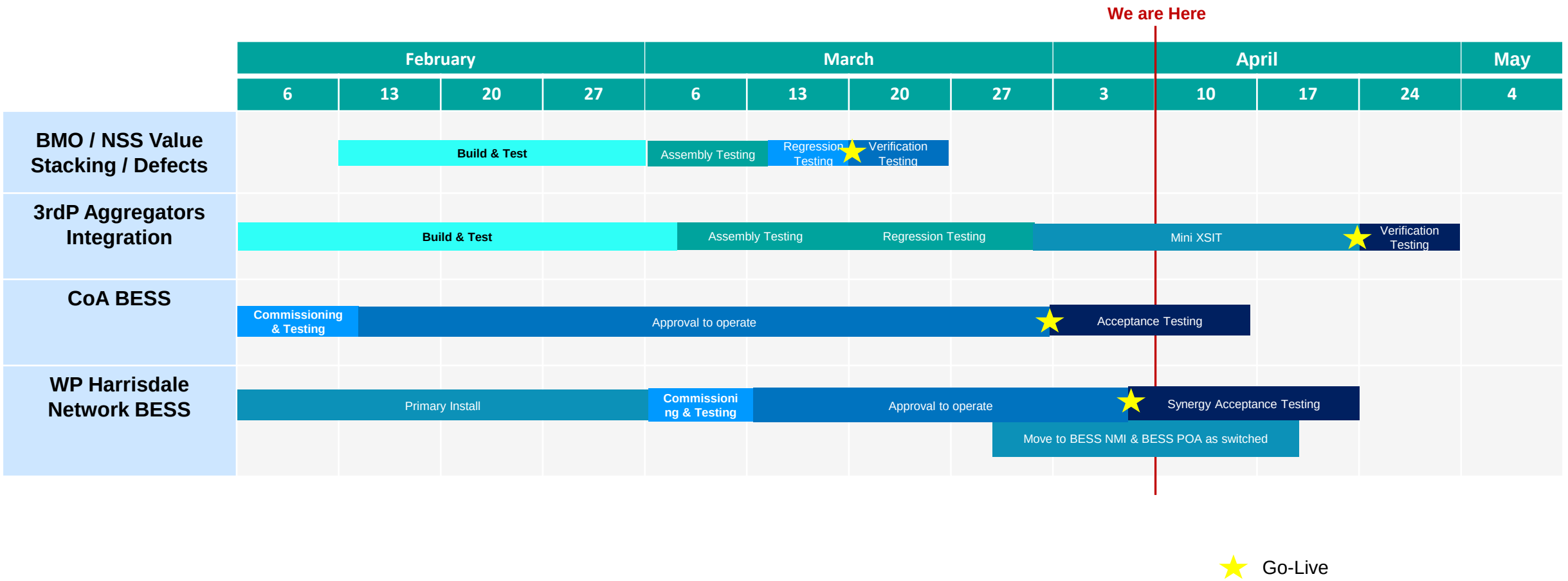
Progress Update



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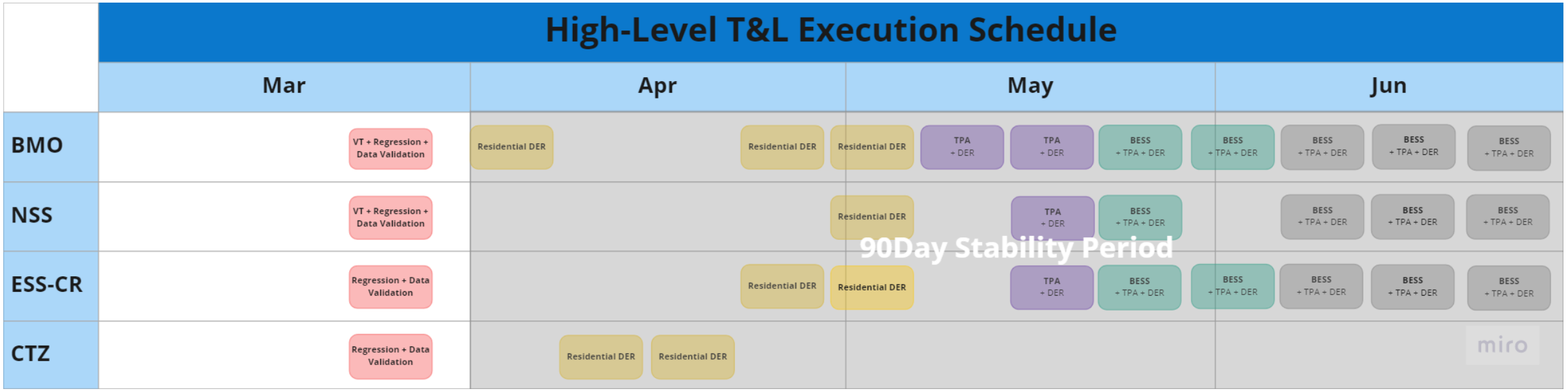
Test and Learn Progress Update

The high-level stability period test plan / schedule below, has been revised following updated X-SIT and Verification Test dates where all value stacking and residual platform defect were resolved.



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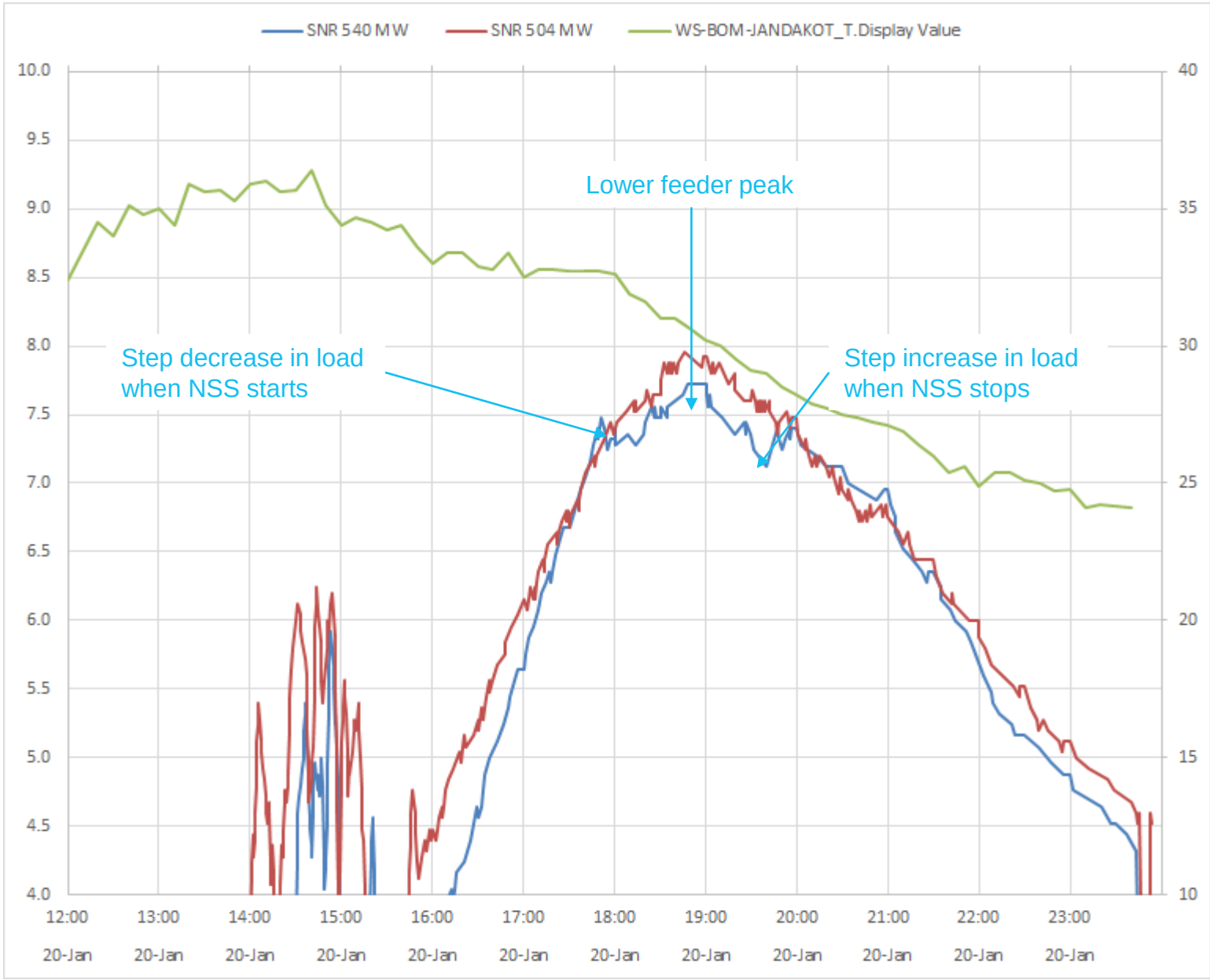
Observations
- NSS Dispatch

- 20 Jan 2023: Firm NSS (18:00-19:20)
- Blue line SNR 540
- Red line SNR 504 – no DER orchestration; similar peak load to SNR 540
- Green line – Jandakot Weather Station temperature
- Observable stepped change in SNR 540 at start and end times of NSS provision
- This is one of the better examples; actual observability of NSS will vary depending on feeder activity



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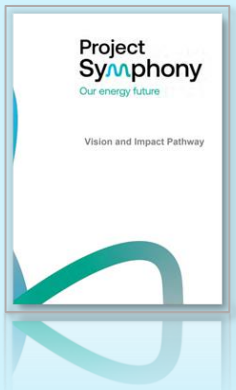
ARENA Deliverables

LIBRARY

PUBLISHED



Vision and Pathway

Work Package

Outline of the economic value of a virtual power plant (VPP) in the South West Interconnected System (SWIS) of Western Australia.

Pilot area report

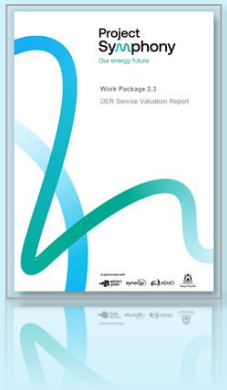
Work Package 1.1

Defines the selected pilot area that will be the focus of Project Symphony by using existing network data and possible future scenarios using Western Power's Grid Transformation Engine

DER Services

Work Package 2.1

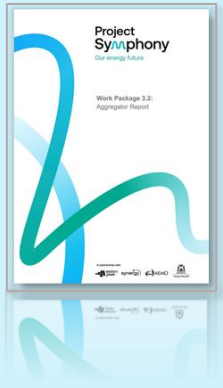
Outline of the economic value of a virtual power plant (VPP) in the South West Interconnected System (SWIS) of Western Australia.



DER Service Evaluation

Work Package 2.3

Valuation of Distributed Energy Resource Services:



Aggregator Report

Work Package 3.2

Results of two customer surveys to understand the sentiment of residential and commercial customers towards DER orchestration and Third-Party Aggregators.

Distribution Constraints Optimisation Algorithm Report

Work Package 4.1

This document compares four equitable allocation methods, or Distribution Constraint Optimisation Algorithms (DCOA),

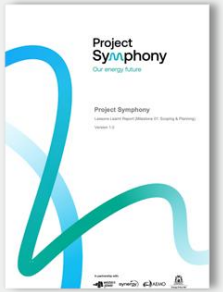
DSO Platform

Work Package 4.3

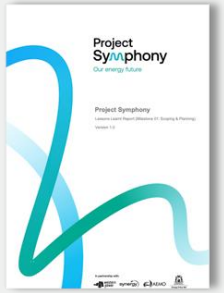
Describes the approach, requirements, and conceptual design for the DSO platform delivered by Synergy for Project Symphony.

*Combined with 4.2 & 4.4

LESSONS LEARNED



Milestone 1 Scope and Planning



Milestone 2 Build and Integrate

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Milestone 4 Deliverables

Milestone 4: Project Completion
Social Science Study (WP3.3)
DER Market Participation Principles Report (WP7.3)
AEMO Planning and Forecasting Report (WP7.4)
Regulation and Rules Report (WP7.1)
Market Participation Requirements Report (WP7.2)
Cost Benefit Analysis (CBA) Method Report (WP8.3)
End Project assessment of industry transition (WP8.2)
Project Close Out Report and Public Dissemination Report (WP8.4)
Provision of a Final Report

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Project Symphony Update & Discussion

Bruce Redmond, Project Symphony Product Owner
Jason Hart, Project Symphony Senior Analyst

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Discussion Topics

- Challenges for DER participation in the WEM
- Topics AEMO is investigating via Test & Learn phase and engagement for potential recommendations
- Publication of ARENA work package 7 reports: End-to-end transactions
- Next steps

Challenges for DER participation in the WEM

- Participation of DER in energy markets is immature, and different challenges have informed initial integrations
- Metering, control, and communications infrastructure and standardization of data will affect short, medium and long term implementation
- Successful market integration will require strong coordination across the industry

Source: Activation of Distributed Energy Resources in the Energy Market, EPRI, 2019

Challenges for DER participation in the WEM

Does an aggregator want to know what TNI they are located at?

- Does it matter?

Do aggregators foresee targeting customers in and around specific areas (TNIs), or more opportunistically where their customers are?

Visibility to the market:
Recruiting customers and registering in the market

What has been the experience with registering for FCAS in the NEM?

- What has gone well or not gone well?

Has there been challenges in meeting standing data requirements, or integration / API requirements?

Other than batteries, are aggregators looking at other device types to participate in VPP's?

Challenges for DER participation in the WEM

WEM Rules define measurement at the NMI:

- Is this the best solution?
- Or should it specific to the service offered, or control capability?

Does NMI-level measurement and control expand potential for Aggregators?

Measurement & Controllability

What are the general views of stakeholders with respect to forecast, measurement and management of uncontrolled load?

- What experiences do you have, have risks actually materialised and how have they been managed?

Challenges for DER participation in the WEM

Are aggregators comfortable with the FCAS service in the NEM?

- What issues remain, if any?

Predictability

Do VPP's have the capability to participate in multiple services in the market

- What are the key challenges associated with this, is it specific to the service?
- Should DER aggregations be treated differently to that of traditional facilities?

Topics AEMO is investigating in Project Symphony

- Developing DMO function
  - Adding processes for Small Aggregation registration and operation
  - Integration with DSO and dynamic operating envelopes and network support services
  - Representing forecasts and actions through coordination processes
    - Enable aggregations of complex facilities with
      - multiple resources
      - mixtures of control capability
  - Timing of coordination processes
  - Approach for telemetry and data exchange
  - Approach for high speed data recording and analysis

Publication of work package 7 – End-to-end transactions

- Developing operational coordination models which enable DER participation
  - Needs to enable multiple control and optimisation models for aggregators
  - While providing high level predictability, controllability and visibility
- Symphony solution is just one model for how an aggregator may operate
- Seeking insights into alternative models to test the participation arrangements against

Next steps

- AEMO is reaching out to organisations to gather insights
- If you would like to discuss any topic please contact us to arrange a discussion

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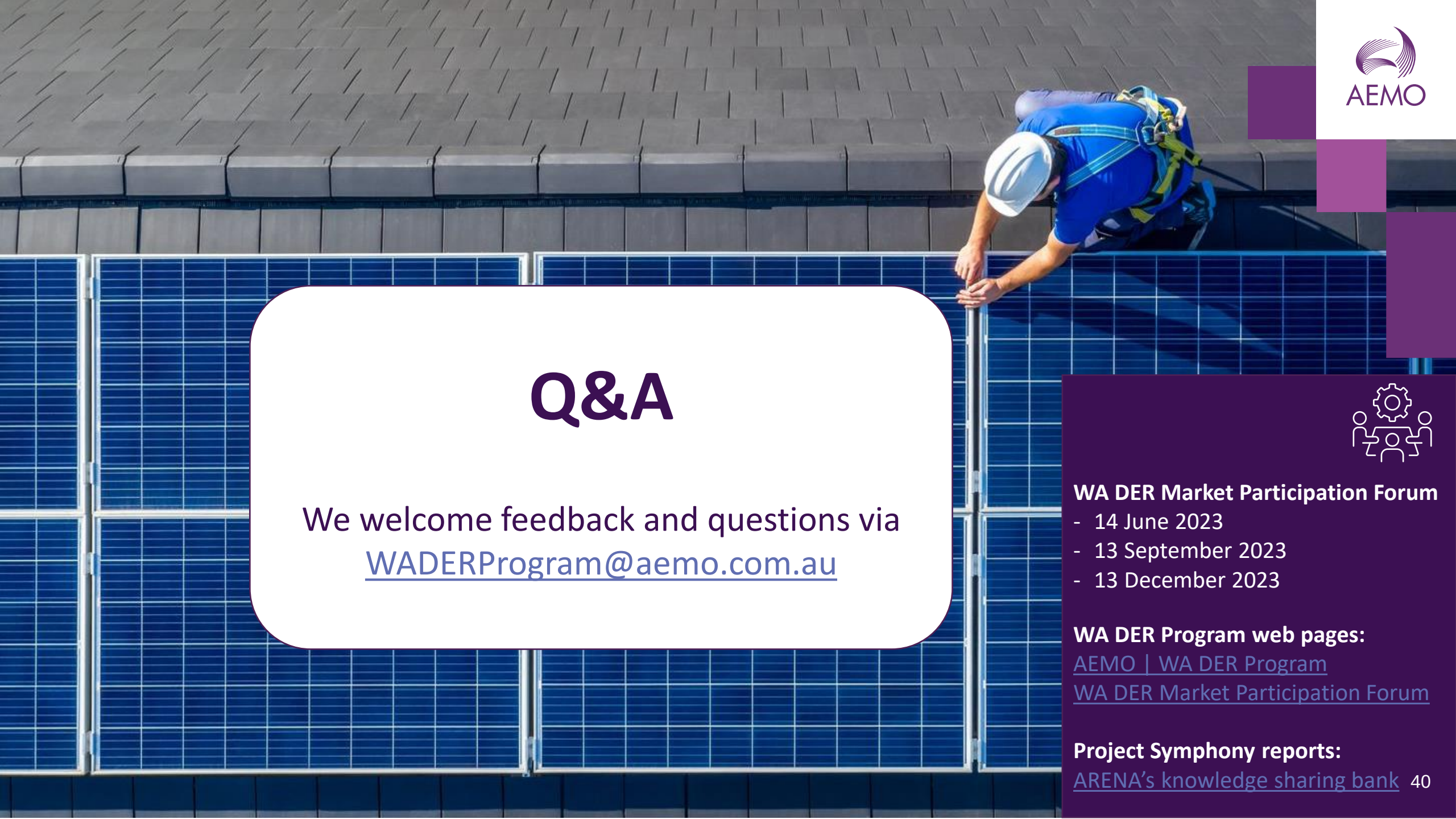

Q&A

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