



# Project EDGE

## DUID Telemetry Overview

Version: Initial Draft

# Important notice

## **PURPOSE & AUDIENCE**

This document describes the overview and high-level design for DUID Telemetry data and subsequent 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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# Contents

- 1. DUID Telemetry** **5**
- 1.1 DUID Telemetry Data contextual overview 8
- 1.2 Data Definition 11

## VERSION RELEASE HISTORY

Version	Effective date	Summary of changes
Initial Draft	Dec 2021	Initial Draft for publication

# 1. DUID Telemetry

DUID Telemetry data is required by market operator for Operational Visibility and Dispatch conformance monitoring. DUID Telemetry data consists of the aggregated instantaneous period ending measurement of active power flow at NMI or at a common measurement point at a site. And actual generation, actual load and actual energy stored for controllable assets in the portfolio. The data provided by an Aggregator is for the whole of portfolio i.e. aggregated from individual sites to the DUID level. Within the trial, DUID Telemetry data is used for two main purposes:

- a. Wholesale Energy Dispatch Compliance
  - This refers to assessment of Aggregator meeting their dispatch target by AEMO.
  - Active power flow ( '+ve' for generation/ '-ve' for load)
  - Measured at NMI or common measurement point behind the NMI
- b. Operational Visibility; Aggregated data from controllable (or flexible) assets in the portfolio. The value represented the aggregation of all controllable DER assets by generation and load; not individual assets or asset types.
  - Controlled generation in kW
  - Controlled load in kW
  - Energy Stored in kWh

## Explanation of key concepts

**Data Coverage:** The data is provided for the whole of the portfolio (i.e. in EDGE, the DUID represents entire Aggregator portfolio)

**Controllable (or Flexible) Assets:** Any DER asset that can be remotely and actively controlled – turned on, turned off, ramped – up or ramped -down is classified as controllable asset. In EDGE this capacity is referred to as the 'Flex' definition of quantity (kW/kWh).

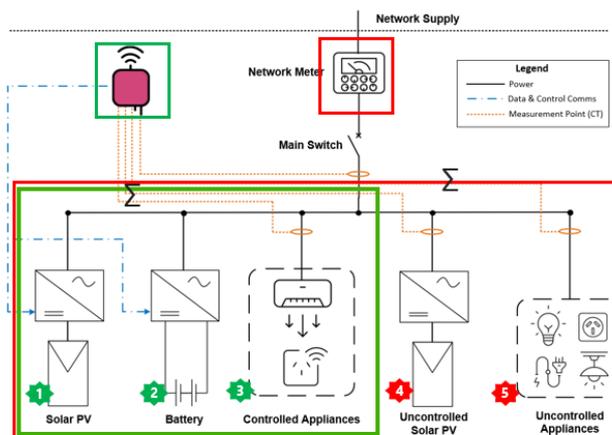
**Controllable (Load and/or Generation) :** Sum of controllable devices (load and/or generation; *not individual devices*) across the participant's registered portfolio of NMIs

-> Only controllable assets are considered when calculating the capacity

-> Measurement at a real/virtual measurement point  
*ps: not individual devices but aggregated of all controllable devices*

-> Visibility of 'summation of' all controlled assets is provided via Bi-directional offer and telemetry

->  $\sum (1 + 2 + 3)$



**Aggregated Net Connection Point Flow:** Sum of net connection point flows across the participant's registered portfolio of NMIs i.e. Net at NMI

-> All Controllable and un-controllable assets considered when calculating the net connection point flow value

-> Measured at Connection point (i.e. NMI)

-> Visibility of Net position at NMI is provided via Bi-directional offer and telemetry  
 Separation of controlled & uncontrolled assets is not required or visible

->  $\sum (1 + 2 + 3 + 4 + 5)$

Example of a site with Energy Storage System (ESS i.e. Battery) and rooftop solar (PV)

- if the Aggregator can constrain/turn off or turn on the PV generation then the **PV is Controllable**.
- if the Aggregator is only controlling/flexing the ESS according to the outcomes of the PV generation, then PV is not being actively controlled. i.e when PV is generating, rather than reducing PV output the ESS is charged to compensate for additional Generation then **PV is not being actively controlled**, therefore does not appear in telemetry data as controlled generation. E.g
  - Uncontrolled PV Generation at sites in aggregator’s fleet turns up and the ESS which is controllable compensates by charging. The quantity charged would appear in the controlled load field of the Aggregated Telemetry.
  - Uncontrolled PV Generation at sites in aggregator’s fleet goes down and the ESS compensates by discharging; the ESS discharge quantity would appear in the controlled generation field of the Aggregated Telemetry

Simple worked examples

Increase in Controlled Load

Time Stamp	Asset	Cont. Gen (kW)	Cont. Load (kW)	Energy Stored (kWh)	Comments
	ESS		-5	10	Breakout by asset for illustrative purposes
	HW System		0	-	Breakout by asset for illustrative purposes
Total @ 10:49		0	-5	10	Telemetry submitted. 1 ESS with 10kW and not charging
	ESS		-10	10.17	Breakout by asset for illustrative purposes
	HW System		-5		Breakout by asset for illustrative purposes
10:50		0	-15	10.17	Telemetry submitted. ESS charging and storage value now + 0.17kWh. 0.17kWh* was used to charge battery and 5kW of other load turned on. *assumes 100% charging efficiency for illustrative purposes.

Increase in Controlled Generation

Time Stamp	Asset	Cont. Gen (kW)	Cont. Load (kW)	Energy Stored (kWh)	Comments
	ESS	5		10	Breakout by asset for illustrative purposes
	PV System	0			Breakout by asset for illustrative purposes
10:49		5	0	10	Telemetry submitted.
	ESS	10		8.33	Breakout by asset for illustrative purposes
	PV System	5			Breakout by asset for illustrative purposes
10:50		15	0	8.33	Telemetry submitted. ESS discharging and storage value now reduced to 8.33kWh*. Total generation 15kW is made up of 5 kW@ PV and 10kW @ ESS. *assumes charge/discharge rate are equal and 100% discharging efficiency at for illustrative purposes.

## 1.1 DUID Telemetry Data contextual overview

Note: In EDGE as the Aggregator is bidding as Bi-directional resources the 'generation' value is provided as positive value and 'load' value is provided as negative value.

Item	Active Power	Actual Controlled Generation	Actual Controlled Load	Actual Energy Stored
<b>Definition</b>	Active Power (in kW) exported to grid or imported from grid within a dispatch interval measured at 'Connection Point' or in case of Flex at a 'common measurement point' and then aggregated to DUID level	Actual Controlled generation in kW: The sum of actual discharge/generation activity of the DUID. <b>Note:</b> this is not intended to include uncontrolled generation such as uncontrolled PV that is not being actively controlled by the aggregator	Actual Controlled load in kW: The sum of actual charge/load activity of the DUID. <b>Note:</b> this is not intended to include un-controlled loads such as household appliance loads unless explicitly under control of the aggregator	The Actual Energy in kWh that is stored in the aggregator's portfolio that could have been discharged if required.
<b>Description</b>	Single value = DUID Exports minus DUID Imports <ul style="list-style-type: none"> <li>DUID Import = Active power consumed by DUID (flow of power -&gt; GRID to DUID)</li> <li>DUID Export = Active power generated by DUID (flow of power -&gt; DUID to GRID)</li> </ul>	<ul style="list-style-type: none"> <li>Actual Controlled Generation represents sum total of all controlled generation/discharge activity in Aggregator's portfolio. For an ESS – discharging is captured as generation</li> <li>For example, in an Aggregator portfolio with 5 ESS each of 1kW capacity. Total Available Controlled Generation is 5 kW; if each</li> </ul>	Actual Controlled Load represents sum total of all controlled charge/ Load activity in Aggregator's portfolio. <ul style="list-style-type: none"> <li>For an ESS – charging is captured as load</li> <li>For example, in an Aggregator portfolio with 5 ESS each of 1kW capacity. Total Available Load is -5 kW. If each ESS is charging -0.5 kW then Actual</li> </ul>	The total energy stored, aggregated to the DUID level.

Item	Active Power	Actual Controlled Generation	Actual Controlled Load	Actual Energy Stored
		ESS is exporting 0.8 kW then Actual Controlled Generation value will be 4 kW.	Controlled Load value is - 2.5 kW	
<b>Definition of Quantity</b>	<ul style="list-style-type: none"> <li>Net NMI (net at site) aggregated to DUID level</li> <li>Flex (total controllable/flexible at site) aggregated to DUID level</li> </ul>	<ul style="list-style-type: none"> <li>Aggregated at DUID level and for controllable portion of portfolio only (Flex)</li> </ul>		
<b>Data importance and usage for AEMO</b>	<ul style="list-style-type: none"> <li>Used in assessing Aggregator's conformance to Wholesale energy dispatch target. This assessment is done after the dispatch interval.</li> <li>State estimation</li> </ul>	<ul style="list-style-type: none"> <li>State estimation – understanding what the system is doing in real-time. This is particularly important following a disturbance or incident; in order to manage power system security.</li> <li>Use in short term generation and demand forecasting</li> <li>Adjustment of near-term forecasts. The ability to see what's happening, means the system level forecasts can adjust in the near-term (0-2 hours ahead) for improved accuracy.</li> </ul>	As per controlled generation.	<p>As per controlled generation.</p> <ul style="list-style-type: none"> <li>Used for power system reserve assessments. For understanding how much is available, should it be required in an emergency.</li> <li>Or, if a market event were to occur, such as a very high price, understanding what energy may be generated.</li> <li>The energy storage information can be utilised in reserve estimations and forecasts for the management of power system reliability.</li> <li>Comparison between measurements provides</li> </ul>

Item	Active Power	Actual Controlled Generation	Actual Controlled Load	Actual Energy Stored
		<ul style="list-style-type: none"> <li>Utilisation of historic data to tune and prepare short-term forecasting models. These are used to assess power system adequacy, security, reserve management, outage planning and risk management.</li> <li>Management of congestion such as network constraints in dispatch.</li> </ul>		visibility of the 'controlled load' that was battery charging as opposed to controlled load being turned on/up
<b>Characteristics</b>	<ul style="list-style-type: none"> <li>Aggregated sum of portfolio activity</li> </ul>	Absolute value, aggregated sum of portfolio generation/ discharge activity	Absolute value, aggregated sum of portfolio load/ charge activity	Absolute value, value does not consider any arrangements Aggregator will have with the end customer
<b>Research Question Relevance</b>	<p>RQ4: How can the DER Marketplace facilitate efficient activation of DER to respond to wholesale price signals, operate within network limits and progress to participation in wholesale dispatch over time?</p> <ul style="list-style-type: none"> <li>Net NMI (net at site) = value limited to dispatch target compliance, no visibility</li> <li>Flex (total flexible at site) – Significant insight with</li> </ul>	<p>Applies to RQ4, Hypothesis A: <i>"DER participation in wholesale energy markets can be achieved progressively, as DER fleets reach materiality thresholds, aligning with ESB visibility and dispatchability models"</i></p> <p>Provides retrospective visibility and situational awareness fundamental to an operable system by AEMO in a high DER future. Without this, DER will not be able to participate in energy markets at scale.</p> <p>RQ8: CBA – enriches CBA by showing asset type contribution to value generation in marketplace</p>		

Item	Active Power	Actual Controlled Generation	Actual Controlled Load	Actual Energy Stored
	separation of controlled and uncontrolled capacity.			
<b>Power Type used</b>	Active power			
<b>Unit of Measure</b>	kW	kW	kW	kWh
<b>Data aggregation Level</b>	DUID	Controllable generation Assets in DUID	Controllable load Assets in DUID	Total Energy Stored available for discharge (net of technical limits like depth of charge).
<b>Granularity (resolution or temporal qualification)</b>		<ul style="list-style-type: none"> <li>• 1 min</li> <li>• instantaneous period ending (each 1 min)</li> </ul>		
<b>Submission Frequency</b>		1 min		

## 1.2 Data Definition

For DUID Telemetry data definition please refer to the Section 6.3 DUID Telemetry data Definition of [Project EDGE: Data Specification Part B](#).