

Project Fact sheet

First ever distributed energy marketplace trial giving Australian consumers the edge

Australia is leading the world in the installation of rooftop solar and has a growing appetite for other Distributed energy resources (DER) including battery storage and electric vehicles.

The energy systems which exist today were designed for the one-way flows of electricity from large-scale generators to consumers.

In order for Australian households and businesses to fully realise the financial and environmental benefits of their DER investments, energy systems and trading frameworks must adapt to facilitate dynamic bi-directional trade and flows of electricity.

What does DER mean?

Distributed energy resources (DER) is the name given to renewable energy units or systems that are commonly located at houses or businesses to provide them with power. Another name for DER is “behind the meter” because the electricity is generated or managed ‘behind’ the electricity meter in the home or business.

Common examples of DER include rooftop solar PV units, battery storage, thermal energy storage, electric vehicles and chargers, smart meters, and home energy management technologies.

What is DER aggregation?

DER aggregation is when a group of Distributed Energy Resources combine their generation output together to operate as a single entity. For example – a single household solar system only generates a very small amount of electricity in comparison to a large power station, however if hundreds or even thousands of households could combine their solar output they could potentially compete with the output of a traditional power station.

Project partners





Project EDGE (Energy Demand & Generation Exchange) seeks to demonstrate a proof of-concept which enables efficient, secure, coordinated DER aggregation, delivering both wholesale and local network support services at the grid edge.

Introduction

Integrating Distributed Energy Resources (DER) at large scale into the National Electricity Market (NEM) is highly complicated as the power system and market frameworks were designed to facilitate the one-way trade and flows of electricity from large-scale generators to consumers.

AEMO, AusNet Services and Mondo are partnering, with support from the Australian Renewable Energy Agency (ARENA), to demonstrate how a Two-Sided Market and power system could work. This builds on the theory explored in the Open Energy Networks process (OpEN), which identified how AEMO and DNSPs could collaborate to deliver a “hybrid model”, shown in Figure 1.

Project EDGE objectives

1. Demonstrate how DER fleets could participate in existing and future wholesale energy markets at scale.
2. Demonstrate different ways to consider distribution network limits in the wholesale dispatch process.
3. Demonstrate how to facilitate standardised, scalable and competitive trade of local network services.
4. Demonstrate how data should be exchanged efficiently and securely between interested parties to support delivery of distributed energy services.
5. Develop a proof of concept, integrated software platform to facilitate delivery of objectives 1-4 in an efficient and scalable way.
6. Develop a detailed understanding of roles and specific responsibilities that each industry actor should play.
7. Conduct comprehensive cost benefit analysis to provide an evidence base for future regulatory decision making.
8. Conduct a customer focused social science study to understand customer opinions on the complexities of DER integration.
9. Deliver best practice stakeholder engagement throughout the project with a commitment to knowledge sharing.
10. Deliver recommendations, supported with evidence, on how and when the concepts demonstrated should be implemented operationally.

Project timeline and milestones

1.

Project Inception

Q4 2020

2.

Core Platform Development

Q4 2021

3.

Finish Platform & Testing

Q4 2021

4.

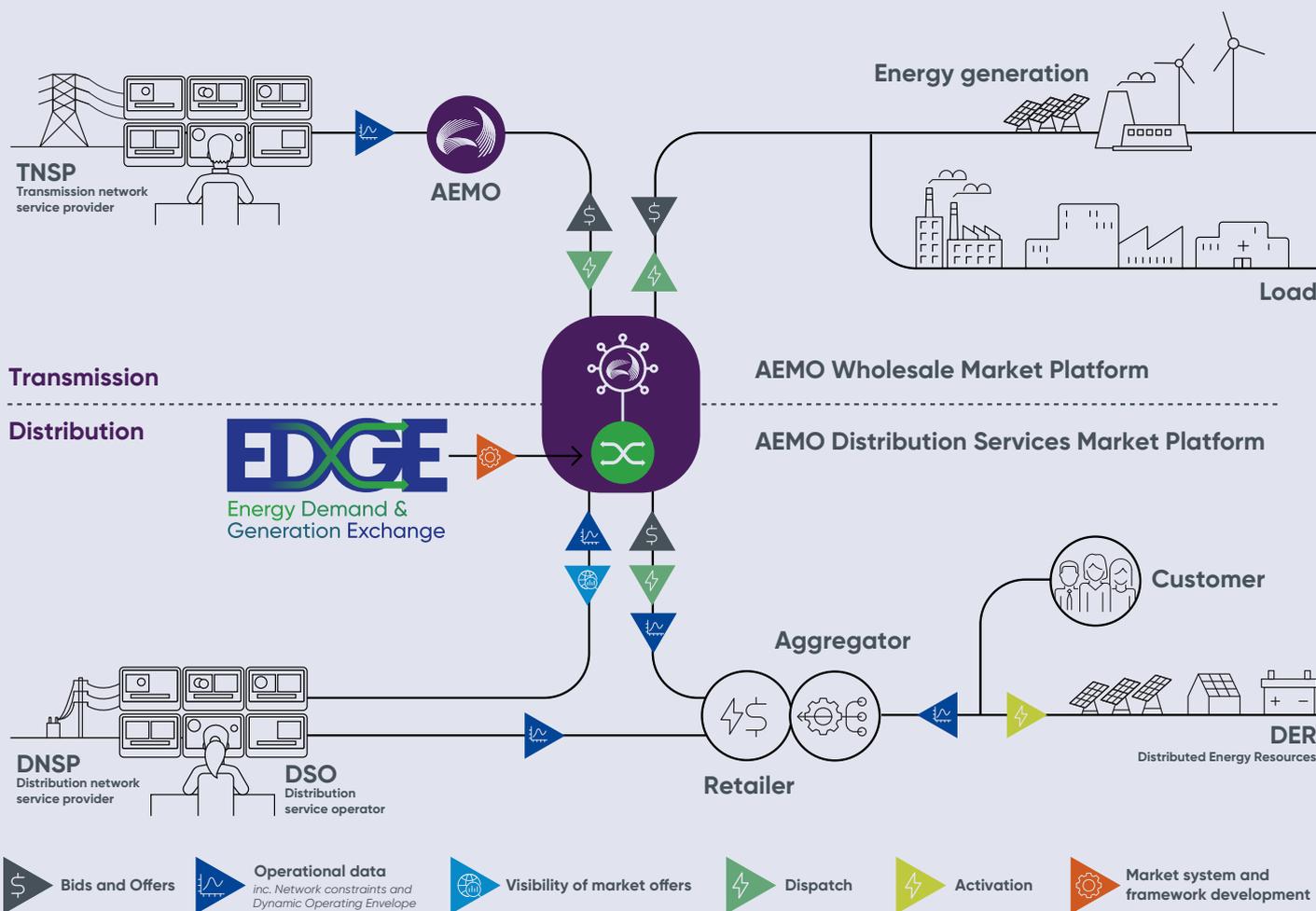
Operational Trials

Q1 2023



FIGURE 1

Project EDGE vision of the OpEN Hybrid model



Where is the project happening

The Project targets a mix of residential and commercial/industrial (C&I) customers within the North Eastern region of Victoria to achieve aggregated generation and storage capacity that can be applied within a market environment to provide a range of wholesale energy and local network services. In scale terms, the Project will eventually include a minimum of 10 MW of DER, across multiple customer segments.

Project EDGE will seek to address a broad range of research questions, with learnings published through knowledge sharing deliverables.

DER Services

What services can DER reliably deliver (wholesale, network support, essential system services)?

What products/frameworks best incentivise delivery of these services?

How can wholesale and local services definitions align to enable value stacking?

Data exchange

How should data be exchanged between actors in a scalable and efficient way?

Who should have access to what data?

How should standards for data models and exchange protocols be agreed?

Local services

What services do DNSPs need to manage their networks, and how to incentivise them?

How can Local Services reliably defer/displace network augmentation?

How to facilitate standardised, scalable and competitive trade of local services?

Cyber Security

How to protect against cyber security risks throughout the distributed supply chain?

What international standard(s) should Australia align to for cyber security purposes?

DER Integration

How can very high levels of DER efficiently and securely integrate into existing and future electricity markets and networks?*

Scalability

How scalable are different approaches to DER integration?

Should different approaches be adopted for different levels of DER penetration?

Distribution network visibility

What level of network visibility is optimal to enable wholesale integration and local services?

Do DNSPs need physical monitoring devices, or can state estimation be used with data purchased from third parties?

What level of visibility does AEMO require of DER as the penetration continues to grow?

New DNSP capabilities

When do DNSPs need to invest in sophisticated systems such as ADMS / DERMS platforms?

How should DNSPs calculate and communicate their distribution network limits as dynamic operating envelopes?

To what extent can dynamic topology switching increase network hosting capacity?

Wholesale Integration Operating Models

How should distribution network limits be considered in wholesale dispatch?

How should DER participation be considered against transmission network constraints?

Should local services dispatch be automatically reflected in wholesale dispatch?

How to obtain operational visibility of DER fleets?

Consumer insights

How can increasing market complexity be distilled into simple value for consumers?

Are consumers willing to give up control of their DER if value is presented to them simply?

Does actual value delivered equal perceived value when consumers sign up their DER?



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