# WA DER Market Participation Forum

15 June 2022

Please note that this forum will be recorded for the purposes of assisting AEMO accurately capturing feedback.

# Welcome

Tom Butler, Manager – Distributed Markets WA

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.**

# AEMO Competition Law Meeting Protocol

AEMO is committed to complying with all applicable laws, including the Competition and Consumer Act 2010 (CCA). In any dealings with AEMO regarding proposed reforms or other initiatives, all participants agree to adhere to the CCA at all times and to comply with this Protocol. Participants must arrange for their representatives to be briefed on competition law risks and obligations.

Participants in AEMO discussions **must**:

1. Ensure that discussions are limited to the matters contemplated by the agenda for the discussion
2. Make independent and unilateral decisions about their commercial positions and approach in relation to the matters under discussion with AEMO
3. Immediately and clearly raise an objection with AEMO or the Chair of the meeting if a matter is discussed that the participant is concerned may give rise to competition law risks or a breach of this Protocol

Participants in AEMO meetings **must not** discuss or agree on the following topics:

1. Which customers they will supply or market to
2. The price or other terms at which Participants will supply
3. Bids or tenders, including the nature of a bid that a Participant intends to make or whether the Participant will participate in the bid
4. Which suppliers Participants will acquire from (or the price or other terms on which they acquire goods or services)
5. Refusing to supply a person or company access to any products, services or inputs they require

Under no circumstances must Participants share Competitively Sensitive Information. Competitively Sensitive Information means confidential information relating to a Participant which if disclosed to a competitor could affect its current or future commercial strategies, such as pricing information, customer terms and conditions, supply terms and conditions, sales, marketing or procurement strategies, product development, margins, costs, capacity or production planning.

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# Online forum housekeeping

1. Please mute your microphone to avoid distracting background noises.
2. Video is recommended for presenters only, as this helps with webinar performance and minimises distractions. However, we encourage you to turn it on via Q&A.
3. We encourage you to ask questions and provide feedback.

- Use the chat function at **any time** during the forum, we aim to respond to as many questions as possible.

- Raise your hand during Q&A and wait till you're called upon. Don't forget to unmute and lower your hand after.

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# Agenda

1. Welcome by Tom Butler
2. Energy Policy WA update by Aden Barker
3. DER Participation
   - System Management overview of operational challenges and importance of visibility by Dean Sharafi
   - Visibility of aggregations of DER (VPP) by Natalia Kostecki, Allicia Volvricht, Toby Price
4. Project Symphony update by Bruce Redmond
   - Summary of results from the second cross-organisational system integration test by Jean-Philippe (JP) Montandon
   - ESS Contingency Raise Scenario by Andrei Costache
5. Project Symphony PMO update by Andrew Blaver
6. Q&A and close by Tom Butler

Government of **Western Australia**
**Energy Policy WA**

# DER Integration

## Energy Policy WA Update


## Aden Barker

**Director Network Regulation & Customer Participation**


Working together for a **brighter** energy future.

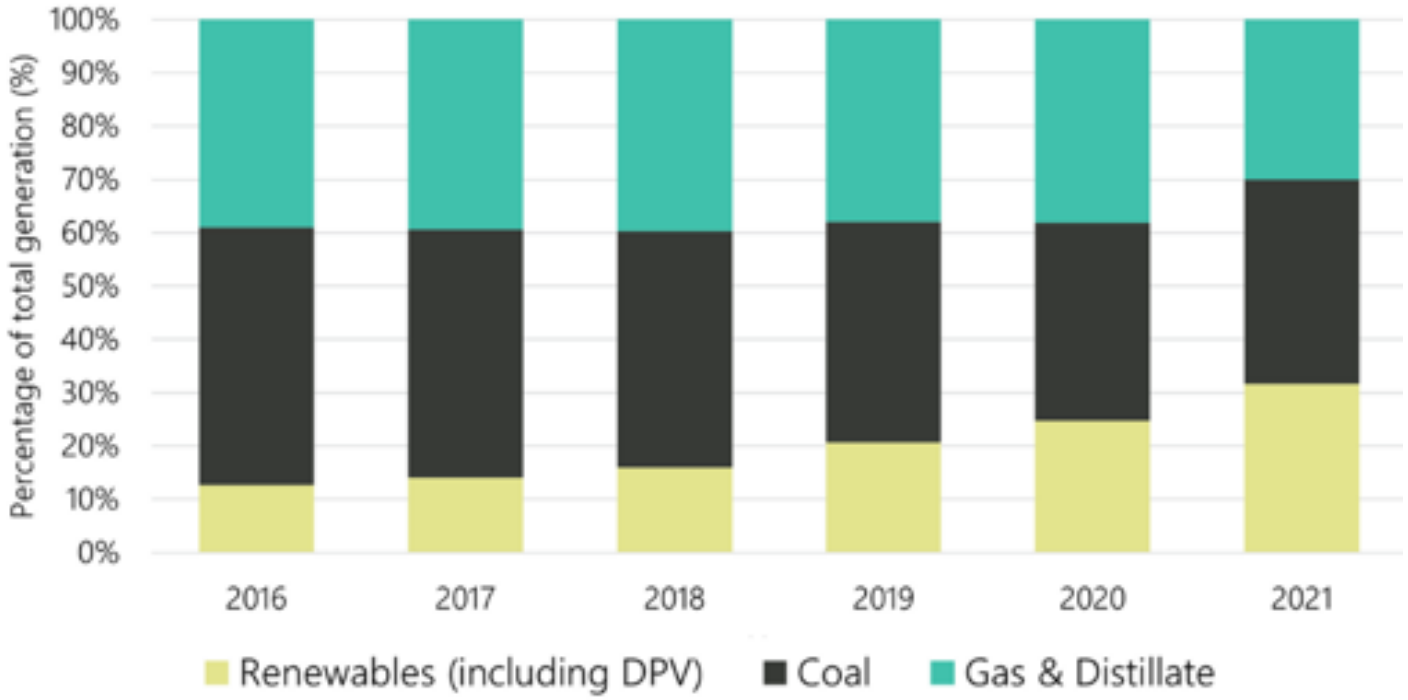
# DER Participation

# Visibility of aggregations of DER (VPP)

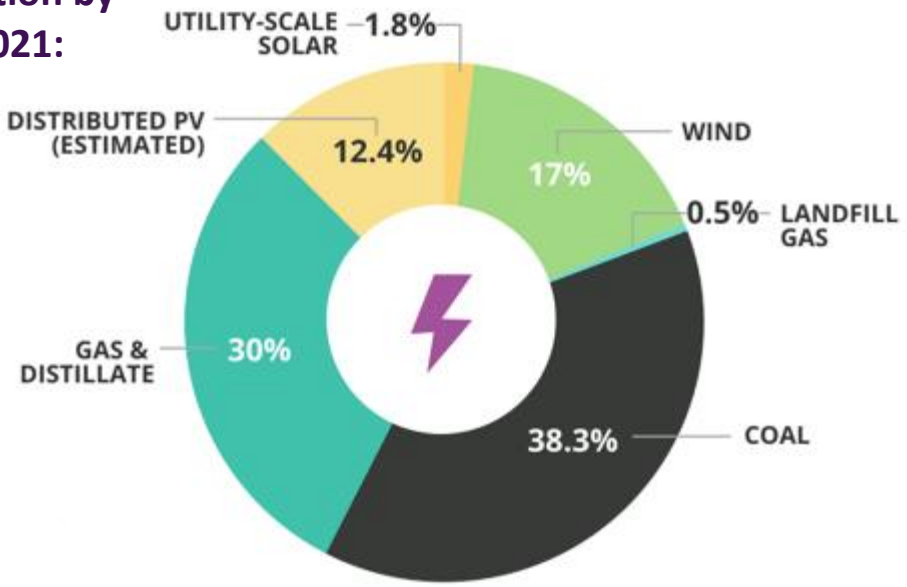
Proposed Visibility Framework

# Western Australia's energy transition

**The renewable energy transition is underway:**




**Average generation by fuel source in 2021:**




**The all-time record for maximum instantaneous renewable energy was set on 7 September 2021 at**

**78.6%** of underlying demand* with

- 56.3% DPV
- 18.1% Wind
- 13.0% Coal
- 8.4% Gas & Distillate
- 4.2% Solar

Data is for Western Australia's Wholesale Electricity Market (WEM).
*Underlying demand includes consumption met by behind-the-meter rooftop solar and battery storage.

# Agenda

- Need for visibility of ‘off-market’ arrangements
- Proposed visibility framework and timings
- DER participation and interaction with visibility arrangements
- Potential uses of visibility information

# Need for visibility-'off-market' arrangements

### What is 'visibility'?

Visibility is ***information provided to AEMO*** on the existence and operation of ***off-market*** arrangements that can affect ***material*** movements of energy. It applies to a ***Virtual Power Plant (VPP) -***

- An aggregation that is not registered under the WEM Rules
- The service provided is not a WEM-based service
- The aggregation is capable of material movements of energy

### What does AEMO need visibility of?

Energy movements that cannot otherwise be forecast (based on historical behaviour) as they are:

- Wholesale price sensitive
- Dependent on factors unknown to AEMO (i.e. MP energy portfolio balancing)

### What does AEMO need for 'visibility'?

Minimum visibility data -

- Data providing a 'physical' description of the unregistered aggregation of DER
- Details about the operation of the service provided by the unregistered aggregation of DER

Seeking information on aggregations of DER prior to their participation in the WEM is consistent with the WEM Objective - *Promote the economically efficient, safe and reliable production and supply of electricity and electricity-related services in the SWIS*

### Why does AEMO need 'visibility'?

AEMO forecasts demand and dispatch Registered Facilities as part of whole of system management. DER is on the demand side of the dispatch equation - changes in DER operation need to be better forecast and managed ***to ensure the power system stays secure***

- Unexpected and material DER movements are met using ESS, and in extreme cases, AEMO intervention (i.e. ESM)
- Where DER movements are expected, this can be met by energy dispatch alone and reduce the quantities of ESS required. The need for AEMO intervention and costs tp the market (and consumer) may be avoided

### Who provides 'visibility' to AEMO?

WEM Rules can only obligate a party (or parties) with whom AEMO has a relationship with under the rules to provide information to AEMO. This limits AEMO's ability to request (and receive) information from an unregistered aggregation of DER in regard of the aggregation and any service it is providing off-market

However, AEMO is able to request information from a 'rule-facing entity' in regard of an unregistered aggregation of DER that the Rule Participant is controlling to receive an off-market service

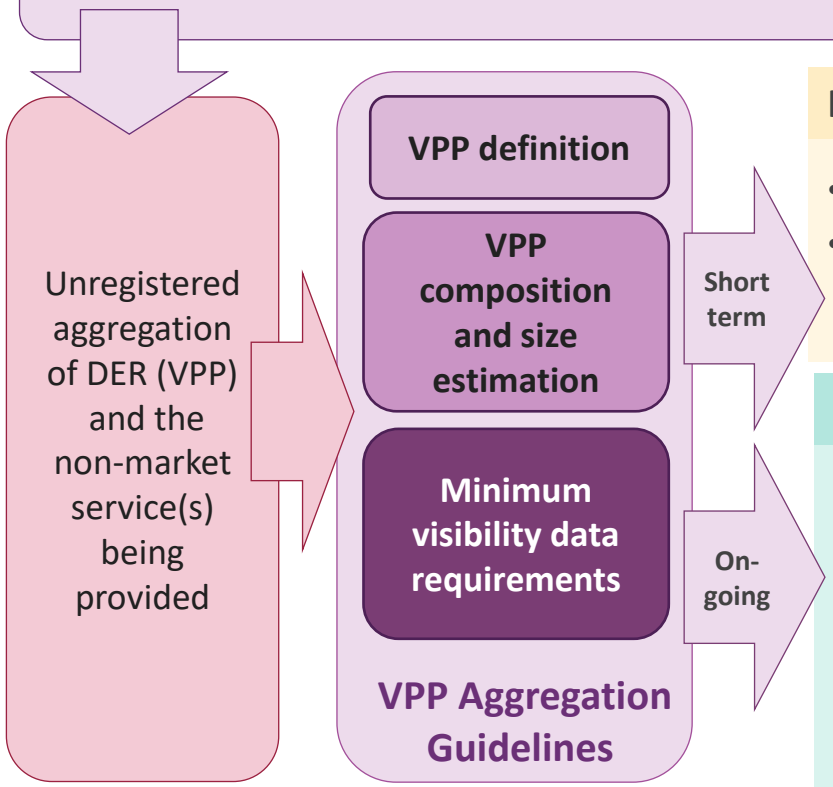
### How is visibility achieved in practice?

Visibility is achieved via the (proposed) Visibility Framework comprising –

- ***Requirements / obligations*** on a Rule Participant to provide some minimum data to AEMO
- ***Guidance / prescription*** on when (and how) visibility obligations apply

# Proposed Visibility Framework

**Purpose:** to inform AEMO of the existence and operation of 'off-market arrangements' with the capability to move material amounts of energy, so AEMO can make informed decisions when performing its function of keeping the power system secure




## Interim to New Market arrangements under new WEM Rules

- DER and associated technologies *may* provide services via off-market arrangements
- Visibility to be provided to AEMO via interim/informal arrangements with (an existing) **Rule Participant** who is using services from unregistered aggregations of DER

## Under New Market arrangements

- Registered aggregations of DER will likely provide the full suite of market services and some tailored services (future, per EPWA implementation plan)
- Visibility to AEMO via rules (existing, new / amended) resulting in **obligations** on:
  - **Rule Participant** using services from unregistered aggregations of DER - from Oct 2023 and on-going
  - **Rule Participant** created out of a requirement to register (i.e. Small Aggregation at a Transmission Node) a VPP / VPP component – future, per EPWA implementation plan

# VPP Aggregation Guidelines

**Objective:** *to facilitate the transition of the WEM/SWIS to a highly distributed energy future through accommodating new business models and providing foundational arrangements for the future participation of DER in the WEM – while keeping the power system secure*

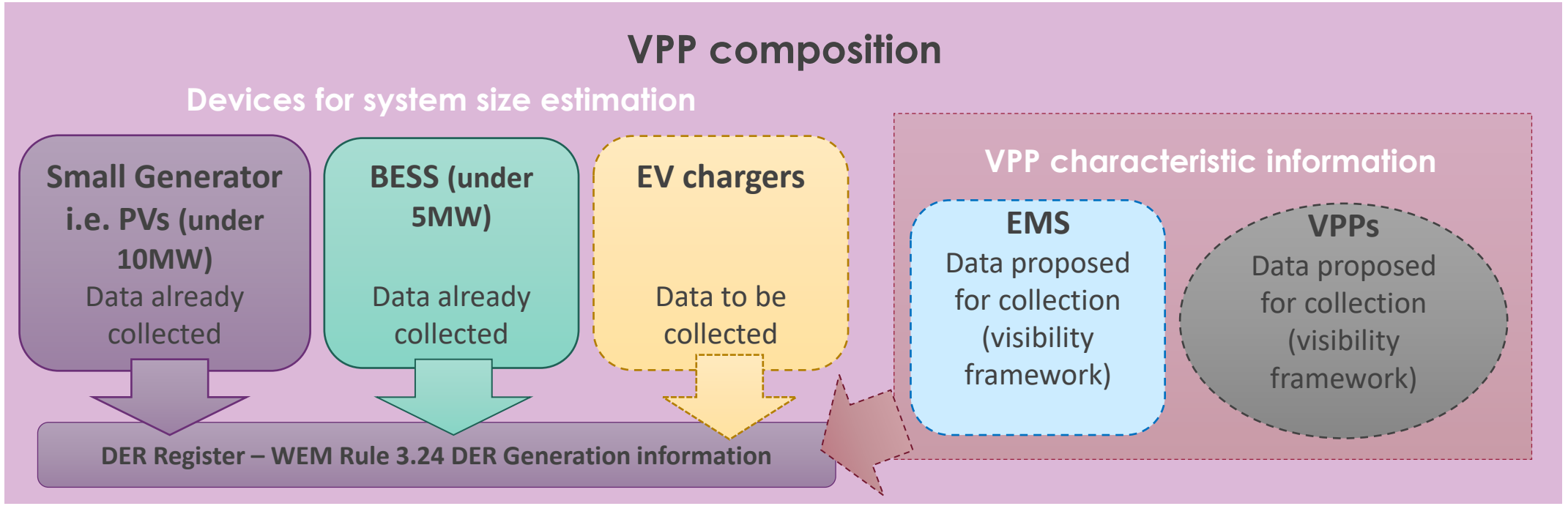
- Provides a common understanding of when a **Rule Participant** must provide ***minimum visibility data*** to AEMO in respect of a collection of distribution system-connected devices that the Rule Participant is operating as a 'VPP'
- Supports AEMO in maintaining system security as off-market arrangements develop at scale and effect material movements of energy
- Clarifies how and when the visibility framework interacts with arrangements under the reformed WEM Rules, supporting transparency for investment decisions
- Mitigates against the setting-up of unregistered aggregations of DER in a way that avoids registration and/or data provision obligations
- Facilitates a transition pathway of a VPP (via its components) to full market participation in WEM services, mitigating design misalignment with WEM arrangements and onerous transitional arrangements
- Provides ongoing visibility of off-market arrangements to AEMO to support its function to keep the system secure

## VPP definition

For the purpose of the VPP Aggregation Guidelines, AEMO's working definition of 'VPP' calls out size, composition, location and centralisation of control

At least 5MW of devices on the *DER Register* situated behind one or more *Transmission Nodes* that are aggregated and centrally controlled by a person via an energy management system

## VPP composition




***Question*: AEMO proposes to expand the DER Register to link DER equipment to any VPP operating it – do stakeholders have a view on this? Who should see VPP characteristic information?**

# Minimum visibility data requirements

***Static data (mandatory)***

- Notification of the existence of the VPP
  - Minimum details on composition, location and size
- Notification that the VPP is providing an off-market service via an unregistered aggregation of DER
  - Minimum details on the type, location and scale of VPP service
  - Minimum contractual information (term of VPP service and how it is deployed)
- Data updated if 'material changes' or as specified in the WEM Rules / Procedure

***Operational data (as relevant and determined necessary by AEMO)***

- Scheduling information sufficient to:
  - enable VPP service's inclusion in AEMO's forecasts (and pre-dispatch process if necessary)
  - ensure no service clashes with ESM, NCESS or PSSR implications
- Data update frequency as specified in the WEM Rules / Procedure i.e. list of NMIs

***Dynamic data (as relevant and available for sharing with AEMO)***

- Advice (in Real Time) that the VPP service has been activated (and deactivated)
- Telemetry or information on VPP service performance

**DER Register data – DER Generation Information**

***Minimum visibility data*** requirements likely to include:

- Notifications – VPP and VPP service
- List of NMIs* – to be checked against DER Register to:
  - Ensure DER devices have met Western Power's connection requirements
  - Validate location of devices wrt to TNIs
  - Understand VPP's technology composition
- List of TNI(s)
- System size estimate
- Details of controlling entity
- Details of the EMS*
- VPP service details
  - Minimum details
  - Scheduling information*
- Updates
- Dynamic data, as necessary

**How obligations to provide *minimum visibility data* could be applied under WEM Rules**

**Immediate term:** Informal arrangements and/or amendments to PASA requirements

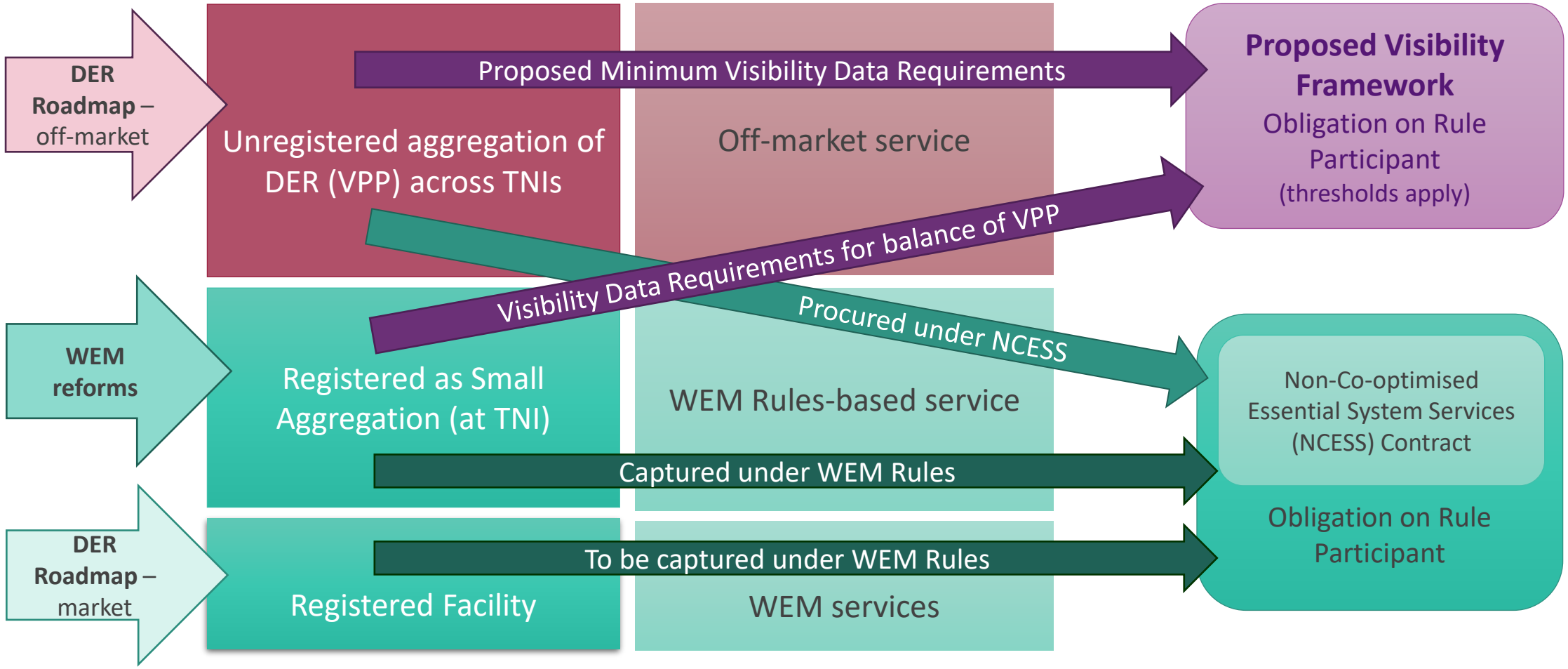
**Under reformed rules:** Potentially a new procedure (data subject to update where there are material changes) and/or revised WEM rules -

- **Static data -** as specified as Standing Data in Appendix 1
- **Operational data -** as specified in WEM Procedure for ST and MT PASA - subject to update as specified in the WEM Rules; or as specified in NCESS contract
- **Dynamic data -** as specified in NCESS contract or otherwise agreed by AEMO and Rule Participant

***Proposed not for public disclosure**

***Questions*: Are the minimum visibility data requirements reasonable and sufficient? What should be provided as part of market data? What data should be confidential?**

# DER participation and interaction with visibility arrangements



# Visibility information – potential uses

- Ensure viability of ESM where DER resources are 'shared'
- Avoid clashes with market services and services procured via NCESS with off-market services
- Facilitate inputs to forecasting and operational planning
- Input to the market-information dashboard
- Inform the development of the WEM ESOO and WoSP (i.e. SWIS generation-mix)
- Facilitate alignment with standards (communications and inter-operability) and inform future alignment/changes
- Inform any requirement for, and design of, future arrangements for performance, compliance and enforcement
- Support on-going visibility arrangements:
  - Determine thresholds at which minimum visibility data requirements apply to a VPP
  - Determine thresholds for registration of a VPP component (i.e. as a Small Aggregation)
- Inform the development of future market participation models for registered aggregations of DER
  - Appropriate registration nomenclature for aggregations of DER participating in the WEM
  - Access to existing or new WEM services

***Question*: Are there other uses for the minimum visibility data?**

# Next steps

- AEMO welcomes stakeholder feedback on this presentation, feedback can be provided to AEMO via WADERProgram@aemo.com.au
- AEMO will work with Rule Participants to develop the interim visibility arrangements that will apply until New Market start, and the on-going arrangements, and seek stakeholder views
- AEMO to consider stakeholder feedback to support drafting of the VPP Aggregation Guidelines – Q4 2022

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# Project Symphony

**Project Update**

**Cross-organisational system integration test “2B” Review**

**Introduction to Essential System Services Contingency Raise Scenario Testing**

**Bruce Redmond, Project Symphony Product Owner**

**Jean-Philippe Montandon, Principal Analyst - DER Market Systems**

**Andrei Costache, Market Analyst DER**

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

# Project Symphony – AEMO's Vision and Product Goals

**Vision**

***To build a future where DER competitively participates to provide services to the WEM and to the network.***

- ***Deliver the systems and processes to create the opportunity for all small scale 'behind the meter' devices – such as solar PV, batteries and controllable load – to support the SWIS and participate in the WEM.***

- ***In achieving this DER will become an integrated part of the SWIS and WEM. DER devices and equipment will provide the technical capability to allow Western Australia to increase the use of these resources as a foundational component of the energy mix.***

- **Product Goal 1: *Build*** a pilot DER Orchestration platform …
- **Product Goal 2: *Test*** the ability for DER Aggregators to interact with AEMO (via the DER Orchestration platform) …
- **Product Goal 3: *Enable*** AEMO to develop the services that will enable DER Aggregators to participate in the WEM…
- **Product Goal 4: *Develop*** technical and policy solutions aimed at enabling the future implementation of AEMO's role in DER Orchestration as the market operator and system manager…

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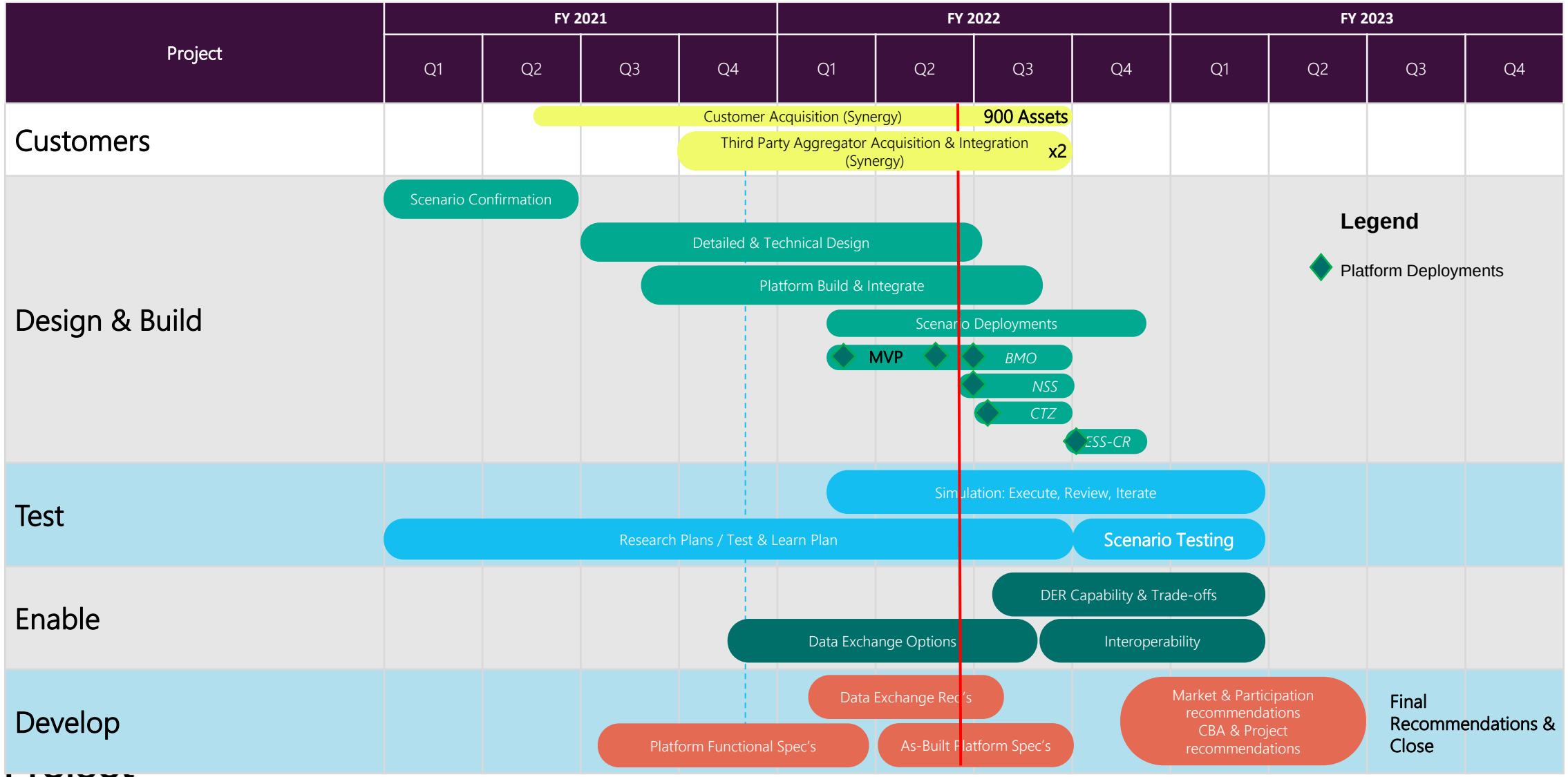
# Project Symphony: Where are we at?

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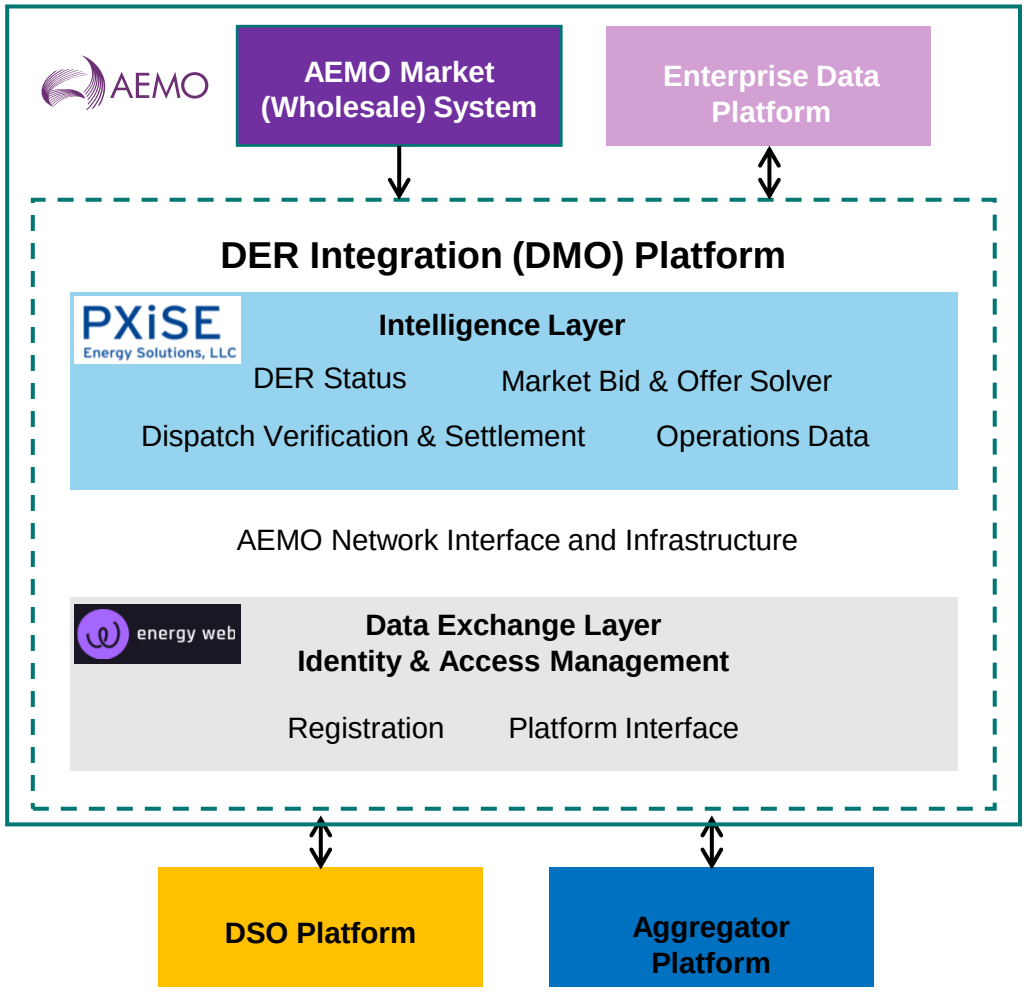
# Market Platform: What we are building




**Reporting & Analysis**

**EDP Model**
- Visuals & Tables
- Dashboard and Reporting

**Platform Functionality**

**Market Scenario's**
- Balancing Market – Bi-directional
- Networks Services
- Constrain to Zero
- ESS-CR

**Dashboard UI**

**Capability & Automation**

Scalability
Performance
Capability

**Platform Integrations**

UI – Upload & Download
API-API

In Progress Complete

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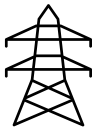
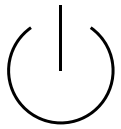
# Project Symphony – Test scenarios

Balancing (Bi-Directional) Market



Network Services



Constrain to Zero

Contingency Raise

**Energy Services - Bi-Directional - Balancing Market Offer (BMO):** Offering (Sell) or bidding (Buy) energy into the balancing market, issuing, receiving & responding to dispatch instructions and settlement to determine the most economically efficient dispatch of generation to meet system electricity demand at a given time.

**Network Support Services:** a contracted service provided by a DER aggregator to help manage network constraints such as distribution level peak demand or reverse power flow and/or voltage issues as identified by the Distribution System Operator (DSO).

**Constrain to Zero:** AEMO dispatches an instruction to the Aggregator to constrain energy output from DER to zero export (net) or zero output (gross). This could be offered as a market service, or incorporated into normal dispatch arrangements if customers are remunerated appropriately.

**Essential System Services (ESS) Contingency Raise:** Market provision of a response to a locally detected frequency deviation to help restore network frequency to an acceptable level in case of a contingency event (such as the loss of a large generator).

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# Phase 2 BMO Test Results

In May, Project Symphony conducted its second cross-organisational system integration test (X-SIT) centred around Scenario 1 – Energy Services Bi-Directional (BMO).

The test was undertaken by three project participants: Western Power as the distribution service operator, AEMO as the market operator and Synergy as the aggregator.

We tested each integration in isolation and organised them into a logical run orders to simulate end-to-end scenarios, which the BMO solution would be expected to achieve on a daily basis during the upcoming stability period.

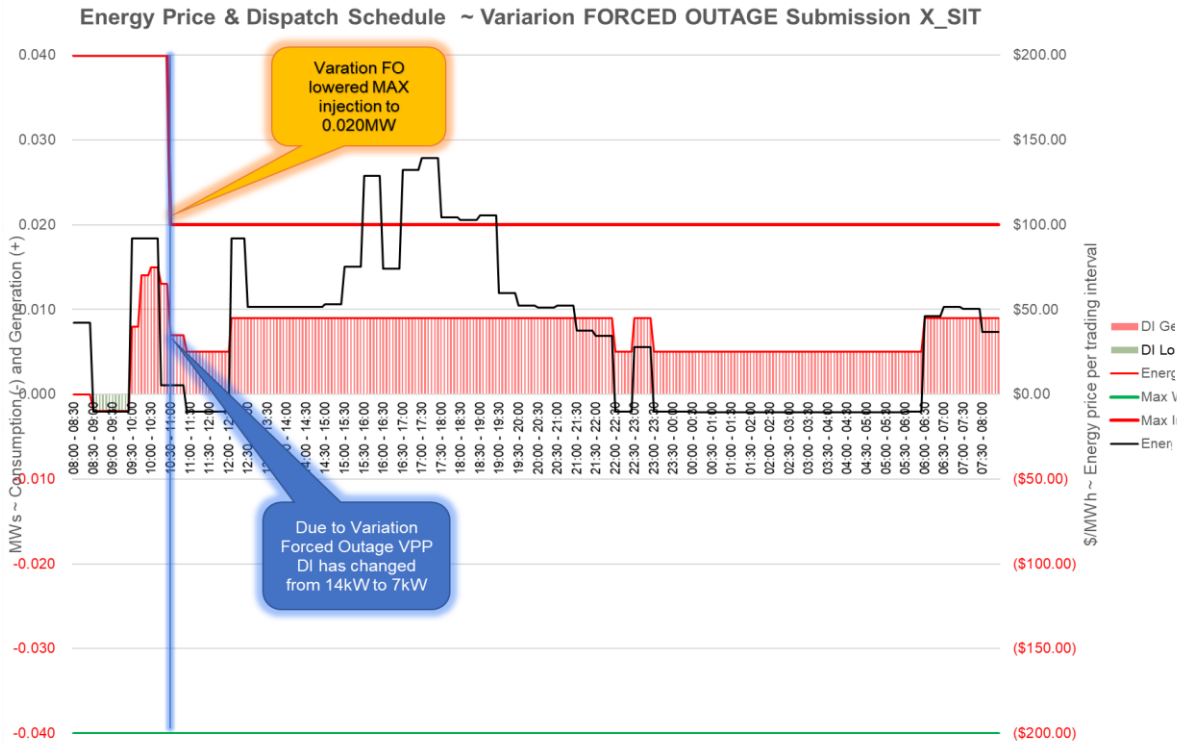
**The high-level objectives of testing were:**

- increase automation of DER platform integration, and
- increased functional capability
  - variations of RTMS integrated bid and offer (“BOFFERs”) & Market Price
- observe behaviour of DERs in terms of DOE compliance and Dispatch Instruction conformance over an extended periods.

# Example of the E2E solution tested in Phase2

Objective of test was to run the scenario shown to the right whilst using 10NMIs, successfully testing the Aggregator capabilities to respond to an updated price change from AEMO and that AEMO was able to pick up on the active RTMS submission and use tranches to calculate the new dispatch instructions.

The E2E test proved that the Aggregator were able to react to market changes and that our vendor platform could create the required dispatch instructions.




| Day 4 (6th May) Scenario | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| AEMO | Synergy | Time AWST | Scenario | Interval | Facility NMIs | BOFFER | DI (MW) | Price $/MWh | Price $/MWh - New @0930 | Price $/MWh - New @1015 |
| | | 830 | | 7 | 10 | | | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 835 | | 8 | 10 | | | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 840 | | 9 | 10 | | | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 845 | | 10 | 10 | | | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 850 | | 11 | 10 | | | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 855 | | 12 | 10 | | | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| Test start Standing Submitted | | 900 | A | 13 | 10 | Standing | -0.002 | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 905 | A | 14 | 10 | Standing | -0.002 | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 910 | A | 15 | 10 | Standing | -0.002 | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 915 | A | 16 | 10 | Standing | -0.002 | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 920 | A | 17 | 10 | Standing | -0.002 | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| | | 925 | A | 18 | 10 | Standing | -0.002 | -$ 10.24 | -$ 10.24 | -$ 10.24 |
| Price Change @ 0926 | | 930 | B | 19 | 10 | Standing | 0.008 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | | 935 | B | 20 | 10 | Standing | 0.008 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | | 940 | B | 21 | 10 | Standing | 0.008 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | Variation Initial Submitted | 945 | B | 22 | 10 | Variation _ Initial | 0.014 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | | 950 | B | 23 | 10 | Variation _ Initial | 0.014 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | | 955 | B | 24 | 10 | Variation _ Initial | 0.014 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | Variation Market Submitted | 1000 | C | 25 | 10 | Variation _ Market | 0.015 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | | 1005 | C | 26 | 10 | Variation _ Market | 0.015 | -$ 10.72 | $ 92.00 | $ 92.00 |
| | | 1010 | C | 27 | 10 | Variation _ Market | 0.015 | -$ 10.72 | $ 92.00 | $ 92.00 |
| Price Change @ 1011 | | 1015 | C | 28 | 10 | Variation _ Market | 0.013 | -$ 10.72 | | $ 5.10 |
| | | 1020 | C | 29 | 10 | Variation _ Market | 0.013 | -$ 10.72 | -$ 92.00 | $ 5.10 |
| | | 1025 | C | 30 | 10 | Variation _ Market | 0.013 | -$ 10.72 | -$ 92.00 | $ 5.10 |
| | Variation FO Submitted | 1030 | D | 31 | 10 | Variation_Forced Outage | 0.007 | -$ 10.72 | -$ 92.00 | $ 5.10 |
| | | 1035 | D | 32 | 10 | Variation_Forced Outage | 0.007 | -$ 10.72 | $ 92.00 | $ 5.10 |
| | | 1040 | D | 33 | 10 | Variation_Forced Outage | 0.007 | -$ 10.72 | $ 92.00 | $ 5.10 |
| | | 1045 | D | 34 | 10 | Variation_Forced Outage | 0.007 | -$ 10.72 | $ 92.00 | $ 5.10 |
| | | 1050 | D | 35 | 10 | Variation_Forced Outage | 0.007 | -$ 10.72 | $ 92.00 | $ 5.10 |
| | | 1055 | D | 36 | 10 | Variation_Forced Outage | 0.005 | -$ 10.72 | -$ 10.72 | -$ 10.72 |

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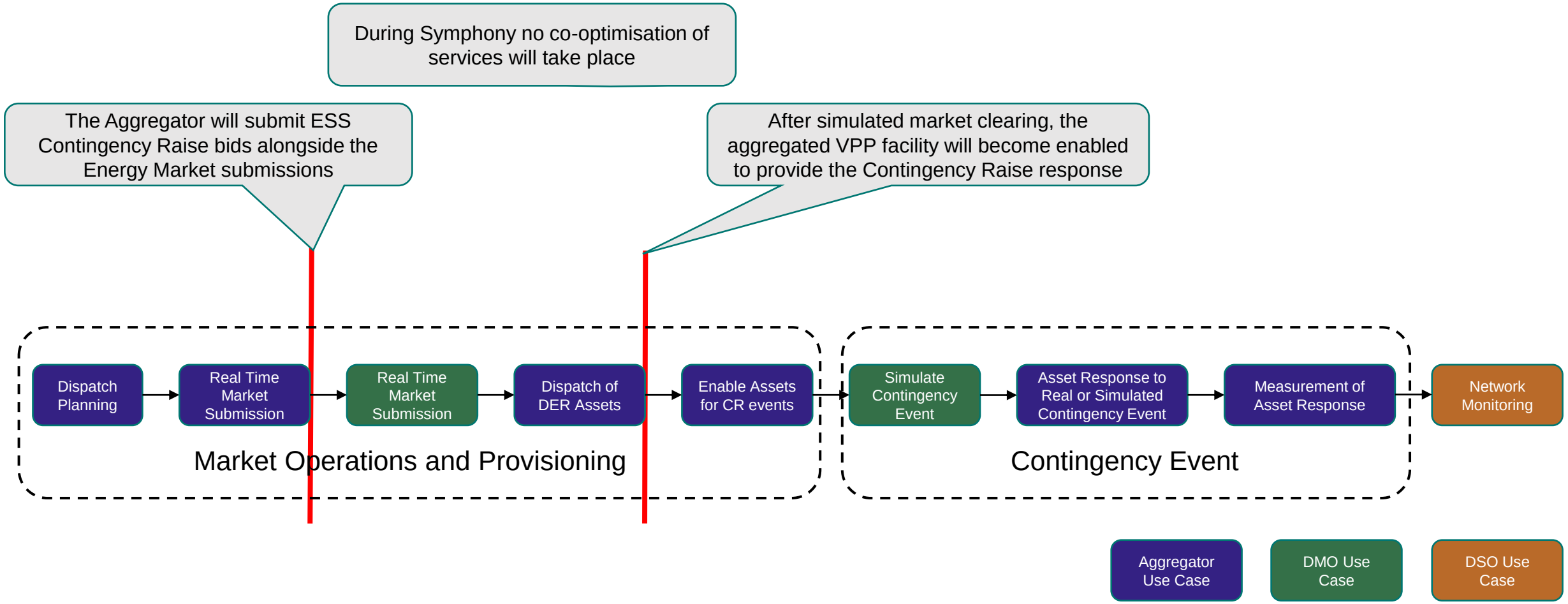
# ESS Contingency Raise Step-through

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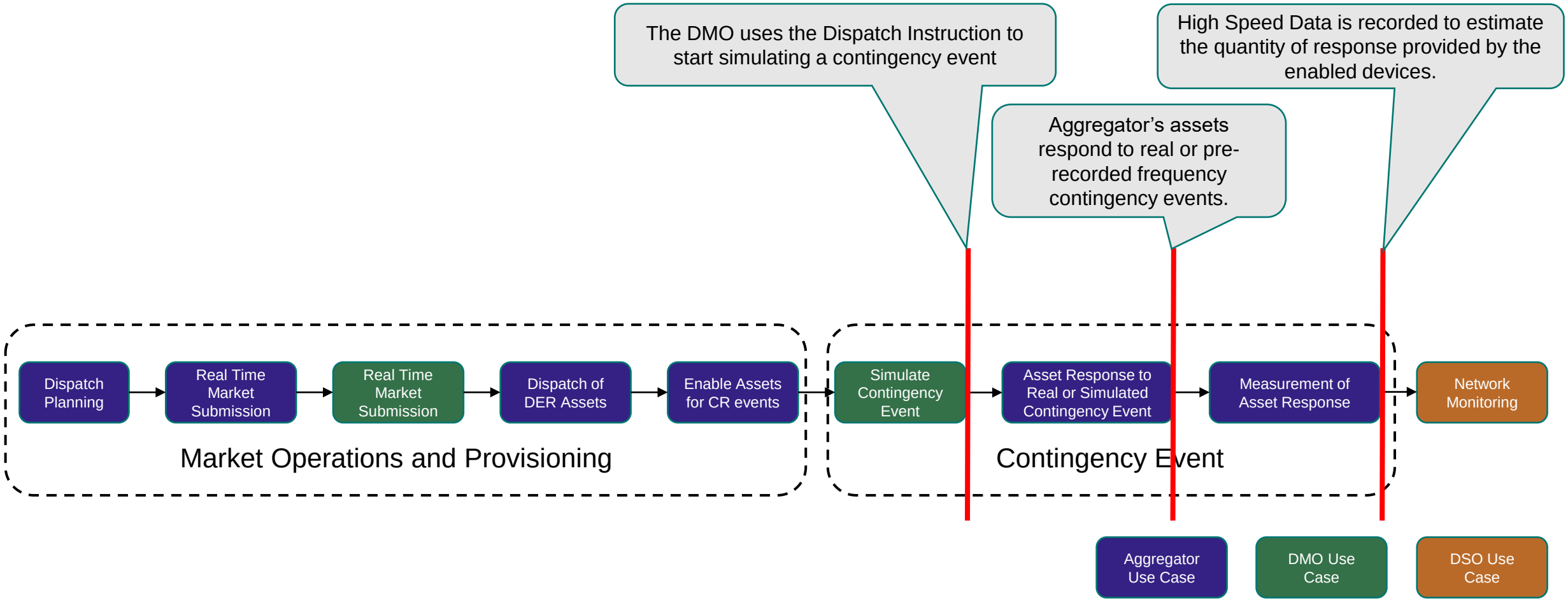
# ESS Contingency Raise (CR) Step-through

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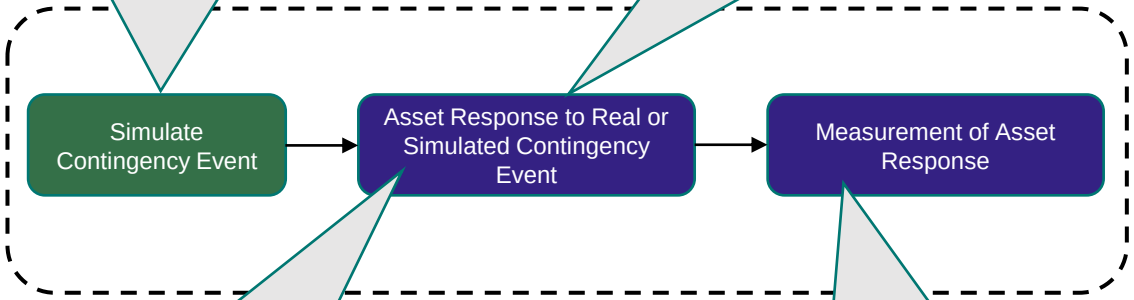
# How do we test ESS-CR?

## Simulate a Contingency Raise event

AEMO will be responsible for receiving and processing the RTMS which will include CR quantities. The Dispatch Instruction then signals the VPP to deliver the offered CR MW quantity.

Aggregator will instruct the VPP controller to respond to a pre-registered frequency event.




## CR enablement throughout the Pilot

While being enabled for ESS CR, the VPP can also respond to credible contingency events.

## Quantifying the Response

High speed data will be recorded at each participating NMI for analysis of the ESS-CR response.

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# WHY are we testing ESS-CR in Project Symphony?

Project Symphony will assess the technical capability of a VPP to participate in the ESS Contingency Raise market which will inform:

| | | |
|---|---|---|
| If VPP's can reliably provide the service. | If the compliance and accreditation process is appropriate for VPP's. | If a VPP is capable of simultaneously providing energy and ESS-CR services. |

The findings will serve to inform future DER participation models in the ESS Contingency Raise market and whether the current framework is appropriate to incentivise VPP's to participate in such market.

Engagement with current and future technology providers is necessary to enable the maturation of technologies which could provide reliable and affordable technical capabilities for VPP's wishing to aggregate devices for participation in the ESS CR market.

**Questions**
*(please add in the Chat):*
1. What are the main challenges you anticipate for VPP's participating in the future ESS-CR service?

2. What would you like to see included in the ESS-CR testing in Symphony?

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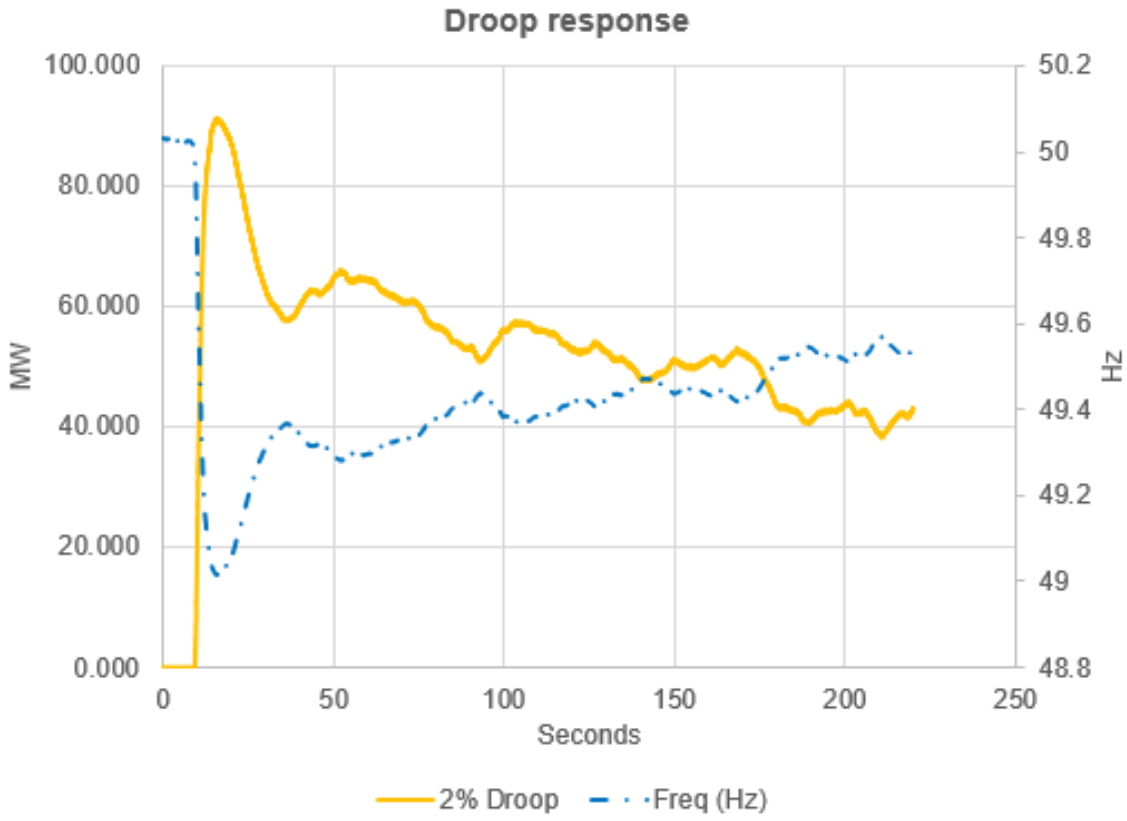
# Ideal Contingency Raise response




$$\Delta P = \frac{\Delta f}{f_{nom} * droop} P_n = \frac{1\ Hz}{50Hz * 0.02} P_n = P_n$$

- $\Delta P$: Change in active power [MW]
- $\Delta f$: Change in frequency [Hz]
- $f_{nom}$: 50 Hz nominal frequency
- $droop$: Droop setting [%]
- $P_n$: Nameplate capacity [MW]

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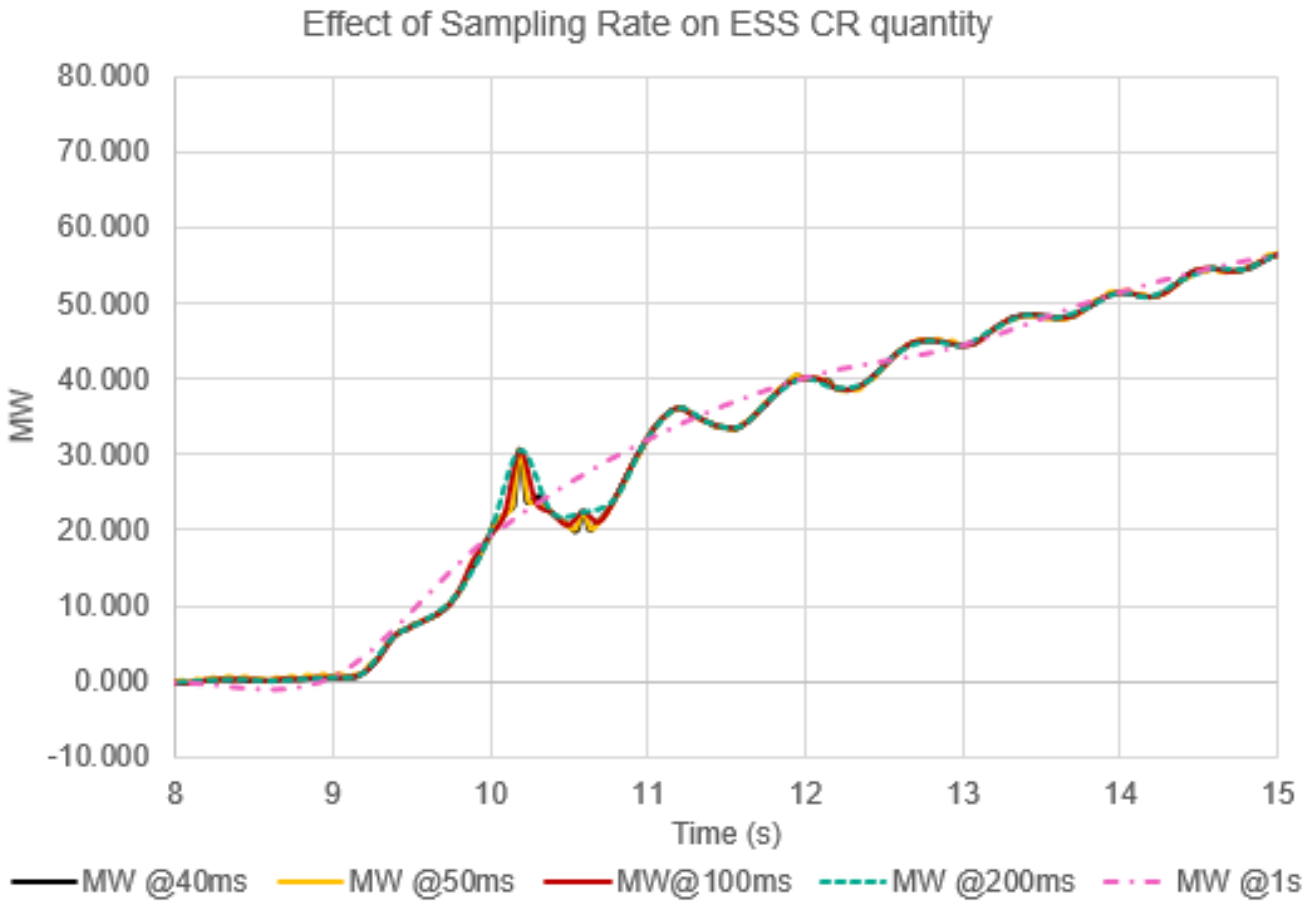
# Sampling Rate effect




Lower resolution results in significant impacts on service measurement accuracy and therefore over/under estimation of the facility's response.

**Conclusion:**

**AEMO has accepted some error based on a 50ms resolution (from 40ms), and requires data from HSRs to verify performance and develop CR requirements for aggregated DER beyond Project Symphony.**

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# High Speed Recorder Compliance: ESS-CR Testing in Symphony

**Quantifying the response**
High speed recorders are required to measure the ESS-CR response at a granularity required for it to be accurately quantified.

The Pilot has defined three categories for HSR devices based on their level of adherence to the **Specifications for High-Resolution Time Synchronised Data Recorders in the** WEM Communications and Control Systems Procedure*:

| HSR Category | Description | Value to Learnings |
|---|---|---|
| WEM Compliant Device | Fully compliant | High |
| Project Compliant Device | High degree of compliance to enable measurement of the ESS-CR response at high granularity | High |
| Non-Compliant Device | Low degree of compliance<br>e.g. OEM Device based measurement | Low |

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*WEM Procedure: Communications And Control Systems v4.0 , Table 9

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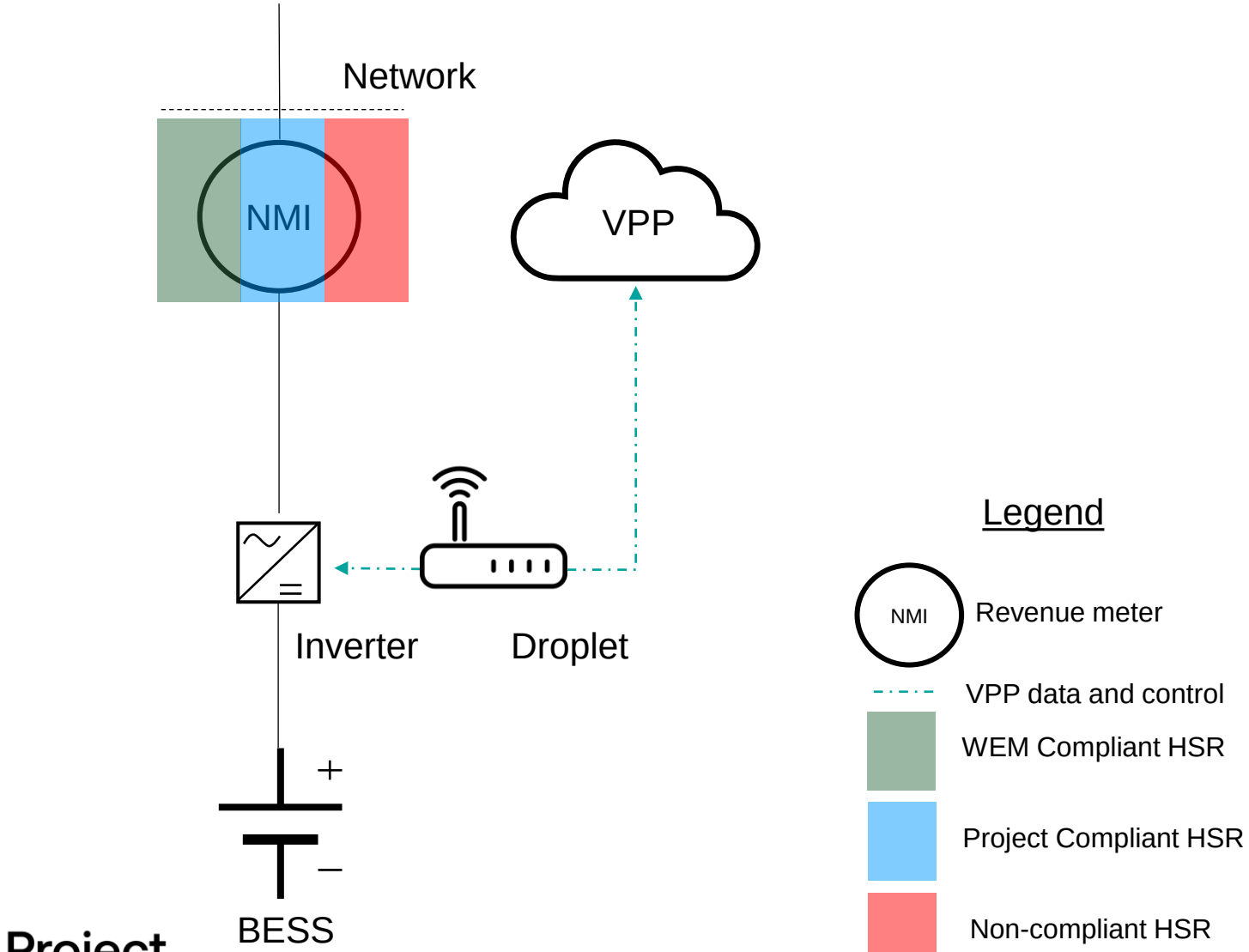
# Calibration - BESS/Tesla Connection Point




Legend

NMI Revenue meter

VPP data and control

WEM Compliant HSR

Project Compliant HSR

Non-compliant HSR

1. The network facing effect of the NSS CR delivered by the BESS/Tesla must be measured at the NMI.
2. The WEM compliant HSR is used to calibrate Project compliant and non-compliant devices using a simulated contingency event.
3. Results from simulated contingency events at the BESS/Tesla connection point during calibration will also inform the ESS CR capacity of the device.

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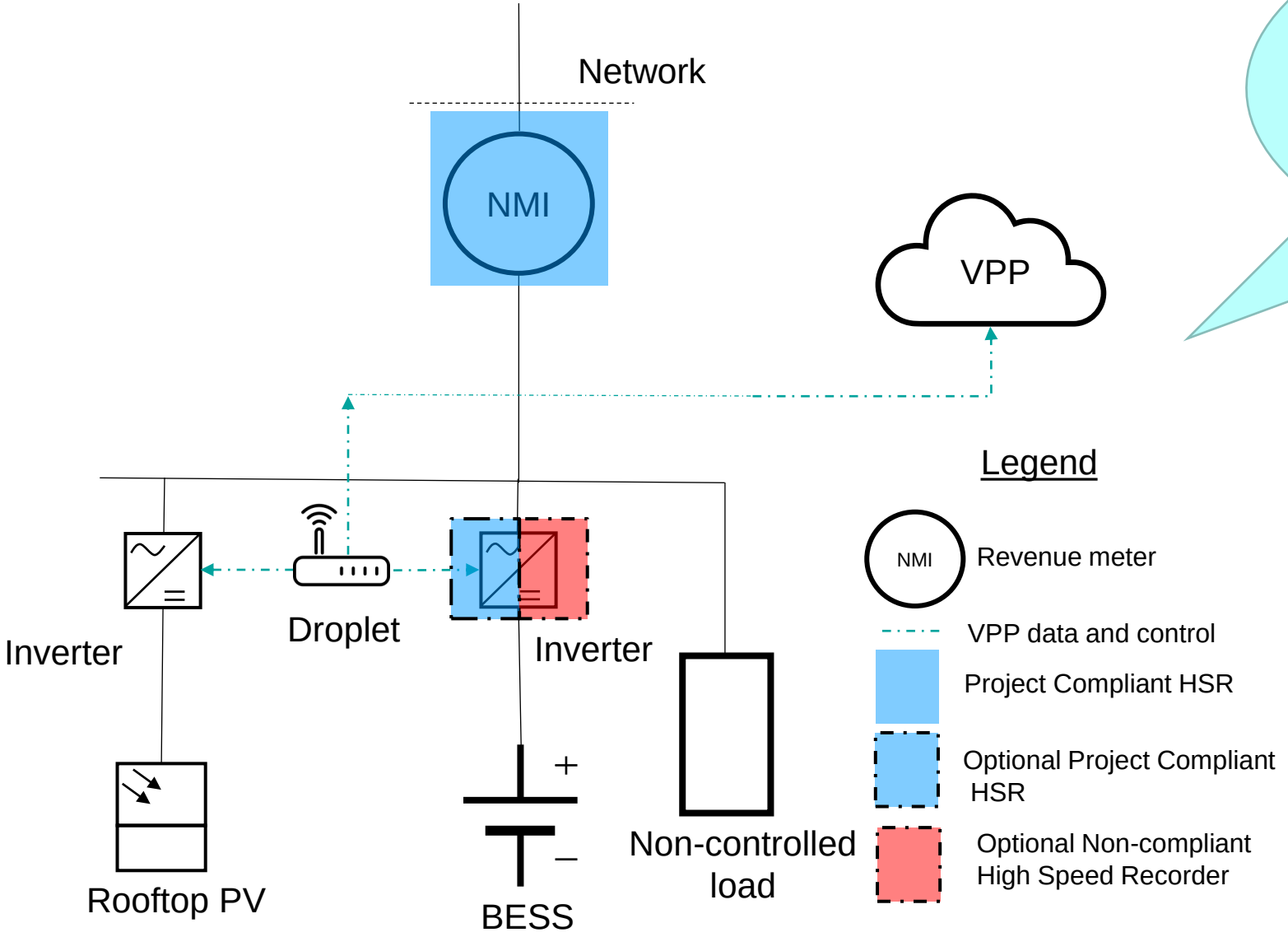
# Residential - Connection Point




**Question**
*(please add in the Chat):*
3. What are your views on the monitoring performance for the ESS-CR service?

1. The network facing effect of the NSS CR delivered by the BESS must be measured at the NMI.
2. Contingency response is captured using a Project compliant HSR.
3. Results from real or simulated contingency events at the connection point will inform the ESS CR capacity.
4. Additional HSRs can be installed at the BESS inverter.

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# Project Symphony Assets for ESS-CR

SNR-540: Southern River

Target Assets: ~150 Batteries totalling ~2MW

**Question**
*(please add in the Chat):*
4. What suggested sample size of BTM batteries should be monitored for ESS-CR?

| Device Type | Qty | Total Power (kW) | Provider | Comment | Proposed HSR Qty | Comment |
|---|---|---|---|---|---|---|
| BTM Residential Battery | 150 | ~700 | Synergy | 5 types of BTM batteries to be installed | 100 | Installed at or close as possible to the NMI<br>Option to install HSR at NMI & Device |
| Commercial BESS | 1 | ~250 | Synergy | BTM | 1 | |
| FoM Battery | 1 | 1,300 | Western Power | FTM | 1+ | Preferred location for Baseline Station |
| Distribution Transformer | 20 | - | Western Power | 3 types of loggers will be trialled for network measurements | | |
| TNI (SNR-540) | 1 | - | Western Power | Existing HSR at TNI (WEM compliant) | | |

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# Project Symphony

## Project Update by Andrew Blaver, Program Manager

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

# Project Symphony

Project Symphony is an exciting and innovative project where **customer distributed energy resources** like rooftop solar, battery energy storage and other major appliances, like air conditioning and pool pumps, will be orchestrated as a virtual power plant to **participate in a future energy market and unlock greater economic and environmental benefits** for customers and the wider community.

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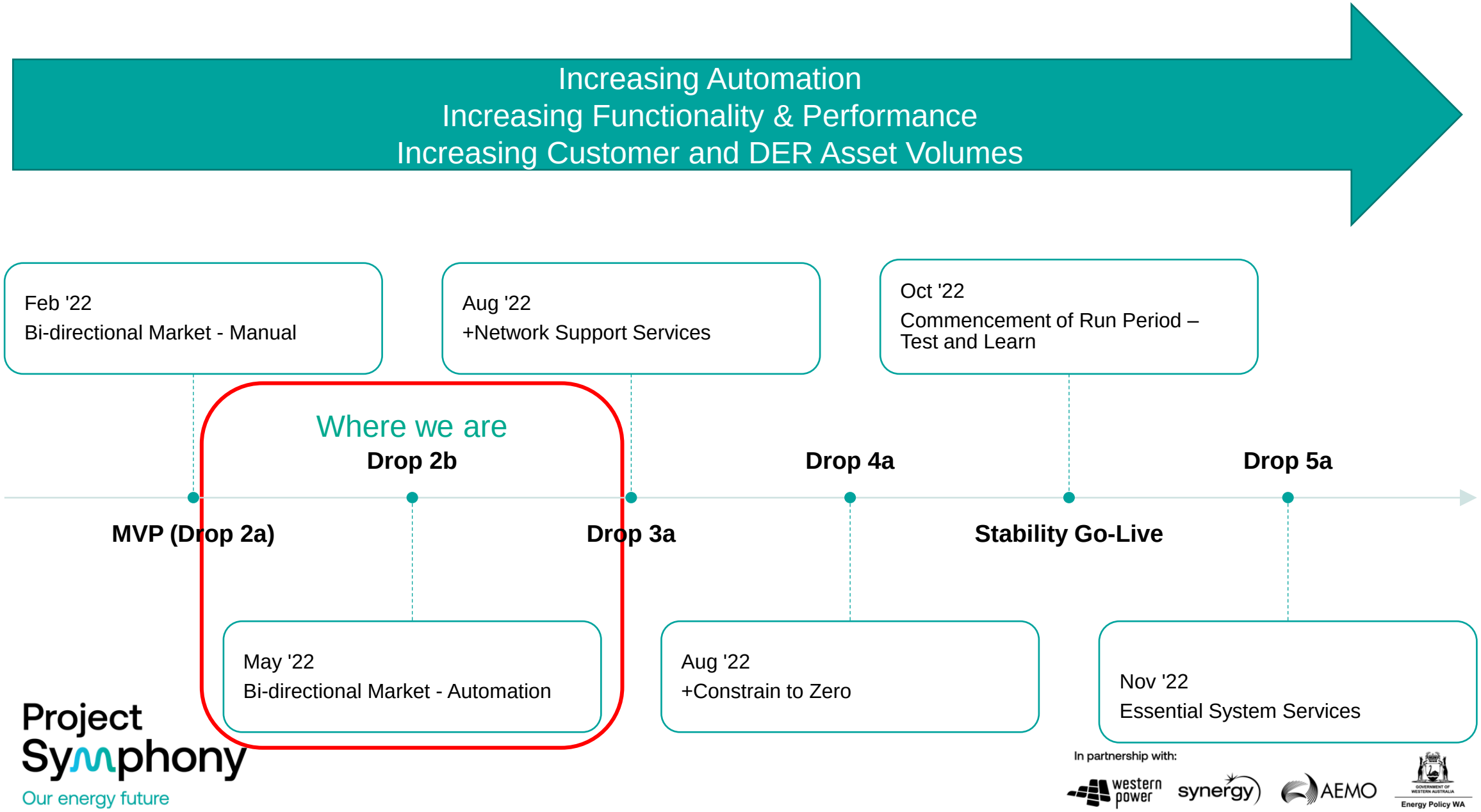
# Roadmap to Stability Go-Live

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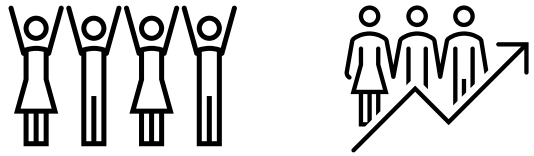
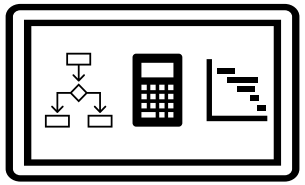
# Project Symphony Success Criteria & Achievements to Date

## Customer participation



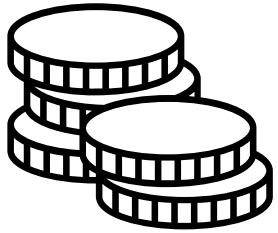
**176/500** participating customers with a combined **495/900** assets

## Technology solutions



DSO, DMO and Aggregator Platforms designed and built.
MVP completed with the first 10 customer assets dispatched to meet an off-market bid.

## Value



**$1.4B**
Potential economic value

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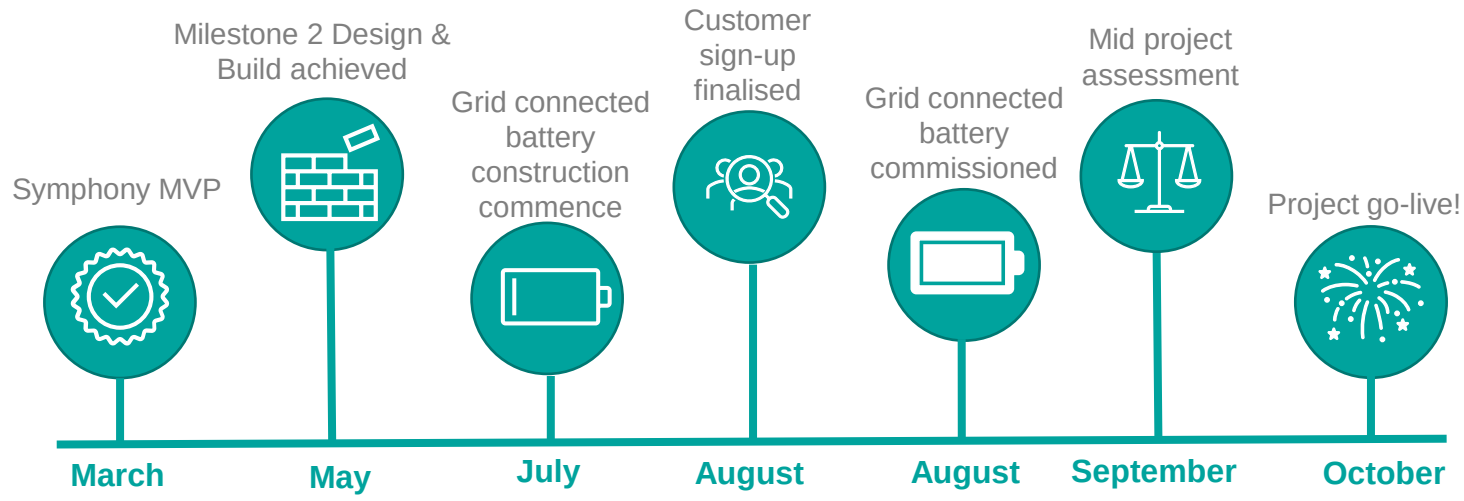
# Project Symphony Milestone Timeline

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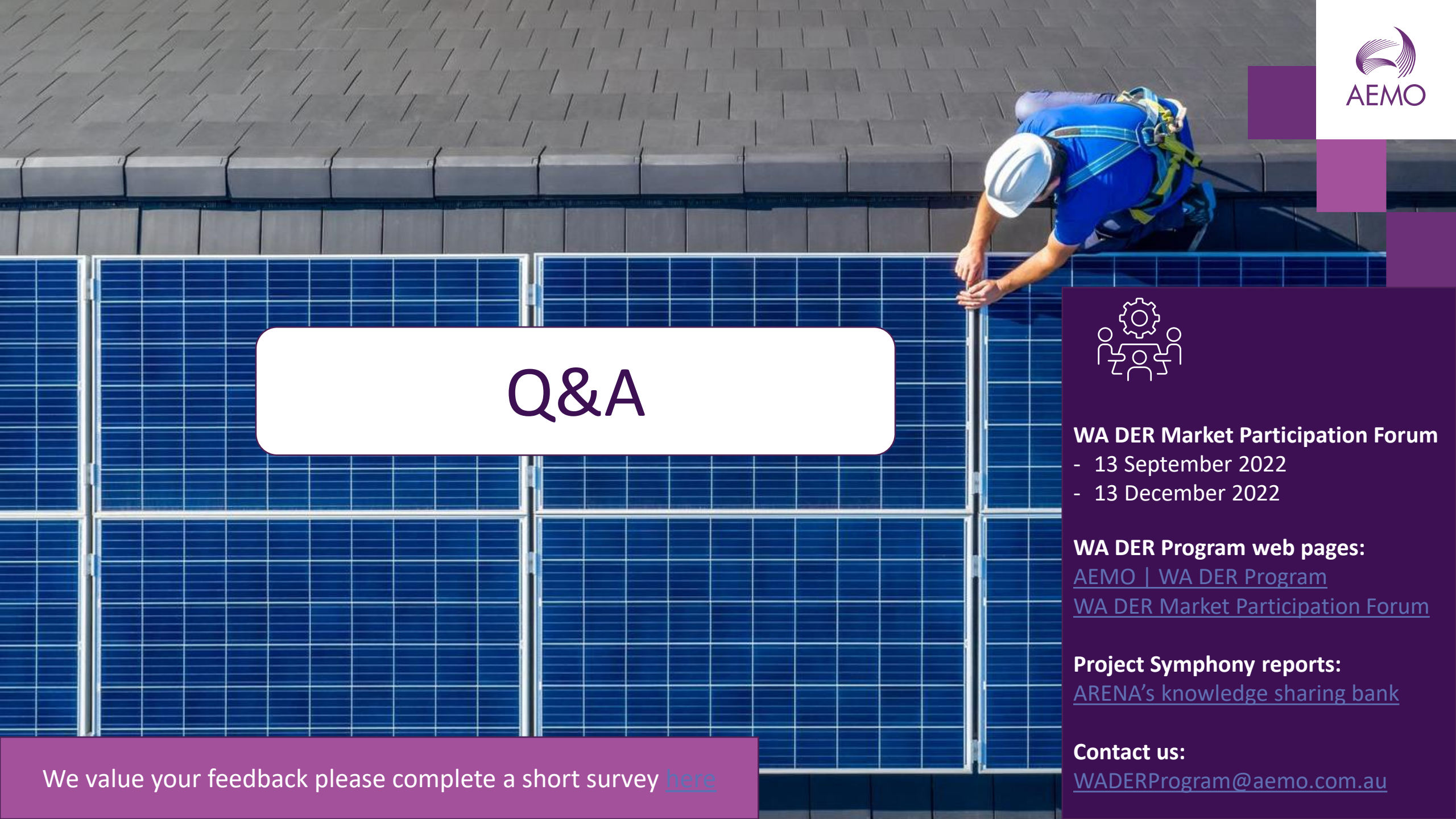

# Q&A

**WA DER Market Participation Forum**
- 13 September 2022
- 13 December 2022

**WA DER Program web pages:**
AEMO | WA DER Program
WA DER Market Participation Forum

**Project Symphony reports:**
ARENA's knowledge sharing bank

**Contact us:**
WADERProgram@aemo.com.au

We value your feedback please complete a short survey here


For more information visit

**aemo.com.au**