Guide to understanding AEMO data for ADRs

AEMO is keen to support ADRs' full understanding of the CDR payload for AEMO supplied data. While it may appear simple to understand and to use, historical variations in the way data has been gathered and the way meters have been configured can make its interpretation somewhat complex. In addition, those who already have some background in energy may not be aware of the changes incorporated into the CDR payload in an effort to standardise the data.

Disclaimer: This guide is intended to aid the understanding of the CDR payloads and is to be read in conjunction with the relevant AEMO and CDR standards which take precedence over this guide. This guide does not replace the standards but is intended as a complementary document. It should also be noted that every attempt is made for this guide to be correct at the time of publication. However, subsequent changes to AEMO or CDR standards may render part or all of this guide incorrect.

Payloads

Usage Data

servicePointId Used by CDR to identify a service point for the duration of the data sharing agreement between the customer, ADR and Data Holder (energy retailer). Not provided by AEMO

meterID Every CDR service point will have one or more meters

registerId Every meter will have one or more registers

registerSuffix Every register will have one or more suffixes. These are listed in the AEMO standard

The register suffix describes the flow of energy and unit of measure at a connection point. At its most simple a service point will have one suffix (for example, E1 on an Interval meter) which indicates that there is only one metered flow of energy at that service point (in the example, an Export from the grid to the service point – a consumption at the service point). Table 1 describes the suffix conventions and units of measure.

controlledLoad Controlled load (sometimes referred to as a dedicated circuit) is where the energy use is controlled or dedicated to (typically) one device – often an electric hot water service – and measured separately from the remaining load. Often this is to allow for the use of less costly off-peak generation after hours.

General energy consumption is not controlled load, while after-hours electric hot water heating on a separate circuit would be controlled load. In the Interval meter example above, E1 might have a controlled load flag of "false" meaning it is for general energy consumption, while a second suffix E2 may have a controlled load flag set to "true" meaning it is for a dedicated appliance at a controlled time (eg. overnight hot water heating). Note that not all electric hot water services are on controlled load (typically as some are configured to heat on demand rather than at set off peak times).

readStartDate Date when the meter read starts

readEndDate Date when the meter read ends

Read dates are the range of dates for the reads. For example, in an Interval meter the reads will likely be presented daily so the start date and end date will be the same date (or if the end date is missing it can be assumed that they are at the same date). However, in a Basic meter the start and end dates are often 3 months apart and so the start date and end date will reflect that difference (the end date always will be provided). Note that the subsequent read start date will commence the day after the previous read end date – for example the start and end dates may be 1 January 2021 to 30 March 2021 with the next start date the 31 March 2021 spanning to the next end date.

unitOfMeasure For most small consumers of energy (typical residences and small businesses) the unit will be kWh (and a missing unit of measure is assumed to be kWh), however large consumers may be measured in kVArh for reactive power or other units as described in the AEMO standard.

readUType A descriptor designating that reads are from either a Basic or Interval meter. This will indicate the form of the following read – basicRead or intervalRead.

basicRead An object which includes the elements of a Basic meter read (one of each of the following):

- quality — A flag indicating the quality of the read – Actual (or missing which assumes an Actual read), Substitute or Final Substitute which indicate that in lieu of an Actual reading there has been a substitution (Note forward Estimates are not provided)
- value — The energy consumed for that time period. Note that this is not the actual meter reading but the difference between the two meter readings scaled if necessary, to represent the energy consumed for that period. (For example meter readings might have been 1234 at the StartDate and 1243 at the EndDate so the actual energy consumed would be 9kWh – the value presented would be 9 in this example). Note also that the value is positive for consumption at the service point and negative for export from the service point (for example a surplus of energy generated at the service point by solar, would appear as a negative value).

intervalRead An object which includes the elements of an Interval meter read:

- readIntervalLength — Interval length in minutes, currently 5, 15 or 30
- aggregateValue — The aggregate of interval read values over the time period (currently day)
- intervalReads — An object which includes the actual Interval meter reads (an array of the following to cover each read interval in the time period – for example 48 sets of quality and value, one for each read interval for a 30 minute Interval meter). Note that interval one commences at midnight AEST and continues at increments of the read interval length (for example the first read interval for a 30 minute Interval meter would be 00:00-00:30 AEST). AEST is used in all jurisdictions throughout the year and does not change for daylight saving:
  - quality — A flag indicating the quality of the read for the interval. See note above in Basic read quality.

value — The energy consumed for that interval. See notes above in Basic read value.

Standing Data (Service Point Data)

Note: all Standing Data / Service Point data is the current data at the time of the request. Historical values are not provided.

servicePointId — Used by CDR to identify a service point for the duration of the data sharing agreement between the customer, ADR and Data Holder (energy retailer). Not provided by AEMO

NationalMeteringId — A NMI is used by the energy industry to identify a service point and is unique across the National Energy Market (NEM)

servicePointClassification — The classification per DSB standards. Most frequently LARGE or SMALL for domestic service points

servicePointStatus — ACTIVE or otherwise per the DSB standards

jurisdictionCode — The State (legal energy jurisdiction) to which the service point belongs

isGenerator — An optional field indicating the presence of a scheduled or semi-scheduled generator. This does not equate to local solar generation or similar. If missing then false.

validFromDate — per DSB standards

lastUpdateDateTime — When this service point information was last updated

consumerProfile — An object which describes the consumer including:

- classification — An optional code describing the consumer class – RESIDENTIAL or BUSINESS
- threshold — The (optional) consumption threshold – LOW, MEDIUM or HIGH

The following payload is provided in addition to the above for getServicePointDetail calls.

distributionLossFactor — An object which describes the DLF including:

- code — A DLF code from the AEMO standards
- description — A description of the code and lossValue
- lossValue — the DLF value

Note: DLF can be reset at or around the end of the financial year.

relatedParticipants — An object which describes the current participants associated with the service point including:

- party — Name of the organisation

role — One of FRMP (retailer), LNSP (typically the Distribution Business) or DRSP (optional)

Note: Participant name/ party is the direct mapping from AEMO's Participant id and may not map to the common or trading name of the retailer – eg ENERGEX maps to Sun Retail Pty Ltd which is actually known to their consumers as Origin.

location — An object in the form of the DSB common Physical Address. Note that the paf address provided is for this service point but there may be additional service points at that address

meters — An object describing the meters at that service point:

- meterId — A unique ID within that service point
- specifications — An object describing the technical specifications of the meter:
  - status — CURRENT or DISCONNECTED
  - installationType — Refer to the DSB standard
  - manufacturer
  - model
  - readType — Refer to the DSB standard
  - nextScheduledReadDate — Optional – for manual meter reads
- registers — An optional object describing the meter's registers:
  - registerId — A unique ID within that service point (eg E1)
  - registerSuffix — A unique ID within that service point (eg E1)
  - averagedDailyLoad — Calculated over an extended period typically annually, often an estimate
  - registerConsumptionType — Refer to the DSB standard
  - networkTariffCode — Often describes the use of that register as published by the LNSP/Distribution Business
  - unitOfMeasure — Typically KWH
  - timeOfDay — Refer to the DSB standard for the time validity of the register (eg ALLDAY or OFFPEAK)
  - multiplier — To convert register value into billable energy
  - controlledLoad — See Usage above
  - consumptionType — ACTUAL or CUMULATIVE

Distributed Energy Resources (DER Data)

servicePointId Used by CDR to identify a service point for the duration of the data sharing agreement between the customer, ADR and Data Holder (energy retailer). Not provided by AEMO

approvedCapacity As approved with the LNSP/Distribution Business (0 indicates no DER)

availablePhasesCount A value of 1-3 (0 indicates no DER)

installedPhasesCount The phases the DER is connected to (0 indicates no DER)

islandableInstallation True if the DER can operate as an island (ie. if grid power is unavailable)

hasCentralProtectionControl Refer to the DSB standard

protectionMode An object describing the protection control:

- exportLimitKva Maximum power that can be exported to the grid
- All other protection mode fields – refer to the DSB standard

acConnections An object describing each of the DER AC connections:

- connectionIdentifier A unique ID within that service point
- count Number of AC connections in the group
- equipmentType INVERTER or OTHER
- manufacturerName
- inverterSeries
- inverterModelNumber
- commissioningDate
- status ACTIVE or otherwise – see DSB standard
- inverterDeviceCapacity Output power or 0 if unknown
- derDevices An object describing the DER devices:
  - deviceIdentifier A unique ID within that service point
  - count Number of devices in the group of DER devices (eg number of solar panels)
  - manufacturer
  - modelNumber
  - status ACTIVE or otherwise – see DSB standard
  - type SOLAR_PV or otherwise – see DSB standard
  - subtype

nominalRatedCapacity Maximum output power kVA of each product in the group or 0 if unknown

nominalStorageCapacity Maximum storage capacity kVAh of each storage module in the group or 0 if unknown

Additional Scenarios

Exporting Energy

While the above focuses on simple energy consumption using one or two suffixes, there can be multiple consumption suffixes at a service point and increasingly one or more suffixes for export of energy from a service point into the grid (eg. for rooftop solar).

Under the current AEMO standard, most commonly service points will have a suffix with one of the following first characters. (This list is not exhaustive – check the AEMO standard):

Interval Meter First character	Basic Meter First character	At the Service Point
E	1-3, (4-6 controlled load)	Consumption kWh
B	7-9	Export to the grid kWh
Q	N/A	Consumption kVArh
K	N/A	Export to the grid kVArh

Table 1

- The second character in the suffix can be 1-9 or alphabetic A-Z (excluding the letters I and O)
- In CDR, the read values corresponding to a consumption at the service point are positive, while all export read values are negative. (So an E1 suffix would have positive values, while a B1 would have negative values).
- Export from the NMI will be the surplus after consumption during that instance so may not be a good indication of the amount generated by the device at that instance.
- Most interval meters read at a lesser interval than they report (eg they may read every second yet report every 5 minutes), therefore an interval may have both consumption and export readings at the same time.

Net meter reads

Historically, Interval meter reads were often netted off before being provided to AEMO. (Basic meters are never netted). Some historical data may have these characteristics. A netted suffix's first characters were:

Interval Meter	At the Service Point
N	Net of consumption and export kWh
X	Net of consumption and export kVarh

Note that the second character in the suffix can be 1-9 or alphabetic A-Z (excluding the letters I and O)

Under a Net suffix, the read values corresponding to a net consumption at the service point are positive, while a net export read value is negative. (So an N1 suffix could have positive or negative

values depending on the net of the consumption and the export at each time interval). Note that net metering could also apply to a service point where there was no local generation – so energy values for each time interval would be positive – indicating a net consumption. But all values being positive does not necessarily imply that the service point does not have local generation as its local generation could always be used at the service point and not exported.

Meter reconfigurations and replacements

While meters and suffixes are often static throughout a two year payload of usage data (two years being the current maximum length of a CDR usage payload), meter reconfigurations and replacements do occur so suffixes may not be the same or have the same characteristics throughout the payload. (Some reconfigurations can reuse a suffix yet apply a different characteristic following the reconfiguration). Any change in meter configuration may make it more complex for an ADR to create a profile of energy consumption patterns throughout the payload period. Typical scenarios which an ADR needs to be aware of within a payload include but are not limited to:

- Removal of controlled load from a service point (which may cause a discontinuation of a suffix or that suffix could continue but always have readings of zero)
- Introduction of local generation at a service point (which introduces a new export suffix or changes the characteristics of an existing Net suffix).
- Meter reconfiguration from an historical Net suffix to separate suffixes (eg. N1 might be split into E1 and B1 or just renamed to E1 if there is no local export)
- Change of meter type from Basic to Interval – sometimes triggered by an introduction of local generation which may create a new export suffix at the same time or more likely, may be as a result of a meter upgrade program (there is such a program at the moment where Basic (and some Interval) meters are being upgraded to 5-minute Interval meters)
- General meter reconfigurations or replacements which may cause the introduction, removal or replacement of suffixes, often at the same time

FAQs

Data Latency

While interval meters typically read every 30 minutes (or at 5, 15 or other intervals) usage data is provided to AEMO at best, daily – so requesting usage data every 30 minutes (or multiple times in a day) is not worthwhile. A small number of interval meters are not updated for at least a week and basic meters are updated at best every 3 months. Given a valid request, AEMO will provide you all the Usage data that it holds. If the data you requested is not provided then we are unlikely to have it.

Standing (Service Point) and DER data is updated far less frequently (thus the term Standing Data) but changes are usually forwarded within 24 hours and may be applied retrospectively. Likewise requesting data multiple times in a day will not return updated data.

Retry on 500

Current practice is that some Primary Data Holders will cut off any retrievals from AEMO at 10 seconds (or at other time intervals) and return a 500 error to the ADR. While there remain some longer transaction durations (and AEMO is working to reduce these), AEMO caches usage data for paging purposes. Unless the AEMO service is truly unavailable (use AEMO's getStatus and/or getOutages), we would recommend retrying the usage request a minute later.

Data Quality

Note that the data provided by AEMO under the CDR is the data AEMO holds on behalf of energy industry participants. The data provided is the responsibility of those participants to maintain and ensure its accuracy and completeness. Under CDR, any issues with quality of AEMO data will be managed by the FRMP/retailer who will pass the issue to the participant responsible for that data. Any fixes will be made by the recipients and will be updated by them in AEMO. (AEMO holds this data to manage its primary business – to procure sufficient energy from generators to meet consumers' demand and to settle the market so that all generation costs are allocated to the responsible retailer participants.)

Historical Data

Currently, the FRMP / current retailer can access all current Service Point and DER data, and Usage data for the period where they were the FRMP to a maximum of 2 years (under the CDR standard).

In addition, Usage data can be made available to FRMPs who were a previous FRMP (within the last 2 years).

> The future inclusion of the Last Consumer Change Date (LCCD) is expected to allow an ADR to request Usage data via the current FRMP but back beyond FRMP changes for a limit of 2 years or until the LCCD, whichever is the most recent.

Service Point / Standing data can only be accessed by the current FRMP and so any change in retailer will remove the previous retailer's ability to provide this data. Service Point data does not include historical data (previous meter configurations etc).

Similarly, DER data is only available via the current FRMP and the dataset does not include historical data (previous DER configurations etc).