Aggregated dispatch conformance in the NEM

Fact Sheet

Aggregated Dispatch Conformance (ADC) is being introduced under the Integrating Energy Storage Systems into the NEM Rule (Rule)

As our electricity system transitions to a net zero system, energy storage and aggregate systems play an increasingly important role to firm up the expanding volume of renewable energy. From 9 August 2023, participants in the NEM have the option to participate in ADC for units within a generating system (**Aggregate System**). This allows an Aggregate System the flexibility to conform to its dispatch instructions by dispatching energy at the connection point from any combination of its units (with some restrictions), rather than individually on a unit-by-unit basis.

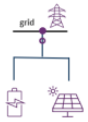
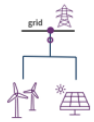
What is an Aggregate System?

AEMO's Dispatch Procedure[1] defines three kinds of Aggregate Systems:

1. **Target Aggregate**: An Aggregate System that comprises a scheduled generating unit and scheduled load pair, for a single physical plant. This is a transitional arrangement. A battery energy storage system **(BESS)** will be deemed to be a Target Aggregate until it transitions from being a scheduled generating unit/scheduled load pair to a single bidirectional unit (**BDU**) on and from 3 June 2024 under the Rule.
2. **Mixed Aggregate**: An Aggregate System that comprises scheduled generating units and which may also include semi-scheduled generating units or scheduled loads (but excluding a scheduled generating unit and scheduled load pair for a single physical plant, which is a Target Aggregate).
3. **Cap Aggregate**: An Aggregate System that only comprises semi-scheduled generating units.

[1] AEMO Dispatch Procedure updated for ADC: https://aemo.com.au/consultations/current-and-closed-consultations/dispatch-procedure-dynamic-adc

Table 1: Examples of each type of Aggregate System

Aggregate type	Description	Example	
Target	Battery only: Scheduled generating unit/scheduled load pair *Transitional arrangement until 03 Jun 24.*	One battery (scheduled)	
Mixed	Comprises scheduled generating units and which may also include semi-scheduled generating units or scheduled loads. Excludes battery-only aggregate	Battery (scheduled) and solar generating unit (semi-scheduled).	
Cap	Only comprises semi-scheduled generating units.	Generating system comprising wind and solar generating units (both semi-scheduled).	

What is aggregated dispatch conformance?

ADC was introduced under the Rule[2,3] and operationalised through AEMO's Dispatch Procedure.[4]

ADC allows the units in an Aggregate System to conform in aggregate with their dispatch instructions, subject to an AEMO requirement for individual conformance or Resource Level Compliance (RLC). Accordingly, ADC provides the Aggregate System with the flexibility to manage its electricity flows behind the connection point.

For example, the Mixed Aggregate shown in Table 1 could:

- Use its BESS storage to firm up its semi-scheduled solar intermittent generation up to its dispatch target.
- Divert excess semi-scheduled solar generation above its dispatch target to charge the BESS if the forecast solar generation (upon which the dispatch target is based) is lower than its actual generation, or if the solar generation is otherwise constrained-off from exporting to the grid.

Limitations of ADC

ADC is subject to two main kinds of limitations:

1. **Network constraints:** AEMO can require individual unit dispatch conformance instead of ADC in specified trading intervals in certain circumstances – for example, where required for stable power system operation.
2. **Frequency control ancillary service (FCAS) provision**:

[2] AEMC, Integrating energy storage systems into the NEM, Rule determination, 2 December 2021, pp. 34 – 36.

[3] National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021 No. 13 and National Electricity Amendment (Implementing integrated energy storage systems) Rule 2023 No. 2, clause 4.9.2A.

[4] Australian Energy Market Operator, SO_OP 3705 Dispatch. Latest version available at power system operating procedures web page: https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures

- A unit enabled for any regulation FCAS in a trading interval must conform individually and cannot participate in ADC in that trading interval.
- A unit enabled for contingency FCAS in a trading interval must be able to fulfil its contingency FCAS obligations for all enabled services – that is, the unit can participate in ADC in that trading interval, but only to the extent that it operates within the FCAS trapeziums for which it is enabled and maintains sufficient headroom and foot room to deliver both energy and the enabled contingency FCAS.

Table 2: Scenarios for when ADC can and cannot be used

CAN AGGREGATED DISPATCH CONFORMANCE BE USED WHEN…						
Aggregate type	… enabled for FCAS regulation		… providing contingency FCAS		… a network constraint is applied to a unit in the aggregate	
Target	✓	Yes, always conforming in aggregate.	✓	Yes, provided it is operating within trapezium.	✓	Yes, always conforming in aggregate.
Mixed	✗	No. Regulation FCAS enabled unit must individually conform i.e. follow its individual automatic generation control (AGC) set point.	✓	Yes, provided: • operating within trapezium. • have sufficient headroom and foot room.	✗	Constrained unit must individually conform.
	✓	Any remaining units (not enabled for regulation FCAS) in the aggregate may conform in aggregate.			✓	Any remaining unconstrained units in the aggregate may conform in aggregate.
Cap	✗	No. Regulation FCAS enabled unit must individually conform i.e. follow its individual AGC set point.	✓	Yes, provided: • operating within trapezium. • have sufficient headroom and foot room.	✗	Constrained unit must individually conform.
	✓	Any remaining units (not enabled for regulation FCAS) in the aggregate may conform in aggregate.			✓	Any remaining unconstrained units in the aggregate may conform in aggregate.

Frequently asked questions

Is ADC mandatory?

ADC is optional for a Cap or Mixed Aggregate. Each participant will need to make its own assessment as to whether ADC is suitable for its generating system.

I am interested in participating in ADC. What is the process for applying?

For a new development, the intent to participate in ADC needs to be considered within the connections process with Network Service Providers (**NSPs**) and AEMO. The aggregate system's ability to participate in ADC will be assessed within the normal connections process. For existing eligible generating systems, the existing process for making a change should be followed – **refer to next question.**

New generating systems or existing generating systems adding new generating units may register for ADC as part of the generator registration process or afterwards, through a separate standalone process managed by AEMO. Existing generating systems may also register for ADC through the separate standalone process.

Do participants with an existing generating system need to apply for a formal NER 5.3.9 or NER Schedule 5.2.2 change to adopt ADC?

The need to undergo a formal NER Chapter 5 change process to access ADC is specific to each existing generating system and dependent on the extent of alteration required. The relevant change process and level of assessment required will be determined by the NSP and AEMO on a case-by-case basis.

Do the generating units comprising an Aggregate all need to be located at the same connection point?

An Aggregate (eligible for aggregated dispatch conformance) is defined as a *generating system*, or part of a *generating system*, where *generating system* is defined under the NER.

The generating units comprising an Aggregate must all belong to the same generating system. This means that all generating units comprising an Aggregate will be located at the same *connection point* as defined in the NER.

However, there are scenarios where there are multiple physical connection points, for example a generating system where its auxiliary load is fed from a separate connection point. This would still be interpreted under the NER as a single *connection point*.

Does each DUID within an Aggregate need to be registered under the same participant ID?

Generally, yes. Generating systems comprised of multiple dispatchable units (DUIDs) are usually configured in AEMO's market systems under a single Station ID. AEMO's market systems only enable a single Participant ID to be associated with a Station ID. Participant's access to market systems for operational purposes is on a Participant ID basis.

How are existing scheduled batteries treated?

AEMO will be using the ADC mechanism to monitor dispatch conformance for a BESS as a Target Aggregate across its scheduled generating unit/scheduled load DUID pair. This is an interim measure until BESS transition from being classified as a scheduled generating unit and scheduled load pair to being a single BDU in mid to late

2024.[5] At this time, AEMO will monitor individual BDU dispatch conformance and discontinue monitoring of the Target Aggregate.

Does ADC replace the need for rebidding?

No. Compliance obligations regarding rebidding remain, including under NER Clauses 3.8.22 and 3.8.22A.

Will existing generators opting into ADC reduce the frequency of curtailments?

Possibly. For example, the need for curtailment could be reduced where variable renewable energy generators can divert excess electricity into local storage, rather than being curtailed due to network congestion.

How does the causer pays methodology accommodate aggregates on ADC?

For Market Participants who nominate to have ADC for their group of generating and load units, all those units (**DUIDs**) will be aggregated as one unit. This applies regardless of the status of their conformance mode in dispatch for a specific trading interval. If at least one unit is enabled for regulation FCAS, the causer pays system will treat all units within the group to be enabled for regulation FCAS.

Units that are not nominated to have ADC will continue to be assessed at the DUID level unless they are aggregated under NER 3.8.3 bid aggregation or AEMO considers it appropriate to assess units with more than one NER classification as a single unit (e.g. a BESS).

Causer pays arrangements will be replaced by Frequency Performance Payments from 8 June 2025, as a consequence of the procedure and system changes arising from the Primary Frequency Response Incentive Arrangements rule. Under the final Frequency Contribution Factors Procedure, eligible generating and load units participating in ADC will be assessed as a single eligible unit. This applies regardless of the status of their conformance mode in dispatch for a specific trading interval.

How does AEMO propose to treat an Aggregate System with grid following and grid forming inverters subject to system strength constraints?

AEMO does not propose to treat an Aggregate System with grid following or grid forming inverters differently for the purpose of ADC, except in circumstances where resource level compliance is required. While each site will need to be assessed individually, a plant would only need to be treated individually if there is a requirement based on the technical characteristics of the plant's inverters/turbines.

If we have a generating system with a solar farm and a grid-forming BESS and the connection point export capacity is the aggregate of the two, will the facility be treated as one entity for dispatch including system strength constraints?

It depends. The generating system will be modelled as three DUIDs – a semi-scheduled solar DUID, and a scheduled gen/scheduled load DUID pair for the BESS. From a system strength perspective, DUIDs may be treated differently, depending on how the inverters/turbines react to the contingency and whether this reaction differs between each of the plant in the generating system. The network topology at the time (outage or system normal) is another factor to be considered.

[5] The IESS rule stipulates that existing BESS transition to the new classification of bidirectional unit (BDU) and that new BESS are automatically classified as BDUs. For more information see AEMO's IESS project implementation.

Once my generating system (or part of generating system) is registered for ADC, when can I commence operating in ADC?

If new DUIDs within a generating system are also registered for ADC as part of the Generator registration process, the ADG effective date and DUID registration effective date will be the same. If existing DUIDs within a generating system are subsequently registered for ADC, you will advise AEMO of the future date from which you want to commence ADC operation – the ADG effective date. AEMO will record this date in its systems, and you only will be permitted to commence ADC operation on or after that ADG effective date. If ADC operations commence prior to the ADG effective date, AEMO will not recognise the ADG and there is a risk that AEMO will declare individual DUIDs as non-conforming. Prior to ADG change being implemented into market production systems, the ADG change will be implemented into market pre-production systems, to enable the Generator's development of integrations prior to ADG effective date.

How do I confirm my registration details for ADC?

1. Check that your DUIDs are registered to an ADG_ID, in the DUDETAIL table of the participant data model.
2. Check the Conformance Type (ADG_Type) and Effective Date of the ADG_ID, in the ADG_DETAIL table of the participant data model.

What system changes do I need to implement?

There are changes made to NEM reports to accommodate ADC, including new and updated Participant Data Model (PDM) tables.

Participants with an ADG_ID should subscribe to, and interface with, the latest DISPATCH_CONFORMANCE NEM report and DISPATCH_UNIT_CONFORMANCE table in the PDM to enable them to monitor the aggregated dispatch conformance of their ADG_ID.

How do I subscribe to the DISPATCH_CONFORMANCE NEM report and non-conformance market notices?

For help on subscribing refer to AEMO | Markets portal help > EMMS > Data Interchange > Data Subscription > Subscribe to Files.

What has changed in my dispatch instructions?

A new CONFORMANCE_MODE field has been added to the DISPATCHLOAD table of the PDM:

- **CONFORMANCE_MODE = 0 (Cap Aggregate only):** DUID is not capped either individually or in aggregate, and can generate to the available energy
- **CONFORMANCE_MODE = 1:** DUID can conform in aggregate with other DUIDs in the ADG_ID with CONFORMANCE_MODE = 1
- **CONFORMANCE_MODE = 2 (Cap or Mixed Aggregate):** DUID must conform individually.

What is Conformance Mode and how is it determined?

Conformance Mode specifies whether a unit is currently on aggregate or individual conformance monitoring, depending on whether individual resource-level compliance is required. Refer to AEMO's dispatch procedure for further understanding of the circumstances where individual conformance may be required.

How do I know if my unit is not conforming to dispatch instructions, either individually or in aggregate?

AEMO's DISPATCH_CONFORMANCE NEM report will enable a participant to monitor aggregated and (if required) individual dispatch conformance.

For dispatch conformance of an individual DUID (where DUID ≠ ADG_ID), if the DUID's "Status" field is not one of ('NORMAL','SUSPENDED') then it is off target and may progress to being declared NON-CONFORMING.

For dispatch conformance of the ADG_ID (where DUID = ADG_ID), if the DUID's "Status" field is not one of ('NORMAL','SUSPENDED') then the ADG_ID is off target and may progress to being declared NON-CONFORMING in aggregate.

How do I know if individual unit conformance applies?

When individual unit conformance applies, the CONFORMANCE_MODE field will have value as 2.

How do I know if conformance is being assessed as all individuals or in aggregate?

There is an added CONFORMANCE_MODE field in the dispatch instructions with values 0,1 or 2, which defines for a trading interval whether aggregated (=1) or individual (=2) dispatch conformance is required for a DUID in an ADG_ID. DUIDs with CONFORMANCE_MODE =0 (only applies for an ADG_Type = 'CAP'), those DUIDs are not required to cap and can generate to the available energy.

How will the conformance of BESSs (as Target Aggregates) be assessed while providing Regulation FCAS?

If a BESS is registered for Regulation FCAS, the amount of Regulation FCAS enabled in the relevant direction is added to the error threshold before assessing whether the BESS is OFF-TARGET. That is, BESS delivery of up to the full enabled Regulation FCAS response (by following AGC setpoints from AEMO) will not under normal circumstances cause the BESS to be assessed by AEMO as off-target.

However if a BESS ADG_ID is consistently over-target (that is, above its energy target + FCAS Raise Reg enabled + error threshold) or consistently under-target (that is, below its energy target - FCAS Lower Reg enabled - error threshold), then the ADG_ID will eventually be declared non-conforming.

Note that while an ADG_ID can progress to 'non-conforming' status its individual DUIDs will not progress beyond 'off-target' status unless AEMO suspends the ADG_ID from the conformance monitoring process. If this occurs, the individual DUIDs will be monitored for conformance.

AEMO has taken all reasonable care in the preparation of this fact sheet. However, the information should not be construed as advice.

Where can I find more information?

AEMC's IESS determination and rule	https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem
AEMO's latest version of the Dispatch Procedure (SO-OP 3705)	https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures
AEMO's IESS participant toolkit	https://aemo.com.au/initiatives/major-programs/integrating-energy-storage-systems-project/integrating-energy-storage-systems-faqs

For any further enquiries, please contact AEMO's Information and Support Hub via

- Support.hub@aemo.com.au or
- call 1300 236 600

This fact sheet is only a summary of the ADC arrangements. Applicants are responsible for ensuring they understand the relevant provisions of the National Electricity Rules and other applicable instruments, which prevail in the case of any inconsistency.

To clarify ADC registration matters, please consult AEMO's website or contact us via onboarding@aemo.com.au

For individual connection proposals that consider ADC, please consult the relevant Network Service Provider.