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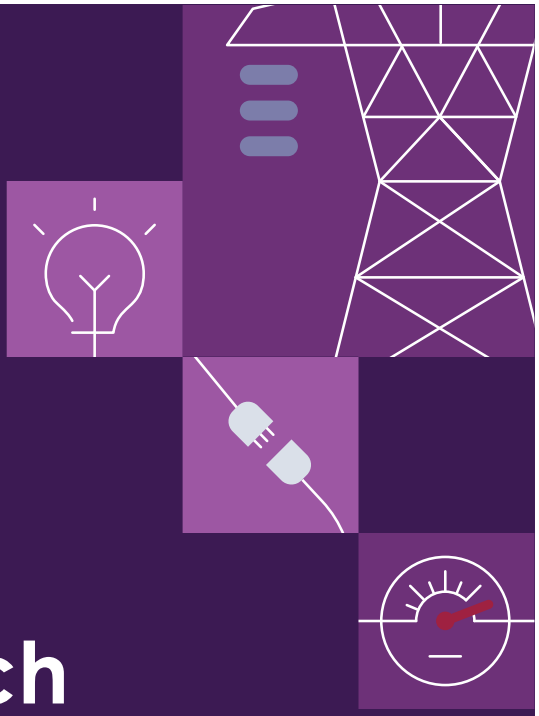
AUSTRALIAN ENERGY MARKET OPERATOR



SO_OP_3705 Dispatch procedure (Dynamic ADC)

Final Information Paper

10 February 2023

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New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia

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1. Summary of consultation

On 28 November 2022, AEMO issued Initial Information Paper to commence AEMO's consultation on the further proposed changes to the SO_OP_3705 Dispatch Procedure (Procedure) to implement aggregated dispatch conformance (ADC) in the relevant form (Dynamic ADC) in accordance with clause 11.145.16 of the National Electricity Rules (NER), under the National Electricity Amendment (Integrated energy storage systems into the NEM) Rule 2021 No. 13 (IESS Rule).

In summary, these changes to the Procedure are:

- Change to the definition of the Target Aggregate type.
- Introduction of a new Mixed Aggregate type.
- Changes to the participation in, and assessment of, ADC for a Mixed Aggregate.
- Changes to how dispatch instructions are issued via AEMO's AGC.
- Changes to when resource level compliance (RLC) is required, to include intervals where any FCAS regulation is enabled for a unit within a Cap Aggregate or a Mixed Aggregate.
- Consequential changes to dispatch instructions and AEMO's dispatch conformance monitoring.

On 20 January 2023, the submission period closed for stakeholders to:

- provide feedback and comments on the Initial Information Paper[1], as well as the accompanying yellow highlighted sections of the change-marked version of the Initial Draft Procedure[2]; and
- identify any unintended adverse consequences of the changes.

AEMO's responses are set out in Section 2 below.

The additional changes are described and explained in Section 3 below.

Dynamic ADC will be implemented on 9 August 2023, as detailed below:

- Initially, AEMO planned to implement a simplified "static" solution for ADC (Static ADC) from 31 March 2023. AEMO consulted on the Static ADC and published the related changes to the Procedure on 16 September 2022.
- However, following subsequent stakeholder feedback on the alternative "dynamic" solution for ADC (Dynamic ADC) AEMO assessed the Dynamic ADC as a preferable solution, which would result in greater uptake by participants. AEMO consulted on further changes to the Procedure to implement Dynamic ADC. The stakeholders broadly supported AEMO to proceed to implement Dynamic ADC.
- However, AEMO has determined there would be insufficient lead time to develop and implement Dynamic ADC by the IESS ADC rule effective date of 31 March 2023. Instead, AEMO is committing to implementing Dynamic ADC by 9 August 2023. This timing:
  - Aligns to the registration commencement and provision of bids in advance of the commencement on 9 October 2023 of the arrangements for Fast Frequency Response (FFR).

[1] https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/so_op_3705-dispatch-procedure-dynamic-adc/soop3705-dispatch-procedure-dynamic-adc--information-paper.pdf?la=en

[2] https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/so_op_3705-dispatch-procedure-dynamic-adc/soop3705-dispatch-procedure-dynamic-adc--changed-marked--draft.pdf?la=en

- Provides implementation efficiencies for both AEMO and participants, particularly grid-scale battery participants who choose to participate in both FFR and ADC.

2. Responses to submissions

AEMO's responses in respect of the stakeholders' submissions are set out in the table below. The full submissions are available on AEMO's consultation page[3].

Participant	Area/Procedure Reference/ AEMO Question	Participant Response	AEMO's Response
ATMOS	General	Atmos strongly supports AEMO's work in implementing the Mixed Aggregate ADC.	AEMO thanks Atmos for their support in developing the modified design
ATMOS	General	Atmos commends AEMO's work to refine the logic to allow a BESS to partially firm a semi-scheduled unit.	AEMO thanks Atmos for their support in developing the modified design
ATMOS	Mixed ADC 2.6.2(b)	Atmos requests AEMO clarify in the procedure the handling of the semi-dispatch cap, as the procedure appears contradictory. If AEMO did intend the semi-dispatch cap flag be ignored, and therefore assumed always 1, Atmos would see this as a strong disincentive to employ ADC. In reviewing the updated procedure SO_OP_3705, we are confused about the definition of the Mixed Aggregate, specifically in intervals where the semi-scheduled component does not have a semi-dispatch cap and generates above its dispatch level. It was our understanding from the IESS Working Group meeting on 26 Oct 2022 that a semi-scheduled unit that did not have a Semi Dispatch Cap (SDC) could be over its target without aggregated dispatch being deemed, as is allowable for a semi-scheduled unit by itself. In the procedure, 2.6.2(b) says that semi-scheduled units in a mixed aggregate ignore their SDC flag and (c) says the conformance mode will be 1 unless individual conformance is required. Given this, it's not clear how a semi-scheduled unit would know whether it needed to be under its dispatch level to be conforming (and hence whether it would trigger ADC). Section A.2 (the conformance calculations appendix) appears to contradict this, referring to the individual semi-scheduled small-error logic (which considers the SDC) in the logic to deem aggregate conformance. Atmos requests that this confusion be cleared up in the procedure, for example by removing the statement in 2.6.2(b) that the SDC flag is ignored.	AEMO agrees to change clause 2.6.2(b) of the Dispatch procedure, to clarify that the SDC flag is also part of a dispatch instruction to a semi-scheduled generating unit in a mixed aggregate, viz: **Updated 2.6.1(b)**: All units in a Mixed Aggregate use the conformance mode in their *dispatch instructions.* ~~Semi-scheduled generating units in a Mixed Aggregate ignore their semi-dispatch cap flag~~ **New 2.6.1(e):** A *semi-scheduled generating unit* in a Mixed Aggregate uses the semi-dispatch cap flag in its dispatch instruction to determine whether to cap its *active power* to its individual Dispatch Target or (if its conformance mode = 1) to participate in aggregated dispatch conformance. **Consequential changes:** **Updated 2.1(a)(ii):**

[3] https://www.aemo.com.au/consultations/current-and-closed-consultations/dispatch-procedure-dynamic-adc

Participant	Area/Procedure Reference/ AEMO Question	Participant Response	AEMO's Response
		If AEMO did intend for the SDC to be ignored for semi-scheduled units, and hence the unit be required to always operate below its dispatch level, Atmos has strong objections. The output of wind and solar farms vary with the natural variation in the available energy. Absent network or economic curtailment, the dispatch level will be set at the forecast output for the interval. The forecast is only ever a best guess, and the actual output will vary above and below this level, including both sides within the same interval. Limiting the output of the semi-scheduled generator by requiring it to be always below the dispatch level would mean material loss of production. It is our view that if this is the intended implementation, for a behind-the-meter renewable plus BESS site the cost of the semi-scheduled unit always staying under the target would outweigh the benefits of the mixed aggregate ADC.	A *dispatch instruction* to produce, consume, reduce or transfer *active power* includes: … (ii) for a *semi-scheduled generating unit* ~~not in an Aggregate~~, a semi-dispatch cap flag **Updated 2.4(c):** The *central dispatch process* determines for each *semi-scheduled generating unit* both a Dispatch Target and an associated semi-dispatch cap flag, and electronically issues these confidentially in a *dispatch instruction* to the relevant *Semi-Scheduled Generator*. If the *semi-scheduled generating unit* is in a~~n~~ Cap Aggregate, the semi-dispatch cap flag is replaced by the conformance mode. **Split 2.4(d) into 2.4(d) and 2.4(e)** **Updated 2.4(f):** For a *semi-scheduled generating unit* in a~~n~~ Cap Aggregate, the requirement in paragraph (d) applies, except the semi-dispatch cap flag in (d) is replaced by the conformance mode. **New 2.4(g):** For a *semi-scheduled generating unit* in a Mixed Aggregate, both the conformance mode and the semi-dispatch cap flag are used: • if conformance mode = 2, the *semi-scheduled generating unit* must individually conform in accordance with paragraph (d). • if conformance mode = 1 and the semi-dispatch cap flag is set to 'TRUE', the *semi-scheduled generating unit* must either confirm in accordance with paragraph (d) or conform in aggregate with other units in the Aggregate – refer to section 2.6.2 for further details. • if conformance mode = 1 and the semi-dispatch cap flag is set to 'FALSE', the *semi-scheduled generating unit* must either conform in accordance with paragraph (e) or conform in aggregate with other units in the Aggregate – refer to section 2.6.2 for further details.

Participant	Area/Procedure Reference/ AEMO Question	Participant Response	AEMO's Response
ATMOS	FCAS Regulation	Atmos notes that despite the trade-off in an interval between providing regulation FCAS and spilling excess generation to the BESS, we believe there remains substantial value to a behind-the-meter wind/solar/BESS project from the implementation of Mixed Aggregate ADC. Atmos acknowledges there is complexity of managing regulation FCAS at the same time as aggregate dispatch conformance in the Mixed Aggregate scenario but would like AEMO to explain further the technical issues here, and to understand whether these could be resolved at a future time. We anticipate that a BESS would aim to be enabled for regulation FCAS much of the time, so there may be a trade-off between capturing spilt energy during constraints and enabling the plant for regulation FCAS. While this trade-off increases the complexity of the operating decisions for the plant, we believe there is still substantial value to a behind-the-meter wind/solar/BESS project in the Mixed Aggregate ADC.	AEMO is still considering support for regulation FCAS whilst contributing to the ADC. AEMO's AGC expects a unit to follow a calculated control setpoint in a predictable way. It is a closed loop control process where the setpoint includes the energy dispatch and regulation FCAS contribution, and the process variable is the actual unit output. For the current logic to work for an Aggregate, telemetered unit ADC contribution targets must be factored into the AGC control setpoint issued to each unit. This requires additional telemetry from the Aggregate and an enhancement of the current AGC and the Aggregate control system to calculate and factor in the ADC contribution targets in the control setpoint.
Origin	*Please detail any unintended adverse consequences of the Changes you have identified.* Causer Pays	Has AEMO considered the interactions with, or implications of the Alternative ADC approach for a Mixed Aggregate under the new Frequency Contributions Factors Procedure (FCFP) commencing on 8 June 2025? A participant indicates their intention to participate in ADC by conforming in aggregate (i.e., individual units may be over or under target). This may result in unintended adverse consequences on contribution factors under the new FCFP, given contribution factors are determined for each individual (eligible) unit. The Alternative ADC approach may result in dispatch conformance benefits but possible contribution factor costs which may be difficult to determine.	AEMO thanks Origin for identifying the interactions with the FCFP and AEMO is considering how ADC will interact with the new Frequency Contributions Factors Procedure.
Total Eren	General	We welcome AEMO's introduction of the Mixed Aggregate definition, which has addressed Total Eren's previous concerns regarding a DC-coupled system, as well as the methodology associated with assessing conformance. We view this modification compared to the previously published High Level Design as a significant improvement	AEMO thanks Total Eren for their support in the modified design.
Total Eren	FCAS Regulation 2.6.5(c)	We note that a battery cannot provide regulation FCAS services and participate in aggregated dispatch conformance concurrently. Ideally, we would like to have the ability to perform these operations concurrently, should we be available and capable to.	AEMO looks forward to working with Total Eren on this issue.

Participant	Area/Procedure Reference/ AEMO Question	Participant Response	AEMO's Response
		However, we do not yet have a proposed modification that would align with the Aggregate Dispatch Conformance solution. Whilst we do not view the inability to perform these operations concurrently as a significant impediment to the viability of our projects, we would welcome the opportunity to explore this further with AEMO in future	

3. Additional changes

AEMO has made additional changes to implement Dynamic ADC as set out in the table below:

Procedure Section Reference	Change made	Reason for Change
Figure 1: Dispatch conformance logic for a Cap Aggregate	Remove the logic in the flow chart that sets Conformance Mode = 2 for a DUID if it is the only DUID in the aggregate without an individual conformance requirement.	This allows the only semi-scheduled generating unit with Conformance Mode = 1 to conform in aggregate, by exceeding its target to firm the under-target delivery of other semi-scheduled generating unit(s) with Conformance Mode = 2, subject to that unit not deliberately offsetting the delivery of FCAS response from the other units.
Figure 2: Dispatch conformance logic for a Mixed Aggregate	Remove the logic in the flow chart that sets Conformance Mode = 2 for a DUID if it is the only DUID in the aggregate without an individual conformance requirement.	This allows the only unit with Conformance Mode = 1 to conform in aggregate, by exceeding its target to firm the under-target delivery of other semi-scheduled generating unit(s) with Conformance Mode = 2, subject to that unit not deliberately offsetting the delivery of FCAS response from the other units.
S2.6.5: FCAS and Aggregated Dispatch Conformance	**Changes to 2.6.5(a):** Each unit in an Aggregate that is registered for regulation FCAS (or if the *Generator* otherwise requests to receive *dispatch instructions* via AGC) will receive a separate AEMO AGC set-point. The exception to this is described below in section 2.6.5(b). **New 2.6.5(e):** A unit in an Aggregate must not offset the delivery from other units in the Aggregate of FCAS response or other service required under the NER.	Clarification. To clarify that a unit in an Aggregate that is participating in aggregated dispatch conformance must not offset the

Procedure Section Reference	Change made	Reason for Change
		delivery of FCAS response from other units in the Aggregate.
A.2 Conformance Calculations	Changes to the Aggregate Error Logic for a Mixed Aggregate, to include FCAS regulation raise and lower (FRC/FRL) adjustments to the error thresholds	Correction
A.4 Information to Participants - Conformance Data Report - Action Messages	Added the paragraph below: For an Aggregate, status action messages at the Aggregate level will refer to the aggregate dispatch target. If a unit in the Aggregate is subject to individual conformance (conformance mode = 2) then the status action messages will refer to the unit dispatch target, else will state “No action required”.	To clarify the different status action messages for the Aggregate versus its constituent DUIDs in AEMO’s Conformance Data Report.
A.5 Worked Examples - Mixed Aggregate – Large Error Example	Changes to the paragraph below: This means that if the Aggregate Actual MW of the aggregate differs from its Aggregate Dispatch Target by more than 15 MW, then the Conformance Status for the Aggregate ~~all units~~ will be Off-Target. If this occurs for three consecutive trading intervals, then the Conformance Status will be Not-Responding	Correction
A.5 Worked Examples - Target Aggregate	Added a worked example for a Target Aggregate	For completeness

4. Next steps

AEMO's consultation on Dynamic ADC is completed with the publication of this Final Information Paper and Final Draft Procedure.

Table 1 Consultation process and timeline

Consultation steps	Dates
Initial Information Paper and Initial Draft Procedure published	28 November 2022 (completed)
Stakeholder information session	30 November 2022 (completed)
IESS Working Group meeting	20 November 2022 (completed)
Submissions due on Initial Information Paper and Initial Draft Procedure	20 January 2023 (completed)
Final Information Paper and Final Draft Procedure published	10 February 2023 (completed with publication of this Final Information Paper and Final Draft Procedure)

A third and final consultation will commence in mid-2023 on the final changes to the Procedure to implement the IESS Rule for bidirectional units.