Addendum – Project EDGE CBA Methodology

This addendum outlines key updates to the Project EDGE CBA methodology published in November 2022.

A.1 Utilisation of Project EDGE field trial forecasting error data

Revision to section 3.1.6 in the Project EDGE CBA methodology.

Project EDGE field trial data was intended to be used to inform the visualisation of the level of DER curtailment associated with the DOE configurations (e.g., to develop forecasting error parameters for each constraint optimisation frequency and DOE objective function tested in the CBA). However, due to constraints in extrapolating the relevant Project EDGE field trial data set, it was instead used to validate export limits for DER Customers developed by Energeia across each CBA scenario.

Establishing appropriate export limits relied on modelling from the UoM. The export limits were developed as an input to the uSim to determine the upper limits of allowable customer exports under each of the CBA scenarios. This impacts the curtailment levels on the network, which reflects the ability of the DOE to facilitate exports for DER Customers.

The outputs from the revised method were then compared to findings provided by the Project EDGE field trial data for validation. In addition, its outputs were verified with SMEs from UoM, AusNet and SAPN who agreed in principle that the approach was reasonable.

A.2 CBA scenarios – market configurations

Revision to section 3.2.3 in the Project EDGE CBA methodology.

It was initially intended that an LSE and data hub would not be tested in isolation. However, stakeholder feedback noted that an LSE could feasibly operate in absence of a data hub and that the value of such arrangement should be considered.

Therefore, the CBA assessed an LSE under different scalable DER data exchange approaches:

- Scenarios 3, 5 ,8 and 10 assume LSE data exchange is facilitated through the data hub
- Scenarios 2, 4, 7 and 9, under a point-to-point arrangement, assume each DNSP seeks to establish its own LSE and associated data exchange integrations with each participating DER Aggregator.

A.3 LSE approach

Revision to section 4.4.2 in the Project EDGE CBA methodology.

The methodology for assessing the value of an LSE has been updated based on stakeholder feedback.

The assessment of value from an LSE has been informed by a UoM research paper, which noted that the value of network support services utilising reactive power for voltage management may be directly derived from its ability to relive network constraints which are locational and temporal[1].

[1] S. Riaz, J. Naughton, University of Melbourne, Project EDGE: Deliverable 8.1: Final report on DER services co-optimisation approaches (March 2023).

To simplify the process of assigning a value to the use of an LSE to reduce DER export curtailment[2], the CBA has used the 2022 CECV, published by the AER[3], to derive an average price associated with reduced curtailment[4]. This price was applied to the CBA's forecast annual volume of curtailed exports[5].

It should be noted that the CBA has adopted a conservative approach to valuing the benefits of an LSE, based only on its use to reduce DER export curtailment through DER based voltage management services. Due to insufficient data the potential benefits related to other use cases for LSE, such as to maintain reliability and quality of electricity supply in the distribution system, were not quantified.

See section 3.3.2 in the Final Report for CBA findings related to an LSE.

A.4 Roles and Responsibilities

Revision to section 4.1 in the Project EDGE CBA methodology.

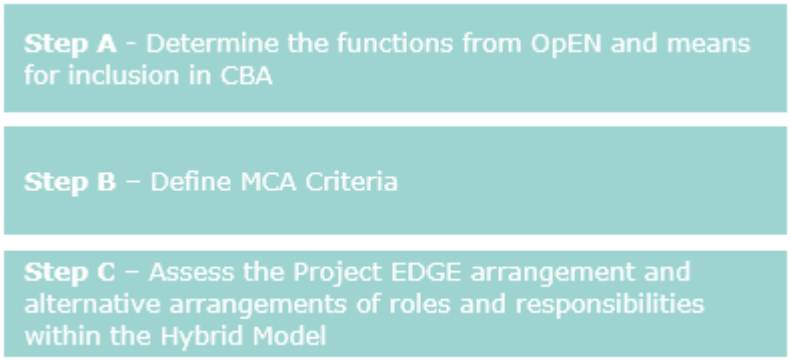
Understanding the value of integrating DER into the NEM requires examination within the CBA of the roles of market participants and the responsibilities assigned to those roles.

The methodology (shown below and outlined in section 4 on the Final CBA Report) for assessing the Project EDGE roles and responsibilities along with other alternatives within the Hybrid Model Framework has been updated based on stakeholder feedback.

In addition to the findings gathered through the Project EDGE field trial, the roles and responsibilities under the Hybrid Model were also assessed within Project EDGE via:

- the CBA scenarios
- using multi-criteria analysis (MCA).

The process for methodology development and analysis of roles and responsibilities followed the steps below:



Step A – Determine functions from OpEN and the means for inclusion in the CBA

[2] UoM analysis suggests that reactive power services from DER can be applied to relieve export constraints in the low voltage network as exports are typically limited by voltage limits rather than the thermal ratings of network assets. Refer to S. Riaz, J. Naughton, University of Melbourne, Project EDGE: Deliverable 8.1: Final report on DER services co-optimisation approaches (March 2023).
[3] AER, 2022. Final CECV Methodology, at https://www.aer.gov.au/system/files/Final%20customer%20export%20curtailment%20value%20methodology%20-%20June%202022.pdf.
[4] The calculation is based on using a CECV average value across the NEM over the 20-year CBA time horizon of $48.38/MWh.
[5] Based on the Energeia TEM outputs for potential avoided voltage constraint curtailment (post DOE configurations tested within the CBA scenarios) over the 20-year CBA time horizon.

OpEN used the functions listed in the table below to define each of the frameworks assessed[6] (e.g., Hybrid, Single Integration Platform, Two Step Tiered Platform and Independent DSO framework). Therefore, these functions represent a logical point from which to assess arrangements of roles and responsibilities within the Hybrid Model.

Table A.1 also outlines the Project EDGE description of each function (i.e., how it was implemented in the Project EDGE field trial), and the means for inclusion in the CBA (i.e., via CBA scenarios or MCA).

[6] EA Technology (July 2019), at http://www.energynetworks.com.au/resources/reports/ea-technology-open-energy-networks-project/

Table A.1: Functions from OpEN and the means for inclusion in the CBA

OpEN Function	OpEN High Level Description	Project EDGE Implementation Description	Inclusion in CBA
1. Distribution system monitoring and planning	• To inform distribution network constraint development.	DSOs engage with various market participants for the development and operation of the distribution network and gather data for active network management.	No Lack of feasible alternatives within the Hybrid Model identified for inclusion in MCA.
2. Distribution constraints development	• To develop distribution network constraints in the form of long-term operating envelopes that will be a key input into the distribution level optimisation.	DSOs undertake the following: • Calculating distribution constraints and long-term requirements for distribution network support • Communicating DOEs • Pre-qualification for LSE requirements and operational assessment of LSE need • Publishing service needs and requirements via an LSE for DER Aggregators.	Yes – CBA Scenarios • Communicating DOEs directly point-to-point compared with via a data hub • Engaging DER via an LSE directly point-to-point compared with via a data hub.
3. Forecasting systems	• Provide key forecasting information to allow for distribution level optimisation.	DER Aggregators gather all the forecast data such as weather forecast, current metering data, operational impacts and customer data profiles.	No Lack of feasible alternatives within the Hybrid Model identified for inclusion in MCA.
4. Aggregator DER bid and dispatch	• Aggregates local DER installation to provide bids into the markets (within provided operating envelopes).	Engaging with DER to create DER Aggregator portfolios:	No Lack of feasible alternatives within the Hybrid Model identified for inclusion in MCA.

			• Engage with prospective customer and exchange customer information • Create customer offer • Customer enrolment • Service contract. DER Aggregator market engagement: • Applying for participation in wholesale energy (enrolment process) • Forecasting of price responsive DER capacity • Forecasting of uncontrolled load • Submit portfolio-wide bi-directional market offers for wholesale energy within DOE (acts as a forecast) • Market Operator: DER portfolio-level dispatch instruction sent for wholesale energy • Dispatch individual DER devices in response to dispatch instructions • DSO: LSE service trigger communicated to DER Aggregators.	
5.	Retailer DER bid and dispatch	• Retailers engage with DER resources to develop portfolios of DER customers (and services) and	In Project EDGE Retailers can be DER Aggregators; the same capabilities apply.	No In Project EDGE Retailers can be DER Aggregators; the same capabilities apply.

		engage with network operators and markets to submit bids and offers.		
6.	DER optimisation at the distribution network level	• Optimise operating envelopes to ensure aggregated bid stacks for DER per service area can feed into wholesale optimisation taking account of distribution network constraints.	• Rules or guidelines created to develop customer DOEs • DSOs: Calculate and communicate DOEs • Market Operator: Publish DOEs to DER Aggregator • DER Aggregators: Aggregation of wholesale bids • DER Aggregators: Co-optimisation of LSE bids by including quantity within portfolio-wide wholesale bid to the Market Operator (Function 4), within DOEs.	Yes – CBA MCA.
7.	Wholesale – distributed optimisation	• Integrate distribution level optimisation results into existing wholesale market optimisation.	Optimisation of constrained wholesale portfolio level bids in NEM central dispatch process.	No Lack of feasible alternatives within the Hybrid Model identified for inclusion in MCA.
8.	Distribution network services	• Distribution network services, such as power quality/voltage control, which can be provided by aggregated DER.	DSO contracts with DER Aggregators via an LSE to provide local network support services.	No Lack of feasible alternatives within the Hybrid Model identified for inclusion in MCA.
9.	Data and Settlement (network services)	• Settlement of network support and control ancillary services at distribution and transmission level.	• DER Aggregators: Transmit DER service delivery verification data for use in LSE settlement • DSOs: Settlements for LSE - following verification of service via telemetry data and the associated payment or	Yes – CBA MCA.

			clawback which is communicated through a data hub.	
10. Data and settlement (wholesale, RERT, FCAS and SRAS)	• Market Operator settles wholesale, FCAS and SRAS transactions at distribution and transmission level.	• DER Aggregators: Transmit telemetry or other non-smart meter service delivery verification data for use in wholesale settlement • Market Operator: Settlement of wholesale energy using smart meter data and portfolio level telemetry as required.	No Outside CBA scope.	
11. DER Register	• Market Operator to provide DER register based on AEMC rule requirements. Periodically gather up-to-date DER information from market participants. Share disaggregated data and publish aggregated locational and technical data of DER with relevant market participants.	• DSOs: Send DER information from connection agreement • Facilitating data exchange for DER use cases (e.g. DOEs, DER Aggregator bids, telemetry, dispatch instructions and LSE) • Establish, maintain and provide access to DER register.	Yes – CBA Scenarios • Utilising a centralised data hub with a single broker to record and share DER data among relevant participants • Utilising a decentralised data hub shared among participants to record and share DER data among relevant participants.	
12. Connecting DER	Regulatory, technical and commercial arrangements around the connection of DER to the distribution network.	• DSOs monitoring compliance and enforcing compliance with wholesale dispatch and DOEs • DSOs monitoring compliance with LSE services to determine service delivery.	Yes – CBA MCA Specifically, DOE compliance monitoring and DOE compliance enforcement were identified as activities that have feasible alternative arrangements within the Hybrid Model.	
13. Network and System Security with DER	• DER contribution to, and influence on, system security.	Constraint net/gross output at site to zero via DOEs and market directions (Market Operator).	No Outside CBA scope.	

Step B remains the same as the Project EDGE CBA methodology published in November 2022, while **Step C** is detailed in the Project EDGE Final Report (Section 4).