



EMMS - Technical Specification - June 2024

1.011-00 March 2024

Pre-production: 02 April 2024

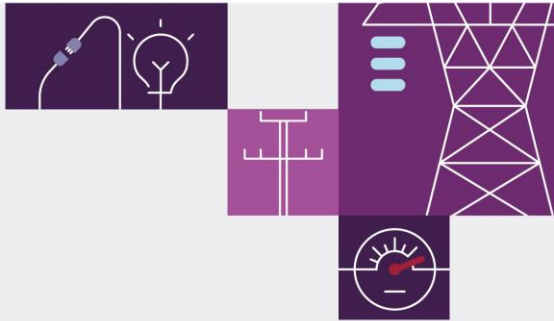
Production: 02 and 03 June 2024

Procedures/Rules

effective: 03 June 2024

Release series: EMMS062024





Important notice

Purpose & audience

This document describes the technical changes required to participant's systems for the EMMS Technical Specification - June 2024 (Release). The Australian Energy Market Operator (AEMO) provides this information as a service targeting business analysts and IT staff in participant organisations. It provides guidance about the changes to their market systems under the National Electricity Rules (Rules), as at the date of publication.

How to use this document

- If you have questions about the business aspects of these changes, please see Consultations on AEMO's website.
- The references listed throughout this document are primary resources and take precedence over this document.
- Unless otherwise stated, you can find resources mentioned in this guide on AEMO's website.
- **Text in this format** is a link to related information. Some links require access to MarketNet.
- **Text in this format**, indicates a reference to a document on AEMO's website.
- **Text in this format** is an action to perform in the Markets Portal.
- This document is written in plain language for easy reading. Where there is a discrepancy between the Rules and information or a term in this document, the Rules take precedence.
- Glossary Terms are capitalised and have the meanings listed against them in the Glossary.
- Rules Terms have the meaning listed against them in the [National Electricity Rules](#) (Rules).

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Distribution

Available to the public.

Document Identification

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Version History

[1.011-00](#) See Changes in this version for details.

Documents made obsolete

The release of this document changes only the version of EMMS Technical Specification - June 2024.

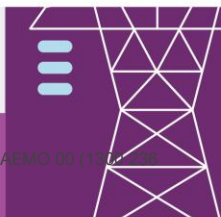
Support Hub

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Contents

- 1 Introduction 1**
 - 1.1 Audience.....1
 - 1.2 Objective1
 - 1.3 Status.....1
 - 1.4 Release dates.....2
 - 1.5 Projects and enhancements.....2
 - 1.6 Rule and procedure changes2
 - 1.7 Related technical specifications2
 - 1.8 Related documents3
 - 1.9 Approval to change3
 - 1.10 Market systems user group meetings4
 - 1.11 Version numbers4
 - 1.12 Changes in this version.....4
- 2 Proposed Timeline 5**
- 3 Participant Impact 9**
 - 3.1 Participant development support environment9
 - 3.2 Pre-production refresh9
 - 3.3 EMMS data model v5.3.....9
 - 3.4 Data subscription.....10
 - 3.5 What happens if I do not upgrade to Data Model 5.3?11
- 4 Integrating Energy Storage Systems..... 13**
 - 4.1 Goal13
 - 4.2 High-level changes.....13
 - 4.3 Detail14
- 5 Registration 15**
- 6 Portfolio Management System..... 17**
- 7 Bidding and Dispatch 18**
 - 7.1 High-level changes.....18
 - 7.2 Bidding submissions19
 - 7.3 Dispatch and pre-dispatch updates35

| | | |
|-----------|---|-----------|
| 7.4 | Market reports, notices and MMS Data Model | 35 |
| 7.5 | BDU MLF calculations..... | 35 |
| 7.6 | BDU MT PASA enhancements | 35 |
| 7.7 | BDU PASA enhancements | 36 |
| 7.8 | BDU external interface enhancements | 36 |
| 7.9 | EMMS Data Model | 37 |
| 8 | Settlements..... | 39 |
| 8.1 | Energy settlement..... | 39 |
| 8.2 | Non-energy settlement..... | 40 |
| 8.3 | Other settlement services..... | 42 |
| 8.4 | EMMS Data Model | 43 |
| 9 | Billing..... | 44 |
| 9.1 | Billing | 44 |
| 10 | Invoicing | 46 |
| 11 | Prudentials..... | 47 |
| 12 | Electricity Data Model 5.3 | 48 |
| 13 | Markets Portal..... | 49 |
| 14 | Reports..... | 50 |
| 15 | FAQs | 51 |
| 15.1 | Data model..... | 51 |
| 15.2 | Participant development support environment (PDSE)..... | 54 |
| 16 | Implementation | 57 |
| 16.1 | Transition..... | 57 |
| 16.2 | Upgrading..... | 57 |
| 16.3 | Implications..... | 57 |
| 16.4 | Risks..... | 58 |
| 17 | Terms | 59 |
| 17.1 | Rules Terms..... | 59 |
| 17.2 | Glossary | 59 |
| 18 | References | 62 |
| 18.1 | Data interchange and data model resources | 62 |

19 Index 64

A1. Version history 65

 19.1 V0.0565

 19.2 V0.0465

 19.3 V0.0366

 19.4 V0.0266

 19.5 V0.0167

1 Introduction


1.1 Audience

AEMO provides this information as a service targeting business analysts and IT staff in Registered Participant companies.

1.2 Objective

The EMMS Technical Specification - June 2024 (Release) describes the projects planned by AEMO from a participant perspective and includes any system related changes for participants.

1.3 Status

| Version | Status |
|-------------------------------------|--|
| 1.01 | About 97% finalised. May have minor changes in the future. |
| 1.001-00 | About 95% finalised. May have minor changes in the future. |
| 0.05 | About 92% finalised. May have minor changes in the future. |
| 0.04 | About 90% finalised. May have minor changes in the future. |
| 0.03 | About 80% finalised. May have minor changes in the future. |
| 0.02 | Updated version based on the design. We still expect changes to the design while development and testing are in progress. |
| 0.01 | <div><p>Initial Draft for review. The design is not ready for participants' builds.</p><p>This version of the document is based on the current Requirements. AEMO will provide an updated versions based on the design once it is available.</p><p>Presents the EMMS Technical Specification - June 2024 evolving design.</p><p>Please send feedback to techwriters@aemo.com.au</p><p>Participants can commence their system builds but design changes may occur according to participant feedback</p></div> |

1.4 Release dates

Scheduled for implementation in:

- Pre-production: 02 April 2024
- Production: 02 and 03 June 2024
 - 02 June 2024: Settlements, Registrations, Retail
 - 03 June 2024: NEM Scheduling, Other Wholesale, Prudentials
- Procedures effective: 03 June 2024

1.5 Projects and enhancements

Changes and enhancements for this Release include:

| No. | Functionality | Change | Affected interface | Reference |
|-----|---|--------|--------------------|-----------|
| | Integrating Energy Storage Systems (IESS) | | | |

1.6 Rule and procedure changes

The following rules and procedures take precedence over technical specifications and guides.

| Title | Version/status | Effective |
|--|----------------|-----------|
| Integrating energy storage systems into the NEM AEMC | V1.0 | |
| IESS HLD Final version v2.0 | V1.1 | |
| IESS – Implementation Strawperson | | |
| SO_OP3705 Dispatch operating procedure | | |
| Regulation FCAS Contribution Factors Procedure (Causar Pays) | Version 7.0 | |

1.7 Related technical specifications

| Title | Description |
|---|--|
| EMMS Technical Specification – Data Model v5.3 – March 2024 | Describes the changes to the Data Model v5.3 according to projects planned by AEMO from a participant perspective. |

| Title | Description |
|---|---|
| NEM Dispatch Bidding Open API Specification Reference - Updates for June 2024 | Describes the changes to the NEM Bidding and Dispatch APIs. |

1.8 Related documents

Once published, these resources take precedence over this technical specification

These guides and resources are updated according to this technical specification and published for the pre-production Release Date.

| Title | Description | Status |
|---|--|-------------|
| Markets Portal Help | Help using the Markets Portal web applications | In progress |
| Energy and FCAS Web Bids | | In progress |
| Format and Validation for FTP Energy, FCAS and MNSP Bids and Offers | | In progress |
| Portfolio Management System | | In progress |
| Market View | | In progress |
| Data Interchange Online help | Help using Data Interchange and the Data Model | Not started |
| NEM Dispatch Bidding API Reference | Allows authorised participants to submit and retrieve their NEM Dispatch Bids/Offeres. | In progress |
| API Reference | Help using AEMO's e-Hub as an interface to communicate information with AEMO. | In progress |

1.9 Approval to change

There is no approval or agreement to change required from participant change controllers for this Release.

AEMO sought agreement in the in a range of **NEM Reform program stakeholder forums**.

1.10 Market systems user group meetings

The Market Systems User Group (MSUG) is an industry user group established to discuss wholesale and retail IT systems releases. Its purpose is to facilitate the continuing improvement of AEMO's IT systems by seeking feedback and collaboration from participants.

MSUG meetings are open to all interested parties, with invitations sent to all included on the distribution list. If you have a technical question for a project and want to attend the MSUG ask your company's support team to include your email address in their **AEMO Help Desk Bulletin (CRM)** distribution list.

1.11 Version numbers

AEMO releases new versions of this document as the technical requirements are streamlined.

Incremental version numbers such as 1.01, 2.01 and so on mean there is a minor change to the technical specification.

Major version numbers such as 1.00, 2.00 means there are substantial changes to the technical specification. Participants must carefully review these changes, detailed below.

1.12 Changes in this version

This version includes the following updates:

- [Updates the](#) NEM Bidding validations [with more context details](#).
- ~~Updates the Proposed Timeline chapter to remove the second pre-release of the scripts in PDSE on 16 February as it contains only minor updates to the scripts released on 22 November. Also, adds a link to the technical specification portal for pre-production refresh timeline.~~
- ~~Adds section in the Participant Impact chapter for Pre-production refresh with a link to the **Technical Specification Portal**.~~
- ~~Updates FAQs chapter with participant questions from the MSUG.~~

2 Proposed Timeline

The dates for the Market System User Group Meetings (MSUG) are tentative. We will provide an invitation one week prior to the meeting.

The rows of the table highlighted in grey indicate milestones for Participant Development Support Environment.

| Milestone | Date | Description |
|---|------------------|--|
| Approval required | NA | Final date for participant approval of this Release. |
| Revised Technical Specification | (TBC) | <p>AEMO releases new versions of this document as the technical requirements are streamlined. During the project this document is the source of truth.</p> <p>From the pre-production release, the technical specification is no longer updated, the related documents become the source of truth.</p> <p>Release schedules and technical specifications</p> |
| Related Documents publication | 2 April 2024 | Release of guides and resources mentioned in Related on page 3 |
| Early release of draft Data Model scripts for Participant Development Support Environment | 22 November 2023 | AEMO provides the draft Data Model scripts to participants |
| Settlements reports for Participant Development Support | 15 December 2023 | <p>One-off delivery of Settlements reports</p> <p>AEMO provides Settlements reports to Participants to support their development and provide early visibility of Settlements table changes.</p> |
| Transition scripts to backfill Bidding tables from backup tables in the Participant Development Support Environment | 22 January 2024 | <p>Participants require the script to perform their back-population activities for their PDSE testing to work. This transition involves large data sets and participants need to involve a DBA resource to assist.</p> <p>This update is mainly for Participants using the Bidding tables</p> <p>Optional only for those not using the Bidding tables</p> <p>Please refer to the Data Model Release Notes provided for PDSE environment.</p> |

Proposed Timeline

| Milestone | Date | Description |
|---|---|---|
| BDU tables in the for Participant Development Support Environment | 22 January 2024 | Environment provided to Participants to support their development and provide early visibility of Bidding changes |
| Pre-release of Data Model 5.3 scripts for Bidding changes only in the preproduction environment | 31 January 2024 - 2 February 2024 | <p>Upgrades Participant preproduction systems with Data Model 5.3 tables ONLY for the 4 Bidding table changes with Primary key changes.</p> <p>Participants using the Bidding tables can implement these changes before the full Data Model release to preproduction on 13 March 2024.</p> |
| MSUG meeting: pre-release review | 7 February 2024 | <p>Market Systems User Group Meeting (MSUG) to review the technical specification and ask AEMO technical SMEs questions</p> <p>This date is tentative. The Knowledge Management team provides an invitation prior to the meeting</p> |
| Pre-release 2 of draft Data Model scripts for Participant Development Support Environment | 16 February 2024 | <p>AEMO provides updated Data Model scripts to participants. This includes any new updates to the scripts since the PDSE drop in November.</p> <p>Participants who have applied the Data Model 5.3 release in November in PDSE need to analyse impact of this updated script as this is not an incremental update. For more information since the November release, see Changes in this version.</p> |
| Pre-release of Data Model 5.3 scripts for Bidding changes only in the production environment | 27 February 2024 | <p>Upgrades Participant production systems with Data Model 5.3 tables ONLY for the 4 Bidding table changes with Primary key changes.</p> <p>Participants using the Bidding tables can implement these changes before the full Data Model release to production on 10 April 2024.</p> |
| Pre-production refresh | <p>4 March 2024 – 8 March 2024</p> <p>Refreshed with production data:</p> <ul style="list-style-type: none"> Wholesale Electricity: 7 February, 2024 Retail Electricity: 4 March 2024 | <p>Refresh of the pre-production system with data refreshed from the production system. An outage of up to five days can occur to the pre-production environment during this period. Participant access is not restricted, however, AEMO do not guarantee the pre-production data content or system availability. During the refresh, access to other AEMO systems such as AWEFS, EMMS, OPDMS, and STTM may be intermittently affected.</p> <p>For more information on the pre-production refresh timeline, see Technical Specification Portal.</p> |

Proposed Timeline

| Milestone | Date | Description |
|---|--|--|
| Pre-production Data Model available | 13 March 2024 - 15 March 2024 | <p>AEMO implements components of the Release to pre-production for participant testing</p> <p>AEMO has full access to the system during this period</p> <p>Participant access is not restricted; however, the data content or system availability is not guaranteed</p> |
| IESS pre-production implementation | 13 March 2024 - 15 March 2024 | <p>AEMO implements components of the Release to pre-production for participant testing</p> <p>AEMO has full access to the system during this period</p> <p>Participant access is not restricted; however, the data content or system availability is not guaranteed</p> |
| IESS pre-production release | 2 April 2024 | When you receive the Support Hub email advising the implementation is complete, preproduction systems available to participants |
| Market trials and industry testing | 2 April 2024 - 24 May 2024 | <p>Participant testing: Unstructured/bilateral participant testing in the pre-production environment</p> <p>Industry testing: Participant testing coordinated by AEMO</p> |
| MSUG meeting: pre-production review | 20 March 2024 (TBC) | <p>Market systems user group meeting to review the implementation of this pre-production release</p> <p>This date is tentative. The Knowledge Management team provides an invitation prior to the meeting</p> |
| Production Data Model available and auto subscription | 10 April 2024 No auto-subscription for existing files | <p>For any existing files with modified or new tables, if participants are subscribed, AEMO moves them to the Legacy version</p> <p>For all new files, participants are auto subscribed.</p> <p>When you receive the Support Hub email advising the implementation is complete, Production systems available to participants</p> <p>For more details, see on page 9</p> |
| Procedure/rules effective date | 3 June 2024 | Procedures mentioned in Rule and procedure changes |

Proposed Timeline

| Milestone | Date | Description |
|--------------------------------------|---------------------------|--|
| IESS production implementation | 12 May 2024 - 16 May 2024 | AEMO implements components of the Release to production for participant testing AEMO has full access to the system during this period Participant access is not restricted; however, the data content or system availability is not guaranteed |
| IESS production release | 02 and 03 June 2024 | When you receive the Support Hub email advising the implementation is complete, Production systems available to participants |
| MSUG meeting: post-production review | 24 April 2024 (TBC) | Market systems user group meeting to review the implementation of the production release This date is tentative. The Knowledge Management team provides an invitation prior to the meeting |

3 Participant Impact

~~For more information, see Implementation.~~
~~To comply with this Release, participants must:~~

3.1 Participant development support environment

Participants need to set up a separate instance of the environment to deploy the draft scripts for Data Model 5.3. You can access the web portal in the PDSE environment [here](#). This environment uses the same URM and TLS certificates as the pre-production Markets Portal interface and participants are not required to make any changes if they already have existing credentials to use the pre-production Markets Portal environment. For more information on the participant development support environment, see [IESS Participant Development Support Environment](#).

3.2 Pre-production refresh

For more information on the pre-production refresh timeline, see [Technical Specification Portal](#).

3.3 EMMS data model v5.3

Participants wanting to receive the new and updated Data Model information in their Data Interchange environments must upgrade to the latest version of the Data Model v5.3.

Participant systems incorrectly configured and not compliant with the Baseline Assumptions in the Data Interchange Framework and Glossary may suffer data loss.

3.3.1 Bidding data model table updates

AEMO introduces a new Primary Key (PK) of DIRECTION field to Bid Package tables:

1. The 10-band bid model is preserved with inclusion of a new DIRECTION field in the primary key (PK) of the main bidding tables of BIDDAYOFFER, BIDOFFERPERIOD, BIDDAYOFFER_D, BIDPEROFFER_D.
2. For a BDU, adding PK implies there are 2 records with same bid data fields with DIRECTION informing which 10 bands are associated to GEN (generation) and LOAD side, that is, separate 10 band model for GEN and LOAD side of the BDU.

3. AEMO back populates the DIRECTION field for all retrospective bid reports (LEGACY/LATEST) in PROD/PREPROD for all unit types and provide participants with an executable script as part of the Data Model 5.3 bid table pre-release (early/mid February) to back populate same in their own databases (as required).
4. The DIRECTION field is populated in bid reports for all unit types regardless of if not provided by participant in submitted bid, that is, AEMO derives if not provided in bid (DIRECTION is mandatory for BDU, optional for all other unit types).
5. Participants remaining on Data Model version 5.2 or less (and associated PDRloader):
 - not consume DIRECTION field present in reports (LEGACY/LATEST) but not supported by PDRloader version to consume.
 - have limitation for BDU only consume one side of bid bands provided (first 10 bid bands) and not second set of 10 bands.
 - for participant to be in line with AEMO data, they must upgrade to the latest version of Data Model v5.3.

3.4 Data subscription

- Participants are automatically subscribed to any newly introduced reports.
- Participants currently subscribed to the existing reports modified in this release move to the legacy version of these reports on the day of the Data Model release.
- Participants should only unsubscribe from legacy version after subscribing to the current version of the report.
- Data Model releases contains updates for various projects. When the project goes live, the updated versions of the reports are made available.
- Participants are only able to subscribe to the new versions of these reports when the project goes live. AEMO notifies participants when the reports are available for subscription.

For help, see:

- [Unsubscribe from files](#)
- [Subscribing to new EMMS Data Model files](#)

3.5 What happens if I do not upgrade to Data Model 5.3?

If the participants do not upgrade to EMMS Data Model 5.3, there will be impacts to both Settlements and Billing tables.

3.5.1 Settlements

The following tables are populated for participants staying with Data Model 5.2 as part of the IESS Transitional Reporting.

- SETCPDATA
- SETGENDATA
- SETSMALLGENDATA

If you do not upgrade to Data Model 5.3, the EXPENERGY and EXPORTENERGY columns in the SETGETDATA and SETSMALLGENDATA tables are UFEA adjusted. You will not be able to reconcile the UFEA amount.

After the release of the Data Model 5.3, the Export MWh displayed in these tables are UFE Adjusted MWh Values.

The details of columns modified:

SETCPDATA

| | | |
|----------|--------------|--|
| IENERGY | NUMBER(16,6) | Import Gross energy into the pool - MWh |
| XGENERGY | NUMBER(16,6) | Export Gross energy from the pool – MWh |
| IENERGY | NUMBER(16,6) | Import energy into the pool – MWh. After IESS INEnergy is not adjusted by UFEA |
| XNENERGY | NUMBER(16,6) | Export energy from the pool - MWh, Plus UFE Allocated MWh. UFEA is always adjusted with Export Energy post IESS. Negative UFEA increases the XNEnergy and Positive UFEA decreases the XNEnergy |

SETGENDATA

| | | |
|---------------|--------------|---|
| GENERGY | NUMBER(16,6) | Generated Gross Energy -MWh |
| NETENERGY | NUMBER(16,6) | Generated Gross Energy - MWh |
| EXPENERGY | NUMBER(16,6) | Export Energy (Generator Purchases) (MWh) – This is adjusted by UFEA |
| EXPENERGYCOST | NUMBER(16,6) | Export Energy Cost (\$) (\$ value corresponding to the Exp Energy which is adjusted by UFEA |

SETSMALLGENDATA

| | | |
|---------------|--------------|--|
| IMPORTENERGY | NUMBER(16,6) | The import direction value for the meter read (MWh) |
| EXPORTENERGY | NUMBER(16,6) | The export direction value for the meter read (MWh) adjusted by UFEA |
| IMPENERGYCOST | NUMBER(16,6) | Import Energy Cost (\$) |
| EXPENERGYCOST | NUMBER(16,6) | Export Energy Cost (\$) ((\$ value corresponding to the Export Energy which is adjusted by UFEA) |

3.5.2 Billing

If participants do not upgrade to Data Model 5.3 and are subscribed to bidding and next_day files, the tables start failing since there are primary key changes to the Bidding tables.

4 Integrating Energy Storage Systems

4.1 Goal

The **Integrating Energy Storage Systems (IESS)** rule seeks to better integrate storage and hybrid systems into the NEM. As a part of this rule change, the following changes are proposed:

- Introduces a new registration category, the Integrated Resource Provider (IRP). The IRP allows storage and hybrids to register and participate in a single Registration Category rather than under two different categories.
- Clarity for scheduling obligations that apply to different configurations of hybrid systems. This includes for DC coupled systems (which have different technologies behind a single inverter) allowing them the flexibility to choose whether those technologies are scheduled or semi-scheduled.
- Transferring existing Small Generation Aggregators to the new category and enabling new aggregators of small generating units and/or storage units to register in this category. Market Customers are still able to include small generating and storage units in their portfolios.
- Enabling aggregators registered in this new category to provide market ancillary services from generation and load.
- Amending the framework to recover non-energy costs based on a participant's consumed and sent out energy over relevant intervals, irrespective of the participant category in which it is registered.

A part of these changes are effective as per the dates below. These include:

- Allowing aggregators of small generating and storage units to provide ancillary services. These changes are effective from 31 March 2023.
- Hybrid systems to use aggregated dispatch conformance (ADC) effective from 08 August 2023.

4.2 High-level changes

| Function | Description | Reference |
|----------------------|---|-----------|
| EMMS Data Model v5.3 | New data table/s established to record information provided to AEMO. | |
| Markets Portal | Potential updates to the Market Info, View offers, Settlements, Offers and submissions web interfaces on the Markets Portal | |

| Function | Description | Reference |
|----------|---|-----------|
| API | Update the NEM Bidding APIs | |
| FTP | Extend the existing capability to support providing additional information required for BDUs. | |

4.3 Detail

The IESS project provides greater clarity for how new technologies and business models, such as batteries and hybrid systems, register and participate in the NEM. AEMO considers this important in the context of:

- growing grid scale battery storage connections
- increasing numbers of applications and interest in registering storage systems and hybrid facilities
- an expectation that there will be a growing role for storage into the future.

The project includes changes to Settlements, Billing and Prudentials, Bidding and Dispatch, Registration and MSATS streams. The following chapters provide details regarding the changes for each stream.

5 Registration

The Registration Manager Client (RMC) is an application the AEMO Registration team use to configure EMMS Registration. RMC records registration information such as registered participant's business details, registration categories, bid and validation data, and other standing data required for registered units to participate in NEM (central dispatch and the spot market). The registration stream changes for the IESS project are:

- Creates a new Integrated Resource Provider (IRP) NEM participant category.
- Removes the existing Small Generation Aggregator (SGA) NEM participant category.
- Allows Registration to record, configure, and view the following bi-directional unit (BDU) classifications:
 - BDU classified as:
 - Scheduled BDU and Market BDU
 - Scheduled generating unit (GU), Scheduled Load and Market GU
 - Non-scheduled BDU and Market BDU
 - Non-scheduled BDU and Non-Market BDU
 - BDU (that is a coupled PU) classified as:
 - Scheduled BDU and Market BDU
 - Semi-scheduled GU and Market BDU
 - Scheduled BDU, Semi-scheduled GU and Market BDU
 - Non-scheduled BDU and Market BDU
 - Non-scheduled BDU and Non-Market BDU
- Provides the capability for Registration to record, configure and identify a DUID is an Ancillary Service Unit (ASU).
- All existing IRS Participants must apply to AEMO to register as an IRP and classify each BDU and GU during the registration grace period.
- All Non-Customer Load Participants must apply to AEMO to register as an IRP or Customer during the registration grace period.
- All New IRS Participants will automatically cease to be registered in both the Generator and Customer participant category in relation to IRS. The New IRS Participant must

Registration

instead be registered in the IRP participant category effective 3 June 2024. AEMO notifies the relevant Registered Participant of the changes.

- All existing participants registered in the Small Generation Aggregator (SGA) NEM participant category will automatically cease to be registered in the SGA category and are registered in the IRP participant category effective 3 June 2024.
- A generating unit classified as an ancillary service generating unit (ASGU) is taken to be classified as an ASU (Ancillary Service Unit), effective 3 June 2024.
- A load classified as an ancillary service load (ASL) is taken to be classified as an ASU (Ancillary Service Unit), effective 3 June 2024.

6 Portfolio Management System

The Portfolio Management System (PMS) is an online portal application that simplifies the WDR and FCAS application processes for AEMO and participants, providing transparency into the classification and aggregation process to Market Participants.

The PMS stream changes for the IESS project are:

- Transition the participant category from Small Generating Aggregators (SGAs) to Integrated Resource Providers (IRP).
- The participant category is stored in RMC. This change allows PMS to read this data from EMMS.
- Allow the Role column in the FCAS_NMI.csv file to have the value of Small Resource Aggregator (SRA).
- Update the existing NMI **Role** field attribute in PMS for any existing SGAs to SRA.
- Update the existing declarations on the PMS interface to reflect IESS terminology changes when participants submit or upload an application (changes ASL to ASU and market load to market connection point).
- Allows an IRP to register NMIs for all available contingency FCAS services including RAISE1SEC, RAISE6SEC, LOWER6SEC, RAISE60SEC, LOWER1SEC, LOWER60SEC, RAISE5MIN, LOWER5MIN.
- Update how **Linked participant ids** field values display, list of all participant Id's of the portfolio participant that has the same ABN with their participant category from EMMS - Portfolio Details Tab.
- Update **Participant type** field values to validate and display participant category from EMMS - Portfolio Details Tab

7 Bidding and Dispatch

The IESS project is seeking to better integrate storage and hybrid systems into the National Electricity Market (NEM). There are significant changes to registration and dispatch arrangements as well as in areas such as non-energy cost recovery, performance standards, and participation options for aggregation of small resources, including batteries.

7.1 High-level changes

The high-level changes to the Bidding and Dispatch stream are as follows:

| Application | Description |
|--|--|
| Submit Energy and FCAS bids JSON Format changes | <p>All Participant Submit Energy and FCAS bids submission methods (FTP, API, Markets Portal Web UI and File Upload) leverage the single submit bids JSON format.</p> <p>The format is enhanced to support the additional attribute data for BDU Energy and FCAS bids. For more details, see Bidding submissions. The modified format supports backward compatibility.</p> <p>Enhance Bid format for BDU:</p> <p>Energy bids</p> <p>Supports a new conditional direction indicator (LOAD, GEN) allowing submission of separate energyBids object and energyPeriods arrays (10 price, availability, and associated parameters) for the Load side and Generation side of the BDU (20 in total). This field is mandatory for BDU Energy and Regulation FCAS bid submissions.</p> <p>For non-BDU, the attribute is optional and may be provided. It is optional to support backward compatibility. If provided, validation is performed as per allowable combination.</p> <p>Contingency FCAS</p> <p>Offers unchanged (single FCAS enablement - 10 bands) with variation the four trapezium period parameters support provision of positive and negative numeric values (currently positive only).</p> <p>Regulation FCAS</p> <p>Supports a new optional direction indicator allowing submission of separate fcasBids array and fcasPeriods arrays (10 price, availability and associated parameters) for the Load side and Generation side of the BDU (20 in total).</p> <p>Submit bids response</p> <p>Formats remain unchanged, existing attributes support new error BDU responses.</p> |
| APIs | <p>Submit Bids, Get Bid(s) Get Submission(s) API requests and responses to support the extended JSON format for BDU, syntax/schema/business validation for the amended BDU Bid submission format.</p> <p>Backward compatibility for non BDU.</p> |

| Application | Description |
|---|---|
| FTP Participant Server | Participant file server (FTP protocols) to support extended JSON format for BDU i.e., syntax/schema/business validation for the amended BDU Bid submission format. Backward compatibility for non BDU. |
| Markets Portal: Energy and FCAS Bids and file upload | Energy & FCAS 5min Bids web portal view/modify/submit (UI) and file upload functionality support for BDU Energy and FCAS bids. |
| NEMReports, MMS Data Model and Market Notices | Enhance the existing Market Reports and Notices to support the introduction of the new IRP participant category and BDU generally described as: <ol style="list-style-type: none"> 1. Energy and FCAS Bid related reports to accommodate the new BDU related attributes - 20 price and availability bands including associated parameters. 2. Variable Dispatch and Pre-dispatch reports inclusion of BDU Energy Targets (negative and positive), new summations/calculations at regional and DUID level. 3. MT PASA DUID Availability report supports provision of IRP MT PASA offer(s). |
| MT PASA offers | MT PASA Offers support submissions from Integrated Resource Providers (IRP) and DUID type BDU. IRP offers leveraged in PASA modelling. Data Interchange and MT PASA DUID availability report support of IRP offer(s). |
| PASA (PD and ST) | PASA calculations (processing) and outputs include BDU generation PASA related data (BDU Load PASA availability excluded). No change to formats. |
| Markets Portal > Market Info | Uplift Markets Portal > EMMS > Market Info interfaces (View Market Summary, View Dispatch and View Pre-dispatch) as per the current web portal framework |
| NEM Data Dashboard | Extend support to include and display IRP and BDU related details: <ul style="list-style-type: none"> - Dispatch, Price and Demand values in calculations and summations. - Fuel Mix and Renewable Penetration - Average Price and 7-Day Outlook values in calculations and summations. |

7.2 Bidding submissions

The NEM Dispatch Bidding systems and interfaces allows authorised participants to submit and retrieve their NEM Dispatch Bids/Offer. AEMO uses effective NEM Dispatch Bid/Offer submissions in the Central Dispatch process.

AEMO allows participant submission and response of Energy, FCAS, or MNSP Bids by four methods. Under IESS, all methods are extended to support the introduction of BDU.

- Directly in the Energy and FCAS Bids web interface using the Markets Portal web.
- JSON file upload to the Energy and FCAS Bids web interface using the Markets Portal web.
- FTP to the participant file server\ParticipantID\Export\Bids folder.

- Submit Bids APIs over MarketNet and Internet.
- Participants can also query previously submitted bid information using get API endpoints – getSubmission, getSubmissions, getBids, and getBid. For more details on the existing Bidding and Dispatch APIs, see [\(In progress\) NEM Dispatch Bidding Open API Specification Reference Copy - Updates for June 2024](#).

The following table provides a list of modified and updated fields in the JSON format for BDUs:

Energy bids

| Name | Rule | Data Type | Description |
|-------------|-----------|------------|--|
| energyBids | Mandatory | Object | Object |
| tradingDate | Mandatory | String | String in date format Must be a valid date. The effective date for this bid. Format: yyyy-mm-dd or yyyy-mm-dd 00:00:00 For example, 2021-04-23 2021-04-23 00:00:00 |
| duid | Mandatory | String(10) | Dispatchable Unit identifier recorded in AEMO's systems. Must be upper case maxLength: 10 |
| direction | Optional | String(8) | Mandatory for BDU submissions (excludes Contingency FCAS); optional for all other unit types. To indicate no value, remove the entire attribute. Validation performed if provided. See Direction Field Enumeration and Use table for allowable enumerated values and use. type: string maximum 15, format: upper case. For BDU, direction expresses if associated energyBids and energyPeriods reflect the LOAD or GEN side of the BDU. |
| prices | Mandatory | Array | The band price. Required. Type: number. Format: multiple of: 0.01 e.g. 0.01, etc. For all unit types prices are 0.00 or positive. |

| Name | Rule | Data Type | Description |
|-----------------------|-------------|------------------|---|
| fastStartProfile | Optional | Object | Only valid for fast-start units. If not provided, the unit is treated as slow start, and all values in the data model default to null. Fast-Start Inflexibility Profile Properties: minimumLOAD, t1, t2, t3, t4 Required: minimumLOAD, t1, t2, t3, t4 For BDU and semi-scheduled generating units remove the entire attribute (must not be provided). |
| dailyEnergyConstraint | Optional | Integer (number) | Represents the maximum energy available from a constrained Plant in the Trading Day Only relevant to the Energy Service Type Cannot be negative Expressed in MWh/day minimum: 0 maximum: 999999 For BDU remove the entire attribute (must not be provided). |
| rebidExplanation | Conditional | Object | Required for rebids, fixed LOAD, and low ramp rates Properties: reason, eventTime, awareTime, decisionTime, category For BDU, if supplied for direction LOAD and GEN, the values must be identical (single provision of rebidExplanaton for LOAD and GEN acceptable) |

Energy periods

| Name | Rule | Data Type | Description |
|---------------|-----------|-----------|--|
| energyPeriods | Mandatory | Array | Mandatory for energy bids only. An array of 288 trading periods from 4:05 am to 4:00 am. Required for an energy submission, type: array, format: minimum items: 288, maximum items: 288 |
| periodId | Mandatory | Integer | The 5-minute trading interval from 4:05 am to 4:00 am. Required for energyPeriods, mnspsPeriods, and fcasPeriods, type: integer minimum item: 1, maximum item: 288, format: 1, 2, 3...288 |

| Name | Rule | Data Type | Description |
|--------------|-----------|-----------|---|
| maxAvail | Mandatory | Integer | Maximum availability for a period, integer minimum 0, format: whole numbers, value: megawatts. For BDU for each direction (LOAD and GEN) integer minimum 0, format: whole numbers, value: megawatts. |
| rampUpRate | Mandatory | Integer | Rate of change up - The maximum rate of increase for the unit. Required for energyPeriods and mnspPeriods, type: integer minimum 0, format: whole numbers, value: megawatts. For BDU for each direction (LOAD and GEN) integer minimum 0, format: whole numbers, value: MW/min |
| rampDownRate | Mandatory | Integer | Rate of change down - The maximum rate of decrease for the unit. Required for energyPeriods and mnspPeriods, type: integer maximum 0, format: whole numbers, value: megawatts. For BDU for each direction (LOAD and GEN) integer minimum 0, format: whole numbers, value: MW/min |
| pasaAvail | Mandatory | Integer | The unit's capability including any capability potentially available in 24 hours, including the offered availability. Required for energyPeriods, mnspPeriods, type: integer minimum: 0, format: whole numbers, value: megawatts. For BDU for each direction (LOAD and GEN) integer minimum 0, format: whole numbers, value: megawatts. |
| fixedLoad | Optional | Integer | Fixed unit output, in MW. Must be 1MW or greater. For BDU provide a single (1) fixedLoad for LOAD and GEN (direction) - remove the entire attribute for direction not provided. <ul style="list-style-type: none">- Direction of GEN, integer minimum 1, format: whole numbers, value: megawatts- Direction of LOAD, integer minimum 1, format: whole numbers, value: megawatts |
| bandAvail | Mandatory | Array | The availability for each 10 price bands. Required for energyPeriods, mnspPeriods, and fcasPeriods. Required properties: avail, type: array, minimum: 10 maximum: 10, format. For BDU for each direction (LOAD and GEN) required properties: avail, type: array, minimum: 10 maximum: 10, format: whole number (0 and positive values for each direction) |

| Name | Rule | Data Type | Description |
|-------------|----------|-----------|---|
| energyLimit | Optional | Integer | <p>Optional for BDU Bid submissions. For non-BDU remove the entire attribute.</p> <p>For each direction (LOAD and GEN) integer minimum 0, format: whole numbers, value: megawatthours.</p> <p>Direction of 'GEN' indicates the min charge level, and Direction of 'LOAD' indicates the max charge level.</p> <p>Rules:</p> <ul style="list-style-type: none">- If provided defines the min and/or max charge levels for this period, energy limit modelling will be applied.- If not provided:<ul style="list-style-type: none">o participants opt in - registered energyLimit (min and/or max) modelling applies.o participants opt out - no energy limit modelling applies. |

FCAS bids

| Name | Rule | Data Type | Description |
|-------------|-----------|------------|---|
| fcasBids | Mandatory | Array | <p>Mandatory for FCAS Offers only.</p> <p>The collection of one or more FCAS offers. Required for FCAS submissions:</p> <p>Properties: tradingDate, duid, direction, prices, service, rebidExplanation, fcasPeriods</p> <p>The rebidExplanation is only required for a rebid.</p> |
| tradingDate | Mandatory | String | <p>String in date format</p> <p>Must be a valid date.</p> <p>The effective date for this bid. Expected in the format:</p> <p>yyyy-mm-dd or yyyy-mm-dd 00:00:00</p> <p>e.g.</p> <p>2021-04-23</p> <p>2021-04-23 00:00:00</p> |
| duid | Mandatory | String(10) | <p>Dispatchable Unit identifier recorded in AEMO's systems</p> <p>Must be upper case</p> <p>maxLength: 10</p> |

| Name | Rule | Data Type | Description |
|------------------|-------------|-------------|---|
| direction | Optional | String(15) | Mandatory for BDU Regulation FCAS Bid submissions (service = RAISEREG or LOWERREG); optional for all other unit types and BDU Contingency FCAS. To indicate no value, remove the entire attribute. Validation performed if provided. See 'Direction Field Enumeration and Use' table for allowable enumerated values and use. type: string maximum 15, format: upper case. |
| prices | Mandatory | Array | An array of 10 prices - Items:price minItems: 10 maxItems: 10 e.g. [0.00, 0.00, 20.00, ...] For all unit types prices are 0.00 or positive. |
| service | Mandatory | String (10) | One of the FCAS service types. Required for fcasBid. Required properties: one of, RAISE1SEC, RAISE6SEC, RAISE60SEC, RAISE5MIN, RAISEREG, LOWER1SEC, LOWER6SEC, LOWER60SEC, LOWER5MIN, LOWERREG, type: string maximum 10, format: upper case |
| rebidExplanation | Conditional | Object | Required for rebids. Properties: reason, eventTime, awareTime, decisionTime, category. For BDU, if supplied for direction LOAD and GEN, the values must be identical (single provision of rebidExplanaton for LOAD and GEN acceptable) |

FCAS periods

| Name | Rule | Data Type | Description |
|-------------|-----------|-----------|---|
| fcasPeriods | Mandatory | Array | Mandatory for FCAS Offers only. |
| periodId | Mandatory | Integer | The 5-minute trading interval from 4:05 am to 4:00 am. Required for energyPeriods, mnsPeriods, and fcasPeriods, type: integer minimum item: 1, maximum item: 288, format: 1, 2, 3...288 |
| maxAvail | Mandatory | Integer | Maximum availability loading for a period, in whole megawatts minimum: 0 Includes BDU. |

| Name | Rule | Data Type | Description |
|---------------|-----------|-----------|---|
| bandAvail | Mandatory | Integer | <p>The availability for each 10 price bands. Required for energyPeriods, mnsperiods, and fcasperiods. Required properties: avail, type: array, minimum: 10 maximum: 10, format.</p> <p>For BDU for each direction (LOAD and GEN) required properties: avail, type: array, minimum: 10 maximum: 10, format: whole number (0 and positive values for each direction)</p> |
| enablementMin | Mandatory | Integer | <p>For all unit types and Reg FCAS for BDU where direction = GEN, value is minimum FCAS enablement limit this service can supply. integer minimum 0, format: whole numbers, value: megawatts.</p> <p>For BDU Regulation FCAS where direction = LOAD value is defined on the negative side. integer maximum 0, whole negative numbers, value: megawatts.</p> <p>For BDU Contingency FCAS whole negative or positive numbers, value: megawatts.</p> |
| enablementMax | Mandatory | Integer | <p>For all unit types and Reg FCAS for BDU where direction = GEN, value is the maximum FCAS enablement limit this service can supply. Required for fcasperiods, type: integer minimum 0, format: whole numbers, value: megawatts.</p> <p>For BDU Regulation FCAS where direction = LOAD value is defined on the negative side. integer maximum 0, whole negative numbers, value: megawatts.</p> <p>For BDU Contingency FCAS whole negative or positive numbers, value: megawatts.</p> |
| lowBreakPoint | Mandatory | Integer | <p>For all unit types and Reg FCAS for BDU where direction = GEN, value is the FCAS low break point. Required for fcasperiods, type: integer minimum 0, format: whole numbers, value: megawatts</p> <p>For BDU Regulation FCAS where direction = LOAD value is defined on the negative side. integer maximum 0, whole negative numbers, value: megawatts.</p> <p>For BDU Contingency FCAS whole negative or positive numbers, value: megawatts.</p> |

| Name | Rule | Data Type | Description |
|----------------|-----------|-----------|---|
| highBreakPoint | Mandatory | Integer | <p>For all unit types and Reg FCAS for BDU where direction = GEN, value is the maximum FCAS MW output this unit can provide (as per MaxAvail). Required for fcasPeriods, type: integer minimum 0, format: whole numbers, value: megawatts</p> <p>For BDU Regulation FCAS where direction = LOAD value is defined on the negative side. integer maximum 0, whole negative numbers, value: megawatts.</p> <p>For BDU Contingency FCAS whole negative or positive numbers, value: megawatts.</p> |

Direction Field Enumeration and Use Table

Submit Bids energybid and fcasBids supports a new conditional direction indicator. You must provide uppercase enumerated value for BDU Energy and Regulation FCAS service type, optional for remainder.
If these values are provided, AEMO validates these attribute value combinations as follows:

| Unit Type | Service Type | Allowable Enumerated Value | Provision in Submit Bid (JSON) |
|-----------|------------------|----------------------------|--------------------------------|
| Generator | Energy | GEN | Optional |
| Generator | Contingency FCAS | GEN | Optional |
| Generator | Regulation FCAS | GEN | Optional |
| Load | Energy | LOAD | Optional |
| Load | Contingency FCAS | LOAD | Optional |
| Load | Regulation FCAS | LOAD | Optional |
| BDU | Energy | GEN | Mandatory |
| | Energy | LOAD | Mandatory |
| BDU | Contingency FCAS | BIDIRECTIONAL | Optional |
| BDU | Regulation FCAS | GEN | Mandatory |
| | Regulation FCAS | LOAD | Mandatory |
| WDR | Energy | GEN | Optional |

| Unit Type | Service Type | Allowable Enumerated Value | Provision in Submit Bid (JSON) |
|------------------|--------------|----------------------------|--------------------------------|
| Normally On Load | Energy | LOAD | Optional |

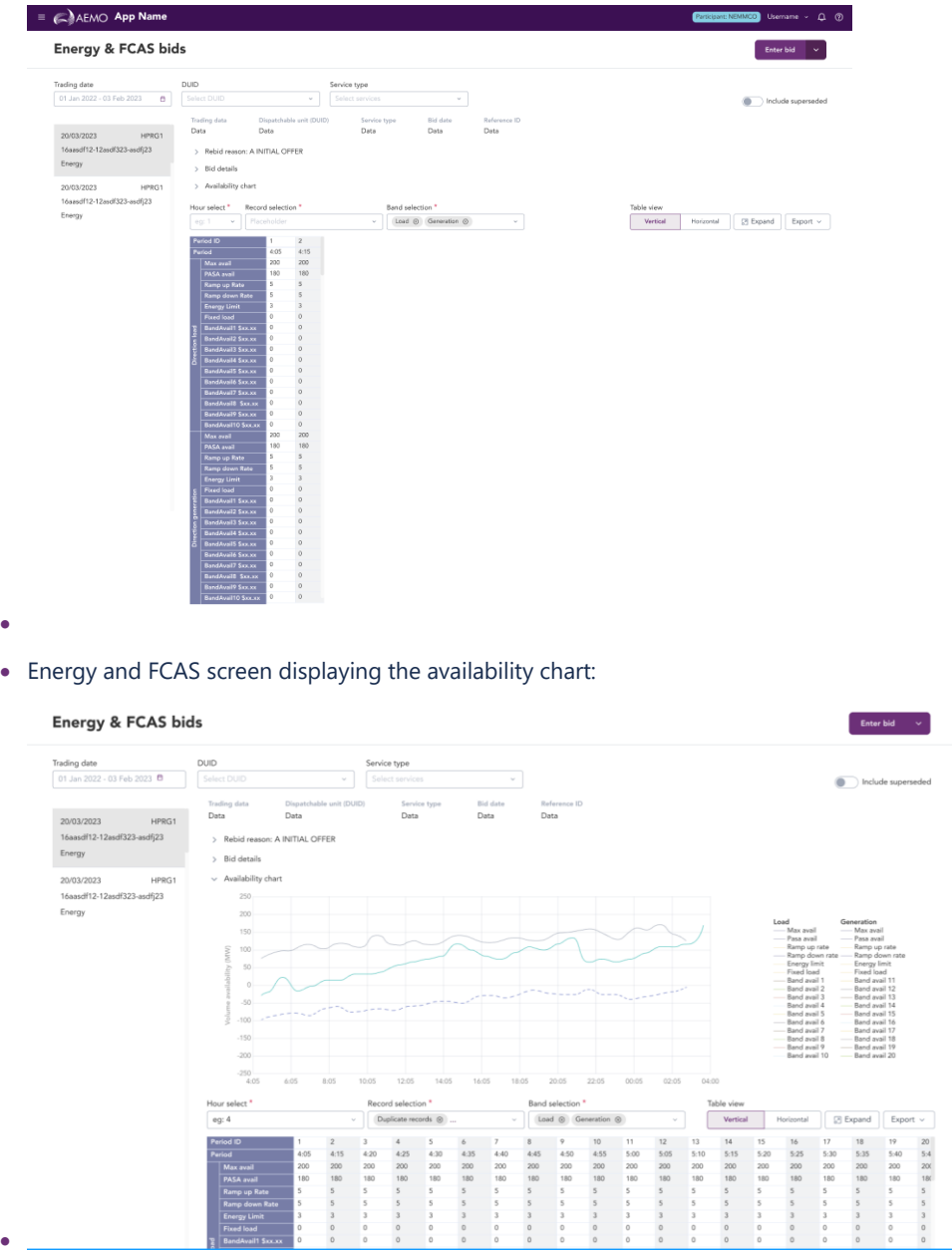
7.2.1 Market portal web bid and JSON file upload

The web interface design is in progress and AEMO publishes new versions of this document as the design is finalised.

Update the Energy & FCAS 5min Bids web interface to support BDU units.

- Energy & FCAS Bids screen:
 - Allows participant to select BDU units, retrieve and display energy and FCAS bids.
 - Allows participant to view the extended BDU Energy and FCAS attributes to support BDU single DUID.
 - Displays the Energy and Regulation FCAS Bid bands (10 load and 10 generation) with the option to expand and collapse either load or generation.
 - Allows participants to select Available chart option to view a graphical display of BDU unit data for energy bids and regulation FCAS bids, 20 price and availability bands including associated parameters.
 - Adds support to Contingency FCAS to display positive and negative FCAS bids.

Bidding and Dispatch



- Energy and FCAS screen displaying the availability chart:

- On the Enter bid screen:
 - Allows participant to select BDU units, retrieve and display energy and FCAS bids.

- Allows participant to view the extended BDU Energy and FCAS attributes to support BDU single DUID.
- Displays the Energy and Regulation FCAS bands ((20 price and availability bands including associated parameters) with the option to expand and collapse either load or generation.
- Extends other existing features to support and display BDU-related information.
- On the Import and Upload Bid File screens:
 - Extends existing capabilities to allow participants to manually upload bid-related payloads (csv) for BDU JSON information.
- On the Export screen:
 - Allows a participant to save the Bid data csv file to a participant's local folder for BDU information.

7.2.2 Bidding submission formats

Extend the Bidding submission JSON format to allow energy and FCAS bids for a single BDU DUIDs.

Enhance Bid format for BDU:

- Energy bids supports a new optional direction indicator (LOAD, GEN) allowing submission of separate energyBids object and energyPeriods arrays (10 price, availability, and associated parameters) for the Load side and Generation side of the BDU (20 in total). For non-BDU, remove the entire attribute.
- Contingency FCAS offers unchanged (single FCAS enablement - 10 bands) with variation the four trapezium period parameters support provision of positive and negative numeric values (currently positive only).
- Regulation FCAS supports a new optional direction indicator (LOAD, GEN) allowing submission of separate fcasBids array and fcasPeriods arrays (10 price, availability and associated parameters) for the Load side and Generation side of the BDU (20 in total). For non-BDU, remove the entire attribute.
- Response formats remain unchanged - existing attributes support new error BDU responses.

7.2.3 Bidding enhancements for FTP

Extend the existing FTP service to allow participants to submit the extended JSON payload to support BDU single DUID.

7.2.4 NEM Bidding validations

The values with in {x} are variables and replaced by the values you submit in your Bids.

These are draft bidding validations and in progress. AEMO publishes new versions of this document as the design is finalised.

| Error title | Error message | Detail |
|---|--|--|
| Band Availability exceeds Max Load capacity | Band Availability must be <= Registered Maximum Load Capacity {1} | Your Bid is rejected because the BDU Energy Bid Direction is LOAD for the associated Energy Periods and the Band Availability (1 to 10) is greater than the Registered Maximum Load Capacity. The Band Availability must be less than or equal to the Registered Maximum Load Capacity for the DUID. Or the BDU Energy Bid MLF-adjusted Price Bands must monotonically increase from LOAD Band Availability (1 to 10) to GEN Band Availability (1 to 10). They must increase from lowest to highest. Band Availability must be <= Registered Maximum Load Capacity {1} |
| Fixed Load violation | Fixed Load cannot be provided for GEN and LOAD DUID {0} | Your Bid is rejected because the optional Fixed Load value for the Energy Periods is for both directions: LOAD and GEN. For a BDU, If you provide the value, it is only allowed for a LOAD direction. You cannot provide Fixed Load for GEN and LOAD DUID {0} |
| Monotonically Increased Prices violation | Prices must increase monotonically for DUID {0} | Your Bid is rejected because your BDU Energy Bid for a Trading Day must include the Direction: LOAD or GEN. You must separate the Energy Bid and associated Energy Periods for the Load and Generation side of the BDU. Or the MLF-adjusted Price Bands do not monotonically increase for LOAD (1 to 10) and GEN Band Availability (1 to 10). They must increase from lowest to highest. For details, see Validation For Bid Convexity And Monotonically Increasing Values. Increase the prices monotonically (in increasing order) for DUID {0} |
| FastStartProfile unit requirement violation | Unit registered as Semi-scheduled units cannot have FastStartProfile in the offer for DUID {0} | Your Bid is rejected because the Fast Start Profile associated with the Energy Bid has a value. A Fast Start Profile is not required for a Semi-Scheduled Generating Unit. |
| Invalid Faststart details | Unit registered as BDU cannot have FaststartProfile in the bid for DUID {0} | Your Bid is rejected because the Fast Start Profile associated with the Energy Bid has a value. A Fast Start Profile is not required for a Bidirectional Unit. |

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| Error title | Error message | Detail |
|--|---|--|
| Minimum/Maximum Price Band Violation | <u>Prices bands must be within Market Floor Price {0}, Market Price Cap {1}, for DUID {2}</u> | <u>Your Bid is rejected because the</u> Prices bands must be within <u>the</u> Market Floor Price {0} and Market Price Cap {1} for <u>the</u> DUID {2} |
| Invalid Direction | <u>The Direction for unit-DUID {1} is not matching the must-match registration details in {0} the offer</u> | <u>Your Bid is rejected because the conditional Direction value: GEN, LOAD, or BIDIRECTIONAL, associated with the Energy Bid, does not match the allowable combination for the DUID or Bid type, or both.</u> |
| Missing {0} Direction in the Offer | <u>Missing {0} Direction in the {1} offer for DUID {2}</u> | <u>Your Bid is rejected because you did not enter a Direction value. You must enter a value for BDU Energy and Regulation FCAS Bids with one of the following values: GEN, LOAD, or BIDIRECTIONAL. A Direction value is optional for all other DUID types. You must enter Direction in the {1} offer for DUID {2}</u> |
| Missing Offer | <u>BDU submission must have both LOAD and GEN offers for DUID {0}</u> | <u>BDU submission must have both LOAD and GEN offers for DUID {0}</u> <u>Your Bid is rejected because you did not enter Direction values for both sides. For a Bidirectional Unit (BDU), the Direction value associated with the Energy Bid or Energy Period determines if it is LOAD or GEN. For BDU Energy and Regulation FCAS bids, you must provide a value for both directions, and that value must be different for both sides. A Direction value is optional for all other DUID types and BDU contingency FCAS.</u> |
| Invalid unit <u>disptach</u> dispatch type | Unit {0} is not registered as a BDU | <u>Your Bid is rejected because energy or FCAS bid parameters are only allowable for a BDU and the DUID is not registered as a BDU.</u> |
| Energy limit violation | <u>Unit {0} is not registered as a BDU and cannot provide Energy limit.</u> | <u>Your Bid is rejected because you did not enter a value for the Energy Limit for a non-BDU DUID associated with the Energy Bid or Energy Period. The Energy Limit value is optional for BDU DUID Energy Bids.</u> <u>For more information, see Energy limit validation. Unit {0} is not registered as a BDU and cannot provide Energy limit.</u> |
| Energy limit violation | BDU {0} is violating Energy Limit criteria for direction {1}, in periodId {2} | <u>Your Bid is rejected because the BDU value violates the Energy Limit for the Direction in Period ID {2}</u> |
| Convexity violation | BDU {0} is violating Convexity criteria in LOAD band avail{{1}} and GEN band avail{{2}}, in periodId {3}} | <u>Your Bid is rejected is because the BDU Energy Bid MLF-adjusted prices for effective Bid bands do not increase monotonically from LOAD bandAvail1 to bandAvail10 to GEN bandAvail1 to bandAvail10. Effective bid bands refer to energy bid band (bandAvail) with non-zero MW capacity limited by bid MaxAvail.</u> |
| <u>Invalid Faststart details</u> | <u>Do not provide FastStart details for BDUs</u> | |

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| Error title | Error message | Detail |
|---|--|---|
| Invalid DailyEnergyConstraint details | Do not provide Daily energy constraint must not be provided for BDUs in the bid for DUID {0} | <u>Your Bid is rejected because you have provided the DailyEnergyConstraint field for BDU. This field is only required for energyBids.</u> |
| Invalid unit ID | The DUID for the unit provided in the offer does not exist. | |
| Invalid number of Submission | Invalid number of submissions for DUID{0} and Trading Date{1} | |
| Standard trapezium size violation | Standard trapezium size violation in PeriodID {0}, for DUID{1} | <u>Your Bid is rejected because the following conditions are not met: EnablementMin <= LowBreakPoint. LowBreakPoint <= HighBreakPoint. HighBreakPoint <= EnablementMax.</u> |
| <u>Value is Positive</u> Trapezium angles violation | {0} cannot be positive in periodId {1} | <u>Your Bid is rejected because the Direction value associated with the Energy Bid is LOAD and the FCAS Periods with: Enablement Min, Enablement Max, Low BreakPoint, or High BreakPoint have positive values. The values must be negative or 0. For BDU FCAS Regulation, if there is bid non-zero regulation max availability on both the LOAD and GEN sides for a trading interval then: There must be no gaps between trapeziums: Bid-EnablementMinGen = 0 Bid-EnablementMaxLoad = 0 Both trapeziums must have the same upper angle. Both trapeziums must have the same lower angle. If the upper angle is less than 90°, bid high and low breakpoints on the generation trapezium must be set to zero. If the lower angle is less than 90°, bid high and low breakpoints on the load trapezium must be set to zero.</u> |
| Value is <u>Negative</u> Positive | {0} cannot <u>must</u> be negative in PeriodID {1} | <u>Your Bid is rejected because the Direction value associated with the Energy Bid is Gen and the Energy Bids with: Enablement Min, Enablement Max, LowBreakPoint, or HighBreakPoint has negative values. The values must be positive or 0.</u> |
| <u>Value is Negative</u> | {0} must be positive in PeriodID {1} | |
| Invalid FCAS service | DUID {0} Duid cannot <u>must</u> have invalid valid FCAS service {1} | <u>Your Bid is rejected because the DUID is not registered to provide FCAS service. Please check the DUID's registration details.</u> |

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| Error title | Error message | Detail |
|---|---|--|
| Sum of max avail exceeds max capacity | Sum of max avail from GEN and LOAD must be <= unit {0} max capacity {1} | Your Bid is rejected because the BDU Energy or FCAS Bid summed values with Max Availability for the LOAD and GEN Direction is greater than the DUID's Registered Maximum Capacity. Sum of Band Availabilities must be less than or equal to the Registered Maximum Capacity of the DUID for the direction. |
| Non identical rebid values | Rebid values not identical for Direction LOAD and GEN, unit -Unit{0} must be identical. | You BDU Energy or FCAS Bid is rejected because the 5 field values associated with rebidExplanation array for LOAD and GEN (direction) are not identical. The validations accepts only a single rebidExplanation for LOAD and GEN fields. |
| BDU FCAS Regulation Band Availability violation | Sum of Band Availabilities of GEN and LOAD must be >= Maximum Capacity {0} for the direction GEN and LOAD. | Your Bid is rejected because the sum of the BDU Regulation FCAS Availabilities for Band Availability (1 to 10) for the FCAS Periods for both the LOAD and GEN Direction is greater than the Registered Maximum Capacity of the DUID. |
| Net Trapezium Gap Violation | Both GEN and LOAD trapeziums should not have any gaps in them i.e. GEN enablementMin=0 and LOAD enablementMax=0, for DUID {0} in periodid {1} | Your Bid is rejected because there is a gap in the combined GEN and LOAD trapezium. When both sides have availability, the individual trapeziums should meet at 0 MW. For more information, see BDU FCAS pptx |
| Net Trapezium Upper Angle Violation | Both GEN and LOAD trapeziums should have the same upper angles, instead of GEN upper angle {2} and LOAD upper angle {3}, for DUID {0} in periodid {1} | Your Bid is rejected because the GEN and LOAD trapezium must have the same upper angle. For more information, see BDU FCAS pptx |
| Net Trapezium Lower Angle Violation | Both GEN and LOAD trapeziums should have the same lower angles, instead of GEN lower angle {2} and LOAD lower angle {3}, for DUID {0} in periodid {1} | Your Bid is rejected because the GEN and LOAD trapezium must have the same lower angle. For more information, see BDU FCAS pptx |
| Net Trapezium Upper Angle Less Than 90° Violation | When upper angle {4} is less than 90°, bid high {3} and low {2} breakpoints on the generation trapezium must be zero, for DUID {0} in periodid {1} | Your Bid is rejected because both Low Breakpoint and High Breakpoint for GEN must be 0 when upper angle is less than 90°. For more information, see BDU FCAS pptx |

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| Error title | Error message | Detail |
|---|--|---|
| Net Trapezium Lower Angle Less Than 90° Violation | When lower angle {4} is less than 90°, bid high {3} and low {2} breakpoints on the generation trapezium must be zero, for DUID {0} in periodid {1} | Your Bid is rejected because both Low Breakpoint and High Breakpoint for LOAD must be 0 when lower angle is less than 90°. For more information, see Net Trapezium Rule For BDU FCAS Regulation . |
| Reason missing for Rampateup violation | Reason required for Ramp Rate lower than registered minimum ramp up rate of {0} | Your Bid is rejected because the value provided is less than the registered minimum value. The validation message provides additional information comparing the minimum ramp rate and the value in the Bid. |
| Reason missing for Rampatedown violation | Reason required for Ramp Rate lower than registered minimum ramp down rate of {0} | Your Bid is rejected because the value provided is less than the registered minimum value. The validation message provides additional information comparing the minimum ramp rate and the value in the Bid. |
| Reason missing for ramprateup violation | Reason required for Ramp Rate lower than registered minimum ramp up rate of {0} | Your Bid is rejected because the value provided is less than the registered minimum value. The validation message provides additional information comparing the minimum ramp rate and the value in the Bid. |
| Reason missing for rampratedown violation | Reason required for Ramp Rate lower than registered minimum ramp down rate of {0} | Your Bid is rejected because the value provided is less than the registered minimum value. The validation message provides additional information comparing the minimum ramp rate and the value in the Bid. |
| Band Availability violation | Sum of Band Availabilities must be >= Maximum Capacity {0} for the Direction {1} | Your Bid is rejected because the sum of Energy FCAS Bid Availabilities (1 to 10) is greater than the Registered Generation or Load Capacity of the DUID. This validation is applied to all DUIDs, including BDUs and is associated with the LOAD or GEN Direction of the Bid. |
| Rebid Price violation | Band prices cannot be changed for a rebid Direction {0}. | Your Bid is rejected because the band prices must remain same for a rebid. |

Inserted Cells

7.2.5 NEM Bidding API updates

Extend support to the NEM Bidding APIs for BDU:

- Get Bid – to additionally return Energy BDU and FCAS information.
- Get Bids - to additionally return one or more Energy and FCAS BDU information.
- Get Submission – to additionally return Energy BDU and FCAS information.
- Get Submissions - to additionally return one or more Energy and FCAS BDU bid information.

- Response error messaging remains same.

For more information on the NEM Dispatch and Bidding API changes, see [\(In progress\) NEM Dispatch Bidding Open API Specification Reference - Updates for June 2024](#). This is a work-in-progress version of the API reference. The changes captured here are migrated to the [NEM Dispatch Bidding Open API Specification Reference](#) once the design changes are finalised.

7.3 Dispatch and pre-dispatch updates

The TOTALCLEARED, INITIALMW and ACTUALMW fields in the Dispatch and Predispatch tables now support negative and positive values.

7.4 Market reports, notices and MMS Data Model

Enhance the existing Market Reports and Notices to support the introduction of the new IRP participant category and BDU generally described as:

1. Energy and FCAS Bid related reports to accommodate the new BDU related attributes i.e., 20 price and availability bands including associated parameters.
2. Variable Dispatch and Pre-dispatch reports inclusion of BDU Energy Targets negative and positive), new summations/calculations at regional and DUID level.
3. MT PASA DUID Availability report supports provision of IRP MT PASA offer(s).

7.5 BDU MLF calculations

Currently, batteries have 2 connection points, one for generation and one for consumption, each with their own primary TLF stored. With the IESS rule change, following the transition of the battery to the BDU configuration, there is a single connection point for the battery and it is configured with dual TLFs.

As per the current Settlements functionality for dual TLFs loaded against TNIs, the battery connection point primary TLF is used for consumption and the secondary TLF (if populated) is used for generation.

In cases where the BDU does not have dual MLFs configured, only the primary is populated and it is the TLF applied for both the consumption and generation of the battery.

7.6 BDU MT PASA enhancements

Extend support to allow existing submission mechanisms (FTP, API and Market Portal) to include IRP participants.

Extend support in NEMReports and Data Model to process offer data to support IRP and associated unit type offers.

7.7 BDU PASA enhancements

PASA calculations (processing) and outputs include BDU generation PASA related data (BDU Load PASA availability excluded) No change to formats

7.8 BDU external interface enhancements

7.8.1 View market on the Markets portal

Rebuild the following interfaces on the Markets Portal > EMMS > View Market:

- View Market Summary

[illegible]

- View Dispatch

[illegible]

- [View Predispatch](#)

Bidding and Dispatch

| | 10:00 | 11:00 | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 17:00 | 18:00 | 19:00 | 20:00 |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Price | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 |
| Operational Demand | 5623 | 5871 | 6153 | 6474 | 6792 | 7110 | 7312 | 7464 | 7482 | 7397 | 7276 |
| Dispatchable Load | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dispatchable Gen | 2396 | 2509 | 2545 | 2522 | 2790 | 2979 | 3028 | 3032 | 3033 | 3034 | 3039 |
| Net Interchange | 1962 | 1938 | 1935 | 1471 | 1438 | 1542 | 1547 | 1545 | 1544 | 1546 | 1557 |
| Available Gen | 2883 | 2883 | 2779 | 2722 | 3150 | 3153 | 3199 | 3203 | 3204 | 3205 | 3208 |
| 10% Demand | 5753 | 6020 | 6311 | 6649 | 6974 | 7291 | 7508 | 7668 | 7688 | 7601 | 7477 |
| LDC Res. Supply | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LDC Reserve | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interconnector Flow | 1630 | 1630 | 1630 | 1630 | 1630 | 1730 | 1730 | 1630 | 1630 | 1630 | 1630 |
| N-Q-MP21 | -129 | -129 | -129 | -127 | -127 | -129 | -127 | -127 | -127 | -127 | -145 |
| N-Q-MP21 | -1250 | -1250 | -1250 | -1248 | -1222 | -1250 | -1250 | -1250 | -1250 | -1250 | -1250 |

7.8.2 NEM data dashboard

Extend support to the **NEM Data Dashboard** to include IRP and BDU related information:

- Include the generation and demand calculation in Dispatch Overview.
- Include BDU-related information in calculations for Price and Demand.
- Fuel Mix displays battery info (as well as other fuel mixes). This must include BDU in existing battery MW and MWh displays and calculations inclusive of time chart MWh view (24 and 48 hr, 3- and 12-months views aggregated).
- Renewable Penetration displays battery info (as well as other fuel mixes). This must include BDU into existing battery MW but exclude the load side of BDU. This update is applied to Renewable Penetration as well.
- Average Price price calculations including historical year/month views to include BDU.
- 7-day Outlook forecast capacity and demand at daily peak for NEM Regions (figures in MW) to include BDU based on data ingested from csv payload from EMMS NEMReports.

7.9 EMMS Data Model

The new version of the EMMS Data Model includes new and updated tables to capture all the changes listed in the above sections. The **EMMS Technical Specification - Data Model v5.3 – March 2024** captures list of table changes.

The important changes to the Bidding tables in the Data Model release 5.3 are as follows:

- The bidding tables maintain a 10-band model through the inclusion of a new DIRECTION field as a primary key of the main bidding tables. (BIDDAYOFFER, BIDOFFERPERIOD, BIDDAYOFFER_D, BIDPEROFFER_D)
- The transition approach for these tables includes a component to back populate the new field to enable the amendment of the primary key.

Bidding and Dispatch

- If participants subscribe to the NEXT DAY set of bidding data, you MUST upgrade the MMS Data Model to receive the new bidirectional bids.

8 Settlements

For the IESS project, the major change to Settlements is in how energy values are used in settlement calculations. Currently, based on the participant category, the SETCP database table contains the customer energy data, SETGEN database table contains the generator energy data, and SETSMALLGENDATA database table for Small Generator Aggregators.

Under IESS, the SETCP and SETGEN tables are removed and replaced by Adjusted Consumed Energy (ACE) and Adjusted Sent Out Energy (ASOE). ACE and ASOE are participant category agnostic data streams. The settlement processes is now based on energy direction, irrespective of participant category and on gross energy values, instead of netted imports and exports. All market participant categories listed as a FRMP (Market Customer, Market Generator, SGAs, MNSP, Interconnector) are affected by the IESS Settlement changes.

Removing netting from settlements ensures energy is settled based on what it is, consumption or generation, rather than who it is allocated to. Under IESS, participants pay for the consumption portion of their energy and are paid for the generation portion. While this ultimately does not impact the resulting energy settlement amount (there is no difference between paying for consumption and being paid for generation compared to paying for the net of both) it impacts the dollar amount on the bills for other services such as non-energy cost recovery.

The Data Model tables under Settlements and Billing packages will not be deprecated. AEMO retains the legacy tables for a period of time until the Revision dates no longer span the pre-IESS period.

8.1 Energy settlement

In the Wholesale energy market, Market Generators are paid for energy they produce (SETGEN), and Market Customers pay for energy they consume (SETCP). In most calculations, the energy is a single net value, that is, the generation and consumption are offset against each other. In some instances, this allows for non-positive consumption or generation, depending on the connection point classification.

8.1.1 Energy settlements

Under IESS, Settlements moves away from the current category-based approach towards an energy direction approach. Generation becomes sent out energy and load becomes consumed energy, regardless of the type of connection point.

The Energy settlement stream changes for the IESS project are:

- All calculations for energy settlements now include IRP details.

Settlements

- The data inputs for the energy settlement calculations change from SETCP, SETGEN, and SETSMALLGENDATA (import and export net meter data tied to participant category) to ACE and ASOE (gross imports and exports).
- Adjusted Gross Energy (AGE) is now the sum of ACE and ASOE.
- Export MWh is assigned to ACE and Import MWh is assigned to ASOE.
- Settlement calculations are performed on gross ACE and ASOE instead of the net values.
- Under IESS, UFE is calculated for the distribution connected market connection points and allocated to any connection points that consume energy in the trading interval, based on gross Adjusted Consumed Energy (ACE). The generation flooring is no longer required as only ACE is considered, not ASOE (something automatically inherited). The types of NMs included in UFEA is now be extended to distribution-connected generators to ensure Market Generators pay for any load recorded at their sites, such as auxiliary load.

8.1.2 Wholesale demand response (WDR)

No changes under IESS

8.1.3 Standalone power systems (SAPS)

No changes under IESS

8.2 Non-energy settlement

There are four types of non-energy settlement covered in this section:

Market ancillary services:

- Contingency Frequency Control Ancillary Services (Contingency FCAS)
- Regulation Frequency Control Ancillary Services (Regulation FCAS)

Non-market ancillary services:

- System Restart Ancillary Services (SRAS)
- Network Support and Control Ancillary Services (NSCAS)

All settlements are made up of payments and recoveries. In non-energy settlement, payment and recovery processes and calculations vary between each service.

There is no change to the payment processes and calculations under the IESS project.

Under IESS, the Recovery of all services is allocated to Cost Recovery Market Participants (CRMPs) based on a proportion of their ASOE or ACE. CRMP is not a new participant category but includes the following group of participant categories:

Settlements

- Market Generators
- Integrated Resource Providers
- Market Customers

Non-energy cost recovery (NECR) is a major change under IESS Settlements. In each trading interval, in relation to each Cost Recovery Market Participant, for each region, an ancillary services transaction occurs. This results in a trading amount for that Cost Recovery Market Participant.

8.2.1 Market ancillary services (MAS)

For Regulatory and Contingency FCAS, the payment process and calculations do not change. Recovery processes for FCAS differs between Contingency and Regulation FCAS.

Contingency FCAS recovery

Under IESS, the Contingency raise payments are recovered from all CRMPs based on ASOE and the Contingency lower payments are recovered from all CRMPs based on ACE.

Regulatory FCAS recovery

Regulation FCAS costs are recovered from Market Participants on a causer pays basis. Causer pays uses a methodology to measure the response (using SCADA data) of generators and loads to frequency deviations to determine a series of causer pays factors (Market Participant Factor – MPF). MPFs are a percentage of the whole cost to be recovered.

AEMO assigns lower causer pays factor to participants who assist in the correction of frequency at the Wholesale Connection Point (WCP), while those causing frequency deviations are assigned a high causer pays factor (at the WCP).

Under IESS, Regulation MPF recovery is based on CRMP participants' share of assigned MPF and the Residual Regulation recovery is based on CRMP's share of ACE.

8.2.2 Non-market ancillary services (NMAS)

For non-market ancillary services (NMAS) services, the payment processes and calculations do not change.

System Restart Ancillary Service (SRAS)

Under IESS, two trading amounts for SRAS recovery are updated. The cost recovery from CRMPs and the cost recovery of SRAS is based on 50% ASOE + 50% ACE.

Network Support and Control Ancillary Service (NSCAS)

Under IESS, two trading amounts for NSCAS recovery are updated. The cost recovery from CRMPs and the cost recovery of NSCAS and tests to be based on ACE.

8.3 Other settlement services

8.3.1 Market fees

Under IESS, Market fees will continue to be calculated for all participants including IRP using the existing process, in line with how participants are currently being charged as market customer/generator.

8.3.2 Intra-regional residues

Settlements residue arises in the NEM because the amount paid by market participants to AEMO for spot market transactions usually differ from the amount paid by AEMO to other market participants for spot market transactions.

Intra-regional settlements residue:

- Settlements residue relating only to settlement transactions within a region.
- Not listed for auctions, but distributed to, or recovered from, the appropriate TNSPs.

Under IESS, intra-regional residue calculations use ACE and ASOE data streams.

8.3.3 Inter-regional settlements residue auction

Inter-regional settlements residue auction:

- Inter-regional settlements residue relating to inter-regional transmission over regulated interconnectors and settlement transactions between regions.
- Calculated based on regional reference prices and inter-regional flows.
- Listed for auctions conducted by AEMO.
- Available for purchase at auction by certain participants in the NEM.

There is no change to inter-regional settlements residue auction under IESS except, the process now extend to allow inter-regional SRAs for IRPs.

Settlements

8.3.4 Reallocations

A reallocation is a Rules-supported financial arrangement under which two Market Participants request AEMO to make matching debits and credits to the settlement position of those Market Participants.

There is no change to reallocations under IESS except, the process now extend to allow reallocations for IRPs.

8.4 EMMS Data Model

The new version of the EMMS Data Model includes new and updated tables to capture all the changes listed in the above sections. The **EMMS Technical Specification - Data Model v5.3 – March 2024** captures list of table changes.

9 Billing

The IESS Rule results in a fundamental change to Billing, moving away from the current category-based approach and towards a directional approach, that is, generator and customer energy becomes sent out and consumed energy respectively, regardless of the type of connection point from which it derives. This creates a participant agnostic settlement process, whereby billing amounts are based on gross Adjusted Consumed Energy (ACE) and gross Adjusted Sent Out Energy (ASOE) at the connection point, irrespective of the participant category the connection point belongs to.

The Settlements systems use a new constant ID, IESS_RULE_CHANGE to identify the IESS rule change calculations. The value of this switch is either 1 or 0.

AEMO provides participants with scripts as a part of the IESS SQL release to populate all past dates with the IESS_RULE_CHANGE = 0 to maintain consistency for the data in the tables.

9.1 Billing

Billing aggregates the settlement amounts calculated for individual trading intervals for each day in the given billing period or overall, for a whole billing week.

- Energy Settlements - The ACE and ASOE in MWh and Dollar values are calculated by the Settlements System and Billing aggregates these values across all the Settlement Dates in the Billing Week to get the Weekly MWh and Dollar Values for the Participant.
- Market Ancillary Services (FCAS) - FCAS Payments are Recovery are done in Settlements and hence the change in Billing is to aggregate the ACE ad ASOE Recovery amounts for each FCAS Service.
- Directions - Direction Recovery is based on the Direction Type. With the IESS Rule Implementation, the recovery energy types for Direction Types are as follows:

| Direction Type | Pre-IESS | Post-IESS |
|----------------|---|------------|
| Energy | Customer Energy | ACE |
| FCAS – RAISE | Generator Energy+ Small Gen Energy | ASOE |
| FCAS – LOWER | Customer Energy | ACE |
| NENA | Customer Energy + Generator Energy + Small Gen Energy + | ACE + ASOE |

- Administrative Price Cap (APC) – With the IESS Rule Change, APC Payments are recovered all the CRMPs based on the ACE MWh Values.

Billing

- Reliability and Emergency Reserve Trader (RERT) – With the IESS Rule Change, RERT Payments are recovered from CRMPs based on the ACE MWh values after excluding the Scheduled Load MWh from their Total Energy.
- GST is applied at the rate the corresponds to the BAS Class for the Transaction Type. For the IESS Rule Change, there are 2 new Transaction Types:

| Transaction Type ID | BAS Class | Description |
|---------------------|-------------------------|------------------------------------|
| NEM_ENERGY_SALE | TAXABLE_SUPPLIES | NEM Energy Generated (Sentout) |
| NEM_ENERGY_PURCHASE | CREDITABLE_ACQUISITIONS | NEM Energy Purchased (Consumption) |

10 Invoicing

The IESS changes for Reports and Invoicing are as follows:

- Updates the private Settlements Batch Reports sent to the participants for a Billing period as follows:
 - Displays total ACE and ASOE amounts in the Energy Transactions section of the SR Report instead of Purchases and Sales.
 - Displays total ACE and ASOE amounts used in the recovery process in the Market Frequency Control Ancillary System (FCAS) section of the SR Report.
 - Displays total ACE and ASOE amounts used in recovery processes in the Non Market Ancillary Service Transactions - Recovery section of the SR Report instead of Customer and Generator amounts.
 - Displays updated Energy and GST amounts, now based on ACE and ASOE in the Taxable Supplies section of the relevant PDF invoice statements instead of net energy amounts and GST based on purchases and sales.
- Updates the public Settlement Custom report (csv) as follows:
 - Displays total ACE and ASOE amounts in the Sales and Purchases fields of the Energy Transactions section of the Custom Settlements Report instead of using BILLINGCP and BILLINGGEN data.

For more information on the changes to the reports, see the [EMMS Technical Specification – Data Model v5.3 – March 2024](#).

11 Prudentials

With the IESS release, Prudential systems must include the new Integrated Resource Provider category type and the new classification types of scheduled bi-directional unit, non-scheduled bi-directional unit and a new resource called a small bi-directional unit.

Under IESS, Prudential systems move from the current customer energy and generation energy approach to energy sent out and energy consumed approach.

The Prudential stream changes for the IESS project are:

- MCL calculations become more accurate for participants that have a larger proportion of risk behaviour represented by ancillary services.
- The Prudential Margin (PM) calculations do not change and therefore, are not affected by the inclusion of Ancillary Services (AS) daily dollar amounts.
- The assessment of the energy values for the purpose of MCL is in line to the ACE and ASOE definition.
 - Load reflects as ACE
 - Generation reflects as ASOE
- Currently, the Current and Forecast Total Energy per Region (MWh) reports incorrect values, the field sums the MW values for every 5 minutes. The calculation must divide this number by 12 ($12 \times 5 \text{ minute} = 1 \text{ hour}$) to report the MWh value.

12 Electricity Data Model 5.3

AEMO releases a separate technical specification document covering the changes for Data Model v5.3 once the design is available.

The new version of the EMMS Data Model includes new and updated tables to capture all the changes listed in the above sections. The list of table changes is captured in a separate document titled **EMMS Technical Specification - Data Model v5.3 – March 2024** and published to the participants. AEMO updates this document throughout the project lifecycle as required.

13 Markets Portal

In the Markets Portal, the following interfaces and their corresponding online help topics are updated for the preproduction release:

- Portfolio Management System
- Market portal web bid and JSON file upload
- View market on the Markets portal

14 Reports

All non-data model report changes are captured in the **EMMS Technical Specification - Data Model v5.3– March 2024** and published to the participants once the design is ready.

15 FAQs

15.1 Data model

15.1.1 When is the full data model (5.3) release available to participants?

The technical specification only covers the new/modified details. The full data model details are available when the scripts/reports are released in the preproduction and production.

15.1.2 Are we having coordinated market trials?

There are coordinated trials, in the sense there's a few settlement scenarios we need to do for publishing, but it's not like 5MS where you need people to put in valid input, but coordinated in the sense AEMO will run through a set of transitions. AEMO is working with the stakeholders regarding these scenarios right now.

15.1.3 Is AEMO planning to provide a detailed transition table mapping for the rest of the tables like Settlements?

This was raised at a QA forum recently and AEMO is looking to republish the mapping explainer document in early November (tentatively).

15.1.4 Is AEMO planning a walkthrough of settlement table changes specifically for business users?

AEMO is following up with stakeholders on their specific needs and considering the best way to provide this information.

For settlements experts from industry, the IESS project team have already provided [information sessions](#) and an explainer of the [detailed table changes](#).

15.1.5 Do all participants need to upgrade the API and FTP bid submission to include the new Direction field?

Only participants registering for bidirectional units MUST upgrade to the new versions. For all existing DUID types, the APIs and FTP submissions are backward compatible and continue working.

15.1.6 What is changing in the INITIALMW and TOTALCLEARED columns in the DISPATCHLOAD, P5MIN_UNITSOLUTION, P5MIN_REGIONSOLUTION, and PREDISPATCHLOAD tables?

The only change for these columns is the comment field. Once the BDUs become active, you may see both positive and negative values in these columns. Previously, these values were always positive.

15.1.7 What is the impact to generator and load NMIs at BDU cutover?

AEMO is working with interested Market Participants in the BDU Readiness Focus Group to look at all scenarios individually. The BDU cutover happens over an extended (9 month) period with participants who have expressed interest in BDU. All the Energy is recorded against the single NMI which is the generated NMI. During the transition process, AEMO removes existing Dispatch Units and creates new Dispatch Units.

15.1.8 In relation to the BDU cutover, is AEMO working with Market Participants as part of the registration process? What does the overall process look like?

Yes, AEMO understands there are tasks participants need to do at specific times and will work with interested Market Participants. AEMO provides more details in the BDU Readiness Focus Group.

15.1.9 Are participants determining the replacement DUID to attach to a BDU or is AEMO driving this?

AEMO is discussing this in the BDU Readiness Focus Group. AEMO sent out draft arrangements to affected participants who have nominated contacts. To obtain the draft arrangements, email iess@aemo.com.au.

15.1.10 Will the bidding validation rules be in the technical specification?

Yes, we will include them in the updated version and also published them in the **Format And Validation For FTP Energy, FCAS And MNBP Bids And Offers**.

15.1.11 Is there a plan to implement a logical solution so negative means load, or a standards for the meaning of negative and positive?

No, we have no future plans to change these unless there is something significant to necessitate it. It was a judgement call to interpret for consistency. We deliberated on these questions and determined internal models to represent them to minimise the change to industry.

15.1.12 For the new SET_ENERGY_TRANSACTIONS table, will the connection points have multiple entries based on the different meter types?

Yes, the meter types are from the NMI classifications. In this table, the CONNECTIONPOINTID sometimes refers to the TNI and in this case there can be multiple NMI classifications under the TNI. The meter type in the energy transactions is used to calculate the fees as the fees are still based upon the customer data and the generated data separately instead of ACE and ASOE.

15.1.13 Why is METER_TYPE included in the primary key in the SET_ENERGY_TRANSACTIONS table?

In this table, the CONNECTIONPOINTID sometimes refers to TNI and in this case there can be multiple NMI classifications under the TNI. This is the reason for adding METER_TYPE as primary key.

15.1.14 When will the Data Model tech spec be finalised?

For more information, see [Technical specification process](#) in the Technical Specification Portal.

15.1.15 AEMO recommends partitioning in the tables in the SQL scripts. But the actual scripts to create new tables don't include the partition option. Is it up to the participant to implement it?

Yes, it depends on your setup. For example, partitioning is available in Oracle Enterprise but not on Oracle Standard. You should preserve the logical structure of what AEMO delivers. AEMO delivers SQL scripts for systems with basic capabilities. If you're using a product with those capabilities and intending on storing an extended data history online, then you can consider implementing partitioning.

15.1.16 What is AEMO's plan for implementing the Sparse Data Model?

See the Sparse Data Model topic in the [Technical Specification Portal](#) for more information. In a previous MSUG, we discussed a transition strategy with participants. AEMO provided an 18-month transition timeframe based on participants' feedback about requiring more time to complete the transition.

The Data Model 5.3 release falls within the transition period. There are significant changes to how offer data is interpreted and a primary key change, so it is an opportunity to also adopt the Sparse Data Model. Or you could defer the sparse data implementation but note fully qualified reports are discontinued at **30 November 2024**. The size of these reports are continuing to grow and is no longer a sustainable delivery model in the long term.

15.1.17 Can we update our data structure to version 5.3 schema and still receive the version 5.2 reports?

Yes, all legacy reports are populated with changes to the bidding tables. When participants apply the pre-release scripts containing the bidding changes, the reports contain the primary key changes.

15.1.18 When Data Model 5.3 is released to pre-production and production, will the _SPARSE files get the new columns (DIRECTION, BIDPERIODTO)?

Yes, the pre-release in pre-production, the PERIODIDTO and DIRECTION columns are populated in the sparse, next day reports, legacy reports and the latest reports. Participants do not need to change their subscription to apply the pre-release.

15.1.19 Will there be a new non-LEGACY non-SPARSE report at that time?

Yes, see above.

15.1.20 Will the _LEGACY files remain unchanged?

No, if the pre-release is applied in pre-production.

15.2 Participant development support environment (PDSE)

15.2.1 What is the transition plan for PDSE?

The Data Model release is in stages. AEMO provides Data Model 5.3 in PDSE by end of November. Preprod scripts are released in March 2024, prod in April 2024. The PDSE is a separate environment. It does not contain everything but pieces of settlements tables/report, separate bidding, implementation of bidding APIs, bidding files.

DO NOT apply the staging scripts to your preprod or prod environments.

15.2.2 What is the tentative date for staging for participants?

At the moment, the milestone date is 15 December for Settlements and 22 January for BDU.

15.2.3 Is data sharing enabled in the PDSE?

The PDSE is a snapshot of the production environment, however, it is not a fully functional or fully supported environment.

15.2.4 Is AEMO refreshing the PDSE regularly or would it be a one-off refresh?

As of now, it is a one off. The initial snapshot is from production. The settlement tables are populated in December as a one-off to provide participants clarity on the new structure of the tables. AEMO may update the PDSE environment if required.

15.2.5 In the PDSE, for the new Settlements tables, how many days' worth of data is populated?

AEMO is planning to publish the reports for one billing run. It is for one billing week, so participants get a feel of what the reports look like.

15.2.6 What week is AEMO providing the data for?

AEMO is planning to use a week from June 2023 period since it was the most recent database update for some internal activities.
If participants already have those reports, they can use the PDSE reports with new tables to compare the changes between the data model versions.

15.2.7 With the June 2023 data, when are the details updated into the new Energy Transaction table?

AEMO is planning to post the settlement billing week update end of November. Participants will predominantly be receiving the details in the first week of December.

15.2.8 Is the web portal in Participant Development Support Environment (PDSE) accessible to participants?

Yes, you can access the web portal in the production environment with the same URM credentials as the pre-production environment. If you require help, contact Support Hub. For more information, see Participant development support environment.

15.2.9 With PDSE, is there is no batcher loader required? CSV Files to be loaded into that env? Just a static?

You can configure the batcher loader in the PDSE environment and populate the report in the bidding tables. This requires updating your data source in PDR loader.
The data source details are available in the PDSE - MMS Data Model v5.3 Release Notes located in the Releases\MMS Data Model\PDSE\v5.3_BETA folder. It contains a section explaining the configuration changes required for the PDR loader.

15.2.10 Will these files be supplied by a batcher or supplied on an ad hoc basis and then go through a PDR loader?

The bidding system is running on PDSE through ftp, API and web bidding. Reports are published to PDSE. Participants must configure the batcher and loader to load reports from PDSE.

15.2.11 Can I use the existing TLS certificate for PDSE?

Yes, you can use your pre-production certificate.

16 Implementation

16.1 Transition

16.1.1 Participant development support environment

Participants need to set up a separate instance of the environment to deploy the draft scripts for Data Model 5.3. For more information on the participant development support environment, see [IESS Participant Development Support Environment](#).

16.1.2 Market trial and industry testing

For more information on the Readiness approach for June 2024, see [Integrating Energy Storage Systems: Readiness approach for June 2024 releases](#).

For more information on the Settlements release, see [Retail and Settlement release](#) and for the BDU information, see [Registration, classification, and bidding changes release](#).

16.2 Upgrading

You can upgrade your pre-production or production Data Model environments once you receive the Data Model scripts. Applying the scripts sets up the new Data Model structure on your local database. You receive the same data until the new versions of fields, files, and reports are released into pre-production or production and you update your subscriptions.

For help, see:

- [Upgrading your DI environments](#)
- [Updating your subscriptions](#):

16.3 Implications

To maintain systems in-line with AEMO's market systems, participants need to:

- Review and assess the impact on their market systems with respect to the changes implemented as part of this Release.
- Change their systems prior to the implementation of this Release.
- Schedule staff and resources to upgrade their market systems for the production implementation of this Release.

16.4 Risks

AEMO introduces a new Primary Key (PK) of DIRECTION field to Bid Package tables:

6. The 10-band bid model is preserved with inclusion of a new DIRECTION field in the primary key (PK) of the main bidding tables of BIDDAYOFFER, BIDOFFERPERIOD, BIDDAYOFFER_D, BIDPEROFFER_D.
7. For a BDU, adding PK implies there are 2 records with same bid data fields with DIRECTION informing which 10 bands are associated to GEN (generation) and LOAD side, that is, separate 10 band model for GEN and LOAD side of the BDU.
8. AEMO back populates the DIRECTION field for all retrospective bid reports (LEGACY/LATEST) in PROD/PREPROD for all unit types and provide participants with an executable script as part of the Data Model 5.3 bid table pre-release (early/mid February) to back populate same in their own databases (as required).
9. The DIRECTION field is populated in bid reports for all unit types regardless of if not provided by participant in submitted bid, that is, AEMO derives if not provided in bid (DIRECTION is mandatory for BDU, optional for all other unit types).
10. Participants remaining on Data Model version 5.2 or less (and associated PDRloader):
 - not consume DIRECTION field present in reports (LEGACY/LATEST) but not supported by PDRloader version to consume.
 - have limitation for BDU only consume one side of bid bands provided (first 10 bid bands) and not second set of 10 bands.
 - for participant to be in line with AEMO data, they must upgrade to the latest version of Data Model v5.3.

17 Terms

17.1 Rules Terms

You can find the following terms defined in the [National Electricity Rules \(NER\)](#).

| Term | Term | Term |
|---------------------|---------------------------|-----------------------------|
| AEMC | Market Participants | Relevant Quarter |
| AEMO | NEM | Small Generation Aggregator |
| AEMO Markets Portal | Region | Settlement residue auction |
| AEMO Website | Regional reference prices | Unit Category |
| Bid File | Registered Participant | Units |
| Market Customers | Registration Category | |

17.2 Glossary

You can find a full list of AEMO glossary terms in [Industry Terminology](#) on AEMO’s website.

| Abbreviation/Term | Explanation |
|-------------------|---|
| ACE | Adjusted Consumed Energy |
| AEST | Australian Eastern Standard Time |
| AGE | Adjusted Gross Energy |
| APC | Administrative Price Cap |
| ASL | Ancillary Services Load (currently excludes Generators or Batteries) |
| ASGU | Ancillary Services Generating Unit |
| ASOE | Adjusted Sent Out Energy |
| ASU | Ancillary Services Unit (new under IESS rule change encapsulating both generation and load) |
| BDU | Bi-directional Unit |
| CRMP | Cost Recovery Market Participants |

| Abbreviation/Term | Explanation |
|-------------------|--|
| EMMS | Electricity Market Management System; software, hardware, network and related processes to implement the wholesale energy market |
| ESB | Energy Security Board |
| FCAS | Frequency Control Ancillary Services |
| FTP | File Transfer Protocol |
| GU | Generating Unit |
| IESS | Integrated Energy Storage Systems |
| IRP | Integrated Resource Provider |
| MAS | Market ancillary services |
| MCL | Maximum Credit Limit |
| MLF | Marginal Loss Factor |
| MPF | Market Participant Factor |
| MW | Megawatt |
| NMAS | Non-market ancillary services |
| NECR | Non-energy cost recovery |
| NEM | National Electricity Market |
| NER | National Electricity Rules |
| PMS | Portfolio Management System |
| Release | EMMS Technical Specification - June 2024 |
| Release Dates | Pre-production: 02 April 2024 Production: 02 and 03 June 2024 |
| RERT | Reliability and Emergency Reserve Trader |
| SAPS | Standalone Power Systems |
| SGA | Small Generator Aggregator |
| SRA | Small Resource Aggregator |
| SRA | Settlements Residue Auction |
| TBC | To be confirmed |

| Abbreviation/Term | Explanation |
|-------------------|----------------------------|
| TLF | Transmission Loss Factor |
| UFE | Unaccounted for Energy |
| WCP | Wholesale Connection Point |
| WDR | Wholesale Demand Response |

18 References

Guide to AEMO's e-Hub APIs: Provides details about using AEMO's e-Hub as an interface to communicate information with AEMO. It assists Wholesale electricity and gas participants developing their own APIs.

Guide to Information Systems: Provides guidance for *Registered Participants* and interested parties about AEMO's participant electricity market systems.

Guide to User Rights Management: Assists participant administrators (PAs) to use the user rights management functions in the MSATS Web Portal.

Retail Electricity Market Glossary and Framework: assist participants of the Retail Electricity Market to understand the overall framework. It also contains a list of terms used in the Retail Electricity Market Procedures and a full list of NEM procedures, guidelines, and documents.

18.1 Data interchange and data model resources

18.1.1 About

Information about setting up a Data Interchange environment: Data Interchange Help > [About Data Interchange](#).

18.1.2 Help

- [Data interchange online help](#)

18.1.3 Software

You can find Data Interchange software in the following locations:

- Data Interchange Help > [Software Releases](#).
- Releases directory on the participant file share: FTP to 146.178.211.2 > Data Interchange, pdrBatcher, pdrLoader, or pdrMonitor.

18.1.4 Reports

- Data Interchange Help > [Data Model Reports](#).

18.1.5 Releases

- Data Interchange Help > [Release Documents](#).

19 Index

C

continuing improvement of AEMO's IT systems, 7

D

Data Interchange software, 45

I

industry user group, 7

M

Market Systems User Group, 7

MSUG, 7

A1. Version history

19.1 V1.00

[This version includes the following updates:](#)

- [Updates the Proposed Timeline chapter to remove the second pre-release of the scripts in PDSE on 16 February as it contains only minor updates to the scripts released on 22 November. Also, adds a link to the technical specification portal for pre-production refresh timeline.](#)
- [Adds section in the Participant Impact chapter for Pre-production refresh with a link to the **Technical Specification Portal**.](#)
- [Updates FAQs chapter with participant questions from the MSUG.](#)

~~19.1~~19.2 V0.05

This version includes the following updates:

- Updates to the rebidExplanation attribute in the Energy and FCAS bids in the Bidding submissions section.
- Updates the Proposed Timeline section to include dates to back populate Bidding tables and other details.
- Adds new section with the draft NEM Bidding validations messages

~~19.2~~19.3 V0.04

This version includes the following updates:

- Updates MSUG and Market trial dates in Proposed Timeline section.
- Adds a new section BDU MLF calculations in the Bidding and Dispatch chapter.
- Adds a new section EMMS Data Model to the Bidding and Dispatch chapter.
- Adds list of changes to the Markets Portal chapter.
- Updates column name from INENERGY to IENERGY in What happens if I do not upgrade to Data Model 5.3?, Settlements section.

- Adds a link about the Participant Development Support Environment in Participant development support environment and Transition sections.
- Adds links to the Settlements and Bidding changes document in the Transition section.
- Updates the FAQs based on the participant queries from MSUG held on 22 November 2023.

~~19.3~~19.4 V0.03

This version of the document includes updates based on the design.

- Updates the Bidding and Dispatch chapter details.
 - Updates Submit Energy and FCAS bids JSON format changes row in the High-level changes table.
 - Adds mock screenshots for the View Market interfaces on Markets Portal. See View market on the Markets portal.
 - Updates tables for Energy bids and FCAS bids parameters. See Bidding submissions.
- Updates the **NEM Dispatch Bidding Open API Specification Reference - Updates for June 2024** to include API design changes.
- Updates Proposed Timeline chapter to include the Participant Development Support Environment dates.
- Updates the Participant Impact section for details on Data subscription.
- Updates the FAQs chapter based on the questions from the MSUG held on October 11, 2023.

~~19.4~~19.5 V0.02

This version of the document includes updates based on the design.

- Updates the Bidding and Dispatch chapter details.
 - Adds mock screenshots for the Energy & FCAS Bids interface on Markets Portal. See Market portal web bid and JSON file upload.
 - Adds tables for Energy bids and FCAS bids parameters. See Bidding submissions.
- Updates the **NEM Dispatch Bidding Open API Specification Reference - Updates for June 2024**.

- Adds link to the [EMMS Technical Specification – Data Model v5.3 – March 2024](#).

~~19.5~~ 19.6 V0.01

No version history, this is the initial draft release.