

Stakeholder information session

Aggregated Dispatch Conformance

IESS Project
26 July 2022

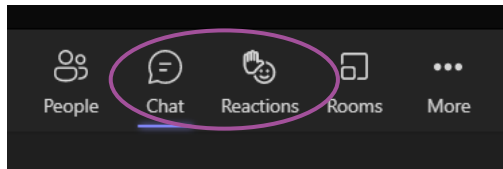


We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay respect to their Elders past, present and emerging.

Introductions

- The purpose of this session is to share the arrangements for Aggregated Dispatch Conformance under the IESS rule implementation, and seek stakeholder feedback on the items outlined in the information paper published on 21 July 2022
 - NOTE: Forum will not be covering the classification of coupled production units. There will be a specific consultation on this starting Q4 2022 or Q1 2023 (TBC)
- This forum does not replace the formal written submissions process – we encourage all stakeholders to provide written feedback to IESS@aemo.com.au by 5.00pm (AEST) on 12 August 2022
- To support discussion during this forum, we ask all attendees to please raise their virtual hand when they intend to speak or post questions in the Teams chat and be respectful to others speaking. There will be breaks to verbally answer questions throughout the presentation as well as at the end



- Please introduce yourself (name & organisation) before you speak.

AEMO Competition Law - Meeting Protocol

AEMO is committed to complying with all applicable laws, including the Competition and Consumer Act 2010 (CCA). In any dealings with AEMO regarding proposed reforms or other initiatives, all participants agree to adhere to the CCA at all times and to comply with this Protocol. Participants must arrange for their representatives to be briefed on competition law risks and obligations.

Participants in AEMO discussions **must**:

- Ensure that discussions are limited to the matters contemplated by the agenda for the discussion
- Make independent and unilateral decisions about their commercial positions and approach in relation to the matters under discussion with AEMO
- Immediately and clearly raise an objection with AEMO or the Chair of the meeting if a matter is discussed that the participant is concerned may give rise to competition law risks or a breach of this Protocol

Participants in AEMO meetings **must not** discuss or agree on the following topics:

- Which customers they will supply or market to
- The price or other terms at which Participants will supply
- Bids or tenders, including the nature of a bid that a Participant intends to make or whether the Participant will participate in the bid
- Which suppliers Participants will acquire from (or the price or other terms on which they acquire goods or services)
- Refusing to supply a person or company access to any products, services or inputs they require

Under no circumstances must Participants share Competitively Sensitive Information. Competitively Sensitive Information means confidential information relating to a Participant which if disclosed to a competitor could affect its current or future commercial strategies, such as pricing information, customer terms and conditions, supply terms and conditions, sales, marketing or procurement strategies, product development, margins, costs, capacity or production planning.

AEMO Forum and Meeting Expectations

This charter explains expectations regarding participation and behaviour in the Australian Energy Market Operator (AEMO)'s stakeholder forums.

Meeting Expectations

All participants will:

- Respect the diversity of the group.
- Speak one at a time – refrain from interrupting others.
- Share the oxygen – ensure that all attendees who wish to have an opportunity to speak are afforded a chance to do so.
- Maintain a respectful stance towards all participants.
- Listen to others' points of view and try to understand others' interests.
- Share information openly, promptly, and respectfully.
- If requested to do so, hold questions to the end of each presentation.
- Remain flexible and open-minded, and actively listen and participate in meetings.
- Abide by COVID-Safe workplace guidelines, if attending a meeting on AEMO's premises.

Roles and Responsibilities

Forum stakeholders agree to:

- Be specific and fact-based in their feedback on a specific workstream or emerging issue;
- Review and provide feedback on papers and reports;
- Relay information to their colleagues or constituents after each meeting and gather information/feedback from their colleagues or constituents, as practicable, before each meeting;
- Maintain a focus on solutions or outcomes that benefit all energy consumers.

AEMO agrees to:

- Provide technical expertise in a manner that is considerate of the audience and their level of expertise;
- Assist participants in understanding issues enough to represent their views;
- Provide all participants the opportunity to voice their views.

Agenda

#	Time	Topic	Presenter
1	3:00-3:10pm	Welcome	Ulrika Lindholm, AEMO
2	3:10-3:20pm	Context	Emily Brodie, AEMO
3	3:20-3:50pm	Overview of Aggregated Dispatch Conformance	Ross Gillett, AEMO
4	3:50-4:00pm	Circumstances for Individual Dispatch Conformance	Ben Blake, AEMO
5	4:00-4:10pm	Proposed changes to Dispatch operating procedure	Ross Gillett, AEMO
6	4:10-4:25pm	Proposed changes to AEMO and participant systems	Ross Gillett, AEMO
7	4.25-4.40pm	Q&A	Ulrika Lindholm, AEMO
8	4.40-4.45pm	Next steps and close	Ulrika Lindholm, AEMO

Please note that this meeting will be recorded for the purpose of compiling notes and the recording will not be published.

2. Context

NEM2025 Implementation Roadmap & the Reform Delivery Committee

- NEM2025 Implementation Roadmap aims to:
 - Implement ESB reforms in a timely and efficient manner
 - Co-ordinate regulatory and IT change
 - Provide transparency to stakeholders on the implementation program.
- RDC facilitates cross-industry collaboration to develop the Roadmap
- RDC comprises sector representatives for:
 - NEM market bodies
 - NEM participants
 - Consumers
 - Renewable energy
 - Demand management
 - Energy efficiency

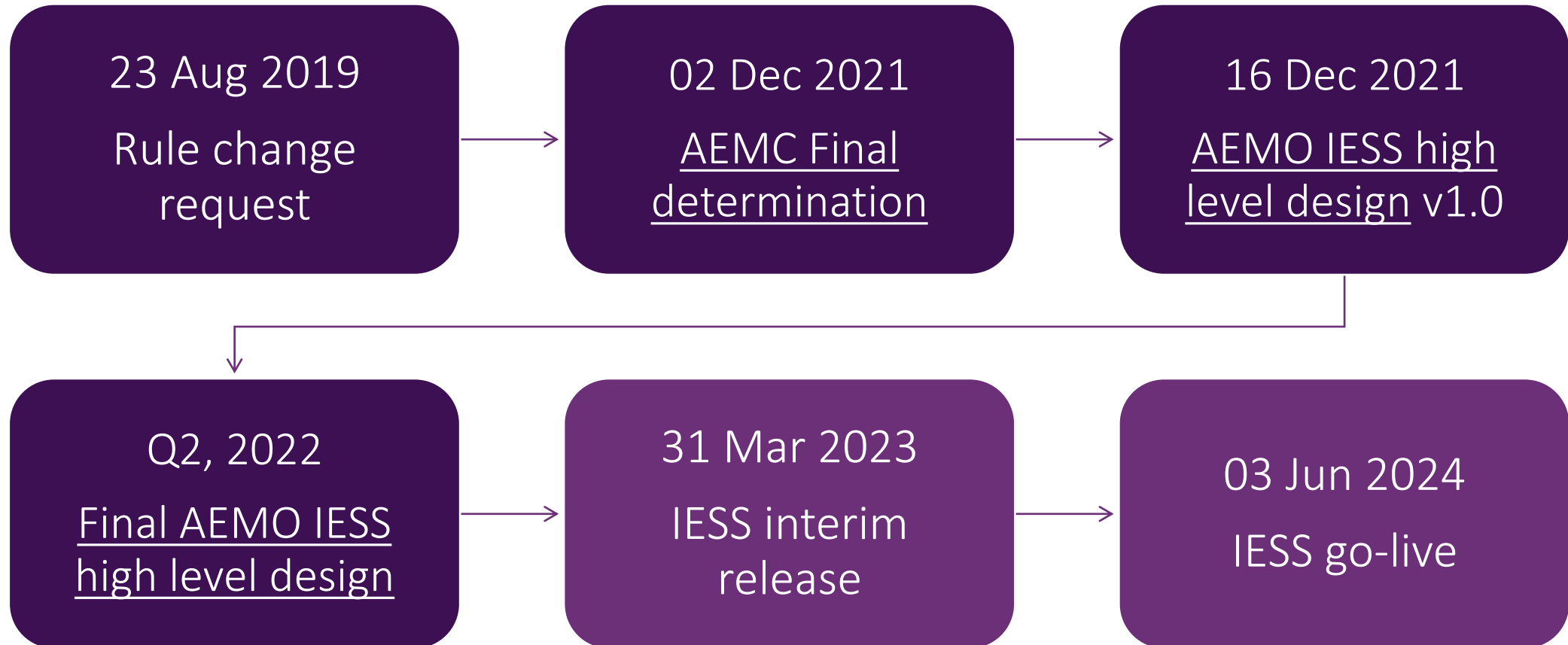
Scope of NEM2025 Implementation Roadmap (Version 1)

Pathway	Reform Initiative
Resource Adequacy Mechanism	<ul style="list-style-type: none"> • Increased MT PASA Information
Essential System Services	<ul style="list-style-type: none"> • Fast Frequency Response • Mandatory Primary Frequency Response • Operating Reserve Market • System Strength (Planning)* • Structured Procurement & Scheduling Mechanism
Integration of DER & Flexible Demand	<ul style="list-style-type: none"> • Integrating Energy Storage • Flexible Trading Arrangements (Model 2) • Scheduled Lite • Dynamic Operating Envelopes • Distribution Local Network Services • Turn-up Services • DER Platform Registry Services • Market & System Operator Integration
Transmission & Access	N/A at this time
Data Strategy	<ul style="list-style-type: none"> • Data Services • EV Charging Standing Data Register • Bill Transparency • Network Transparency

To learn more, visit: <https://aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/reform-delivery-committee>

*Led by transmission network service providers

IESS rule change



IESS Rule Overview

Registration

Integrated Resource Provider (IRP) is a new category for use by participants with storage and hybrid systems

Bidirectional Units for resources that can consume and produce energy

Market Small Generator Aggregators will transfer to IRP with **Small Resource Aggregator** label.

Market Small Generator Aggregators will be able to **provide market ancillary services**

Participation and Scheduling

Outlines scheduling obligations for **hybrid systems** (including DC coupled systems)

Scheduling arrangements for **bidirectional units** include:

- single DUID
- 20 bid bands for energy
- 10 bid bands for each FCAS

Introduces assessment of **dispatch conformance** in aggregate

** In some intervals, particular units may be required to conform individually*

Settlement

Non energy cost recovery framework updated so that payments apply equally to all Cost Recovery Market Participants, removing existing differences due to registration category

Recovery will be based on a participant's share of gross consumed energy and/or gross sent out energy in an interval across its connection points

Some clauses apply from 31 March 2023 (interim release)

IESS PROJECT

Workstreams:	CONNECTIONS	REGISTRATION	DISPATCH	SETTLEMENTS	RETAIL
Initial release: 31 Mar 2023	No changes for release #1	Aggregators can provide FCAS Hybrid systems to use aggregated dispatch conformance	Aggregators can provide FCAS Hybrid systems to use aggregated dispatch conformance	No changes expected for release #1	No changes for release #1 (B2M or B2B)
Final release: 03 Jun 2024	Storage, hybrid & coupled connections	Integrated Resource Provider (IRP) registration Bidirectional unit (BDU) classification	BDU bidding & dispatch (energy & FCAS) BDU dispatch conformance Operational planning & forecasting	Settlement & prudentials (including non-energy cost recovery)	Integrated resource provider access to MSATS, eMDM & PAE B2B changes (IEC-led)

PROCEDURE CHANGE

INDUSTRY READINESS, TESTING AND RISK MANAGEMENT

AEMO READINESS, TESTING, RISK AND RELEASE MANAGEMENT

STAKEHOLDER ENGAGEMENT

3. Overview of Aggregated Dispatch Conformance

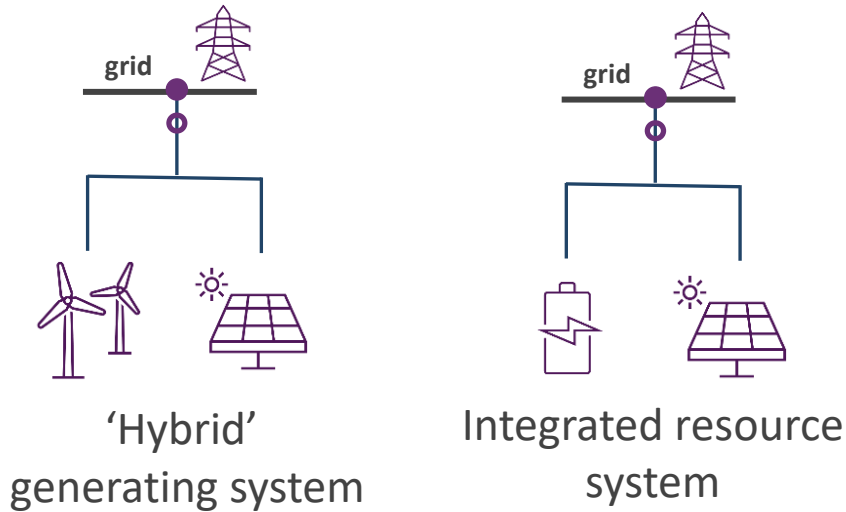
Overview

- Outline the proposed arrangements for aggregated dispatch conformance (ADC) under NER 11.146.16 of IESS initial rule
 - ADC required for initial IESS release on 31 March 2023
- Explain other options considered to implement ADC
- Discuss and seek feedback on the proposed changes to AEMO's Dispatch operating procedure to implement ADC, including specific issues raised in the consultation paper
- Outline proposed changes to AEMO and participant systems

Proposed Aggregated Dispatch Conformance arrangements

Hybrid vs Integrated Resource System

- **Hybrid:** Multiple technologies behind a large-scale connection point
- **Integrated resource system (IRS):** Hybrid with bidirectionality at connection point (eg includes batteries)
- IESS Rule allows an IRS to be managed for dispatch in aggregate (Aggregated Dispatch Conformance, or ADC), subject to AEMO’s requirement for individual dispatch conformance (Resource Level Compliance)
- **The proposed Dispatch Procedure generically refers to an **Aggregate System** or an **Aggregate**, to allow non-hybrids and non-IRS to participate in ADC**

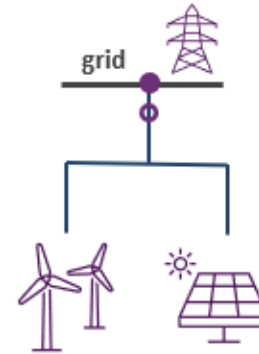


Hybrid generating system	Integrated resource system
Two SS units	One SS unit, one BDU
Two SS DUIDs	One SS DUID, Sched Gen + Load DUID
Two ECMs	One ECM
Two sets of bids	Two sets of bids
Two targets	Two targets
May provide FCAS	May provide FCAS
AGC for each DUID	AGC for each DUID

Two types of ADC

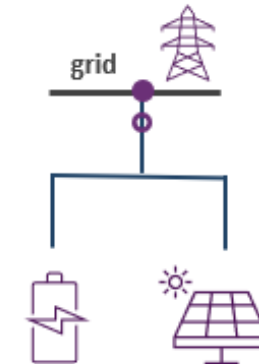
- **Cap Aggregate**

- Generating system behind a connection point with semi-scheduled generating units only



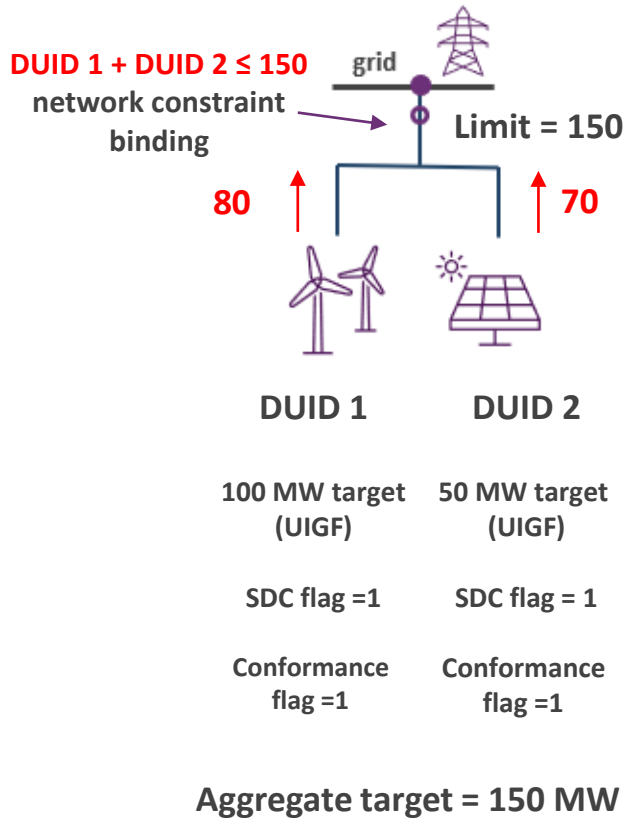
- **Target Aggregate**

- Generating system behind a connection point with one or more scheduled generating units (which includes a scheduled battery)



- Participant can opt-in to ADC as part of registration

ADC for a Cap Aggregate

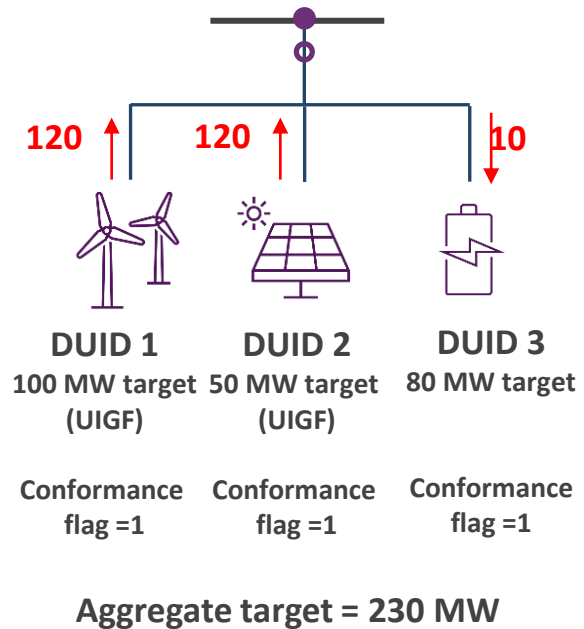


DUID CF	How is DUID CF set?	Dispatch Conformance Requirement
0	If <u>no</u> DUID has its SDC flag set = 1 → CF = 0 for all DUIDs	DUIDs with CF = 0 are not required to cap output (either individually or in aggregate) <ul style="list-style-type: none"> Can generate to their energy resource availability
1	If <u>any</u> DUID has its SDC flag set = 1 <u>and</u> this DUID is not in a binding individual constraint	DUIDs with CF = 1 must cap their aggregate output at their aggregate target <ul style="list-style-type: none"> Aggregate target is firm, can be delivered from any combination of DUID outcomes In the example, must cap the aggregate output at 150 MW
2	If this DUID is in a binding individual constraint	DUIDs with CF = 2 must cap their individual output at their individual target

SDC = Semi-dispatch cap
CF = Conformance flag

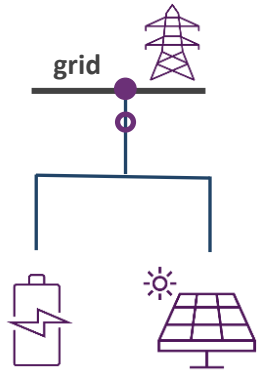
- In all cases, DUIDs may underperform target (either individually or in aggregate) as dictated by their energy resource availability (as is now)

ADC for a Target Aggregate



DUID CF	How is DUID CF set?	Dispatch Conformance Requirement
1	If this DUID is not in a binding individual constraint	DUIDs with CF = 1 must control their active power to meet their aggregate target <ul style="list-style-type: none"> Aggregate target is firm, and can be delivered from any combination of DUID outcomes In the example, must meet the aggregate target of 230 MW
2	If this DUID is in a binding individual constraint	DUIDs with CF = 2 must meet their individual target <ul style="list-style-type: none"> Semi scheduled generating unit may underperform its individual target as dictated by energy resource availability (as now)

Issue with ADC and FCAS



Integrated resource system

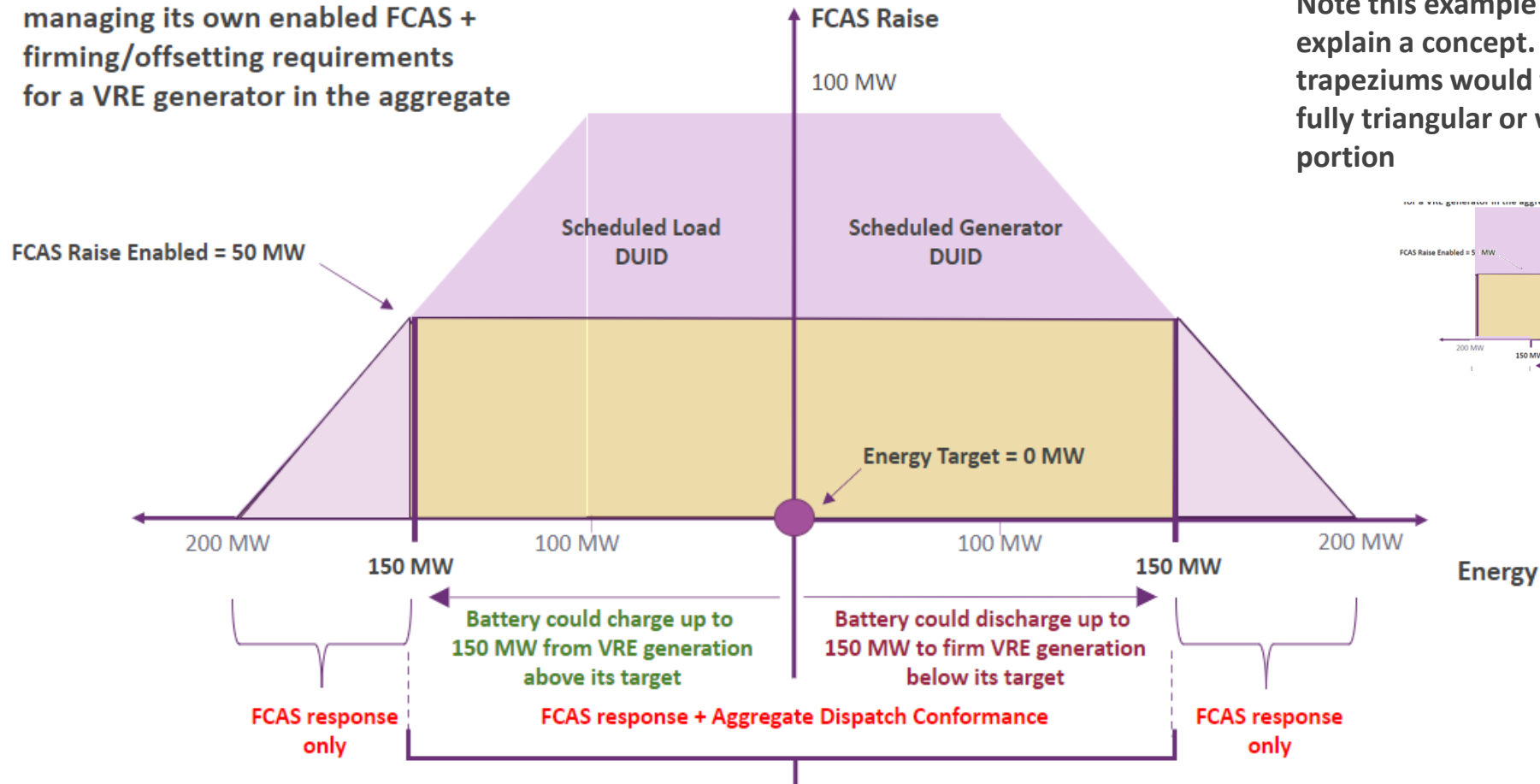
- FCAS enablement creates issues for ADC, as each FCAS is enabled at the DUID level based on its bid FCAS trapezium
- Aggregate dispatch does not consider:
 - individual DUIDs under AGC control for regulation FCAS
 - individual DUID FCAS trapeziums

AEMO is seeking feedback on:

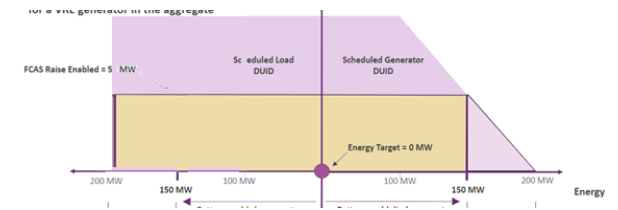
Requiring participants to manage dispatch within their individual bid FCAS trapeziums in aggregate dispatch conformance mode

ADC and FCAS - Example

This example shows a 200 MW battery (Generator/Load DUID pair) concurrently managing its own enabled FCAS + firming/offsetting requirements for a VRE generator in the aggregate

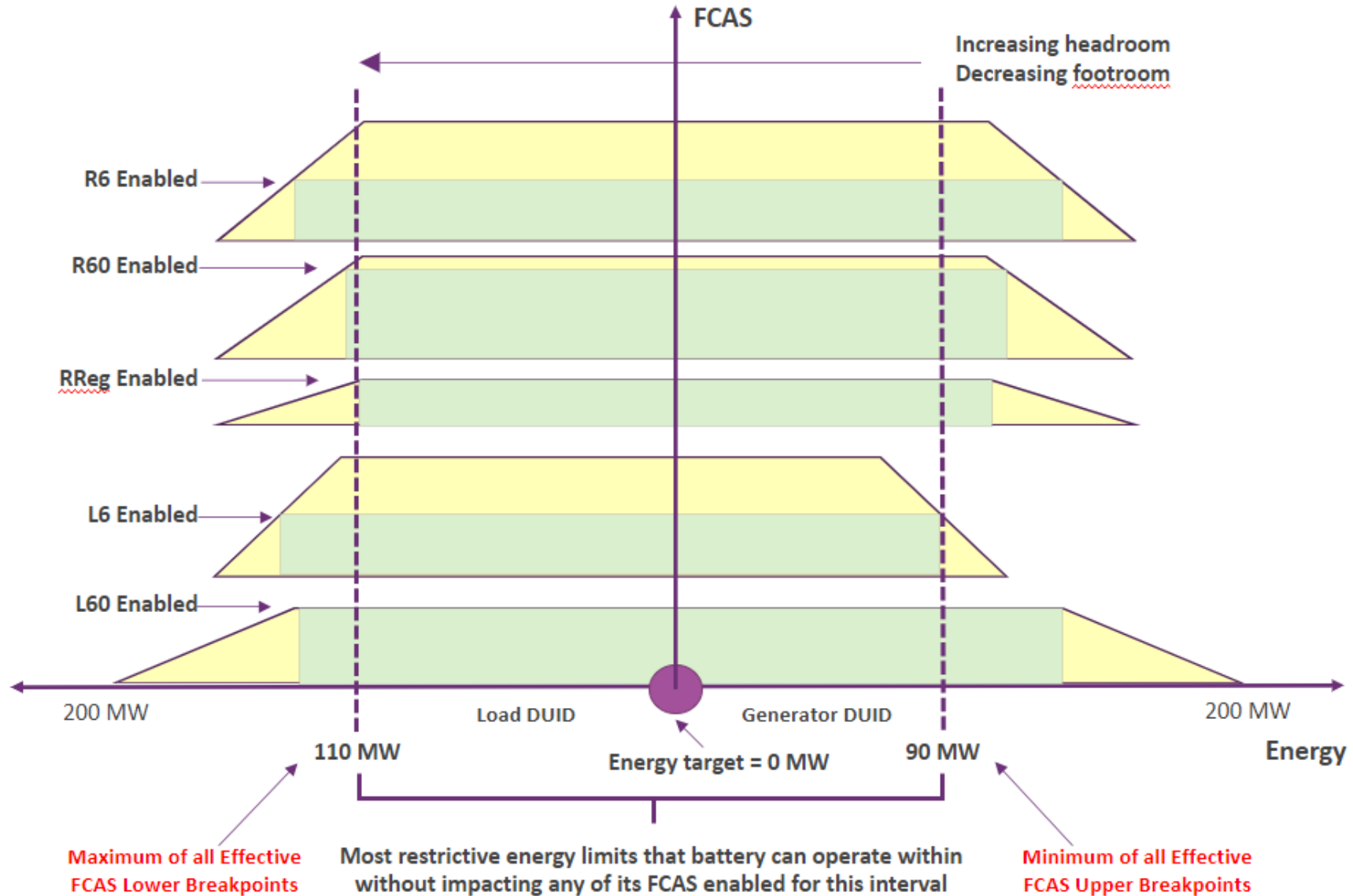


Note this example is highly stylised to explain a concept. Battery raise trapeziums would typically be either fully triangular or with a flat horizontal portion



Unless providing FCAS response, battery must operate within these energy limits to avoid reducing its enabled FCAS Raise headroom/footroom

ADC and FCAS - Example



Other ADC options considered

Other ADC options considered

AEMO initially considered two other options to implement ADC:

1. **Exclude a generating system with FCAS units from registering for ADC**
 - Likely to exclude any hybrid with a battery used for FCAS
 - Reduced value stacking for batteries
 2. **Allow a generating system with FCAS units to register for ADC, but require individual conformance on all units at times when any unit is FCAS enabled**
 - More complex and expensive to implement than option 1
 - Reduced value stacking for batteries which are usually FCAS enabled
- In May and June 2022, AEMO held preliminary one-to-one discussions with some stakeholders to inform options for ADC
 - Initial feedback rejected Option 1 and indicated support for full ADC with FCAS (option proposed in this Dispatch procedure consultation)

4. Circumstances for Individual Dispatch Conformance

Individual Dispatch Conformance

- The aggregated dispatch conformance requirements are subject to, and overridden by, any individual unit dispatch conformance requirement or the provision of ancillary service response
- There are technical characteristics that might require individual dispatch conformance for a unit in an Aggregate, for example to facilitate the maintenance of stability or the delivery of services required for *power system security*

Technical characteristics that might require individual unit dispatch conformance

Characteristics	Description
Network Support	Constraint to ensure delivery of a <i>network support and control ancillary service</i> under a <i>network support agreement</i>
Quality of Supply	Limits to manage voltage unbalance, negative sequence voltage, harmonics, flicker or voltage step changes
System Strength	System strength limit
Transient Stability	Transient stability limit for a fault on a network element
Voltage Stability	Steady state voltage collapse or voltage stability limit

5. Proposed changes to Dispatch operating procedure

Summary of procedure changes (1)

Section	Heading	Changes
1.4	Glossary	Aggregate System or Aggregate, Aggregate Dispatch Target, Cap Aggregate, Target Aggregate, Conformance flag
2.1	Content of dispatch instructions	<ul style="list-style-type: none"> - Dispatch instructions include new conformance flag - Fast start units can only conform in aggregate when in normal mode
2.2	Issue of dispatch instructions	AGC will issue a single dispatch instruction covering all units in an Aggregate
2.3	Automatic Generation Control	AGC ramps to aggregate dispatch target if no units dispatched for regulation FCAS
2.4	Semi-Scheduled Generating Units	Semi-dispatch cap flag replaced by conformance flag
2.6 (New)	Aggregate Systems	Generator can apply to register its generating system for aggregated dispatch conformance as either a Cap Aggregate or a Target Aggregate
2.6.1 (New)	Aggregated Dispatch Conformance – Cap Aggregate	<ul style="list-style-type: none"> - Cap Aggregate only comprises semi-scheduled generating units - If no unit has its semi-dispatch cap flag set, all units have conformance flag = 0 - If any unit's semi-dispatch cap flag is set, all units have conformance flag = 1 unless individual conformance (conformance flag = 2) - Units with conformance flag = 0 not required to cap active power output (either in aggregate or individually) - Units with conformance flag = 1 must cap aggregate active power output at aggregate dispatch target
2.6.2 (New)	Aggregated Dispatch Conformance - Target Aggregate	<ul style="list-style-type: none"> - Target Aggregate includes one or more scheduled generating units, including scheduled battery - By default, all units have conformance flag = 1 unless individual dispatch conformance (conformance flag = 2) - Units with conformance flag = 1 must control aggregate active power to meet their aggregate dispatch target
2.6.3 (New)	Individual Dispatch Conformance	<ul style="list-style-type: none"> - Aggregated dispatch conformance overridden by any individual unit conformance requirement or provision of any service required under the NER - Table 1 shows the technical characteristics that might require individual dispatch conformance - If individual unit dispatch conformance required, conformance flag = 2 - If conformance flag = 2 for a semi-scheduled generating unit its active power output must be capped at its dispatch target and may only deviate from it due to energy source availability, physical capability or when providing any service under NER - If conformance flag = 2 for a scheduled generating unit/scheduled load, its active power must meet its dispatch target and may only deviate from it due to physical capability or when providing any service required under NER

Summary of procedure changes (2)

Section	Heading	Changes
2.6.4 (New)	FCAS and Aggregated Dispatch Conformance	<ul style="list-style-type: none"> - If any FCAS units, AEMO set up AGC to issue a single dispatch instruction for all units (aggregate set-point) - Generator must set up a complying AGC system to receive aggregate set-point and allocate it across all units - FCAS unit can firm or offset its active power against other units to the aggregate dispatch target, subject to there being no impact on the FCAS unit's ability to provide its enabled FCAS response - FCAS unit not subject to individual dispatch conformance must operate within the effective FCAS lower and upper breakpoints relevant to the FCAS enabled, for each FCAS - Example of management FCAS headroom/footroom vs firming requirement
2.8	Ramp rates in energy dispatch instructions	- Must linearly ramp to dispatch target, either as an individual unit, if individual dispatch conformance is required, or in aggregate with other units, subject to energy source availability (for semi-scheduled), physical limitations, technical capabilities and provision of any service required under the NER
3.1.1	FCAS Conformance	AEMO may require periodic reporting of FCAS conformance and management of FCAS headroom and footroom
3.2.2	Automated Processing (Conformance Data report)	<ul style="list-style-type: none"> - Refers to aggregate dispatch target in action messages - Aggregate non-conformance constraint refers to aggregate dispatch target
3.3	Scheduled Loads	Scheduled load non-conformance (including batteries) automatically processed by Conformance Monitor
3.4	Conditions to apply to Fast Start registered generating units	Fast start unit in an Aggregate may also be declared non-conforming
3.5	Non-Conformance constraints	RHS of aggregate non-conformance constraint = sum of generation or consumption for all units
3.6	Market Reporting of Non-Conformance	<ul style="list-style-type: none"> - Non-conformance notices refers to all units in Aggregate, and aggregate magnitude of non-conformance - Correction: AEMO does not report the "reason" in the non-conformance market notice
A.2	Conformance Calculations	- Conformance Monitor calculation of aggregate dispatch conformance, including Aggregate Error, Small and Large Aggregate Error Trigger thresholds, Small and Large Aggregate Error Counts and conditions for resetting
A.4	Information to Participants	Action messages in Dispatch Conformance report refers to aggregate dispatch target
A.5	Worked Examples	Examples of how Conformance Monitor determines ADC for a Cap Aggregate and for a Target Aggregate

Issues for feedback

Topic/Reference	Issue for feedback
Conformance Reporting (Section 3.2.2)	AEMO is considering the best way to report dispatch conformance for Aggregates to participants. The model in the Dispatch Procedure describes our current thoughts but we expect the list will extend to differentiate between aggregated and individual unit level monitoring
Conformance monitoring for Batteries (Section 3.3)	<p>AEMO is considering an enhancement to its automatic conformance monitoring process to link the generating unit and load DUID pair for a scheduled battery as an interim arrangement prior to their transition into the single DUID bidirectional unit model.</p> <p>This will ensure all scheduled batteries are included in the automatic conformance monitoring process, and allow AEMO to fully automate the issue of non-conformance notices for a scheduled battery.</p>
Conformance Error Threshold Calculations (Appendix A.2)	<p>When the error threshold is calculated for the generator and load DUID pair of a scheduled battery, the combined impact of the two DUIDs would be considered.</p> <p>AEMO is considering the following:</p> <ul style="list-style-type: none"> MWO = sum of Max Avails of the two DUIDs ROC = minimum directional Ramp Rate of the two DUIDs

6. Changes to AEMO and participant systems

Proposed AEMO system changes

AEMO system	Proposed change
Registration	<ul style="list-style-type: none"> • Linkage between DUIDs in an Aggregate • Type of ADC
Dispatch instructions	<ul style="list-style-type: none"> • New conformance flag
Dispatch conformance monitor	<ul style="list-style-type: none"> • Aggregated dispatch conformance monitoring and reporting • Aggregated non-conformance constraints and notices
Causer pays	<ul style="list-style-type: none"> • Linkage between DUIDs in an Aggregate
Automatic generator control (AGC)	<ul style="list-style-type: none"> • Single AGC model/set-point, covering for all units in an Aggregate
FCAS conformance	<ul style="list-style-type: none"> • Unit FCAS conformance monitoring and reporting

Proposed Participant system changes

Participant system	Proposed change
Registration	<ul style="list-style-type: none"> Recognise linkage between DUIDs in an Aggregate
Dispatch instructions	<ul style="list-style-type: none"> Use new conformance flag
Dispatch Conformance Report	<ul style="list-style-type: none"> Use new Conformance Flag Interface to new aggregated dispatch conformance reporting Interface to new aggregated non-conformance constraints and notices
Aggregate Control System	<ul style="list-style-type: none"> Implement ADC for an Aggregate within FCAS operating limits Implement individual unit dispatch override Implement AGC, with single set-point disaggregation into individual units subject to above
FCAS conformance	<ul style="list-style-type: none"> Implement FCAS conformance monitoring and reporting

Transitions for Batteries

Timing	Transition activities
From 31 March 2023	<p>For all two-DUID scheduled battery, AEMO will apply ADC linkage to DUIDs, to allow conformance monitoring to occur:</p> <ul style="list-style-type: none"> • Currently, battery DUIDs that are registered for FCAS Regulation are suspended in AEMO’s Conformance Monitor • Linkage will allow AEMO’s updated Conformance Monitor to monitor dispatch conformance for these batteries • <i>AEMO will not require participant to make any system changes</i>
From 03 June 2024	<ul style="list-style-type: none"> • All two-DUID batteries (capable of linearly transitioning from consuming to producing electricity) will transition to the single DUID BDU model • AEMO’s updated Conformance Monitor will automatically transition from the two-DUID model (with ADC linkage) to the single DUID model

7. Q&A

Stakeholder questions

Question	Initial response
<p>(1) If we have a hybrid facility with Solar + grid-forming BESS and connection point export capacity is the aggregate of the two, will the facility be treated as one entity for dispatch including system strength constraints?</p> <p>(2) Can BESS be expected to operate for system strength reasons while SF is constrained?</p>	<p>(1) The hybrid will be modelled as 3 DUIDs – a semi-scheduled solar DUID, and a scheduled gen/load DUID pair for the BESS. From a system strength perspective it really depends on how the inverters/turbines react to the contingency and if there is a difference between each of the plant in the hybrid. And on the network topology at the time (outage or system normal).</p> <p>(2) Again this will depend on the characteristics of the plant.</p>
<p>At present many developers are making a decision on whether to install a grid-forming battery or a grid-following battery in a hybrid system with solar or wind.</p> <p>If the dispatch policy treats the solar/wind and battery systems separately for system strength, this means that the solar/wind component may be constrained for system strength defeating the purpose of installing the grid-forming inverters. This would be a disincentive for installing grid-forming inverters, compared with syncons which cannot be separately dispatched. How does AEMO propose to treat hybrids of grid following and grid forming inverters for dispatch for system strength constraints?</p>	<p>While each site will need to be assessed on an individual basis – plant would only need to be treated individually if there is a requirement based on the technical characteristics of the plant's inverters/turbines (see answer above). In general we do not expect there to be many of these in the system.</p>

Stakeholder questions

Question	Initial response
<p>Will existing generators opting into this scheme reduce the frequency of curtailments?</p>	<p>Most likely yes, if (for example) they divert otherwise spilt energy into local storage.</p>
<p>Our main concern will be around how this will be implemented for existing BESS Generators.</p> <p>In particular, we are interested in the timelines and pre-testing for the change over.</p>	<p>The IESS implementation includes consideration of industry readiness, including for those parties in various stages of the connection process as well as for existing affected participants.</p> <p>The IESS industry readiness strategy will be developed in Q1 2023 in consultation with the IESS Working Group and any NEM 2025 umbrella forum. It will consider transition, market trial, testing and go-live. AEMO is also planning to hold one-to-one discussions with key participants in Q3 and Q4 this year to assess what additional industry readiness support it may need to consider.</p> <p>To learn more about AEMO’s indicative plans for IESS industry readiness, refer to the working group materials on this topic.</p>

Stakeholder questions

Question	Initial response
<p>Does AEMO have any intentions to adjust the FCAS Causer Pays methodology to accommodate for the Integrated Resource Providers and hybrid plants in particular. Ie, will the assessment continue at the DUID level or will there be allowances for moving the reference point to the point of connection?</p>	<p>AEMO intends to update the Causer Pays procedure to accommodate for the IESS project. For Market Participants who nominate to have aggregate compliance for their portfolio of generating units and loads, all of those elements (DUIDs) will be aggregated as one element. Portfolios that are not nominated will continue to be assessed at the DUID level. The minor and administrative changes will be tracked changed into the Procedure and will be open for 10 business days of consultation from 15 August at which time stakeholders can raise any question/queries for AEMO to respond to.</p> <p>The consultation will be announced via the AEMO Communications newsletter and AEMO's consultation pages.</p>

8. Next steps

Next steps

Deliverable	Timing	Status
One-to-one pre-consultations to inform options for Aggregate Dispatch Conformance	May/June 2022	Complete
Information paper published	21 July 2022	Complete
Aggregated Dispatch Conformance information session	26 July 2022	Complete (today)
Ongoing engagement with IESS Working Group	27 July 2022	Not started
Submissions due on information paper	12 August 2022	In progress
Final draft of SO_OP3705 Dispatch Procedure published, effective from 31 March 2023	1 September 2022	Not started

← We are here

Stakeholder are invited to send feedback to IESS@aemo.com.au by 5.00pm (AEST) on 12 August 2022.

I ESS project contact



iess@aemo.com.au



<https://aemo.com.au/initiatives/major-programs/integrating-energy-storage-systems-project>



Thank you for joining today's session!
If any questions, contact us at IESS@aemo.com.au

For more information visit

aemo.com.au

Appendix A

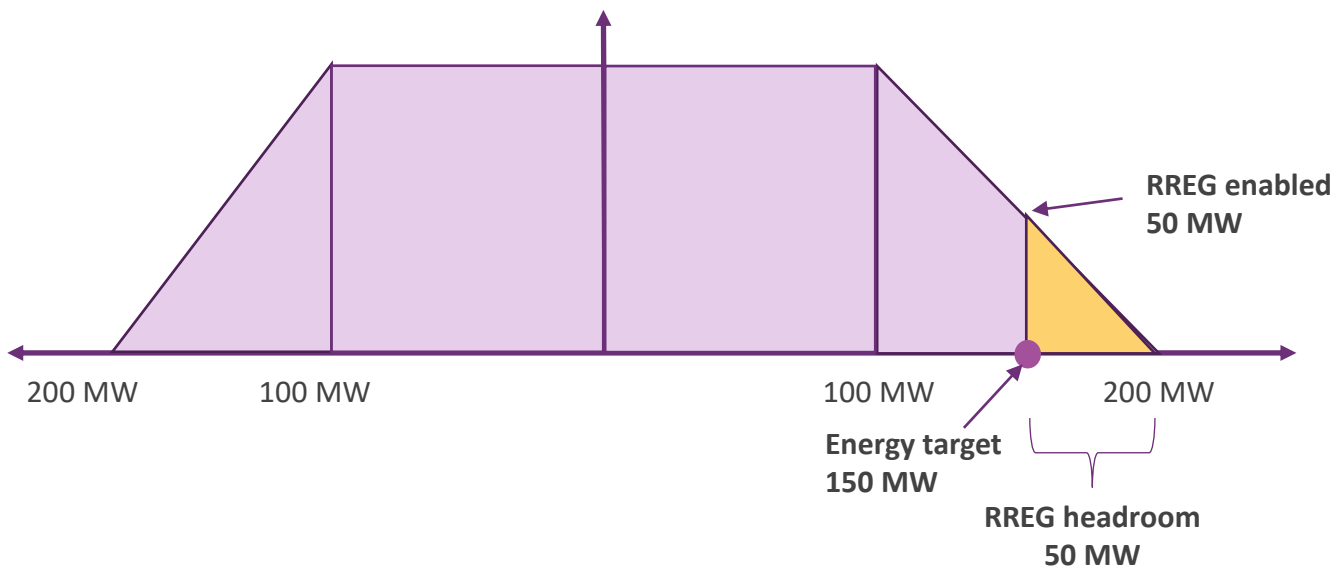
Regulation FCAS under ADC

If a Participant registers an Aggregate with a DUID registered for regulation FCAS, or otherwise elects to receive AGC setpoints for its Aggregate, the **participant must implement a complying AGC system** approved by AEMO that covers all the DUIDs in the Aggregate:

- Participant's AGC must provide to AEMO the following AGC SCADA:
 - AGC Status
 - AGC Upper Limits and Lower Limits
 - AGC Ramp Up and Ramp Down Rates
 - AGC Set-Point Feedback
- AEMO's AGC will sum the energy targets and enabled regulation FCAS across all DUIDs and send a **single AGC setpoint for the aggregate to the participant AGC**
 - AEMO's AGC setpoint = $\text{sum}(\text{ramped energy targets}) + \text{regulation requirement}$, and is bounded by the AGC SCADA and total enabled regulation FCAS
- Participant's AGC will allocate the single AGC setpoint across all DUIDs, subject to the Aggregated Dispatch Conformance requirements
- **Participant's AGC must account for estimated losses** to each DUID's dispatch point, if also controlling flow at the connection point

ADC and FCAS – Example with AGC

- Battery energy target = 150 MW, registered for FCAS
- Solar energy target = 150 MW, not registered for FCAS



RREG Headroom = can be used for actual RREG response, but not for energy firming

- Battery is unable to firm solar in this interval as it cannot discharge any further without reducing FCAS enabled RREG headroom of 50 MW
- However solar, if its resource availability is above target, could charge the battery
- **How would this look?**
 - Solar generates at 170 MW, 20 MW over target
 - Battery reduces to 130 MW, 20 MW under target
 - AGC setpoint targets up to 50 MW above the aggregate linear dispatch trajectory for raise regulation

Receives energy targets, RREG enabled, Conformance Flag for each DUID

Receives aggregate AGC setpoint every 4 seconds: setpoint reflects 300 MW energy target + up to 50 MW RREG

Participant control system:

- Solar generates to its available resource (100 MW, which is under-target by 50 MW)
- Dispatches Battery to (AGC set-point minus Solar energy target) to meet its own energy target + raise regulation requirement
- Reserves 50 MW of RREG headroom on Battery, by not adjusting Battery for any Solar under-target

Detailed summary of procedure changes (1)

Section	Heading	Changes
1.4	Glossary	New definitions for Aggregate System or Aggregate, Aggregate Dispatch Target, Cap Aggregate, Target Aggregate, Conformance flag, Hybrid system
2.1	Content of dispatch instructions	<ul style="list-style-type: none"> Dispatch instruction for Aggregate units includes new conformance flag Fast Start units in an Aggregate can only conform in aggregate when in normal mode
2.2	Issue of dispatch instructions	AGC will issue a single dispatch instruction covering all units in an Aggregate
2.3	Automatic Generation Control	AGC will ramp the Aggregate to its Aggregate Dispatch Target if no units are dispatched for regulation FCAS
2.4	Semi-Scheduled Generating Units	If a semi-scheduled generating unit is in an Aggregate, the semi-dispatch cap flag is replaced by the conformance flag
2.6 (New)	Aggregate Systems	<ul style="list-style-type: none"> Generator with a generating system behind a connection point that comprises two or more of - scheduled generating unit, semi-scheduled generating unit, scheduled load – can conform in aggregate to dispatch instructions for those scheduled resources (aggregated dispatch conformance), excluding any scheduled resource for which AEMO requires individual dispatch conformance (resource level compliance). Resource level compliance is required where a network constraint would be violated if the scheduled resource operates other than in accordance with its dispatch instruction, due to technical characteristics of the scheduled resource Generator can apply to register its generating system for aggregated dispatch conformance as either a Cap Aggregate or a Target Aggregate. All units in an Aggregate must be capable of linear ramping, in aggregate and individually if individual dispatch conformance is required

Detailed summary of procedure changes (2)

Section	Heading	Changes
2.6.1 (New)	Aggregated Dispatch Conformance – Cap Aggregate	<ul style="list-style-type: none"> • Cap Aggregate only comprises semi-scheduled generating units • All units use the conformance flag and ignore the semi-dispatch flag • If no unit has its semi-dispatch cap flag set, then all units have conformance flag = 0 • Units with conformance flag = 0 are not required to cap their active power output (either in aggregate or individually) • If any unit’s semi-dispatch cap flag is set then all units have conformance flag = 1 unless individual unit dispatch conformance is required (conformance flag = 2) • Units with conformance flag = 1 must cap their aggregate active power output at their aggregate dispatch target
2.6.2 (New)	Aggregated Dispatch Conformance - Target Aggregate	<ul style="list-style-type: none"> • A Target Aggregate includes one or more scheduled generating units, including scheduled battery • All units use the conformance flag and ignore the semi-dispatch flag • By default, all units have conformance flag = 1 unless individual unit dispatch conformance is required (conformance flag = 2) • Units with conformance flag = 1 must control their aggregate active power to meet their aggregate dispatch target
2.6.3 (New)	Individual Dispatch Conformance	<ul style="list-style-type: none"> • Aggregated dispatch conformance overridden by any individual unit dispatch conformance requirement or provision of any service required under the NER • Table 1 shows the technical characteristics that might require individual dispatch conformance • If individual unit dispatch conformance required, then conformance flag = 2 • If conformance flag = 2 for a semi-scheduled generating unit its active power output must be capped at its dispatch target and may only deviate from it due to energy source availability, physical capability or when providing any service required under NER • If conformance flag = 2 for a scheduled generating unit or scheduled load, its active power must meet its dispatch target and may only deviate from it due to physical capability or when providing any service required under NER

Detailed summary of procedure changes (3)

Section	Heading	Changes
2.6.4 (New)	FCAS and Aggregated Dispatch Conformance	<ul style="list-style-type: none"> • If any units in an Aggregate are registered for regulation FCAS (or Generator otherwise requests dispatch instructions via AGC), then AEMO will set up its AGC to issue a single dispatch instruction for all units (aggregate set-point) • Generator must set up a complying AGC system to receive the aggregate set-point and allocate it across all units • An FCAS unit can firm or offset its active power against other units in the Aggregate to the aggregate dispatch target, subject to there being no impact on the FCAS unit's ability to provide its enabled FCAS response • An FCAS unit not subject to individual dispatch conformance must: <ul style="list-style-type: none"> ○ maintain its enabled FCAS reserve for each FCAS, and cannot transfer any enabled FCAS to other units, and ○ operate within the effective FCAS lower and upper breakpoints relevant to the FCAS enabled, for each FCAS (operating limits) • Generator determines these operating limits for each trading interval based on FCAS bid trapeziums and enabled FCAS • Example of management FCAS headroom/footroom vs firming requirement
2.8	Ramp rates in energy dispatch instructions	<ul style="list-style-type: none"> • Units in an Aggregate must linearly ramp their active power to the dispatch target, either as an individual unit, if individual dispatch conformance is required, or in aggregate with other units in the Aggregate, subject to: <ul style="list-style-type: none"> ○ energy source availability (for semi-scheduled) ○ physical limitations of facility ○ technical capabilities of facility, consistent with applicable performance standards; and ○ provision of any service required under the NER • For a Cap Aggregate, where neither aggregate nor individual dispatch conformance is required, semi-scheduled generating units must either linearly ramp to their dispatch target or generate to their energy source availability, subject to above
3.1.1	FCAS Conformance	AEMO may also require Ancillary Service Providers to periodically report on their FCAS conformance and management of enabled FCAS headroom and footroom

Detailed summary of procedure changes (4)

Section	Heading	Changes
3.2.2	Automated Processing	(AEMO's Conformance Data report) <ul style="list-style-type: none"> For a unit in an Aggregate, AEMO's Conformance Data report refers to the aggregate dispatch target in action messages For units in an Aggregate, the aggregate non-conformance constraint determines the aggregate dispatch target
3.3	Scheduled Loads	Non-conformance of a scheduled load within an Aggregate (including for batteries) will be automatically processed by AEMO's Conformance Monitor (ie automatically issue a non-conformance notice and apply a non-conformance constraint)
3.4	Conditions to apply to Fast Start registered generating units	A fast start unit in an Aggregate may also be declared non-conforming if unit has: <ul style="list-style-type: none"> (i) has synchronised and increased above 0 MW without a dispatch instruction; or (ii) fails to reduce to 0 MW in accordance with its dispatch instruction
3.5	Non-Conformance constraints	For an Aggregate, the RHS of the aggregate non-conformance constraint = sum of telemetered generation or consumption for all units in the Aggregate
3.6	Market Reporting of Non-Conformance	<ul style="list-style-type: none"> Non-conformance market notice will refer to all units in the Aggregate, and to the aggregate magnitude of non-conformance Correction: AEMO does not report the "reason" in the non-conformance market notice
Appendix A.2	Conformance Calculations	Describe how AEMO's Conformance Monitor determines aggregate dispatch conformance including calculation of: <ul style="list-style-type: none"> Aggregate Error Small and Large Aggregate Error Trigger thresholds Small and Large Aggregate Error Counts and conditions for resetting
Appendix A.4	Information to Participants	Action messages in AEMO's Dispatch Conformance report refer to aggregate dispatch target for an Aggregate System
Appendix A.5	Worked Examples	Provide examples of how AEMO's Conformance Monitor determines aggregate dispatch conformance for a Cap Aggregate and for a Target Aggregate

Sample dispatch instruction

							Energy targets to meet in aggregate (230 MW) across all DUIDs belonging to Aggregate System, subject to DUID 'SF1' capping to its individual energy target (100 MW). Participant will need to determine aggregate energy target as: $\text{Sum}(\text{Gen}) - \text{Sum}(\text{Load})$			
C	NEMP.WORLD	DISPATCHIS	AEMO	HYBRID1	21/10/2021	9:30:13				
I	DISPATCH	CONSTRAINT	5	SETTLEMENTDATE	RUNNO	CONSTRAINTID	MARGINALVALUE			
D	DISPATCH	CONSTRAINT	5	21/10/2021 9:35	1	#SF1_E	20			
I	DISPATCH	UNIT_SOLUTION	2	SETTLEMENTDATE	RUNNO	DUID	CONNECTIONPOINTID	TOTALCLEARED	DO NOT USE SEMIDISPATCHCAP	NEW CONFORMANCE_FLAG
D	DISPATCH	UNIT_SOLUTION	2	21/10/2021 9:35	1	SF1	QSF1	100	1	2
D	DISPATCH	UNIT_SOLUTION	2	21/10/2021 9:35	1	WF1	QWF1	50	0	1
D	DISPATCH	UNIT_SOLUTION	2	21/10/2021 9:35	1	BESS1G	QBESS1	80	0	1
D	DISPATCH	UNIT_SOLUTION	2	21/10/2021 9:35	1	BESS1L	QBESS1	0	0	1

DUID 'SF1' is in a binding network constraint '#SF1_E'

SF1, WF1 are semi-scheduled gens
BESS1G is scheduled gen
BESS1L is scheduled load

Aggregate System ignores the SEMIDISPATCHCAP flag and uses the new CONFORMANCE_FLAG instead
Note the SEMIDISPATCHCAP flag = 1 for DUID 'SF1' because it is in a binding constraint '#SF1_E'

If CONFORMANCE_FLAG = 1 then DUID can operate as part of an aggregate to meet the aggregated energy target
If CONFORMANCE_FLAG = 2 then DUID must conform to its individual energy target. This is set because DUID 'SF1' alone is in a binding network constraint '#SF1_E'

Sample dispatch conformance report

Aggregate target (230 MW) is met by its aggregate actual (100+150+0-20=230 MW)

SF1 individual target (100 MW) is met by its actual

Participant can determine aggregate target and actual for Aggregate System as:
Sum(Gen) - Sum(Load)

Participant can determine aggregate dispatch error for Aggregate System as:
Aggregate Target - Aggregate Actual - Error Threshold

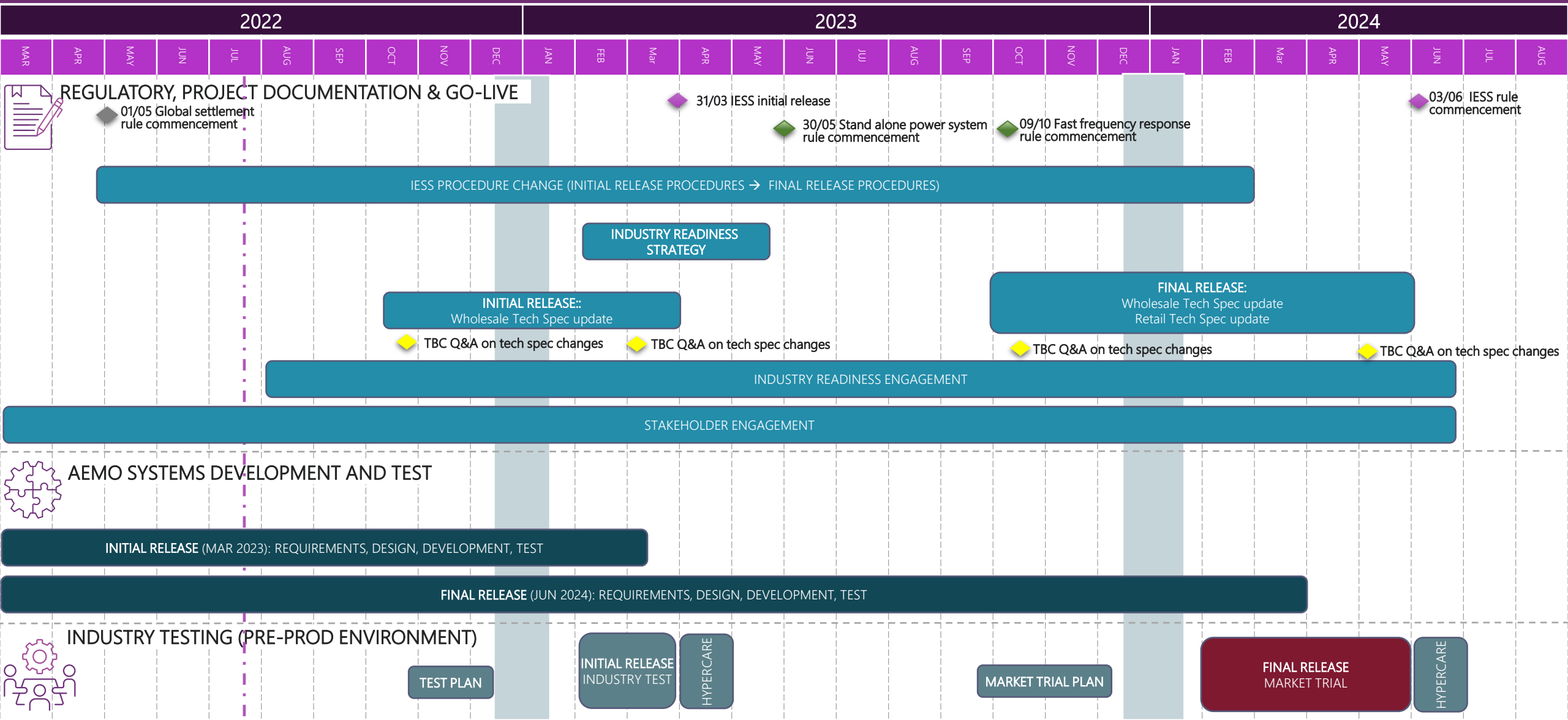
DISPATCH_CONFORMANCE	HYBRID1	21/10/2021	17:45:10	359599397			NEW
UNIT_CONFORMANCE	INTERVAL_DATETIME	DUID	TOTALCleared	ACTUALMW	PARTICIPANT_STATUS_ACTION	CONFORMANCE_FLAG	
UNIT_CONFORMANCE	21/10/2021 9:35	SF1	100	100	No action required. Unit is following dispatch target	2	
UNIT_CONFORMANCE	21/10/2021 9:35	WF1	50	150	No action required. Aggregate is following aggregate dispatch target	1	
UNIT_CONFORMANCE	21/10/2021 9:35	BESS1G	80	0	No action required. Aggregate is following aggregate dispatch target	1	
UNIT_CONFORMANCE	21/10/2021 9:35	BESS1L	0	20	No action required. Aggregate is following aggregate dispatch target	1	
	7						

SF1, WF1 are semi-scheduled gens
BESS1G is scheduled gen
BESS1L is scheduled load

This indicates the conformance status of the DUID and action required, either as part of an aggregate or as an individual

From the dispatch instruction

IESS – Indicative Industry Timeline



- IESS Confirmed
- IESS Indicative
- Concurrent initiatives
- Completed activities
- Summer holiday periods: Avoid industry IESS activities where possible
- Market trial:** Feb-24 configure environment; Mar-24 1st test cycle; Apr-24 2nd test cycle; May-24 remediation