# Project EDGE Data Specification

## Part A: On-boarding & Enrolment Data

## May 2022

Version: Final

# Important notice

## PURPOSE & AUDIENCE

This document describes the data requirements to facilitate participation in the EDGE DER Marketplace operation and to deliver Wholesale and Local Services (to Distribution Network Service Providers (DNSPs)). The Australian Energy Market Operator (AEMO) provides this information as a service targeting business and IT staff in participant organisations.

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## VERSION HISTORY

Initial Draft

## DOCUMENTS MADE OBSOLETE

Publication of this documents makes Project EDGE Data Specification Part A Dec 2021 published on 5th Jan 2022 obsolete

## FEEDBACK

Your feedback is important and helps us improve our services and products. To suggest improvements, please contact AEMO's Support Hub. To contact AEMO's Support Hub use Contact Us on AEMO's website or Phone: 1300 AEMO 00 (1300 236 600) and follow the prompts.

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## VERSION RELEASE HISTORY

| Version | Effective Date | Summary of changes |
|---|---|---|
| **Initial Draft** | 19 Oct 2021 | Project milestone 2 Draft for ARENA effective 19th Oct, 2021.<br>Subject to further refinement and enhancements as Project EDGE progresses through the next phase of detailed design. |
| **v1** | 2 Dec 2021 | Initial Draft for release<br>Subject to further refinement and enhancements as Project EDGE progresses through the next phase of detailed design.<br>New additions to the Data Specification:<br>• DUID Telemetry Data<br>• Availability Forecast<br>• Boffer as Forecast<br><br>Split EDGE Data Specification into a two part document as below:<br>• Part A: Introduction to Data Exchange, data obligations and Participant Enrolment<br>• Part B: Market Participation and Operational Visibility Data Requirements |
| **Final Version** | 27 May 2022 | Enhance and refinement Project EDGE Data Specification specifically<br>In Part A:<br>• Updated Sec 4. Data Requirements to include OE and Flex OE Desktop Analysis data requirements<br><br>In Part B addition of:<br>• Enhanced Dynamic Operating Envelope (v2) schema – aligned to CSIP Australia (information model only)<br>• Pre dispatch (PD) price forecasts as an input and consideration to Aggregator Boffer computation<br><br>Publication of the Part C of the Project EDGE Data Specification covering:<br>• Data requirements for DOE Economic Optimisation and Flex OE Desktop Analysis. This contains data definition for: |

| Version | Effective Date | Summary of changes |
| --- | --- | --- |
| | | ▪ NMI level Unconstrained Boffer (Flex and NMI)<br>▪ NMI Level telemetry data<br>▪ NMI level post-dispatch interval Operating Envelope<br>▪ NMI level Unconstrained Load/ Generation Forecast |

# 1. Glossary

## 1.1 Abbreviations

| Term | Explanation |
|---|---|
| **Active Customer** | A customer is active when participating in markets through an Aggregator (for example, Mondo). |
| **Active DER** | DER that is under active and explicit control of the Aggregator (for example, battery, controllable loads or demand response enabled devices). |
| **Active DER Forecast** | Aggregator forecast of consumer DER that they manage for a given time period (Bi-directional offers are a type of active DER forecast). |
| **Actual Performance Data** | Aggregated data set at the DUID level of actual performance data. |
| **Aggregator** | Role played by Aggregator in EDGE. Manages consumer DER for local DER trade and wholesale energy market participation. |
| **ARENA** | The Australian Renewable Energy Agency. |
| **API** | Application Programming Interface |
| **AEMO** | Australian Energy Market Operator |
| **AEST** | Australian Eastern Standard Time. Also known as Market Time or NEM time. |
| **Bid** | Submitted by controllable load for load increase or decrease. |
| **Bid Type** | Category of service for which Bi-directional Offer is submitted (Energy, Ancillary Services, Local DER Service, Network Support Service). |
| **Bi-directional Offer ('Boffer')** | An Offer that includes both generation and load. May be referred to as "Boffer". |
| **Bi-directional Unit** | An asset or a generating plant that has the capability to both:<br>(a) consume electricity to convert into stored energy; and<br>(b) convert stored energy to produce electricity. |
| **Conformance Monitoring** | Monitoring where dispatch targets are not met. |
| **Constrained Bi-directional Offer** | DER wholesale market offer that is self-constrained by an Aggregator using limits/constraints communicated by the DNSP through operating envelopes. |

| Term | Explanation |
|---|---|
| **Composite Bi-directional Offer** | Aggregation of the multiple Bi-directional Offer(s) from various Aggregator per TNI. Only applies for the Static Nodal Limit target operating model. This is part of the Security Constrained Economic Dispatch function i.e. two step solve. |
| **DMO** | Distributed Market Operator. Role played by AEMO in EDGE |
| **DSO** | Distribution System Operator. Role played by DNSP which is AusNet Services in EDGE |
| **DOE** | Dynamic Operating Envelope |
| **DER** | Distributed Energy Resources |
| **DNPS** | Distribution Network Service Provider. Owns, maintains and manages the electricity distribution network. |
| **DUID** | Dispatchable Unit Identifier, represents wholesale generation or load unit. |
| **Data Exchange Capability** | Set of capabilities and functions developed on the Platform to facilitate streamline data exchange between AEMO, DNSP and Aggregator. |
| **DER Compliance** | Assessing whether Aggregators are dispatching according to operating envelope limits and / or nodal capacity allocation. |
| **DER Raw Capability** | Capabilities that must be tested and verified before DER can be used by an Aggregator to enter a contract for DER Service delivery. |
| **Disaggregated Dispatch** | Part of the Nodal constraints operating model. The process by which a Composite dispatch target from the wholesale market is disaggregated and then sent to individual Aggregators. |
| **DER Marketplace** | Market frameworks and systems that facilitate the efficient trade of distributed energy services at both the wholesale and local level for the long-term interests of consumers. |
| **Device Standing Data** | Device data that changes infrequently, maintained and accessed within internal AEMO systems. |
| **Dispatch Interval** | Interval frequency at which service dispatch instructions are sent and the minimum service duration (5 minutes). |
| **Dispatch Target** | Issued as part of a dispatch instruction, tells an Aggregator what energy export / import target they much reach by the end of the dispatch interval. |
| **Distributed Energy Services** | Energy and non-energy services (such as voltage control) that are delivered by aggregated DER at both |

| Term | Explanation |
|---|---|
| | the wholesale and local level (within the distribution network). |
| **Distribution Network Limit** | Physical limits (for example, voltage, thermal) that apply within the distribution network. The limits can be applied either at NMI or distribution node level. These are applied in the dispatch process to limit the capability of a load or a generating unit such that it is unacceptable to either consume or generate the level of electrical power that would otherwise occur. |
| **Distribution Network Node** | A logical grouping of NMIs defined below the TNI within a distribution network hierarchy. |
| **EDGE** | Energy Demand and Generation Exchange |
| **EW-DSB** | Energy Web – Distributed Service Bus |
| **Firm Bi-Directional Offer** | DER wholesale market offer submitted after a nominated cut-off time – the price per band cannot be changed and quantity can change. |
| **Generation Capacity** | Capacity (kW) available for power generation/export from DER through the Grid interactive port (that is, terminal of the Inverter) into the distribution network. This refers to the controllable Device capability and not the site capability. |
| **Load Capacity** | Capacity (kW) available for power load / import to DER through the Grid interactive port (that is, terminal of the Inverter) into the distribution network. This refers to the controllable Device capability and not the site capability. |
| **Local DER Services** | Defined by the DNSP and Aggregators, not traded on wholesale markets. |
| **Local Service Exchange** | A component of the Platform for facilitating the posting, procurement and trade of real and reactive power as Local DER Services between DNSP, TNSP and Aggregators, to manage network congestion and increase network limits. |
| **Logical Network Model** | Shows the logical distribution network hierarchy down to the NMI. |
| **MC** | Market Customer (also referred as Retailer), who purchases electricity from the spot market. |
| **MASP** | Market Ancillary Service Provider, is a market participant which provide Frequency Control Ancillary Services (FCAS) |
| **NEM** | National Electricity Market, also referred as Market in this document |
| **NER** | National Electricity Rules |

| Term | Explanation |
|---|---|
| **NMI** | National Meter Identifier, National Metering Identifier, the customer DER connection point to the grid. |
| **NEM Time** | Also referred as Market Time. This is the AEST time. |
| **NMI Operating Envelope** | Operating Envelope applied to an individual NMI. |
| **NMI Standing Data** | Site data that changes infrequently, maintained and accessed within internal AEMO systems. |
| **Nodal Capacity Limits** | Nodal capacity limits are thermal limits associated with distribution network nodes (low voltage (LV) circuit up to bulk substation). In Project EDGE, nodal capacity limits may be used to constrain wholesale bi-directional offers as part of the security constrained economic dispatch (SCED) function within the Static Nodal Constraints model. |
| **Offer** | Submitted by generators to provide power/energy (power generation). |
| **Operating Envelope** | Power export (to grid) & import (from grid) limits provided by DNSP to Aggregators and AEMO. |
| **Operational Forecast** | Aggregated data set at the DUID level of anticipated active power flows. |
| **Optimised Operating Envelope** | Import/export limit updated with Bi-directional offer and network configuration information at a greater frequency than static Operating Envelopes. |
| **Participant ID** | Unique identifier for a Participant. |
| **Passive DER** | DER that is not controllable (that is, Rooftop PV). |
| **Peak Demand** | Periods where wholesale demand has reached a peak and local load may need to be curtailed. |
| **Peak Generation** | Periods where wholesale generation has reached a peak and local load may need to be increased. |
| **Platform** | An off-market, proof-of-concept, technology platform for facilitating trade of DER energy and ancillary services between buyers and sellers at wholesale and local levels. The Platform is common to Project EDGE and Project Symphony. |
| **Reactive Power (Q)** | The consumption and export (supply) of Var (for example, over a distribution network for voltage management). |
| **Real Power (P)** | The actual amount of power being used, or dissipated, in a circuit (the generation or consumption of Watts). |
| **Regional Bi-directional Offer** | DER Bi-directional Offer by Aggregator for the whole region (that is, the National Electricity Market (NEM) Jurisdiction). The Offer will consist of the 10 Price bands, Quantity offered and set of NMIs making up the Offer. |

| Term | Explanation |
|---|---|
| **Scheduled Resource** | Assets that, as either net generators or net consumers (load) of electricity, participate in the central dispatch and pricing processes operated by AEMO. |
| **Security Constrained Economic Dispatch (SCED)** | Two-step solve process that is part of the Static Nodal Constraints wholesale target operating model (TOM). |
| **Settlement Simulation** | Off-market settlement activity intended to show customer value gain for a given trading period. |
| **Static Network Location Limit** | Provided by DNSP with operating envelope for use with static nodal model. |
| **Static Operating Envelope** | Import/export limit set through combination of customer connection agreement with DNSP and forecasts. |
| **Technology Type** | This refers to the control system and the response available from the Aggregator portfolio. The two types of controllers are as:<br>• Variable or Proportional Controller<br>• Switch Controller |
| **TNI** | Transmission Node Identifier. Bulk substations at the interface between the transmission and distribution networks, used as the connection point for the wholesale spot market. |
| **Trading Interval** | This refers to the half hour interval, used in Settlement processes. Note within this interval there will likely need to be 5 min energy dispatch intervals in this demonstration. |
| **TSO** | Transmission System Operator; AEMO's function outside of these demonstration projects. |
| **VPP** | Virtual Power Plant |
| **Value Stacking** | Value stacking means having the capability to perform and capture the commercial value of multiple energy services at the same time. |
| **Wholesale Integration** | Set of capabilities and functions developed on the Platform to facilitate Aggregator and DNSP participation in wholesale services/Local DER Services. |
| **Wholesale Clearing Price Comparison** | Comparison of DER Bi-directional Offers and Composite offers to the wholesale spot clearing price to prepare a merit order and determine which offers are cleared for dispatch. |
| **WTD** | Willingness to Deliver |
| **WTP** | Willingness to Pay |

## 1.2 Key Concepts

| Term | Explanation |
|---|---|
| **Dispatch Interval (DI)** | Dispatch Interval or DI is the 5-minute interval for which Aggregator is sent an dispatch target and it is the trading period for which the electricity price is set in the market known as spot price.<br>• It is provided as interval ending (as in DI end time)<br>• It is of 5-minute duration.<br>• There are 288 5-minute DI in a NEM trading day<br>– DI start time refers to the start time of the Dispatch Interval<br>– DI End time refers to the end time of the Dispatch Interval<br>• For Dispatch Interval of 10:00 hrs<br>– DI start time would be 9.55<br>– DI end time would be 10.00 |
| **Trading Interval (TI)** | A period of time prescribed in the National Electricity Rules for the wholesale exchange. It is of 5-minute duration.<br>• There are 288 5-minute TI in a 24-hour period.<br>• E.g. for TI 10.00 TI start time would be 9.35 and TI end time would be 10.00 |
| **Trading Day** | The 24-hour period from 0400 hrs to 0400 hrs the following day |
| **Gate Closure for Boffer** | Project EDGE has adopted the same Boffer gate closure as in NEM for existing participants.<br>Gate closure for a trading day is defined as 12.30 PM the day before that Trading day.<br>• At this time the price bands are (fixed) for the following trading day;<br>– Any Boffers submitted after 12.30 PM trading day -1 , for the trading day are considered as Re-bids<br>• Aggregator has the flexibility to adjust the volume (i.e. quantity) offered in each of the price band for the trading<br>• Aggregator must not update the price in the price bands. AEMO will reject the re-bid if the prices are changed in the price band.<br>• After 12.30 the band prices for the following day cannot be updated. |

# 2. EDGE Data Specification Overview

EDGE Data Specification is published to provide Aggregators and interested parties with detailed overview of the integration to EDGE Marketplace, data obligations for participating in Project EDGE.

Its contents are for the purpose of facilitating the research activities of Project EDGE and **are not intended to set a precedent to be adopted within current or future market arrangements.** The project intends to gather evidence to inform future market arrangements that would occur through appropriate consultation processes.

For ease of consumption the EDGE Data Specification is presented as a three-part document as described below:

## 2.1 Part A: Introduction to Data Exchange, Data Obligations and Participant Enrolment

Part A covers the introduction to Project EDGE and data exchange, followed by overview of the data obligations for participation into trial and enrolments and on-boarding specific data requirements for Aggregator and DNSP.

Part A contains following sections:

- Glossary of terms and key concepts
- Introduction
- Project EDGE data requirements
- Data Exchange Overview
- Message Acknowledgement
- Participant On-boarding and Enrolment Data requirements
- Appendix

## 2.2 Part B: Market Participation & Operational Visibility Data Requirements

Part B covers the Project EDGE data requirements for market participation; provision of Dynamic Operating Envelopes (DOE) for enforcing distribution level constraints, provision of Bi-directional Offers for Energy (Boffer) – providing Aggregator intent, pre-dispatch price forecast as a input to Boffers and AEMO dispatch instructions.

Part B also covers data requirements for Operational Visibility of the Aggregators portfolio to AEMO. This includes DUID Telemetry data, Operational forecasts (provided via Boffer) and Availability Forecasts.

Please note: for the purpose of the Project EDGE, AEMO will treat the Boffer submitted by Aggregator every 5 mins covering 48 hrs as the Aggregators operational forecasts. No separate Operational Forecast data feed is required.

- Market Data requirements in

– Bi-directional Offer (Boffer) [also used as Operational Forecast]
– NMI Operating Envelopes (DOE) v1
– NMI Operating Envelopes (DOE) v2 aligned to the CSIP AUS
– Dispatch Instructions
  - Operational Visibility data requirements in
– DUID Telemetry Data
– Availability Forecast Data
– Pre-Dispatch Price Forecast (5 min & 30 min)

Please refer to the Project EDGE Data Specification Part B: Market Participation & Operational Visibility Data Requirements document.

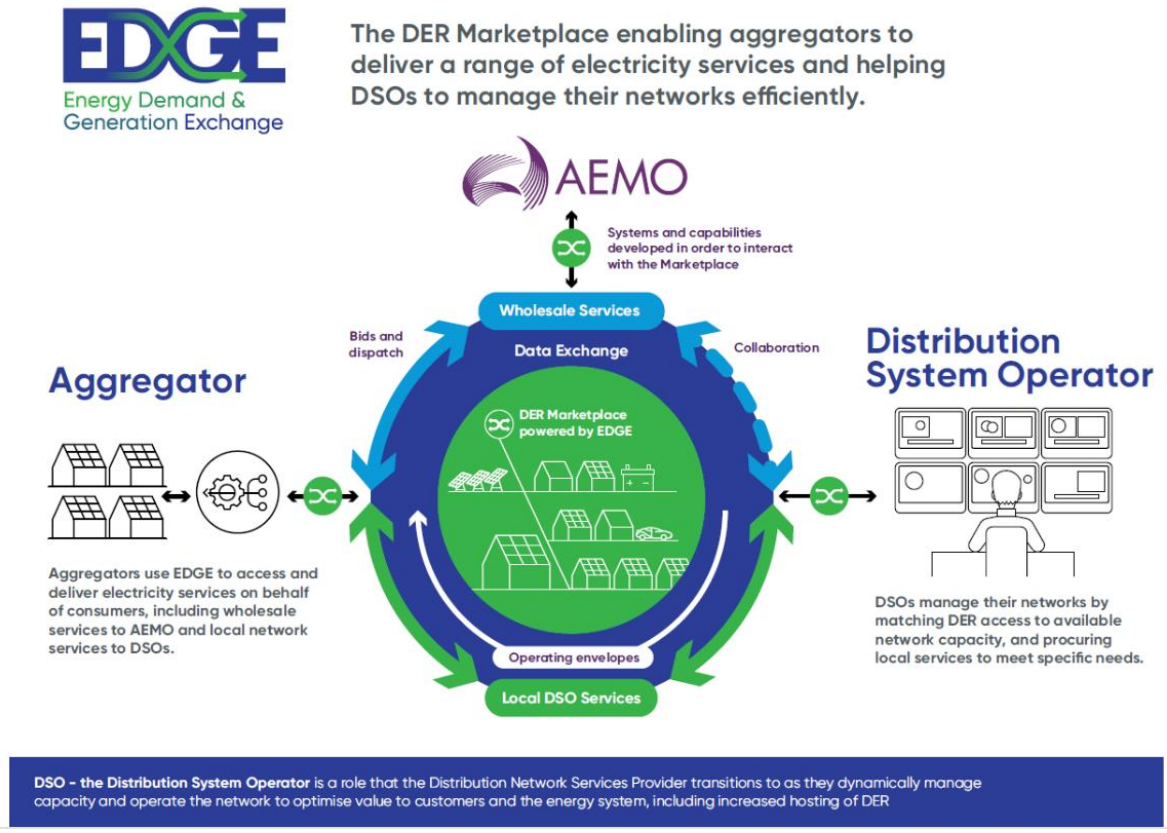
## 2.3 Part C: DOE Economic Optimisation and Flex OE Desktop Analysis Data Requirement

Part C covers the Project EDGE data requirements for DOE economic optimisation and Flex OE desktop analysis. All data provided must be at NMI level; as listed below:

- Forecast Data : Pre-dispatch Uncontrolled Load or Generation forecast at NMI level
- Unconstrained Boffers

– Pre-dispatch NMI level Boffer for 'Flex' (i.e. aggregation of all flexible assets at the site)
– Post-dispatch NMI level Boffer at 'NMI' (i.e. measure at the NM( - net of site)
  - Telemetry Data
– NMI level Telemetry data including reference to DOE applied during that interval
  - Operating Envelope: Post-Dispatch DOE containing with reference to objective function

# 3. Introduction




Project EDGE (Energy Demand and Generation Exchange) is a multi-year project to demonstrate an off-market, proof-of-concept Distributed Energy Resource (DER) Marketplace that efficiently operates DER to provide both wholesale and local network services within the constraints of the distribution network.

The project is a collaboration between:

- AEMO as system and market operator),
- AusNet Services as Distribution System Operator (DSO), and
- Mondo as Aggregator

with financial support from the Australian Renewable Energy Agency (ARENA).

The intent is to use this to demonstrate capabilities which can then be replicated across other areas of the National Electricity Market (NEM).

EDGE will test the DER Marketplace concept that facilitates three core functions:

- Data exchange
- Wholesale integration of DER
- Local Services Exchange

Key Project EDGE objectives are:

- EDGE aims to understand and inform the most efficient and scalable way to integrate DER into the system and markets so that all consumers benefit from a high DER future, even those that don't own DER.
- When we say scalable, we're looking to learn for a future where DER is at very large scale in the NEM, millions of devices, dozens of aggregators, consistent with ISP High DER and Step change scenarios.
- The evidence gathered through the demonstration will culminate in a Cost Benefit Analysis on various progressions and options for how a DER Marketplace could be implemented and under what conditions e.g the level of DER penetration.
- This evidence will be used to back regulatory change and technology investment recommendations to make this a reality provided it is proven successful.

Additional information including detail on the Project EDGE and project objectives are outlined in 2021 EDGE Webinar Slides Mar 2021.

Project EDGE Data Specification has been designed such that its participants will be able to meet the objectives of the project. EDGE which will provide a robust evidence base to deliver recommendations on how and when the concepts demonstrated should be implemented operationally.

## 3.1 Data Requirements Considerations

The project data requirements are defined based on four key considerations for a DER Marketplace.

| Consideration | Visibility | Forecastability | Measurement | Coordination |
|---|---|---|---|---|
| **Description** | To give situational awareness to system and network operators | To provide predictability of DER | To enable markets and service verification | To support secure operational control |
| **Data** | • DUID Telemetry<br>• Select device telemetry | • Bi-directional bid-offers ('Boffers')<br>• Availability Forecasts | • DUID Telemetry<br>• Meter reads | • Dynamic Operating Envelopes<br>• Dispatch instructions |

## 3.2 Purpose

The purpose of this document is to provide an overview of the data requirements and details of data attribute definitions defined for Project EDGE. Associated JSON schema objects are also available in addition to this document. This document is intended to assist participating DNSP and Aggregators in building their own platforms and capability to participate in the Project. The Aggregators and DNSP will interface and interact with the EDGE DER marketplace.

This document contains data definitions for the following datasets:

- Participant On-boarding and Enrolment
- Bi-directional Offers ('Boffers')

- Dynamic (NMI) Operating Envelopes (v1 and v2 [aligned to CSIP – AUS])
- Dispatch Instructions
- DUID (Aggregated portfolio) Telemetry Data. Also referred as actual Operational Data
- Availability Forecasts (under review; to be confirmed)
- Load Forecast (under review; to be confirmed)
- Device Telemetry (from select assets) (under review; to be confirmed).
- Pre-dispatch price forecast
- Desktop Assessment data (OEEO)

## 3.3 Audience

This document is intended for staff of current and intending project participants who are involved in product and application development.

## 3.4 Assumed Technical Knowledge

This document assumes a working knowledge of:

- JSON file formats and data interchange formats to store and exchange data objects consisting of attribute-value pairs and arrays.
- Running a Kubernetes container (on-prem or in cloud environment)
- Integrating to cloud environment
- Using EWF DSB framework to communicate with AEMO. Refer to the EWF Partner Information Guide for more detail.
- Familiarity with the data exchange concepts and frameworks as provided Data Exchange Hub section.

## 3.5 Assumed reading and context

This document assumes a knowledge and awareness of the following documents that have been published by AEMO in relation to Project EDGE

- Project EDGE Factsheet
- Project EDGE Aggregator overview
- Project EDGE Applicant Expression of Interest form
- Project EDGE Data Specification Part B
- Project EDGE DUID Telemetry Overview
- EWF Partner Information guide
- Project EDGE Wholesale Service Qualification
- Project EDGE Local Service Exchange Draft Overview
- Further information[1]

[1] Further information available at AEMO | Project EDGE

# 4. Data Requirements

Project EDGE participants are required to submit and exchange the following datasets using the EDGE DER Marketplace platform ('Platform') to participate in Wholesale Energy services provision and the Local Services Exchange. The datasets can be grouped into three key categories:

- **On-boarding and Enrolment data**:

– to on-board DNSP and Aggregators to EDGE marketplace Platform

– to enrol DNSP and Aggregator into Project EDGE

- **Operational Visibility data**: to provide operational visibility via

– Bi-directional Offer (Boffer)

– DUID Telemetry (aggregated DUID level actual performance data)

- **Market Participation Data**: to actively participate into the market by

– Bi-directional Offer (Boffer)

– Dynamic (NMI) Operating Envelopes (DOE)

– Dispatch Instructions

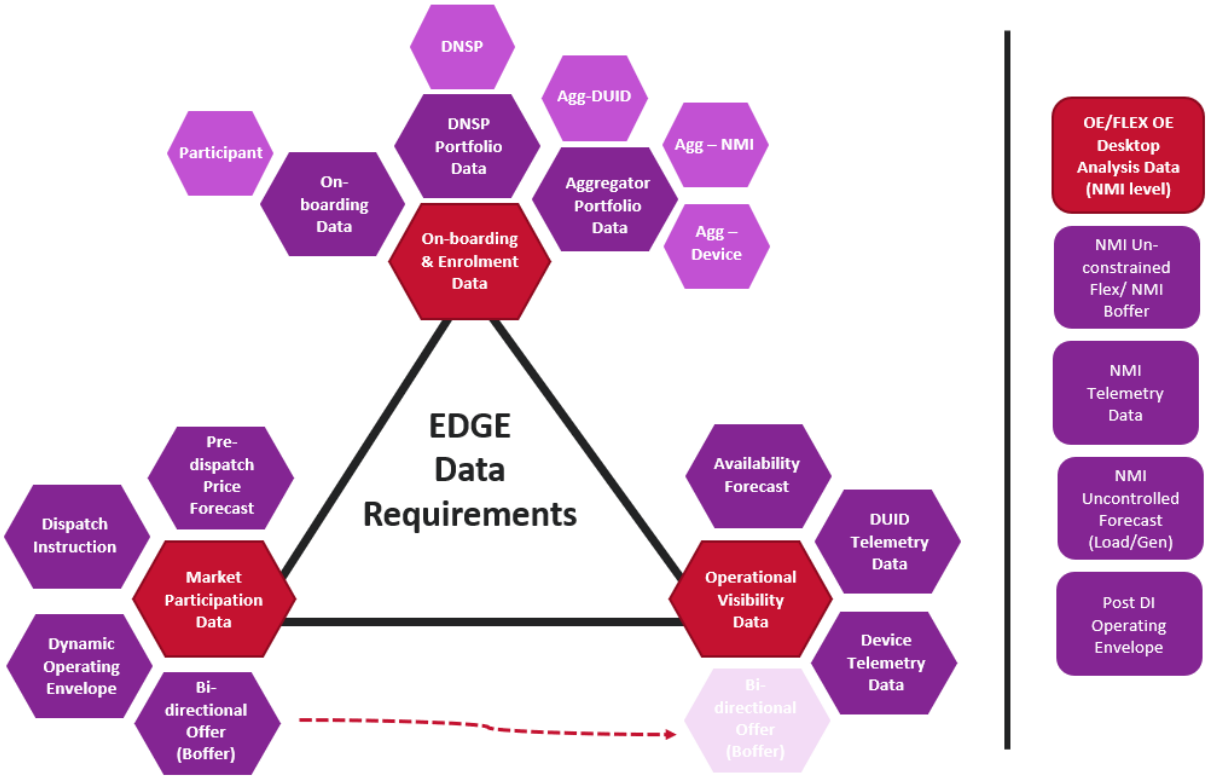
- OE/FLEX OE Desktop Analysis Data: to conduct desktop analysis to identify the potential value of economically optimising OE and OE for Flex.

– Unconstrained NMI level Boffer – for Flex and Net NMI

– NMI level Telemetry Data

– NMI level uncontrolled load/generation forecast

– Post-dispatch interval NMI level operating envelopes




**Please note:** For Project EDGE, Aggregator's Boffer (covering 48 hours period & submitted every 5 mins) will be treated as Operational Forecast. No separate Operational Forecast data stream is required.

Operational Visibility datasets are required to perform after the fact analysis and not used in the operational decision making.

Based on current understanding and project design, all data will be exchanged via the Project EDGE data exchange framework unless otherwise stated within this document.

## 4.1 Data Description and Purpose

| Data Category | Dataset (Integration Id) | Description | Purpose |
|---|---|---|---|
| **On-Boarding & Enrolment Data** | On-boarding data: Participants (INT001) | This comprises of data on the participant category, participant type and Participant ID. This data is provided manually via email in the EDGE Data proforma in tab 'Participant' | • For on-boarding and configuring the participant on the EDGE Marketplace platform<br>• Create channel/topics<br>• Assign roles to participants |
| | DNSP Portfolio data: DNSP (INT003) | This dataset comprises of the list of NMIs within the EDGE geography; this also consists of default export & | • For capturing the DNSP portfolio |

| Data Category | Dataset (Integration Id) | Description | Purpose |
|---|---|---|---|
| | | import limits as specified by DNSP. DNSP is the DSO in Project EDGE. | • Validating the completeness of Dynamic NMI DOE published by DNSP |
| | Aggregator Portfolio Data: – Agg DUID Data, Agg - NMI Data (INT002), Agg - Device Data (INT004) | This consists of the 3 key data sets on the Aggregator's portfolio<br>• DUID Configuration & portfolio capacity details ('Agg-Duid')<br>• List of NMIs in portfolio & services offered/ NMI ('Agg-NMI')<br>• List of devices by NMI and various device attributes ('Agg-Device') | • For capturing the Aggregator portfolio<br>• To validate the Boffer submitted by Aggregator<br>• Used in Market pre-solve<br>• Map DOE published by DNSP to Aggregators NMI |
| **Market Participation Data** | Bi-directional Offers (INT008) | This represents Aggregator's intent to deliver Wholesale Energy Service by using aggregation of DER assets in their portfolio. | • To actively participate in EDGE (wholesale energy)<br>• To provide Aggregator's intent to offer their portfolio and provide operational visibility to AEMO<br>• To provide price responsiveness of the portfolio |
| | Dynamic Operating Envelopes (INT010) | This represents the time varying import and export limits at a NMI level or a common measurement point at a site; calculated and published by DNSP. Also referred to as Dynamic Operating Envelopes (DOE). | So that<br>• For AEMO to incorporate distribution network limits in the market solve and dispatch instructions<br>• Provides Aggregator with export and import limits that they shall not breach while meeting the dispatch target |
| | Dispatch Instructions (INT016) | This consists of the dispatch target sent to an Aggregator.<br>• Dispatch target or instructions are | • To inform Aggregator of the dispatch target considering the Boffers submitted by |

| Data Category | Dataset (Integration Id) | Description | Purpose |
|---|---|---|---|
| | | generated every 5 minutes based on the Aggregator's Boffers<br>It is expected that the Aggregator responds to these instructions and delivers the service. | Aggregator after incorporating distribution network limits using DOE |
| | Pre-dispatch Price Forecast | Pre dispatch price forecast is forecast (at 5 min and 30 min resolution) of regional reference price or Spot Price by NEM region. The forecast is recalculated every 5 and 30 mins. This forecast is based on Bids/Offers submitted by market participants, AEMO operational forecasts and constraints. This forecast is as generated by AEMO market system. | • Provides visibility of the price forecast to Aggregators for consideration into Boffer calculation and make decisions in operating their portfolio. |
| **Operational Visibility** | DUID Telemetry Data (INT017) | This consists of DUID level aggregated telemetry data sampled at 1 minute resolution for:<br>• net connection point flow<br>• aggregated flexible DER capacity<br>Telemetry data refers to the actual performance of the portfolio. | For AEMO to perform dispatch conformance analysis and use in the AEMO Operations downstream processes. |
| | Device Telemetry (tbc) | This consists of accurate measurements of DER sampled at 5-minute resolution | For Local Service Exchange (LSE) enrolment, service qualification and service delivery verification (where applicable) |
| **DOE Economic Optimisation and Flex Desktop Analysis Data** | Pre-dispatch NMI level Uncontrolled Load/ Generation Forecast | NMI level forecast of total uncontrolled load/generation at a site measured at a connection point. | Desktop analysis to identify potential value of economically optimising NMI level operating envelopes and Dynamic Operating Envelopes for Flex capacity only (i.e. aggregation of all flexible assets a site) |
| | Pre-dispatch NMI level unconstrained FLEX Boffer | Flex Boffer ($/qty) prepared at a NMI level prior to start of the dispatch interval for a dispatch interval.<br>• Flex: aggregation of all controllable assets a site.<br>• Unconstrained Boffer, DOEs are ignored in this calculation | |

| Data Category | Dataset (Integration Id) | Description | Purpose |
|---|---|---|---|
| | Post-dispatch NMI level unconstrained NMI Boffer | Net NMI Boffer ($/qty) prepared at a NMI level after the completion of the dispatch interval for a dispatch interval.<br>• NMI: net connection point flow.<br>• Unconstrained Boffer, DOEs are ignored in this calculation | |
| | NMI level Telemetry data | This consists of the NMI level Telemetry data sampled at 1 minute resolution for<br>• net connection point flow<br>• aggregated flexible DER capacity<br>Telemetry data refers to the actual performance of the aggregation of DER assets at site. | |
| | Post-dispatch NMI level Operating Envelope | This represents the time varying import and export limits at a NMI level calculated after the dispatch interval ('perfect hindsight') and published by the DNSP. | |

## 4.2 NEM Time Requirement

**All data submitted must be in NEM time**. NEM time is commonly referred as Market time. NEM time is defined as AEST which is 10 hrs ahead of UTC time

For example, 2019-09-23T**09:30:15**+*10:00*. In this example the time component (in bold) is in NEM time and the offset (*in italics*) specifies the number of hours by which NEM time ahead of UTC

All data exchanged via AEMO, submitted to AEMO or received from AEMO will be NEM time. It is expected that participants will convert local time into NEM time before exchanging or submitting to AEMO.

The JSON schema enforces and ensure validity of:

- all timestamps in the data meet ISO 8061 format, and
- all data is submitted in NEM time (i.e. +10:00)

In addition to data being in NEM time, please note all '5-minute' data must align to dispatch interval start time or dispatch interval end time where applicable. For all '5-minute' interval data it is responsibility of the Aggregator and the DNSP to ensure that time aligns to NEM Dispatch interval start time or NEM Dispatch interval end time and no time drift has occurred.

For all other interval data, Aggregator and DNSP must ensure that time align to NEM time.

For example, in case of

- **Dispatch:** the dispatchDatetime of '2019-09-23T09:30:00+10:00' represents dispatch interval of 09:30 hrs. Dispatch Interval is always time period ending. Thus, this timestamp covers a '5-minute' period from 09.25 to 09.30.

EDGE marketplace also follows the ISO 8601 format the Date **format**.

| Field Type | Format | Example |
|---|---|---|
| **Date** | yyyy-MM-dd | 2018-07-23 |
| **Datetime** | yyyy-MM-ddThh:mm+hh:mm | 2018-07-23T13:24+10:00 |
| **Datetime with second** | yyyy-MM-ddThh:mm:ss+hh:mm | 2018-07-23T23:02:38+10:00 |
| **Datetime with milli-seconds** | yyyy-MM-ddThh:mm:ss.sss+hh:mm | 2018-07-23T23:02:38.350+10:00 |

Where:

- yyyy = four-digit year
- MM = two-digit month (01 = January, etc)
- dd = two-digit day of month (01 to 31)
- hh = two digit of hour (00 to 23). Please note AM or PM formats are not allowed.

Please provide time in 24hr format.

- mm = two digits of minute (00 through 59)
- ss = two digits of second (00 through 59)
- sss = three digit of milli second (000 through 999)

For example, 2019-09-23T09:30:00+10:00, here the time component is in NEM time and the offset specifies number of hours by which the time is ahead of UTC.

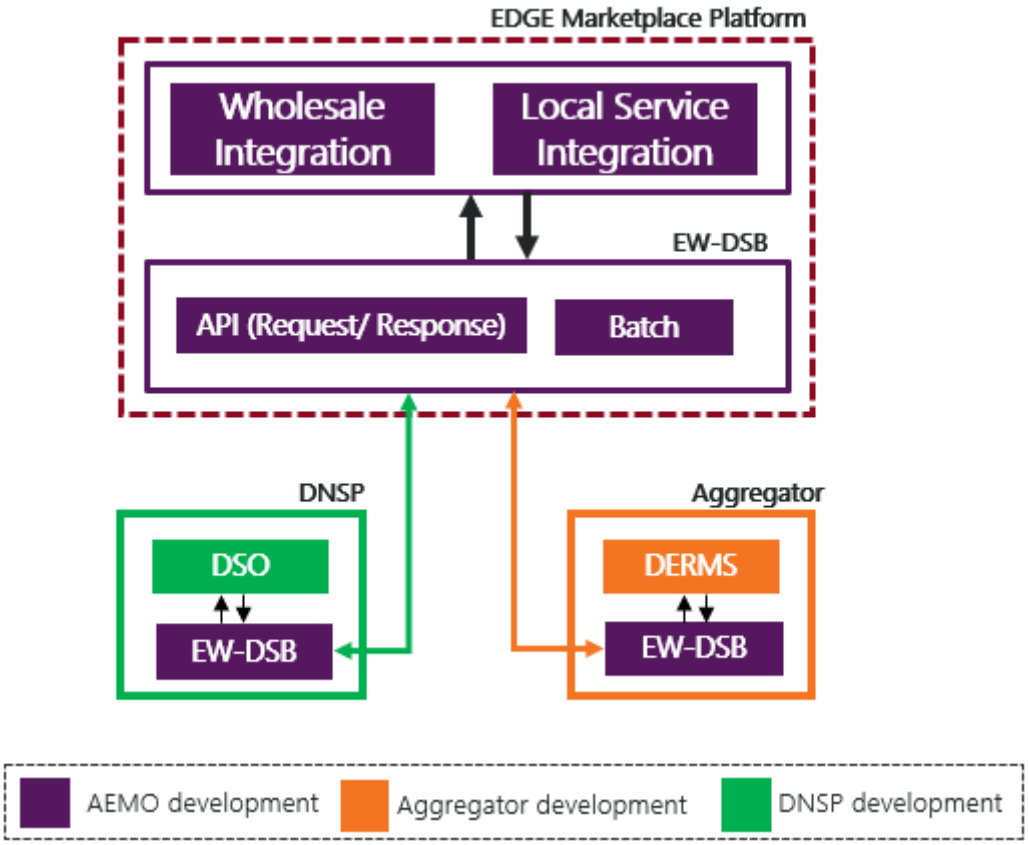
# 5. Data Management

| Data Category | Data Ownership | Data Usage | Data Storage | Data Retention | Data Privacy & Legal |
|---|---|---|---|---|---|
| | Who owns & manages access to the data? | How is data used and what happens if the participant has different view of the data | How, where, and what data is stored? | How long data is stored for? | • Data privacy/ legal consideration<br>• Data sharing consent requirement |
| Considerations | Access managed by AEMO<br>Data Ownership stays with the EDGE participants | Data used<br>• for knowledge sharing analysis<br>• Research hypothesis testing<br>• Cost benefit analysis<br>• Project marketplace operations<br>Please note:<br>• All participants will have access to EDGE data relevant to their project role and will have the capability to download data submitted by them | • AEMO EDGE Platform<br>• AEMO Enterprise Data Platform | • To meet Project research requirements | • Data will be shared with project partners to support the development of knowledge sharing and cost benefit analysis outputs to support future reform. |

# 6. Data Exchange

## 6.1 Data Exchange Conceptual View

Integration with the EDGE Marketplace is built on the Energy Web Distributed Service Bus (EW-DSB) messaging services. The messaging bus enables transactions to be transmitted via channels to recipients that subscribe to that channel. In the EDGE Marketplace platform, the Aggregators EW-DSB and DNSPs EW-DSB interacts with AEMO EW-DSB.




In addition to providing a scalable and decentralised messaging service EW-DSB also provides

- Guaranteed delivery of the messages
- Authentication and Authorisation using Digital Identities (DID)
- Role based access control
- Message broadcast, message unicast (message sent to 1 recipient) and message multicast (message sent to a group of recipients)

The EW-DSB has been specifically built by Energy Web Foundation to enable secure communications for DER for the utilities industry. The key components of the EW-DSB comprise of

1. Hosting a Kubernetes container in the Aggregator environment
2. Downloading and configuration the AKS container to communicate
3. Obtaining private and public keys from AEMO/EWF
4. Configurating public/private keys to communicate to the EDGE Marketplace hosted in the AEMO environment
5. Configuring appropriate channels for each type of transaction to be passed.

To participate in the EDGE Marketplace, a DNSP and Aggregator must be on-boarded onto the EDGE Marketplace platform and be enrolled into the Project EDGE as a DSO and Aggregator respectively.

Aggregators will also be required to submit a registration form and meet Project EDGE data and system requirements. Once the registration form has been assessed, AEMO will invite selected Aggregators to register and proceed through the onboarding process.

From a **system perspective**, there are 3 methods of integration with the EDGE Marketplace Platform

1. **Client Gateway:** This component abstracts some of the complexity involved in connecting to the DSB; it is an application written in TypeScript and running on NodeJS. The code is open source and available on Github. To run the client gateway, it can be:
   a. Deployed within a docker container
   b. Deploy in your Kubernetes cluster using our provided Helmchart

The client gateway is interacted with using REST endpoints, UI upload/download or web sockets.

2. **Direct integration with the decentralized Service bus (DSB):** Integration with the DSB directly can be done using the REST endpoints provided by the DSB directly. To interact with this directly participants will need to handle enrolment, authorisation, and message signing/verification directly.
3. **DSB client SDK**: Alternatively, participants may embed a DSB client SDK into their existing server applications as an alternative to running the client gateway. The key difference between the DSB Client SDK and the Gateway is that enrolment is a manual process for the SDK. Users of an SDK must visit EnergyWeb Switchboard to manage their DID and request enrolment to the AEMO DSB. Currently, a Python SDK is maintained by EWF, however, additional SDKs could be produced upon request Integration with a Client SDK uses REST endpoints abstracted as functions.

From a **data exchange perspective:**

- Aggregator must be able to:
  1. Ingest and process
     a. Operating Envelopes provided by AEMO via EW-DSB
     b. Dispatch instructions provided by AEMO via EW-DSB
  2. Submit
     a. Boffers to AEMO via EW-DSB

b. DUID Telemetry via EW-DSB

3. Send out dispatch instructions to the DER devices
4. Receive and provide acknowledgement of data receipt
5. Meet data requirements as defined in this data specification document.

- DNSP must be able to:
  1. Provide Operating Envelopes via EW-DSB to AEMO
  2. Receive and provide acknowledgement of data receipt
  3. Meet data requirements as defined in this data specification document.

## 6.2 EW-DSB Introduction and Configuration.

Key terminology related to EW-DSB

| Item | Description |
|---|---|
| **Channel** | Channels are used to communicated messages between a sender (i.e. message publisher) and recipient (message subscriber). Messages are sent to and received from Channels. Channel will store message for a defined period of time. Given below is the list of Channels provided by the EW-DSB.<br>• **Administration specific channels**<br>– This is channel is used by AEMO to perform Channel administration<br>– Access to 'Administration Channel' is restricted to AEMO.<br>• **Participant-type specific channels**<br>– These channels used by EDGE participants to publish a message to AEMO. For example:<br>○ Aggregator will use 'Aggregator type' channel to publish message to DMO<br>○ DNSP will use 'DSO type' channel to publish message to DMO<br>• **Participant specific channel**<br>– These channels are used by EDGE participants to receive messages from AEMO |
| **Topic** | Topic or collection of topics are created for a channel, and users use the Topic under a Channel to facilitate data exchange over the EW-DBS and exchange data.<br>Role based access to a channel will allow access to all topics configured for that channel. |
| **User** | A user is defined as a person or system having access to the EW-DSB. For EDGE we have 2 types of users<br>• A named user: for testing and QA purposes<br>• A system user: for data exchange<br>– AEMO as DMO<br>– AusNet Services as DSO |

| Item | Description |
|---|---|
| | – Mondo as Aggregator |
| **User Role** | A User could be 'sender' known as publisher or 'recipient' known as subscriber of the message.<br>• The publisher will create the message and will want to send the message<br>• The subscriber will receive the message and process the message |
| **Role Permission** | Various 'role permissions' are assigned to the users depending on the participant type and interactions they need to perform on the DER marketplace. A User can have a<br>• Publisher Roles<br>• Subscriber Role |
| **Client UI** | This refers to the web browser interface used by the participants to create the DIDs and upload the Participant Enrolment data |
| **Acknowledgments** | For details on the acknowledgement please refer to 'Section 5: Message Acknowledgement' |

## 6.3 EDGE Channels

Given below is list of Channels developed and available on EW-DSB

| Channel Name | Channel Namespace | Publisher Role | Subscriber Role | Description |
|---|---|---|---|---|
| **aggregators** | aggregtors.channels.{project-env}.apps.{org}.iam.ewc | Aggregators | AEMO | Channel carries messages to AEMO from aggregator participants |
| **dsos** | dsos.channels.{project-env}.apps.{org}.iam.ewc | DSO i.e. DNSPs | AEMO | Channel carries messages to AEMO from DSO participants |
| **participant** | {participantName}.channels.{project-env}.apps.{org}.iam.ewc | DMO i.e. AEMO | Participant | Single channel for each participant to receive message from AEMO |

## 6.4 EDGE Topics

Given below is list of Channels developed and available on EW-DSB.

**Note:** The Topic namespace is defined as topic/<version number>/<topicName>. For example topic/v1/boffer where version number is referred by v1

| Topic Name | Publisher | Subscriber | Description |
|---|---|---|---|
| **boffer** | Aggregator | AEMO | For submitting (or publishing) Aggregator's Boffers for Wholesale Energy |
| **bofferAck** | AEMO | AEMO | For submitting (or publishing) |
| **dsoOperatingEnvelope** | DSO | AEMO | For submitting (or publishing) DNSP's Dynamic NMI level Operating Envelopes (DOE) |

| Topic Name | Publisher | Subscriber | Description |
|---|---|---|---|
| **dsoOperatingEnvelopeAck** | AEMO | Participant | For submitting (or publishing) acknowledgment of successful acceptance or rejection of the DOE submitted by the DNSP to AEMO. This is the async acknowledgement sent to DNSP |
| **operatingEnvelope** | AEMO | Participant | For sending (or publishing) DOE relevant to the NMIs in the Aggregator Portfolio |
| **operatingEnvelopeAck** | Aggregator | AEMO | |
| **Dispatch** | AEMO | Participant | For sending (or publishing) Dispatch Instructions to the relevant Aggregator |
| **dispatchAck** | Aggregator | AEMO | For submitting acknowledgement of receipt of Dispatch Instructions from AEMO |
| **duidTelemetry** | Aggregator | AEMO | For submitting (or publishing) DUID level Telemetry data.<br>PS; There is no async acknowledgement of this data being successfully accepted by AEMO |
| **dnspRegistration** | DNSP | AEMO | For submitting (or publishing) DUID level Telemetry data.<br>PS; There is no async acknowledgement of this data being successfully accepted by AEMO |
| **duidRegistration** | Aggregator | AEMO | For submitting (or publishing) DUID level Telemetry data.<br>PS; There is no async acknowledgement of this data being successfully accepted by AEMO |
| **nmiRegistration** | Aggregator | AEMO | For submitting (or publishing) DUID level Telemetry data.<br>PS; There is no async acknowledgement of this data being successfully accepted by AEMO |
| **deviceRegistration** | Aggregator | AEMO | For submitting (or publishing) DUID level Telemetry data.<br>PS; There is no async acknowledgement of this data being successfully accepted by AEMO |

## 6.5 Channel and Topic Mapping EDGE

Given below is mapping between the Topic Name and Channel Name. For most up to date listing of channel and topics please refer to https://energyweb.atlassian.net/wiki/spaces/AEMO/pages/2773647540/Channel+Design+MVP

| Topic Name | Topic Namespace | Channel | Publisher | Subscriber |
|---|---|---|---|---|
| **boffer** | topic/v1/boffer | aggregatorsNem.channels.dsb.apps.energyweb.iam.ewc | Aggregator | AEMO |
| **bofferAck** | topic/v1/bofferAck | {participantName}.channels.dsb.apps.energyweb.iam.ewc | AEMO | AEMO |
| **dsoOperatingEnvelope** | topic/v1/dsoOperatingEnvelope | dsosNem.channels.channels.dsb.apps.energyweb.iam.ewc | DSO | AEMO |
| **dsoOperatingEnvelopeAck** | topic/v1/dsoOperatingEnvelopeAck | {participantName}.channels.dsb.apps.energyweb.iam.ewc | AEMO | Participant |
| **operatingEnvelope** | topic/v1/operatingEnvelope | {participantName}.channels.dsb.apps.energyweb.iam.ewc | AEMO | Participant |
| **operatingEnvelopeAck** | topic/v1/operatingEnvelopeAck | aggregatorsNem.channels.dsb.apps.energyweb.iam.ewc | Any Aggregator | AEMO |
| **Dispatch** | topic/v1/dispatch | {participantName}.channels.dsb.apps.energyweb.iam.ewc | AEMO | Participant |
| **dispatchAck** | topic/v1/dispatchAck | aggregatorsNem.channels.dsb.apps.energyweb.iam.ewc | Aggregator | AEMO |
| **duidTelemetry** | topic/v1/duidTelemetry | aggregatorsNem.channels.dsb.apps.energyweb.iam.ewc | Aggregator | AEMO |
| **dnspRegistration** | topic/v1/dnspRegistration | dsosNem.channels.channels.dsb.apps.energyweb.iam.ewc | DNSP | AEMO |
| **duidRegistration** | topic/v1/duidRegistration | aggregatorsNem.channels.channels.dsb.apps.energyweb.iam.ewc | Aggregator | AEMO |
| **nmiRegistration** | topic/v1/nmiRegistration | aggregatorsNem.channels.dsb.apps.energyweb.iam.ewc | Aggregator | AEMO |
| **deviceRegistration** | topic/v1/deviceRegistration | aggregatorsNem.channels.dsb.apps.energyweb.iam.ewc | Aggregator | AEMO |

# 7. Message Acknowledgements

Message acknowledgements are the messages sent from the receiving system (or application) to a sending system (or application). Aggregator and DNSP will be provided by the message acknowledgements covering

- Successful submission of message
- Unsuccessful submission of messages (Error messages)

As part of Project EDGE data exchange capability, the EW-DSB will provide acknowledgements as

- **System Acknowledgements**: these are the outcome of Schema Validation on Message
- **Transaction Acknowledgements**: these are outcome of Business Validation on Messages

## 7.1 Generic Message Structure

```
POST /message
{
    "fcqn" : "channel namespace",
    "topic" : "topic namespace",
    "transactionId" : "optional participant generated id",
    "payload" : {as defined for each topic}
}

GET /message?fcqn={channel namespace}
{
  "id": "ChannelAssignedMessageId",
  "topic": "topic namespace",
  "payload": {as defined for each topic}
    }
  },
  "signature": "hash of message and publisher key",
  "sender": "publisher DID",
  "timestampNanos": epochtimestamp in ns,
  "transactionId": "optional participant generated id"
}
```

# 8. Participant On-boarding & Enrolment Data

Participant on-boarding refers to the set of activities involved in configuring, on-boarding and setting up the participant on the EDGE marketplace platform to facilitate data exchange. Completion of participant on-boarding and enrolment allows the participants to exchange data with other participants and actively participate in the EDGE.

Participant Enrolment refers to the enrolment of the participant portfolio into the Project EDGE Marketplace. This allows the participant to utilise their portfolio to participate in the market and make offers to provide wholesale energy and/or local services and procure services via the EDGE marketplace.

Participant on-boarding must take place first, followed by participant enrolment.

- **For Participant On-boarding**: Aggregator and DNSP must provide AEMO with participant details including their Participant ID and category via email.

– DNSP to submit data defined in the 'Participant Data' table of this EDGE Data Specification

– Aggregator to submit data defined in the 'Participant Data' table of this EDGE Data Specification

- **For Participant Enrolment:** Aggregator and DNSP must provide the portfolio data to AEMO via email for validation by AEMO; upon successful validation of the data notification from AEMO the participant is then required to submit data to AEMO systematically via either Client UI or DSB/API

– **Aggregator** is required to submit data on their portfolio including DUID configuration, list of NMI associated to the DUID and subsequent devices associated to the NMIs in the Aggregator portfolio. The 3 datasets provided are for

  ○ DUID Configuration as defined in DUID Data (Aggregator) table.

  ○ List of NMI in portfolio as defined in NMI Data (Aggregator) table.

  ○ List of Device by NMI as defined in Device Data (Aggregator) table.

– **DNSP** is required to submit a list of NMIs along with the logical representation of network hierarchy; in addition to that, the DNSP will also be providing default NMI level Operating Envelopes for the NMIs in the project EDGE.

  ○ The NMI list is defined in NMI Data (DNSP) table.

## 8.1 Participant Enrolment data

| Item | Description | At Enrolment | |
|---|---|---|---|
| Data Provider | Participant providing the data | Aggregator | DNSP |
| Update Frequency | The frequency of submission of the data | • On initial enrolment; and subsequently<br>• On changes in the portfolio (addition or removal of sites or assets) | |
| Data Composition | The make up or composition of the enrolment data required | • Participant Information<br>• DUID configuration<br>• List of NMI and services<br>• List of Devices | • Participant Information<br>• List of NMI<br>• Default limits for NMI<br>• Logical representation of network Hierarchy |
| Data Validation | Who validates the Participant on-boarding and Enrolment data | • Schema Validation by EDGE marketplace platform<br>• Business validation performed manually by AEMO analyst | • Schema Validation by EDGE marketplace platform<br>• Business validation performed manually by AEMO analyst |

## 8.2 Enrolment Data Characteristics

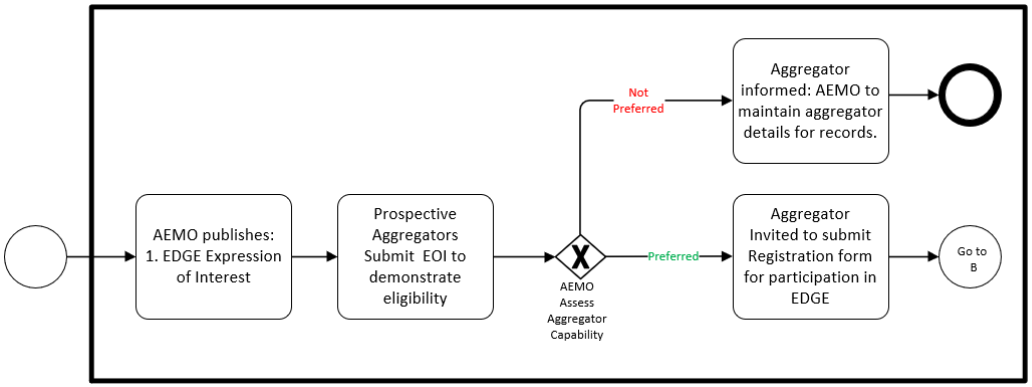
| **Dataset Name** | **Step 1: Participant On-boarding** | **Step 2: Participant Enrolment** |
|---|---|---|
| **Description** | Data required to configure, on-board and set up the participant in the EDGE Marketplace platform | Data required to successfully enrol participant in the EDGE trial; and to allow participant to participate in the wholesale energy market and local services market. |
| **Information Classification** | Confidential | Confidential |
| **Publication Frequency** | • On initial enrolment<br>• When there is a change in portfolio | • On initial enrolment<br>• When there is a change in portfolio |
| **Data Volume** | Low | Low |
| **Data Submission** | Manual data submission | Manual data validation followed by Client UI upload or DSB/API submission by Participant |

| Dataset Name | Step 1: Participant On-boarding | Step 2: Participant Enrolment |
|---|---|---|
| **Sending Recipient** | • Aggregator<br>• DNSP | • Aggregator<br>• DNSP |
| **Receiving Participant** | • AEMO | • AEMO |
| **Business Response** | • Provided via Email from AEMO analyst | • Schema validation response provided by the Client UI<br>• Business response provided via Email from AEMO analyst |

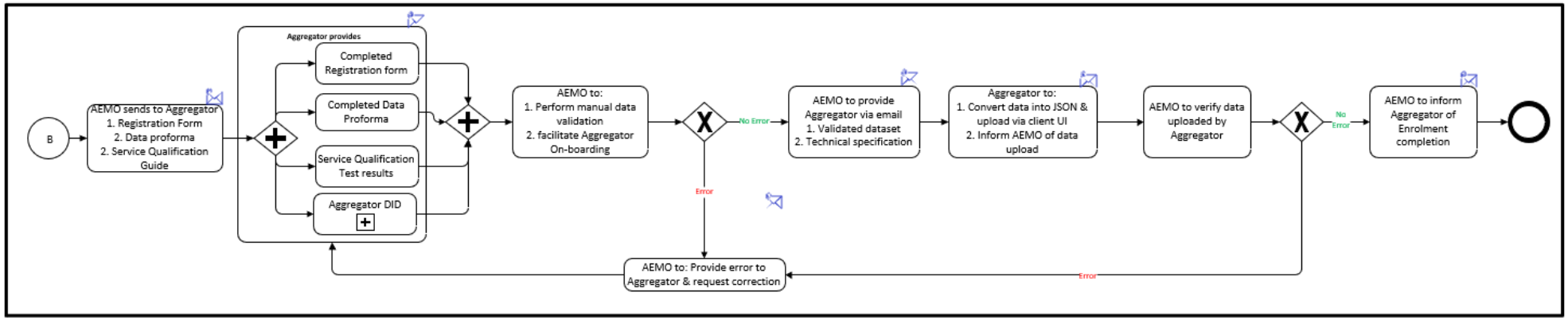
## 8.3 Aggregator On-boarding and Enrolment Process Overview

Aggregator On-Boarding and Enrolment into Project EDGE is a two-step process.

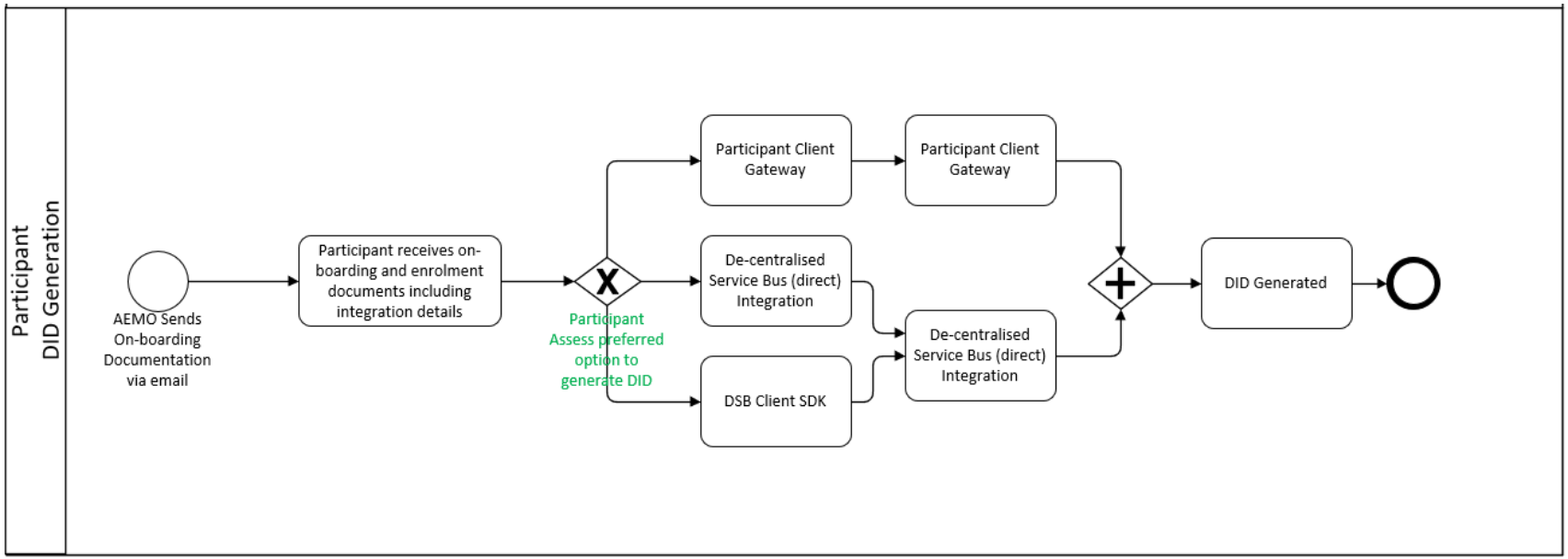
### Step 1: Aggregator Expression of Intertest




### Step 2: Aggregator Enrolment including On-boarding



## 8.4 Participant DID Generation



## 8.5 Enrolment Data Definition

### 8.5.1 Participant Data

Following data definition is applicable to both DNSP and Aggregator. In the data proforma this table is provided in '**Participant**' tab.

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| 1 | participantId | Participant ID | String | Unique identifier of the participant.<br>Provided by the Participant | Y | N | 6 digits alphanumeric<br>Universally unique (AEMO enforced) |
| 2 | participantName | Participant Name | String | Name of the Participant | Y | N | |
| 3 | participantType | Participant Type | String | Categorises the enrolling participant into the role played by applicant in EDGE trial. {Pick List: Aggregator, DSO, DMO} | Y | N | For DNSP = DSO;<br>For Aggregator = Aggregator |
| 4 | registeredCategory | Registered Category | String | Registered category of the Participant. {Pick List: Market Customer, MASP, DRSP, DNSP, Non-Registered} | Y | N | Provided by Applicant |
| 5 | regionID | Region ID | String | The region (state) in which the participant is enrolled and DUID is located. {Pick List = VIC, WA} | Y | N | For EDGE = VIC |
| 6 | comment | Comments | String | Free text field to capture any relevant information regarding the enrolment or the portfolio | N | Y | |
| 7 | initialEnrolmentDate | Enrolment Date | Date | Date the Participant is initially (1st time) enrolled into the EDGE platform. On this date the enrolment will become effective. | Y | N | To be determined by AEMO |

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| | | | | | | | Valid date (YYYY-MM-DD); Only date part w/o time in YYYY-MM-DD format |

### 8.5.2 DUID Data (Aggregator)

Aggregator is required to submit the DUID data as part of Participant Enrolment. The following table captures the data definition for the DUID configuration as proposed by Aggregator. In the data proforma this table is provided in **Agg-DUID** tab.

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| **1** | participantId | Participant ID | String | • Unique identifier of the participant.<br>• Provided by the Participant | Y | N | • 6 digits alphanumeric<br>• Universally unique (AEMO enforced) |
| **2** | duid | DUID | String | Dispatchable Unit Identifier. This is used by EDGE marketplace to generate dispatch instruct for. This represents the system aggregation point of Aggregator portfolio. | Y | N | • 8 digit alphanumeric<br>• Min length = 8<br>• Max length = 8<br>• Universally unique |
| **3** | duidName | DUID Name | String | Name of the Dispatchable Unit.<br>Format of the DUID name | Y | N | For e.g. <VPP> <Participant> <Region> <NumberA> |
| **4** | duidRegion | DUID Region | String | The region (state) in which the DUID is located. {Pick List = VIC, WA} | Y | N | For EDGE = VIC |

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| **5** | duidTechnologyType | DUID Technology Type | String | This refers to the control type of the DUID. DUID Technology type {Pick List = Switching, Proportional} | Y | N | The Technology type should reflect the control type for majority of the devices in the Aggregator portfolio. |
| **6** | registeredCapacityGen | Registered Generation Capacity | Number | Expected unit generation operating capacity in kW | Y | N | • Generation provided as '+ve' value<br>• >= 0<br>• Must be <= Max. Generation Capacity |
| **7** | registeredCapacityLoad | Registered Load Capacity | Number | Expected unit load operating capacity in kW | Y | N | • Load provided as '-ve' value<br>• <= 0<br>• Must be <= Max. Load Capacity (absolute value) |
| **8** | maxCapacityGen | Max Generation Capacity | Number | Maximum Generation capacity is used IN Boffer validation; this represents the absolute maximum generation provided by the Aggregator portfolio in kW. This could be same as Registered Generation Capacity. | Y | N | • Generation provided as '+ve' value<br>• >= 0 |
| **9** | maxCapacityLoad | Max Load Capacity | Number | Maximum Load Capacity is used IN Boffer validation; this represents the absolute maximum load provided by the Aggregator portfolio in kW. This could be same as Registered Load Capacity. | Y | N | • Load provided as '-ve' value<br>• <= 0 |

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| **10** | effectiveStartDate | Effective Start Date | Datetime | Specifies the datetime from which record is active | Y | N | Valid date (YYYY-MM-DD) |
| **11** | effectiveEndDate | Effective End Date | Datetime | Specifies the datetime on which the record ceases to be an active record | N | Y | Valid date (YYYY-MM-DD) |

### 8.5.3 NMI Data (Aggregator)

Aggregator is required to submit the NMI list and EDGE marketplace services (e.g. Energy, Local Services etc) delivered by NMI as part of Participant Enrolment. The following table captures the data definition for the NMI list as proposed by Aggregator. In the data proforma this table is provided in '**Agg-NMI**' tab.

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| 1 | nmi | NMI | String | NMI identifier. NMI must be submitted without the checksum | Y | N | • 10 character, alpha numeric |
| 2 | duid | DUID | String | Corresponding DUID to which the NMI is associated/controlled | Y | N | • 8 digit alphanumeric<br>• Min length = 8<br>• Max length = 8<br>• Universally unique |
| 3 | nmiService | NMI Service Type | String | Field to capture the one or more services delivered by the NMI.<br>{Pick list = Energy. Local Raise, Reactive Power} | Y | N | |

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| 4 | nmiEnrolledDate | NMI Enrolled Date | Datetime | This refers to the date 'NMI' is enrolled into the Project EDGE. From this date onwards NMI enrolment becomes effective, and Aggregator can use the NMI to deliver the services in EDGE | Y | N | • Valid date (YYYY-MM-DD)<br>• No time part required |
| 5 | nmiTrialChurnDate | NMI Churn Date | Datetime | This refers to the date 'NMI' is removed from the Project EDGE. From this date NMI enrolment ceases and Aggregator can no longer use the NMI to deliver the services in EDGE. | N | Y | • Valid date (YYYY-MM-DD)<br>• No time part required |

### 8.5.4 NMI Data (DNSP)

DNSP is required to submit the NMI list along with the default NMI level Operating Envelops (import/export limits) and the logical representation of Distribution Network hierarchy for the area covered EDGE as part of Participant Enrolment. The following table captures the data definition for the NMI list as proposed by DNSP. In the data proforma this table is provided in '**DNSP**' tab.

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| 1 | participantID | Participant ID | String | • Unique identifier of the participant.<br>• Provided by the Participant | Y | N | • 6 digits alphanumeric<br>• Universally unique (AEMO enforced) |
| 2 | nmi | NMI | String | National Meter Identifier. NMI must be submitted without the checksum | Y | N | • 10 character, alpha numeric |

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| 3 | isoTx | ISO TX | String | This refers to the head of a SWER network in AusNet jurisdiction.<br>It is the nodal point for calculation of OEs for SWER network customers | Y | Y | • No validation performed by AEMO |
| 4 | dTx | DTX | String | This refers to the head of a 3-phase network in AusNet jurisdiction. This is also referred as 'Distribution Transformer'.<br>It is the nodal point for calculation of OEs for distribution transformer network customers | Y | Y | • No validation performed by AEMO |
| 5 | defaultExportLimit | Default Export Limit | Number | Active Power Import limit applicable to the specified interval, measured in kW. This is most likely based on connection agreement | Y | N | • Export value represented as '+ve' number<br>• >=0 |
| 6 | defaultImportLimit | Default Import Limit | Number | Active Power Import limit applicable to the specified interval, measured in kW. If import limit is not available, then provide as NULL. | Y | Y | • Import value represented as '-ve' number<br>• <=0 or Null |
| 7 | effectiveStartDate | Effective Start Date | Datetime | Specifies the datetime from which record are active.<br>Datetime the data is uploaded by AST | Y | N | • Valid date (YYYY-MM-DD) - date part w/o time |
| 8 | effectiveEndDate | Effective End Date | Datetime | Specifies the datetime from which the record ceases to be an active record. | N | Y | • Valid date (YYYY-MM-DD) - date part w/o time |

### 8.5.5 Device Data (Aggregator)

Aggregator is required to submit a list of all DER assets (controllable assets) by NMI for all NMI in their portfolio. Aggregator must also provide various attributes of the DER assets installed at customer sites in the portfolio as part of Participant Enrolment. The following table captures the data definition for the Device list as proposed by Aggregator. In the data proforma this table is provided in '**Agg-Device**' tab.

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| 1 | nmi | NMI | String | NMI identifier at the site. NMI to be provided without checksum | Y | N | 10 characters, alpha numeric |
| 2 | acConnectionId | AC Connection ID | String | Unique identifier for each AC Connection or Group in a DER installation. | Y | N | |
| 3 | acEquipmentType | AC Equipment Type | String | This refers to AC grid connection source of a DER installation.<br>Indicates whether the DER device is connected via an inverter or Other equipment type. | Y | N | Example of AC equipment type are "Inverter" or "Other" |
| 4 | deviceID | Device ID | String | Unique identifier for a single DER Device or a group of DER Devices with the same attributes. | Y | N | For Oct 2021, the deviceID from Mondo System will be provided |
| **5** | deviceType | Device Type | String | This contains the primary technology used in the DER device. {pick List = 'Solar PV', 'Storage', 'Hybrid'} | Y | N | |
| **6** | inverterPowerRating | Invertor Power Rating (kW) | Number | Invertor Power Rating in **kW**. This represents the maximum PV inverter output at the site | Y | Y | |
| **7** | storageCapacity | Storage Capacity (kWh) | Number | Battery Storage Capacity in **kWh**. This refers the maximum storage capacity of the Battery at the site | Y | Y | |

| ID | Attribute | Business Name | Date Type | Description | Is Mandatory | Is Nullable | Comments/ Validation Rule |
|---|---|---|---|---|---|---|---|
| **8** | nominalRatedCap | Nominal rated capacity (kVA) | Number | Maximum output in **kVA** that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group | Y | Y | |
| **9** | nominalStorageCap | Nominal storage capacity (kVAh) | Number | Maximum storage capacity in **kVAh**. This refers to the capacity of each storage module within the device group. | Y | Y | |
| **10** | deviceSerialId | Device Serial ID | String | This is the serial number of the Device. For a battery this will be the Serial Number of the actual battery unit | Y | Y | |
| **11** | inverterManufacturer | Inverter Manufacturer | String | Contains the Inverter manufacturer | Y | Y | |
| **12** | inverterSerialNumber | Inverter Serial Number | String | Contains the Serial number of the Inverter | Y | Y | |
| **13** | inverterModelVersion | Invertor Model Version Number | String | Contains the make/brand, model and series number of the inverter | Y | Y | |
| **14** | deviceManufacturer | Device Manufacturer | String | Contains the name of the device manufacturer | Y | Y | |
| **15** | deviceModelNumber | Device Model/Version | String | Contains the Model number of the device | Y | Y | |
| **16** | deviceEnrolDate | Device enrolled Date | String | This refers to the date 'device' is enrolled into the Project EDGE | N | N | |
| **17** | deviceTrialChurnDate | Device Trial Churn Date | String | This refers to the date 'device' is churned from the Project EDGE | N | N | |

## 8.6 Validation Rules

Prior to the participant (Aggregator/DNSP) uploading the data via the Client UI or submitting via API endpoints; AEMO analyst **manually** performs the following validation checks on the participant data to be submitted by Aggregator and DNSP.

| Rule ID | Description |
|---|---|
| **Participant ID** | 1. Universally unique.<br>2. Manually enforced by AEMO |
| **DUID** | 1. Universally unique.<br>2. Manually enforced by AEMO |
| **NMI** | 1. NMI provided is a valid NMI<br>2. NMI provided is an active NMI<br>3. NMI provided exists in 'Victoria'<br>4. NMI provided is not associated to an existing DUID<br>5. NMI and Device ID pair provided is not associated to an existing DUID |

# 9. Appendix

## 9.1 Key Contacts in Project EDGE

| Contact Name | When to contact | Email |
|---|---|---|
| **Project EDGE** | General EDGE enquiries and related DER Program queries | EDGE@aemo.com.au |

## 9.2 Quick references

| Description | Location/Link |
|---|---|
| **AEMO Website - EDGE** | https://aemo.com.au/en/initiatives/major-programs/nem-distributed-energy-resources-der-program/der-demonstrations/project-edge |
| **EDGE Project Factsheet** | https://aemo.com.au/-/media/files/initiatives/der/2022/edge-factsheet.pdf?la=en |
| **EDGE – Expression of Interest** | https://aemo.com.au/-/media/files/initiatives/der/2021/edge-expression-of-interest-form.pdf?la=en |

## 9.3 FAQs

| Question | **Response** |
|---|---|
| Is there an order or sequence of data submission | First step to participate in the Project EDGE is to complete Participant on-boarding and Enrolment. Completion of this activity provides DNSP and Aggregators with required system access and capability to participate in DER marketplace (deliver Wholesale Energy and LSE services)<br>• First : Participant On-boarding data<br>• Second: Participant enrolment |
| How data is exchanged | All data exchanged as part of EDGE must be exchanged via the EDGE marketplace – EW-DSB<br>No manual data exchange for market participation is expected. |
| What data is required for Participant Ob-boarding | Participant information as described in Section 6.4.1 |
| What data is required for Participant Enrolment | From DNSP<br>• Portfolio information covering the list of NMI and the applicable default export and import limits as described in Section 6.4.4<br>From Aggregator portfolio information covering |

| Question | **Response** |
|---|---|
| | • DUID configuration data as described in Section 6.4.2<br>• NMI list and services offered as described in Section 6.4.3<br>• Device list and device meta data as described in Section 6.4.5 |
| In what Time Zone data is to be provided? | Data must be submitted in NEM time (i.e. AEST). NEM time is defined as AEST (+10:00) time. |
| What Date or Datetime format to use in data exchange | Pls refer to Section 2.2 |
| Can data be provided in the local time zone | **No**, all data submitted to AEMO must be in NEM time.<br>AEMO will reject data submitted in time zone other then NEM time. |
| Do data measurements or forecasts needs to align to Dispatch Interval (DI)/ Trading Interval (TI) Start time or End time | Yes, all measurements must be aligned to DI/TI end time.<br>• Actual Measurement Data must be at DI time ending i.e. measured at 5 min boundary. For example 10.00, 10.05 etc<br>• 5 min Forecasts must be at DI time ending i.e. forecasted at 5 min boundary. For example. 10.00, 10.05 etc<br>• 30 min Forecasts must be at TI time ending i.e. forecasted at 30 min boundary. For example. 10.00, 10.30 etc<br>• Telemetry Data:<br>– Instantaneous values must be at DI time ending i.e. measured at 5 min boundary, E.g. 10.00, 10.05 etc.<br>– The minimum, maximum and mean values must be measured over the DI i.e. 5 min duration. E.g. Maximum: Customer gross load should be maximum customer gross load within the 5 min interval (i.e. in-between start and end of dispatch interval) |
| When are dispatch instructions generated and published | • Dispatch instructions are published every 5 mins when the DER marketplace is operational<br>– Dispatch instructions are sent out to Aggregators just after the start of the Dispatch Interval.<br>– We expect AEMO can calculate the dispatch target and send dispatch instructions to the Aggregators withing 1st 30 seconds of the dispatch interval<br>• For example for DI of 09:05 hrs Dispatch target calculated and sent out by 09:00:30 and the expectation is Aggregator is able to meet the dispatch target by end of the DI |
| What are data obligations on Aggregator for participation in EDGE | To successfully participate in EDGE Aggregator has to meet following data obligations:<br>1. Aggregator to provide<br>a. Datasets<br>i. Participant on-boarding and enrolment data<br>ii. DUID level Boffers<br>iii. NMI level Boffers |

| Question | **Response** |
|---|---|
| | iv. DUID level telemetry data<br>v. NMI level Telemetry Data<br>vi. Availability Forecast data<br>vii. NMI level load/ generation forecast<br>viii.<br>2. Acknowledgement on data sent by AEMO<br>a. Acknowledgement of receipt of DOE<br>b. Acknowledgement of receipt of Dispatch Instructions<br>3. Aggregator must be able to receive below from AEMO<br>a. Dispatch Instructions<br>b. Dynamic NMI DOE |
| What are data obligations on DNSP for participation in EDGE | To successfully participate in EDGE DNSP has to meet following data obligations:<br>1. DNSP to provide<br>a. Datasets<br>i. Dynamic NMI DOE<br>2. DNSP must be able to receive below from AEMO<br>a. Acknowledge of receipt of NMI DOE<br>b. Dispatch Instructions<br>c. Boffers<br>d. NMI level forecasts generated by Aggregator |
| What are the data obligations on AEMO as part of EDGE | To successfully play the role of Market Operator in EDGE, AEMO will:<br>• Clear the market and perform after the dispatch conformance monitoring and simulate settlement.<br>• Share the outputs from the Dispatch conformance monitoring and simulated settlement |
| Can Aggregator only participate in Local Service Exchange (LSE) | No, EDGE expectation is that Aggregator participates in the Energy and the LSE. It is not a must to be able to deliver all the LSE services. |