



# DER Market Integration Consultative Forum

21 October 2021

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

*We pay our respects to their Elders past,  
present and emerging.*

# AEMO Competition Law Meeting Protocol

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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

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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.

# Today's meeting

Time	Item	Speaker
11:00 – 11:05	Welcome and introductions	Amanda van der Sluys (AEMO)
11:05 – 11:10	NEM registration documentation updates for small battery systems	Adam Gorton (AEMO)
11:10 – 11:35	United Energy – Storage value stacking, demand management, constraints and non-network solution initiatives	Greg Hannan (UE)
11:35 – 11:55	Project EDGE: Data Exchange Model	Jesse Morris (EWF)
11:55 – 12:10	WDR Update	Ruth Guest (AEMO)
12:10 – 12:30	Scheduled Lite Rule Change Overview	Trent Morrow & Liam McManus
12:30	Future meetings & close	Amanda van der Sluys (AEMO)

# NEM registration documentation updates for small battery systems

Adam Gorton  
[AEMO]

# Overview

AEMO has recently updated the [NEM Guide to Generator Exemptions and Classification of Generating Units](#) in relation to small battery systems, with a nameplate rating of less than 5MW.

The guide:

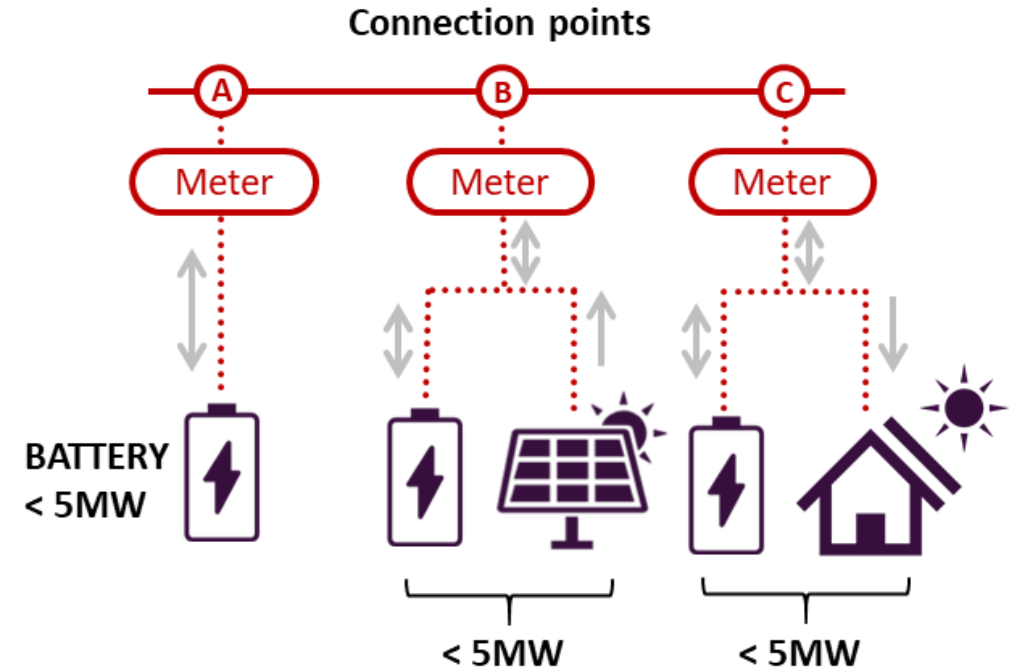
- Now clarifies the circumstances when the electricity consumed from the grid to charge a small battery system intended for subsequent energy production, is treated as a 'market load' or 'auxiliary load'.
- Uses the term 'battery system' in place of 'battery storage facility'.
- Has been updated to clarify a person who owns, controls or operates a generating system with a total nameplate rating of at least 5MW but less than 30MW, that comprises of a small battery system with a nameplate rating of less than 5MW, may apply to AEMO for an exemption from the requirement to register as a Generator.

In line with these guide amendments, the [Registering a Battery System in the NEM – Fact Sheet](#) has been updated and now further outlines AEMO's approach to registration of battery systems and the classification of their connection points in the NEM.

# Registering a Battery System in the NEM – Fact Sheet

Connection points with exempt batteries and a combined generating unit nameplate rating of <5 MW may be classified:

- By a Market Customer as a market load, where the battery either:
  - has a separate connection point,
  - is coupled with another generating unit and imports from the grid at a single connection point or
  - is located 'behind the meter' at a consumer's premises.
- By a Market Small Generation Aggregator as a market generating unit, where the battery:
  - has a separate connection point, or
  - is coupled with another generating unit at a single connection point.



- A. Battery system with a separate connection point (stand-alone facility)
- B. Battery system coupled with another generating unit (hybrid facility)
- C. Battery system located 'behind the meter' at a consumer's premises (battery with consumer load)

For more information about these document amendments please contact AEMO's Registration team via [onboarding@aemo.com.au](mailto:onboarding@aemo.com.au).

# United Energy CitiPower Powercor

## MICF Presentation

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Greg Hannan  
[United Energy]





# Being a Distribution System Operator (DSO) provides new opportunities and risks, with expanded customer and regulatory obligations



What is a DSO?

A **Distribution System Operator or DSO** is the **evolution** of our current obligation of providing safe, affordable and reliable network services to customers, to include providing **network capacity for two-way flows** of energy and managing a system with **highly distributed solar generation, batteries** and **electric vehicles**.



Are we already a DSO?

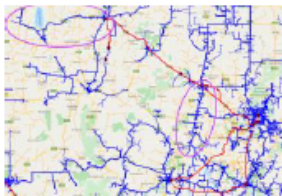
**Yes.** Customer, regulatory, technical and commercial factors **already require us** to develop and deliver DSO capabilities. **We are doing this** through our efforts to facilitate **~ 2 GW of renewable generation, control batteries, actively manage demand** and **procure or provide least cost network services**.



What are we doing?

**Advocating for a larger role for distributors** in the energy transition and the structure of the NEM beyond 2025, **pursuing trials** and **preparing investment plans**.

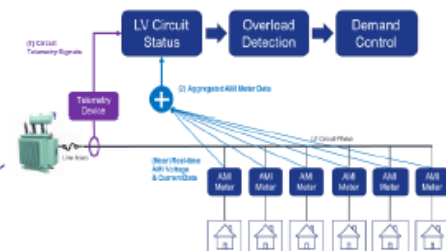
# Current pilots, trials and emerging opportunities



Donald, Tarnagulla microgrid feasibility study



Yarra Energy Foundation community battery MoU / DELWP Neighbourhood Battery Initiative



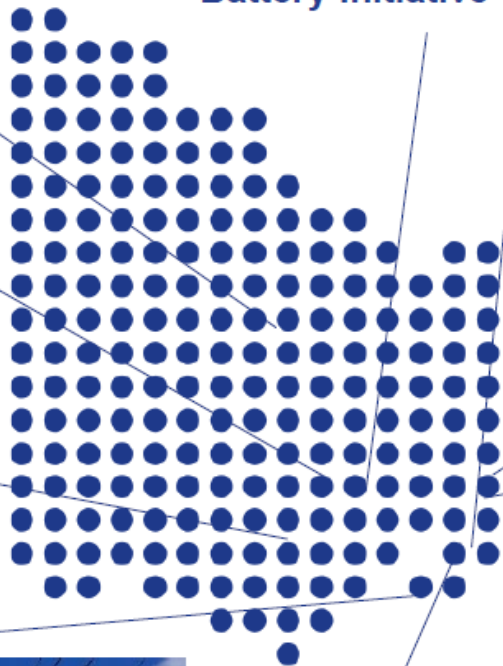
EV tariff trials



EV trial  
Enabling Electric Vehicle friendly networks and neighbourhoods



Tarneit Community Battery Feasibility Studies



Lower Mornington Peninsula Non-Network Solution



“Electric Avenue”  
UE pole-top battery trials  
40 batteries for network support and retailer FCAS

Summer Saver Program  
Expanded into CitiPower/Powercor



**Questions?**

# Project EDGE: Data Exchange Model

Jesse Morris

[EWF]



energy web

**Project EDGE: DER Market Integration Consultative Forum**

20 October 2021



# Energy Web was launched to help energy market participants digitise their systems in order to accelerate decarbonisation

## Energy Web at a glance:

- International nonprofit foundation
- Mission: develop and deploy an open-source operating system in support of a low-carbon energy future
- Est. 2017, founded and spun out of Rocky Mountain Institute
- All EWF software free and open source

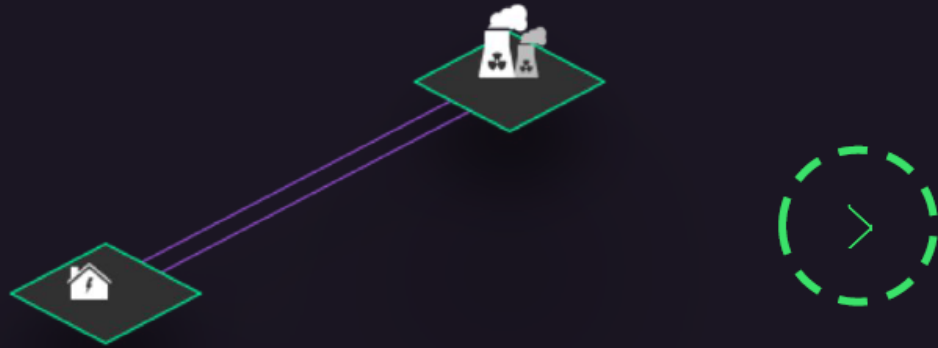




# EWF's primary customers are grid operators and energy market participants from around the world



# The challenge: clean energy assets are not integrated with market participant operating systems. We solve that challenge with open source, digital infrastructure



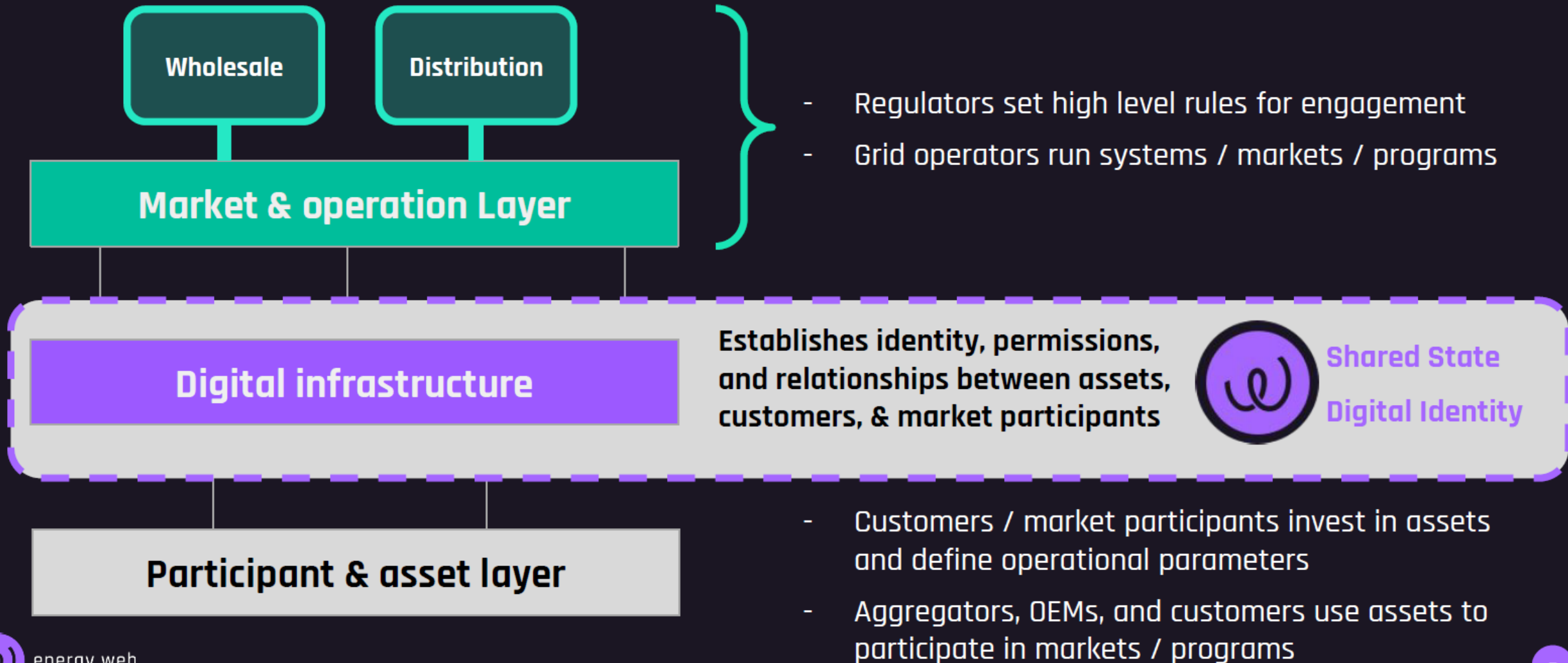
**20<sup>th</sup> Century Model: centralized, top-down registration and operation of a small number of large fossil-fuel assets**



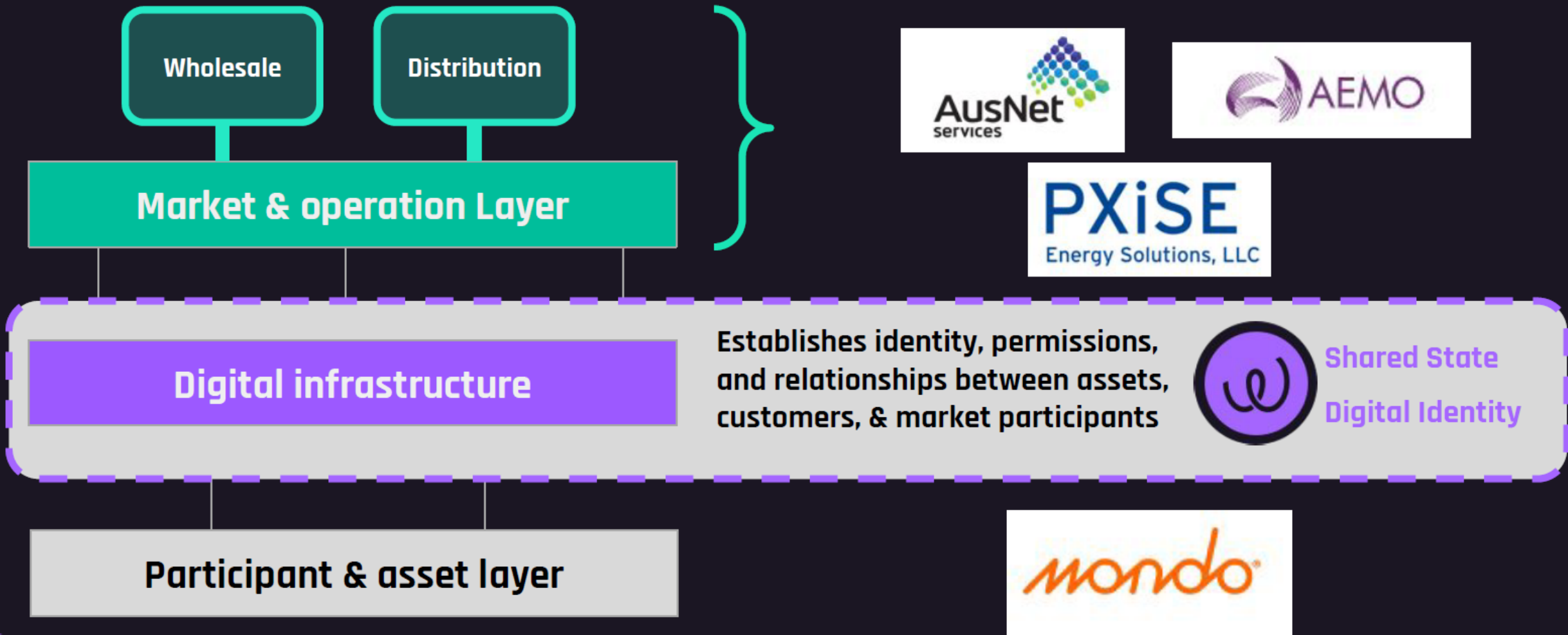
**Energy Web Model: enable any clean energy asset owned by any customer to participate in any energy market - a future where DER is at huge scale, billions of devices, hundreds (or more) of aggregators.**



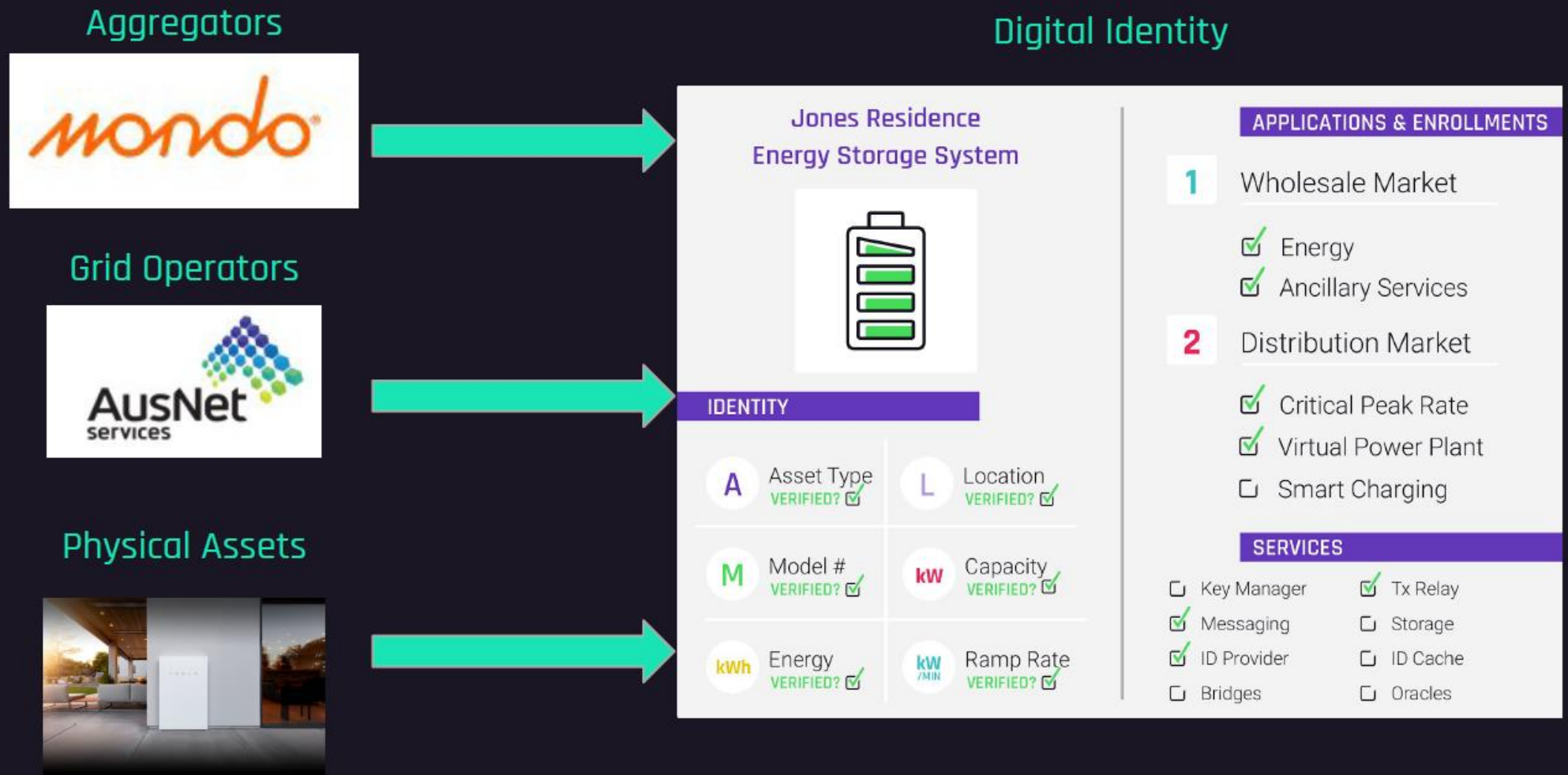
# Our open-source digital infrastructure helps assets, customers, and organizations integrate with grid / market operator systems



# Our approach is focused on increasing grid operator trust in DER and reducing complexity for DNSPs and Aggregators



# To do so, we use “digital identities” that form the basis of all data exchange and market processes



# Digital identities are constructed using a new technology called “decentralized identifiers” (DID)

A DID is a persistent, tamper-proof identity.

Each DID acts as a “portfolio” of information about a given customer, asset, or market participant.

This portfolio can hold technical, locational, relational, and/or historical information.

Each item of information is verified by other actors via cryptographic claims and proofs.

This creates certainty that portfolio contents are accurate.

## Jones Residence Energy Storage System



### IDENTITY

**A** Asset Type  
VERIFIED?

**L** Location  
VERIFIED?

**M** Model #  
VERIFIED?

**kW** Capacity  
VERIFIED?

**kWh** Energy  
VERIFIED?

**kW /MIN** Ramp Rate  
VERIFIED?

### APPLICATIONS & ENROLLMENTS

**1** Wholesale Market

- Energy
- Ancillary Services

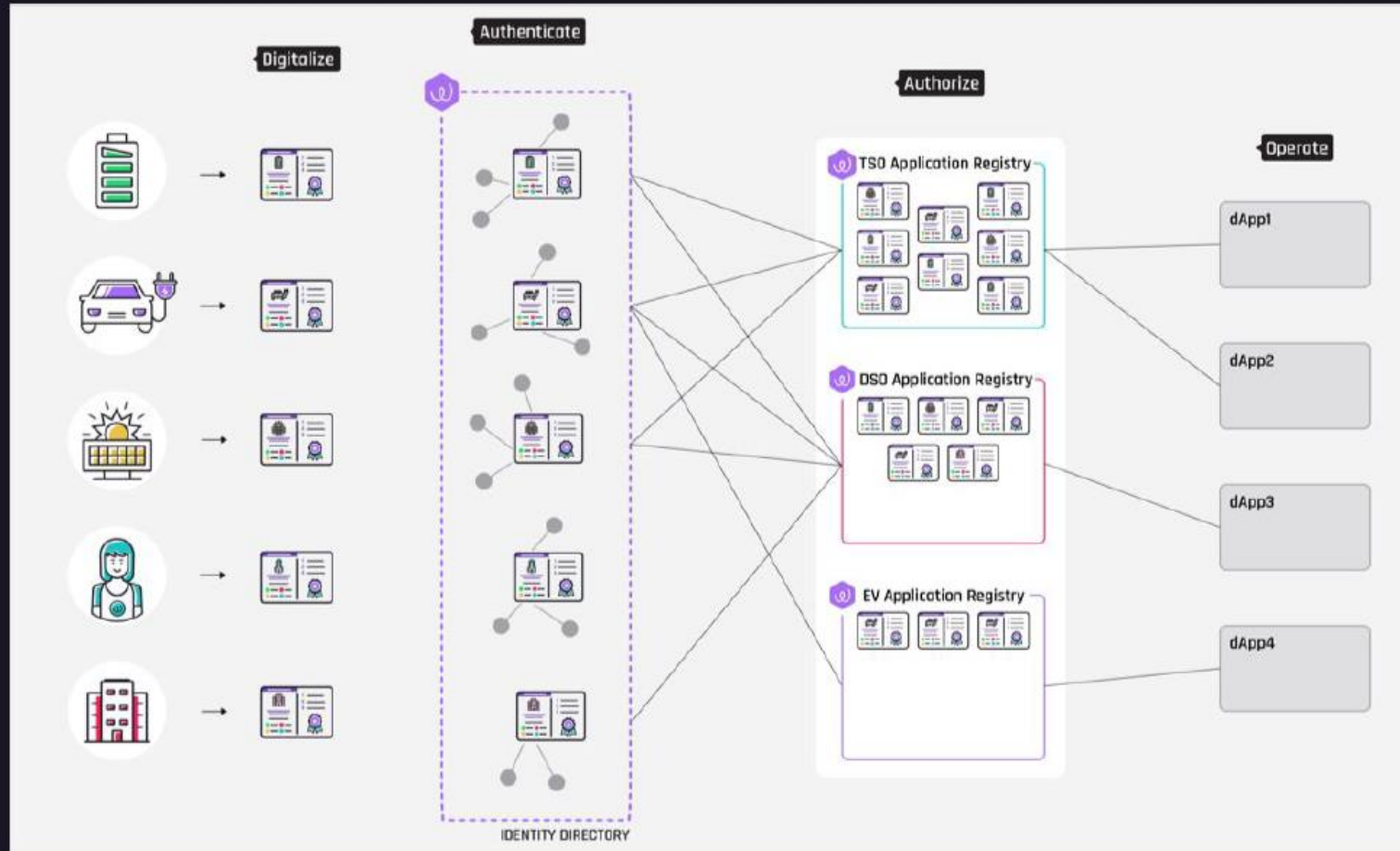
**2** Distribution Market

- Critical Peak Rate
- Virtual Power Plant
- Smart Charging

### SERVICES

- Key Manager
- Messaging
- ID Provider
- Bridges
- Tx Relay
- Storage
- ID Cache
- Oracles

DIDs are permitted to enroll to multiple systems / markets / programs. Single sign-on for energy is a useful analogy.





## The EDGE Project has several objectives

- **Wholesale DER Integration**

- 1. DER participation in wholesale markets at scale
- 2. Distribution network limits in dispatch

- **Local Services Exchange**

- 3. Efficient and scalable trade of Local Network Services

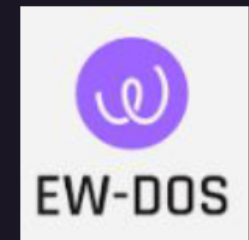
- **Data Exchange**

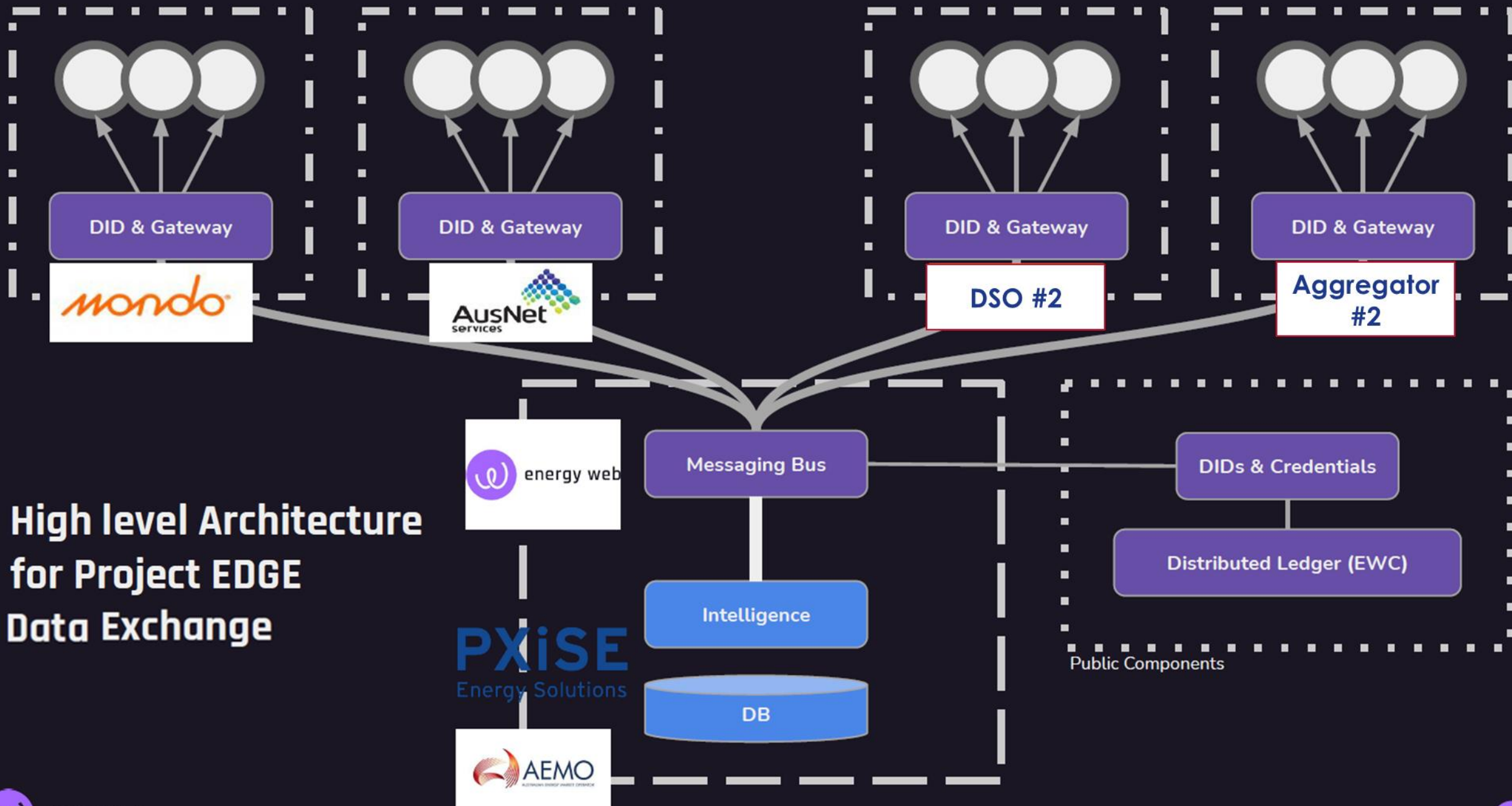
- 4. Efficient and scalable data exchange

5. Integrated technology system

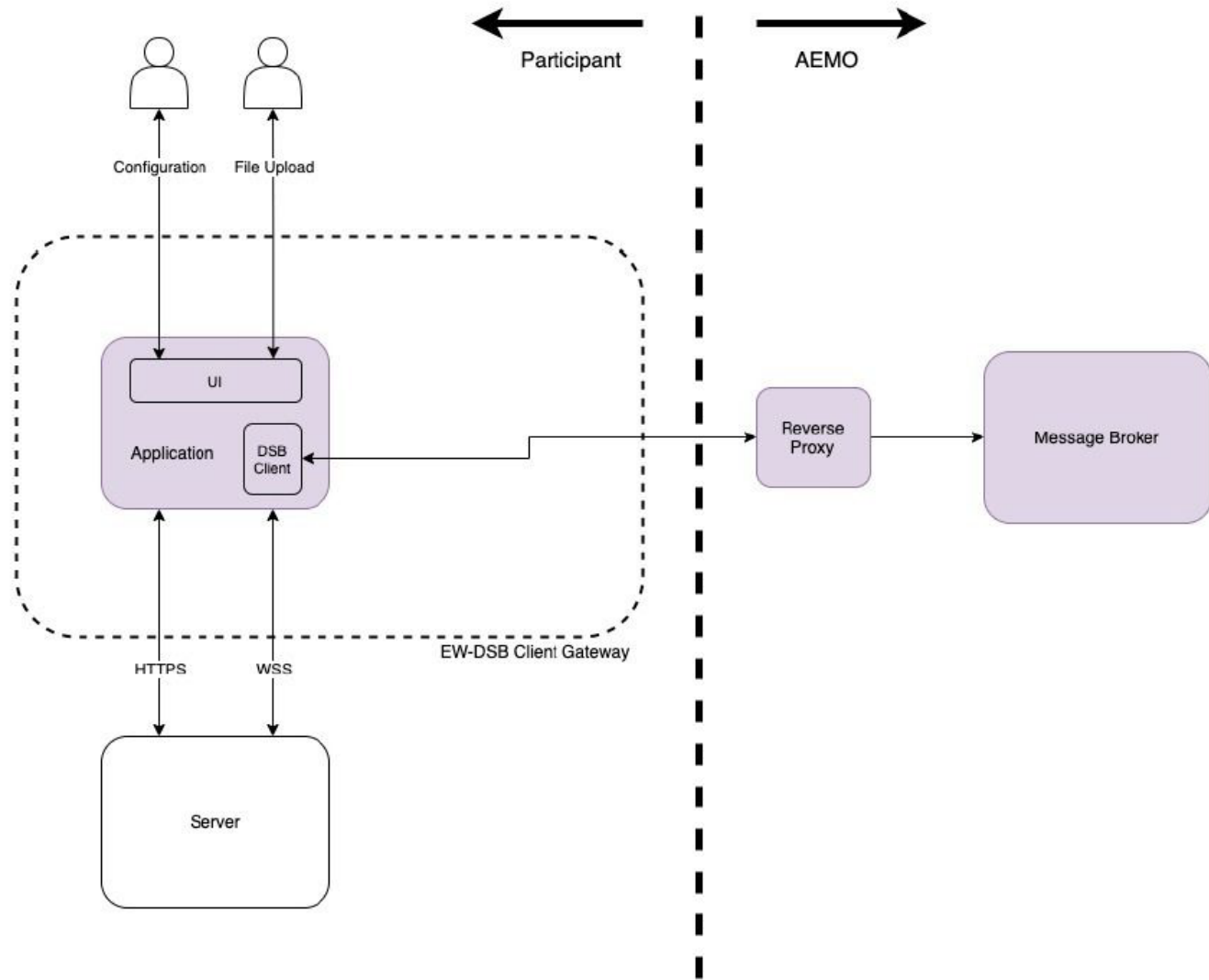
required to facilitate

objectives 1-4





# High level Architecture for Project EDGE Data Exchange



## How we work with Aggregators in EDGE:

- We integrate with Aggregators using a distributed service bus (DSB)
- Unlike other systems, the DSB is designed and implemented to be fully decentralised and scalable
- A DSB gateway is used to abstract the complexity involved in connecting
- Once installed it, exposes:
  - Configuration UI
  - File Upload/Download UI
  - Documentation UI
  - Integration (RESTful/WebSocket/MQTT - endpoints for message exchange)
- The DSB client gateway is an app written in TypeScript and runs on NodeJS. The code is open source and available on GitHub.
- Aggregators deploy the DSB Client (on-premises or cloud) either:
  - Within a docker container
  - In a Kubernetes cluster
- Alternatively, a DSB client SDK can be embedded into existing server applications



## The technology approach we are using can create significant value for DNSPs and Aggregators by:

- Avoiding point-to-point, bespoke integrations between siloed DNSP / AEMO / Aggregator technology systems. Instead, we use **shared, open source, digital infrastructure**
- Addressing current and future requirements around customer data privacy regulation
- Providing near real-time visibility on individual DER (solar, battery, EV, flexible load) deployed on networks

**Shared digital infrastructure = no vendor lock-in, no software licensing obligations,  
complete flexibility on communication protocols**

## The EDGE trial is testing the waters for what a decentralized approach to data exchange can do for Australia

- Beyond providing an Identity and Access Management backbone for the trials, we see significant opportunities for the Energy Web stack to create additional value in Australia:
  - Provide a **shared, cooperative Australian** platform for DER market participation at scale
  - Support Zero Export Limit use cases (at both aggregator and IOT level)
  - Enhance DER register



# Q&A / Discussion





# WDR Update

Ruth Guest  
[AEMO]

# Overview of WDR

- Demand response in the market ahead of a fully integrated 2SM design
- Implement by October 2021 – prior to summer 2021/22
- Design Priorities:
  - Third –party registered participant (demand response service provider, DRSP)
  - WDR capability registered and visible in the market
  - WDR participating in dispatch and pricing through standard bidding and scheduling processes
  - WDR telemetry requirement for system operations and visibility (where large or in congested area)
  - WDR visible to market participants and AEMO (including DNSP)
  - Simple baseline methodology for market start (based on CAISO 10 of 10) with the ability to add further baseline methodologies in 2022.
  - WDR funded by FRMP through AEMO settlement processes
  - WDR integrated in operational forecasting processes (DSPI portal for medium term)
  - WDR performance assessment and compliance based on available data (post-event)

# Delivery – Scope of Change

- Rule made June 2020 following a second draft det. and collaboration on high level design.
- Significant reductions in scope e.g. no causer pays, no MT PASA.

Area	Key artefacts
Registration	<ul style="list-style-type: none"><li>• DRSP registration - capability</li><li>• WDRU classification - eligibility</li><li>• Aggregation and portfolio management</li></ul>
Settlements	<ul style="list-style-type: none"><li>• DRSP and FRMP settlement</li><li>• WDR dispatch event trigger</li><li>• Calculations and reporting</li></ul>
Baselining	<ul style="list-style-type: none"><li>• Eligibility testing</li><li>• Baseline determination</li><li>• Compliance</li></ul>
Prudentials	<ul style="list-style-type: none"><li>• DRSP prudential risk</li><li>• Credit support management</li><li>• Daily assessment</li></ul>
Dispatch and forecasting	<ul style="list-style-type: none"><li>• WDR energy modelled as a response</li><li>• Bidding, dispatch and telemetry</li><li>• Post event compliance</li></ul>
Demand side participation	<ul style="list-style-type: none"><li>• DRSP data requirements</li></ul>
Retail Systems	<ul style="list-style-type: none"><li>• Include DRSP role</li></ul>

**For more information on the AEMC WDR rule change see [here](#).**

# Delivery – Stakeholder Engagement

- Monthly Consultative Group formed
- Significant package of Procedure changes managed

Rules consultation	Engagement
Wholesale Demand Response Guidelines	Power System Data Communication standard
Intervention, Direction and Clause 4.8.9 instructions (SO_OP_3707)	Dispatch (SO_OP_3705)
B2B Procedure: Meter Data Process	Pre-Dispatch (SO_OP_3704)
CATS Procedures	Short Term Reserve Assessment (SO_OP_3703)
Metrology Procedure: Part A	Glossary (SO_OP_2000)
Metrology Procedure: Part B	Load Forecasting (SO_OP_3710)
Service Level Procedure (ENM)	Power System Security Guidelines (SO_OP_3715)
Service Level Procedure (MDP)	Treatment of Dispatchable Loads in the NEM (Guide to Scheduled Load)
Service Level Procedure (MP)	Publication of HistDemand Data - Business Specification
WIGS Procedures	Operation of the Intervention Price Provisions in the NEM
Spot Market Operations Timetable	Standing Data for MSATS
NEM Settlement Estimates Policy	B2B Accreditation and Revocation
Credit Limits Procedures	NMI Procedures
Market Suspension Compensation Methodology	B2B Guide
Demand Side Participation Information Guidelines	B2B Procedure: Technical Delivery Specification
	Settlement Estimation Guide
	Baseline compliance guideline

# Implementation

- Managed around the 5MS project delivery (1 October go live)
- Registration and portfolio management (internal) deployed June '21 in readiness for registration.
- Pre-production deployed w/e 1 October
- Industry testing commenced 5 October for completion w/e 22 October
  - Three large retailers and one DRSP taking part
  - Settlement cycle completed for week 1. Week 2 to include more complex scenarios.
- Production deployment commenced w/e 15 for completion w/e 22 October
- Go / No-Go decision made on Friday 15 October – GO!
- On track to go live 24 October with one registered DRSP
  - Two further organisations have indicated their intent to register this year.

**For more information on WDR, visit: <https://aemo.com.au/en/initiatives/trials-and-initiatives/wholesale-demand-response-mechanism>**



# Scheduled Lite Rule Change Overview

Trent Morrow & Liam McManus  
[AEMO]

# What is Scheduled Lite?

- Voluntary mechanism aimed at lowering barriers and providing incentives for non-scheduled load and generation to provide information and participate in scheduling processes.
- The mechanism will be applicable to loads, aggregated DER and small generators (< 30MW). We expect participation in the market by a trader rather than direct participation of end users.

## **Development of Scheduled Lite mechanism**

- ESB proposed the development of the Scheduled Lite mechanism as part of the DER Implementation Plan.
- The Scheduled Lite mechanism complements the implementation of Flexible Trading Arrangements, aiming to better integrate flexible demand and DER into the NEM.
- AEMO tasked with preparation of a high-level design and submission of rule change request by mid 2022.

# Scheduled Life Objectives

Create a framework to encourage more responsive resources

Reduce barriers to participation

More resources visible to the market, available in dispatch and providing system services should lead to increased competition.

Improve the efficiency of dispatch

Increase participation in scheduling, improve information

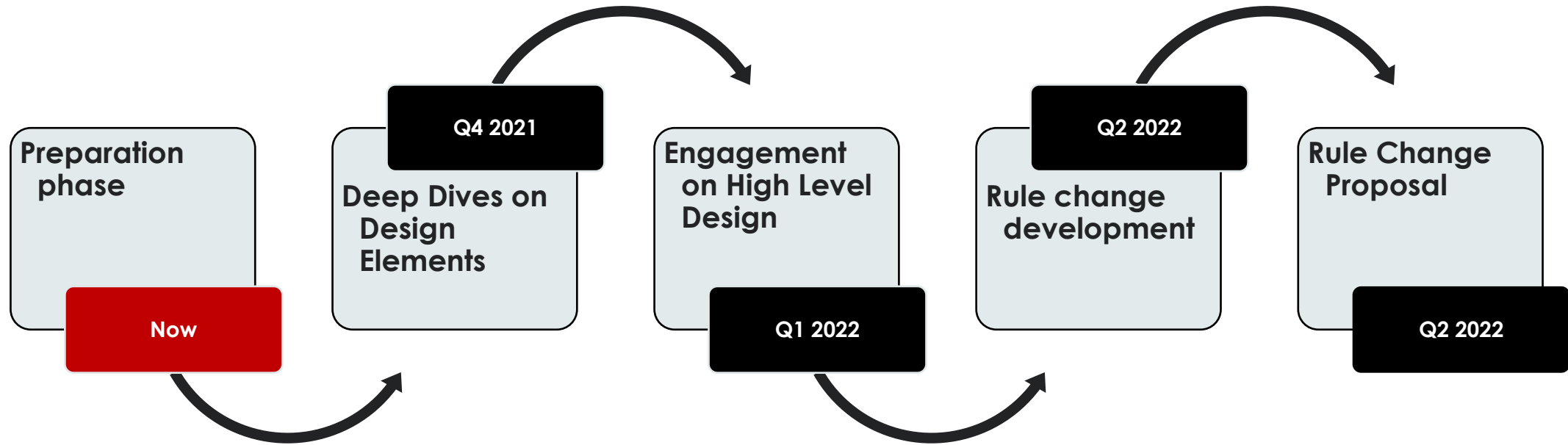
Additional information on likely behaviour or intentions, should improve dispatch outcomes.

Improve efficiency of forecasting and scheduling

Utilise information about price responsive resources in demand forecast

More accurate forecast information and decisions making for AEMO, network operators and market participants.

# Scheduled Life – Timeline and Stakeholder Engagement



- Deep dives will consider key design elements and participation models for flexible demand, aggregated DER and non-scheduled generators (< 30MW).

# Scheduled Life Models

Developing two models for resources to opt into:

**1. *Visibility Model*** will focus on the provision of real-time and forecast information to AEMO for use in forecasting and market scheduling processes. Data may include:

- Real time information
- Forecasts for generation and load
- Indicative prices at which participants will curtail generation and/or demand respond

**2. *Dispatchability Model*** will integrate price responsive load and generation into the NEM dispatch process.

Participants will be able to:

- Provide bids for their consumption and generation
- Receive dispatch targets
- Gain access to potential future markets

# Scheduled Lite Design Element: Registration and Classification

## Key questions to consider:

- What registration categories and classifications will Scheduled Lite participants use?
- What are the processes for registration of a Scheduled Lite asset and/or portfolio of assets?
- What are the hurdles for participation?

### Important use cases

- Aggregators of distributed resources (e.g VPPs)
- Aggregation of flexible demand
- (Large) non-scheduled loads
- Small non-scheduled generators (<30MW)

### Related projects

- Wholesale Demand Response: framework for registering portfolios of assets.
- Integrated Energy Storage Rule Change: future registration model for the NEM.
- Flexible Trading Arrangements: an enabler for separation / aggregation of price responsive resources.

# Scheduled Life Design Element: Forecast Information

## Key questions to consider:

- What information exists and can be made available?
- What additional information can be made available? And at what cost?
- What information is of value to AEMO, the market and network operators?

### Examples of potential data streams

- Static or Standing data – what are the assets and who is responsible for them?
- Real time or near real time information
- Forecasts for generation and/or consumption
- Indicative bids for price responsive generation and/or consumption

### Related projects

- DER Trials i.e. VPPs, Project EDGE, Project Symphony - providing insights into forecasts from DER
- Semi-Scheduled Participant Self-Forecasting – provides an example framework for provision of self-forecasts

# Scheduled Lite Design Element: DER Dispatch Model

## Key questions to consider:

- How do we integrate Dynamic Operating Envelopes into the dispatch of DER? Who manages compliance?
- What is required for integrating Scheduled Lite participants into NEM Dispatch? Aim will be for the same obligations as Scheduled Units to identify barriers to ‘full participation’
- How can FCAS and Energy co-optimisation be implemented for DER Dispatch?

## Use cases

- Dispatching a VPP for Energy
- Co-optimising Energy and FCAS of distributed resources
- Co-optimisation with local or system services

## Related projects

- Project EDGE – learning from DER Trials to inform Dispatch Model
- Wholesale Demand Response – potential to leverage processes developed for WDR



# Scheduled Life Design Element: Incentive and Compliance

## Key questions to consider:

- What incentives would be sufficient to promote participation?
- Where do the incentives flow?
- What compliance arrangement is fit for purpose?

### Examples of incentives

- Reduced RERT costs
- Reduced Regulation FCAS allocation

### Example of compliance arrangements

- Pay for performance
- Minimum requirements / performance

### Related projects

- PFR Incentive Arrangements and Causer Pays changes.
- Wholesale Demand Response: framework for participation.

# Scheduled Life Design Element: Other Design elements

There are additional design elements not covered in greater detail today. These will be covered at a later date:

## Participant Operational Model

- What modes of operation suit the target participants? And what obligations are necessary to ensure AEMO's requirements for Power System Security are met?

## Market Information

- What information would be useful for market participants in managing their risks?

## Integration into Forecast and Security processes

- Can participants provide their own Self-Forecasts and how would AEMO integrate that information into Forecast and Security tools like STPASA?

## Data Exchange

- Is there potential for substantial data sharing arrangements between industry participants to enable Scheduled Life and other initiatives?

## Telemetry

- What is the technology solution for collecting data from distributed resources?

Are there any design elements or use cases that have been missed and should be considered?

# Next Steps – Deep Dive Workshops

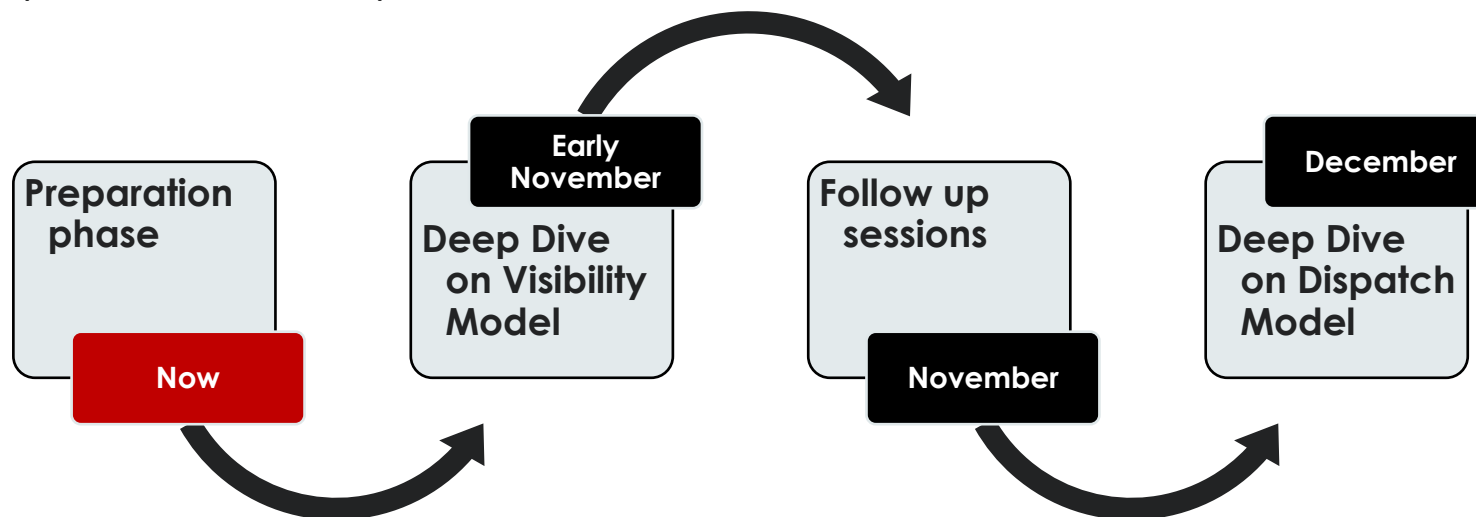
AEMO is planning to hold ‘Deep Dive’ workshops to have detailed discussions on key design elements.

The first workshops will be held in **early November** and will focus on the details of design elements that have the most relevance to the Visibility Model:

- Participation Framework - Identifying key use cases, Identifying barriers to participation
- Forecasting and Real Time Data – Identifying what information can be provided, detailing what information is of value for AEMO

Workshops in **December** will focus on design elements that have the most relevance to the Dispatch Model:

- DER Dispatch Model – How aggregated DER can be integrated into AEMO’s Dispatch Systems
- Incentives and Compliance – What is required for Scheduled Lite to be successful?



# Q&A

- Raise a hand to speak
- Use the Teams chat function

Any other business



# Future Meetings & Close

Next meeting: 18 November 2021

# Future Meetings

## Indicative dates:

- **A poll will be distributed via email to obtain feedback on the best date for the first meeting of 2022.**
- **Future meetings will be scheduled for the same day/time on a monthly basis for the rest of the year.**

## Note:

- Agenda & meeting documents will aim to be provided 5 days prior to meetings.
- Meeting actions will be distributed within 5 days post meetings (as required).
- Non-confidential information will be shared following each meeting.





# Questions & contact

[DERProgram@aemo.com.au](mailto:DERProgram@aemo.com.au)