

# Project EDGE (Energy Demand & Generation Exchange)

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Panel 1: Decentralization

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#### ARENA ACKNOWLEDGEMENT AND DISCLAIMER

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# Project EDGE | A collaboration between AEMO, AusNet & Mondo





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**Project EDGE** (Energy Demand and Generation Exchange) is a collaboration between the **Australian Energy Market Operator** (AEMO), **AusNet Services** (AusNet) and **Mondo Power** (collectively, the Project Partners), with financial support from the **Australian Renewable Energy Agency** (ARENA).



# The National Electricity Market



### **How the NEM Works**

- The National Electricity Market (NEM) Operates one of the world longest interconnected power systems, a distance of around 5,000 kilometres.
- The NEM spans Australia's eastern and south-eastern coasts and comprises of **five** interconnected states that also act as price regions
- There are over 100 generators and retailers participating in the market, so it's highly competitive and therefore an efficient way of maintaining relatively competitive electricity prices in the wholesale market.



#### **Fast Facts**



There are over 504 registered participants in the NEM, including Market Generators, Transmission Network Service Providers (TNSP), Distribution Network Service Providers (DNSP), and Market Customers.



The NEM commenced operation as a **wholesale spot market** where supply and demand is matched instantaneously in December 1998.



The NEM incorporates around **40,000 km** of transmission lines and cables.



The NEM supplies about **204 terawatt** hours of electricity to businesses and households each year.



\$11.5 billion was traded in the NEM in FY 2020-21.



The NEM supplies approximately 10.7 million customers.



The NEM has a total electricity generating capacity of **65,252** MW (as at December 2021).



The NEM has approximately **14 GW** of distributed solar (as at Dec 2021). Collectively the **largest** generator in the NEM.



## **EDGE** overview

Project EDGE seeks to demonstrate a proof-of-concept DER Marketplace that enables efficient & secure coordination of aggregated DER, and facilitates the delivery of both wholesale and local network services at the grid edge

Target outcome is to provide an evidence base to inform Australia's Post 2025 NEM reforms regarding an efficient DER integration pathway to the benefit of all consumers



### **Project EDGE | Cross-industry collaboration**







### **Supporting Partners**



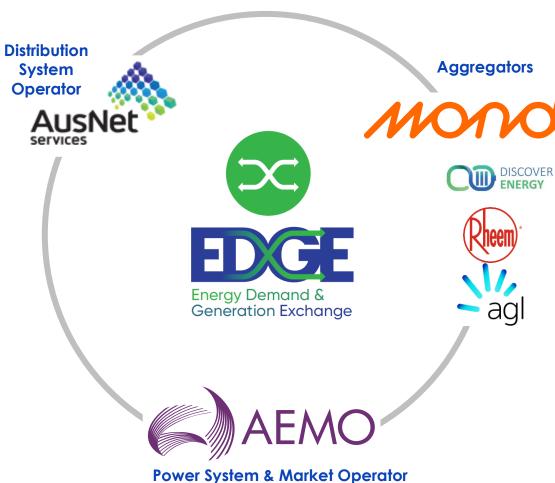


**DSO** capability



Digital identity & data exchange

PXISE
Energy Solutions, LLC
Market logic/intelligence





Networks, Research & Knowledge Sharing



**Customer Insights** 







### Project EDGE – Key functions Overview









# Dynamic Operating Envelope (DOE)

# Bi-directional Offer (BOffer)

### Wholesale Dispatch Instruction

 A dynamic operating envelope provides upper and lower bounds on the import or export power, in a given time interval, for either individual DER assets or a connection point.  Bi-directional Offer means an offer that includes both generation & load across the aggregator's registered portfolio of NMIs. As the trial progresses through various phases the application of BOffers will also go through a progression. Dispatch Instructions are issued by AEMO
to Aggregators for the purpose of
meeting the supply and demand
balance in EDGE by either generating
(i.e. export to grid) or by consuming (i.e.
import from grid) as a DER portfolio









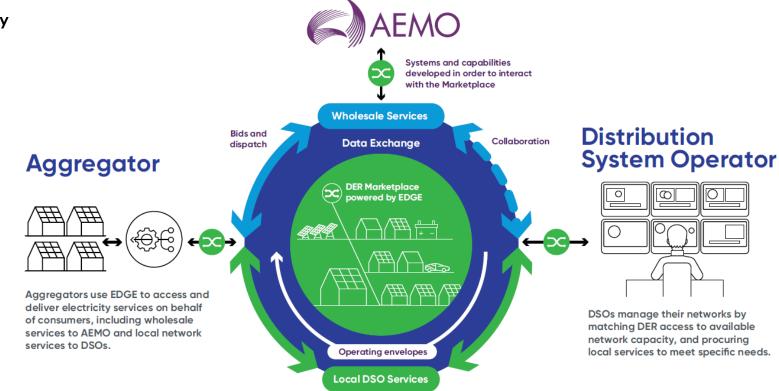


# Project EDGE seeks to demonstrate an efficient model for DER integration at scale

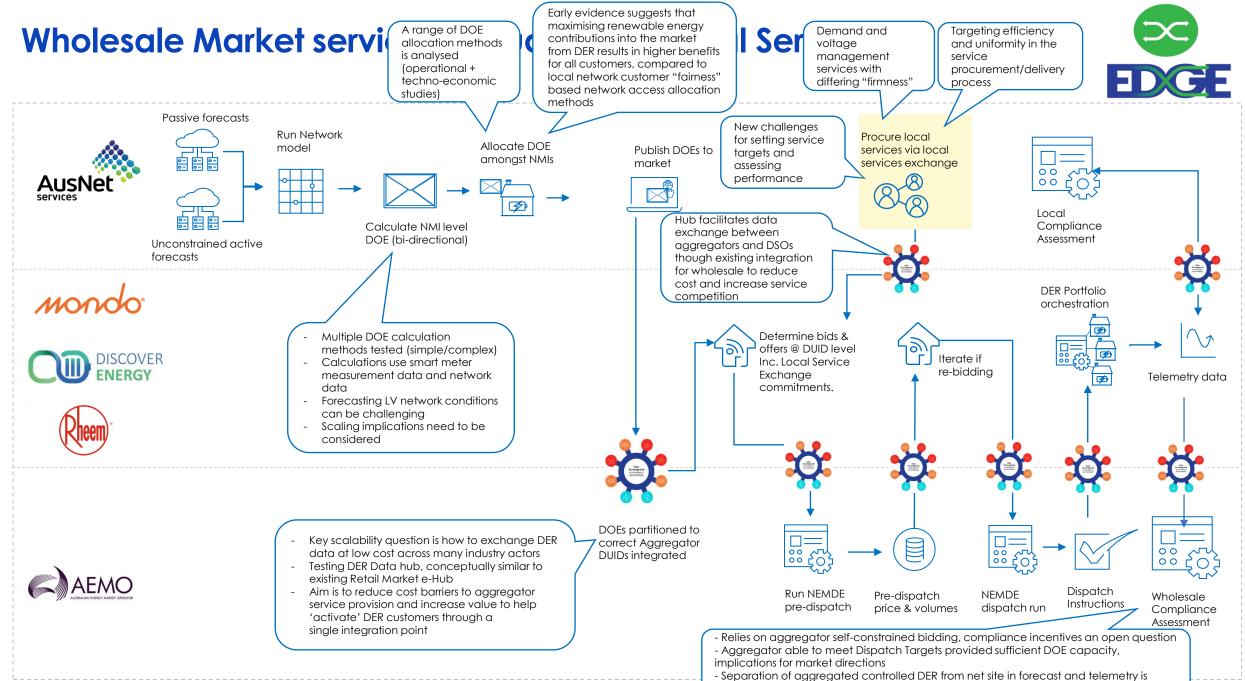


#### Building on the Open Energy Networks Hybrid model

- Building on OpEN with detailed design underpinned by the NEO
- Open and collaborative approach between partners (AEMO, AusNet & Mondo) and industry
- Scientific approach to delivering a robust evidence base and independent CBA



The **DER Marketplace** is not a single, AEMO-run platform or capability. Rather, it is an integrated digital ecosystem that links many systems and capabilities across various industry actors to enable the efficient and scalable exchange of data and services.



critical to analysing VPP behaviour and system operations

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### **Project EDGE Publications**



Publications	Publication Date
Project EDGE CBA Methodology Consultation Paper	July 2022
Project EDGE Public Interim Report	June 2022
Project EDGE Customer Insights Study	June 2022
Project EDGE Research Plan	March 2022
Project EDGE MVP Showcase	December 2021
The National Electricity Market Fact Sheet	November 2021
Project EDGE Lessons Learned Report #1	May 2021
Project EDGE Public Webinar #1	March 2021
Project EDGE Factsheet	January 2021

For further news and knowledge sharing publications, please visit the **Project EDGE Website** 

For any questions, comments or feedback, please contact: EDGE@aemo.com.au



# Thank you!



# Appendix

### **Project EDGE | Timeline**



### Based in Hume region of Victoria

Five Phases, from July 2020 – March 2023

Jul 2020 -Nov 2020

**Phase 1**Project Establishment

Dec 2020 – Oct 2021

Phase 2
Core platform development

Nov 2021 – Apr 2022

Phase 3
Finish Platform &
Capability Testing

May 2022 – Aug 2022

**Phase 4 Scaled**Operational Trials with single Aggregator

Sep 2022 – Mar 2023

Phase 5 Expanded
Operational trials with
multiple Aggregators

Satisfy conditions precedent

Develop plans, and establish governance and project management framework Complete detailed design, and frameworks tested

Build and test platforms and interfaces for all participants

Confirmed customer recruitment locations.

Flexible connection agreements with customers

Knowledge sharing

Demonstrate and test marketplace operation in an off-line capacity, for:

- Data exchange between participants
- Wholesale participation

Knowledge sharing

Operational demonstration of a range of scenarios and distributed system services using live data

Knowledge sharing

Introduce additional Aggregators and Retailers

Cost benefit analysis

Customer insights study

Knowledge sharing & recommendations

We are here

# Project EDGE will test the core functions of a digitised, decentralised power system and market



Project EDGE will test the three key function sets that are vital elements of efficient and scalable DER integration, which are combined in Project EDGE in a concept called the DER Marketplace.

#### 1. DER wholesale integration

Enable large-scale DER portfolios to operate on the grid whilst remaining:

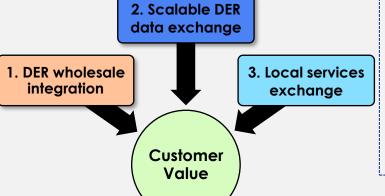
- Within the secure limits of the network
- Visible to the market operator so that it can efficiently coordinate the supply demand balance.

#### Enabled through:

- DNSPs sharing dynamic operating envelopes (DOEs)
- DER portfolios engaging in the wholesale market through visibility and then dispatchability models (Scheduled Lite)

#### 2. Scalable DER data exchange

Harnessing digital technologies to enable secure, efficient, and scalable exchange of vast amounts of data across industry actors



### 3. Local services exchange

Testing how a Local Services Exchange (LSE) digital dashboard could enable efficient and scalable trade of local network services that DNSPs procure from aggregators bilaterally.

DNSPs could develop and use an LSE interface to procure services from DER aggregators as a non-network alternative to augmenting the network. This also enables aggregators to stack value streams efficiently and provide better offers to customers.

To align with the NEO it is critical that Project EDGE identifies how these key functions are in the long-term interests of all customers.

### Project EDGE exists to provide evidence-based insights to benefit all customers.









### We have **three** key pillars that will inform policy decisions to provide value to industry and customers.



#### Research Plan

A detailed research plan has been developed by the University of Melbourne to guide the activities undertaken to ensure the data obtained supports the objectives of the project and can be used as part of an evidence base for change and development of the future energy market and systems.

### Cost Benefit Analysis

The purpose of the CBA for Project EDGE is to identify and analyse whether the implementation of an operational DER marketplace is in the long-term interests of consumers consistent with the NEO. Deloitte Access Economics has been commissioned to conduct the CBA and will also assess under which scenarios adding more complexity and sophistication to the DER marketplace may be justified.

### Customer Insights Study

Together with Deakin University, Project EDGE is running a multi- year consumer study that examines perceptions of, and decision-making around, Virtual Power Plants (VPPs) among potential residential and business customers, and current residential battery owners.

### Evidence generated by Project EDGE is supporting the Energy Security Board's Market Reforms



- The Energy Security Board's (ESB's) Post 2025 National Electricity Market redesign identified that the change in energy consumers' behaviour provides a strong opportunity to develop a two-sided energy market.
- This would result in lower overall system costs for everyone, increase the efficiency of existing network assets, and optimise the utilisation of flexible loads and variable renewable energy.
- The evidence-based approach by Project EDGE will support recommendations that inform policy, regulatory and market decisions relating to reforms needed by industry to operationalise a two-sided market.

