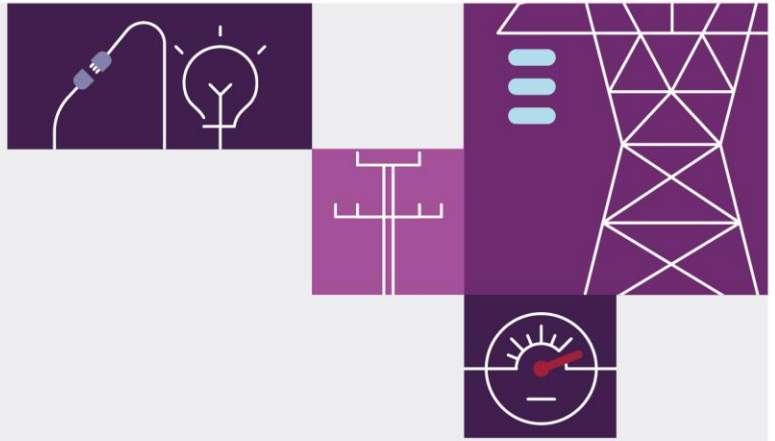


Integrating Energy Storage Systems (IESS)

October 2023

Industry testing and market trial strategy





Important notice

Purpose

The Industry testing and market trial strategy sets out the high level approach and principles associated with the National Electricity Market (NEM) testing activities that will support Integrating Energy Storage Systems (IESS) rule implementation.

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Version control

Version	Release date	Changes
0.1	22/09/2023	Initial draft issued for discussion
1.0	17/10/2023	Feedback from industry incorporated. Final strategy

Executive summary

The Australian Energy Market Operator (AEMO) and National Electricity Market (NEM) participants are currently implementing the Integrating Energy Storage Systems (IESS) and the implementation program has entered its development phase.

The National Electricity Rules (NER) changes for IESS have amended or introduced new regulatory obligations on certain NEM participants and AEMO. They require significant updates or changes to market procedures and market and participants' systems at various times. AEMO has a key coordination role, through collaboration with its industry working groups, to ready industry and itself for the various rule commencement and IT system "go-live" dates.

As described in the [IESS readiness approach](#), a key component of market readiness is the industry testing phase – the period where AEMO and NEM participants test their market-interfacing business systems against updated procedures and AEMO's upgraded market systems.

At a high level, the Industry testing and market trial strategy defines the scope, approach, process, responsibilities and high-level schedule of the industry testing phase for the IESS market transition. It is supported by detailed testing plans. The strategy is consistent with and should be read in conjunction with the [IESS readiness approach](#).

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1 Introduction

This chapter provides background information on AEMO's Integrating Energy Storage Systems (IESS) implementation program, and sets out the purpose, scope and approach to the development of this Industry testing and market trials strategy.

1.1 AEMO's IESS implementation program

On 2 December 2021 the Australian Energy Market Commission (AEMC) made a Final Determination on the Integrating Energy Storage Systems (IESS) rule. The change seeks to better integrate storage and aggregate systems into the National Electricity Market (NEM). The IESS rule comprises four distinct high-level changes, described in Table 1.

Table 1 Changes introduced by the IESS rule

Implementation date	Change	Description
Fri 31 Mar 2023	Small generation aggregators (SGA) providing FCAS	Complete. Aggregators of small generating and storage units can now provide ancillary services (if they choose to do so).
Wed 09 Aug 2023	Aggregated dispatch conformance (ADC)	Complete. <ul style="list-style-type: none"> Aggregate Systems can choose to register for ADC ADC provides an Aggregate System with the flexibility to conform to its dispatch instructions by dispatching energy at the connection point from any combination of its units (with some restrictions), rather than individually on a unit-by-unit basis Includes minor changes for Battery Energy Storage Systems (BESS). AEMO will temporarily be using the ADC mechanism to monitor net dispatch conformance for a BESS across its scheduled generating unit/scheduled load pair, as a Target Aggregate.
Sun 02 Jun 2024	IESS retail and settlement changes	Significant changes to the calculation method to be used for Non-Energy Cost Recovery (NECR): <ul style="list-style-type: none"> Recovery calculations are to consider the gross (consumption separate from generation) energy amounts of all participants, rather than current approach using net energy (generation – consumption) of specific participant types Major settlements database structure changes are required to enable the new calculations, these changes will flow into the Data Model and affect: <ul style="list-style-type: none"> Participant reconciliation and reporting activities AEMO data provision Embedded network management changes to ensure that the parent has the appropriate gross energy volumes available for settlement.
Sun 02 Jun 2024 (IRP) Mon 03 Jun 2024 (BDU)	Registration, bidding and dispatch changes	<ul style="list-style-type: none"> Introduction of Integrated Resource Provider (IRP) participant type Bidirectional unit (BDU) bidding and dispatch, with impacts for BDU participants and bidding system vendors/developers.

The IESS program covers the procedural, IT system and market readiness arrangements needed to implement the IESS rule including:

- Procedures – defines and implements the required changes to market procedures
- Systems – designs, develops, tests, and implements changes to AEMO's market systems
- Readiness – coordinates, assists and prepares AEMO and participants for the transition to IESS.

AEMO's IESS implementation program has entered the development phase of the project. This paper is specific to the industry testing and market trials component of market readiness for the IESS June 2024 releases. At a high level, it also addresses other participant support provisions, such as the availability of the participant development support environment (PDSE) provided to support participants' development of changes against "beta" versions of market systems capability.¹

1.2 Purpose of the industry testing and market trials strategy

This Industry testing and market trials strategy is a key component of AEMO's [IESS readiness approach](#). The purpose of the industry testing and market trials strategy is to set out a plan for managing, coordinating, monitoring and reporting on AEMO's and NEM participants' industry testing activities and results.

It is a high-level document that describes the testing approach that applies to the entire IESS industry testing/market trials phase. As described in section 5.1, this strategy will be supported by individual test plans containing specific details about each of the planned industry test and market trial phases.

1.3 Reference documents

The following IESS related documents or web pages are relevant to the industry testing and market trials strategy.

Table 2 Reference documents and web sites

#	Document name
1	AEMC IESS rule change
2	AEMC Implementing IESS rule change
3	AEMO IESS High Level Design and Implementation Strawperson
4	AEMO IESS Participant Toolbox
5	AEMO IT change and release management (including links to EMMS and MSATS technical specifications)

1.4 Related documents

The industry testing and market trials strategy is one of several documents that support the [IESS readiness approach](#) as shown in Table 3.

Table 3 Relationship between the Industry testing and market trials strategy and other IESS documents

Related document	Description of relationship
IESS readiness approach	The IESS readiness approach is the overarching plan to guide AEMO and NEM participants' IESS readiness activities and operational preparedness. The industry testing and market trials strategy provides further guidance on the market testing approach and schedule for IESS.
Test plans	These plans provide the detailed support for the test phases. See chapter 5.

¹ Further information on the participant development support environment is available via the [NEM Reform Implementation Forum](#) and the [Industry Testing Working Group](#). See also chapter 3.



1.5 Audience

This Industry testing and market trials strategy is primarily intended for all NEM participants affected by the IESS market reform,⁸ particularly their:

- Test managers, test leads, test analysts (system integration, UAT, industry testing and market trials) and project managers
- Developers and business and functional SMEs.

Secondary audiences within these businesses including:

- Development managers
- IT operations teams
- Change controllers
- Operations teams.

2 Industry testing and market trials framework

This chapter describes the framework that underpins the IESS industry testing and market trials strategy. It explains the strategy's objective, scope and underlying principles. It also defines 'market testing' for the purposes of IESS implementation.

2.1 Defining "market testing"

Throughout this document, "market testing" refers to the testing performed between NEM participants and AEMO to validate whether the updates made to NEM participants' market interfacing systems and AEMO's market systems comply with the IESS regulatory and procedural arrangements. Market testing is conducted in pre-production as a final stage before deployment to production.

Generally, AEMO can conduct three different types of market testing with the industry as explained in Table 4. This is in addition to the pre-production system being available for participants to perform self or bi-lateral testing at any time from when changes are deployed.

During the IESS industry test and market trial period, AEMO expects to use components of each of the following test types to support aspects of participant testing scenarios.

Table 4 Market testing types

Type of market testing	Description	IESS example
Industry testing	Self-testing of functionality such as connectivity, and/or coordinated multi-party testing of functional scenarios.	A participant testing a BDU bid submission and receiving a BDU dispatch instruction.
Invitation industry testing	Coordinated testing of business process scenarios with a select number or subset of participants with systems ready for testing.	A scheduled battery operator working with AEMO to test the process for converting a battery from 2 DUIDs to 1 DUID.
Market trials	Coordinated multi-party end-to-end testing of business process scenarios.	Settlement runs reflecting updated non-energy cost recovery processes.

2.2 Market testing objective

Market testing provides market participants the opportunity and tools to test their updated systems and processes against AEMO's updated electricity retail and wholesale market procedures and systems. AEMO will consider the market testing results as part of the readiness criteria for its 'go-live' and contingency decisions.

In relation to IESS implementation, the overall objective of market testing is:

to support market readiness and confirm AEMO's and participants' operational preparedness for the IESS system "go-lives" and rule commencements.

2.3 Market testing scope

Market testing will consist of system integration testing between NEM participants' systems and AEMO's systems, to test the system changes required to implement IESS June 2024. Where required for a test phase, test plans will detail the scope inclusions and exclusions for that phase (see section 2.3.1 & 2.3.2).

The industry testing and market trials strategy and associated test plans relate to the IESS June 2024 rule commencements and supporting market system changes:

Sun 02 Jun 2024	<ul style="list-style-type: none"> • Non-energy cost recovery (NECR) and associated data model table changes • Removing market small generation aggregator (MSGA) and introduction of Integrated Resource Provider (IRP) • New/updated NMI classification codes (NCC).
Mon 03 June 2024	<ul style="list-style-type: none"> • Bidirectional Unit (BDU) bidding and dispatch.

AEMO, as the market operator, needs to make the following **market system changes** to implement the IESS June 2024 releases:

- Fundamental change to **non-energy cost recovery** (NECR) mechanisms to use consumption and sent out energy values, rather than a participant category-based approach.
- **Major settlements database structure changes** required to enable the NECR calculations. These changes will flow into the Data Model and affect participant reconciliation and reporting activities. NECR will also affect statements and related reports.
- **New registration category:** IRP can classify integrated resources (including a BDU), market generators, market scheduled loads and market connection points (previously market loads and small generating connection points) through AEMO registration processes and systems.
- **MDM platform:** Upgrade of AEMO's meter data management system to support calculations and updated RM reports based on direction of energy rather than category of energy source i.e., consumption and sent-out energy, not generation and customer load. This includes support for gross energy calculations for embedded networks.
- **Bidding and dispatch:** Upgrades to AEMO's systems to support new dispatchable unit type, the BDU, which has the capability to send out and consume energy (that is not considered auxiliary load).

Note that the IESS market testing scope is aligned with the approach to transition and 'go-live' as described in the [IESS readiness approach](#).

2.3.1 Scope inclusions

Market capability based technical, functional and business operational testing is included in the IESS market testing scope, as follows:

- **Market technical verification and validation:** Determines the technical state of the solution e.g. connectivity and provided interfaces

- **Market functional verification and validation:** Determines the state of solution as matched against required business functionality and business processes. The solution may not mirror production from a complete “go-live” perspective.
- **Market operational capability verification and validation:** Determines the state of the solution from a “go-live” perspective and verifies technical, functional, and operational compliance to obligations. Mirrors as close as possible the “go-live” state of the solution from the perspective of data, timing etc. Covers key business processes essential to the operation of the NEM wholesale market.

2.3.2 Scope exclusions

Market testing scope exclusions:

- Participants’ development activities in the IESS participant development support environment (described in section 1.1)
- Changes to NEM participants’ supporting business systems that do not directly interact with AEMO’s market systems (i.e. back-end systems). These are addressed by participants own test strategies.
- Any bilateral testing between participants. Participants can coordinate bilateral testing between themselves in parallel with market testing.
- Downstream business procedures for each industry participant.
- Testing of agreed non-critical business processes (unless otherwise agreed by the affected participants).
- Accreditation as there is no accreditation for IESS June 2024 releases.

Each NEM participant is responsible for their own preparedness in respect of the above matters and should account for such items within their respective organisational testing programs.

2.4 Market testing principles

Market testing of multiple-party interactions requires cooperation between participants to be successful. The following key principles should guide all parties involved in industry testing:

1. **Market testing strategy alignment with IESS June 2024 releases:** The Industry testing and market trials strategy will align with the IESS June 2024 rule commencements and deployment approach.
2. **Appropriate choice of testing type for each test phase:** The type of market testing selected for each test phase will be in keeping with the complexity, materiality, and implementation timeframe of the system change. This is to ensure that the cost, time, and resources applied to testing are appropriate to the change. For example, simple industry testing is usually suitable for a minor change, as is a full market trial for a complex system change that affects large numbers of market participants.
3. **Detailed test plans** will be developed by AEMO in consultation with the industry testing working group (ITWG) to support IESS June 2024 releases testing activities, with the level of detail and involvement consistent with type of industry testing being conducted.
4. **AEMO will provide timely and suitable test environments:** AEMO will facilitate participants testing their updated systems and processes against AEMO's electricity retail and wholesale market procedures and systems updated for IESS June 2024 releases.
5. **Adherence to the market testing strategy and associated tests plans:** All parties participating in market testing must use their best endeavours to adhere to the industry test and market trial strategy and test plans – including meeting key dates, fulfilling entry criteria checklist, adhering to defect management guidelines and reporting guidelines.
6. **Appropriately skilled resource capability:** All parties participating in market testing must be appropriately resourced for the test planning and test execution effort.
7. **Scope limited to critical business processes:** Any coordinated testing that requires interactions between multiple parties will be limited to critical business processes, unless otherwise agreed by the impacted parties. For example, business processes that affect key transactions that support market continuity.
8. **Focus on IESS June 2024 market readiness and market testing objectives:** All parties participating in market testing should be committed to cooperating with each other and be prepared to be responsive and flexible when responding to events, in accordance with the relevant IESS June 2024 objectives.
9. **Market testing outputs will be a consideration in market readiness assessments:** For each market testing phase, the number, severity, and type of defects will be a contributing factor to the relevant market readiness assessment along with the number of participants who took part in testing. This information will be considered by AEMO in its proceed and contingency decisions.
10. **Release notes** will be provided for each system detailing functionality and defects fixes applicable to the release.

3 Industry testing and market trials strategy

This chapter sets out the industry testing and market trials strategy, comprising:

- the approach to market testing
- high-level test activities and timing
- assumptions underpinning the strategy.

3.1 Industry testing and market trials strategy approach

In accordance with the testing objective, scope and principles, the testing strategy for IESS June 2024 provides participants with the necessary capability so that they can choose to undertake preparatory and testing activities ahead of the IESS June 2024 rule commencements.

PARTICIPANT DEVELOPMENT SUPPORT ENVIRONMENT

As part of the overall strategy AEMO is also making available a test environment (additional to AEMO's pre-production) called the "participant development support environment" (PDSE). This is to better support IESS June 2024 participant development and internal testing and therefore market readiness.

This environment allows participants to test their system changes against beta versions of key AEMO system changes well ahead of the commencement of the relevant market test phases. It allows participants to independently confirm their ability to interact successfully with AEMO's systems in advance of scheduled market test phases.

Further information around functionality, timing and connectivity will be published on the AEMO web site and can be obtained via AEMO's Support Hub. Queries for market testing can also to be sent through using the NEM Reform mailbox: nemreform@aemo.com.au.

3.1.1 Test phases

The strategy comprises of three test phases that support the staged industry transition of IESS June 2024 and will be detailed in specific test plans (see chapter 5). These test phases relate to the following rule commencements and go-lives.

Commencement/ go-live	Test phases
Sun 02 Jun 2024	<ol style="list-style-type: none"> 1. IESS standing data changes: <ul style="list-style-type: none"> – Introducing IRP registration category – Removing SGA registration category – New and updated NMI classification codes (NCC) 2. New settlement and prudential calculations: Non-energy cost recovery (NECR) changes and associated settlement database structure changes
Mon 03 Jun 2024	<ol style="list-style-type: none"> 3. BDU bidding and dispatch

Testing of all three phases will occur over the market trial period of April and May of 2024. To enable this testing, a mock rule commencement date (or dates) will be used to simulate Go-Live.

Tables 5 to 7 below set out the high-level approach to each test phase. The tables describe the test phase, test objective and testing type and timing. They also identify the participants affected by the test phase.

Table 5 Market Trial Phase 1: IESS standing data changes

02 June 2024: Removing SGA registration category, introducing IRP registration category and introducing or updating NCCs		
Affected /potentially affected participants	Financially responsible market participants: Market Generators Market Customers Small generation aggregators Integrated Resource Providers Ancillary service provider	Network service providers Metering service providers Embedded network managers
Description	At rule commencement / cutover there are several standing data changes that will occur: <ul style="list-style-type: none"> • IRP registration category introduced. • SGAs moved into the new IRP category as Small Resource Aggregators. • Operators of BDUs registered after Dec 2021 moved into new IRP category². • New NCC of TIRS to identify transmission-connected IRS and replace existing requirement for two NMIs. • New NCC of DIRS to identify distribution-connected IRS and replace existing requirement for two NMIs. • New NCC of DGENRATR to differentiate between distribution and transmission connected generation and allow for the correct application of UFE. • Proposed testing methodology is to use back dating of the rule commencement and associated data changes to the mock pre-production go live. 	
Test objective/s	<ul style="list-style-type: none"> • Test registration changes: <ul style="list-style-type: none"> – Confirm update of SGAs to new IRP registration category (NCC of NREG will be maintained). – Confirm update of post-Dec 2021 BESS operators to new IRP registration category. • Test metering standing data changes and related changes:³ <ul style="list-style-type: none"> – Test transition of existing sites with multiple NMIs and NCCs to DIRS/TIRS (for example a current battery with one NMI for load and one NMI for Generation will be transitioned to one NMI with classification of TIRS or DIRS). – Test standing data update of NCC of DGENRATR. – Test that CATS reports will be able to accommodate new NCCs. – Test that MSATS screens will be able to accommodate new NCCs. – Test that MSATS can process transactions with new NCCs. • Test that impacted applications can accommodate retrospective changes for dates prior to cut over date. • Confirm cutover / commencement processing. 	
Market Test Type/s	<ul style="list-style-type: none"> • Market trial – scheduled scenarios • Industry testing - individual scenarios 	
Timeframe	<ul style="list-style-type: none"> • IESS standing data test phase commences: April 2024 • IESS standing data test phase finishes: April 2024 	

² NOTE: Re-registering post-Dec 2021 BESS commences Mon 03 June 2024 but will be tested along with the other standing data changes which commence Mon 02 Jun 2024.

³ The transition and implementation of NCC changes will be managed as follows:

- AEMO will manage the transition of new NCCs for those existing NMIs where a code needs to be applied.
- Following IESS rule commencement:
 - the NSP will apply the non-registered NCC (LARGE, SMALL and NREG) to create the NMI, as currently is the case.
 - AEMO will apply the new NCC (GENERATR, DGENRATR, TIRS or DIRS) as part of the formal registration process once the installation is registered.

Table 6 Market Trial Phase 2 - Settlements & Prudential Calculations

02 June 2024 - Non-energy cost recovery (NECR) and settlement database structure changes	
Affected participants	Financially responsible market participants: Generator Market customers Small generation aggregators Integrated resource providers Ancillary service providers Network service providers Metering service providers Embedded network managers
Description	<ul style="list-style-type: none"> • Test changes to the NECR calculations reflecting the move from net energy to gross energy for settlement weeks post rule commencement and the database structure updates required to implement them. • Test changes to embedded network management, where netting of children from parent reads are moving to the Metering system. • Testing to confirm existing calculations for settlement weeks prior to rule commencement are not affected. • Proposed testing methodology is to use a back dated mock pre-production rule commencement/Go-Live to enable use of existing meter data from the pre-production refresh to enable Post Go Live settlement week calculations.
Test objective/s	<ul style="list-style-type: none"> • Population of EMMS Data Model 5.3 that will affect participant reconciliation and reporting activities, and AEMO data provision. • Confirm existing Net calculation methodology and reporting is not impacted for periods up to 02 June 2024. • Confirm shift to new gross calculation methodology and reporting is reflected in settlements for periods post 02 June 2024 <ul style="list-style-type: none"> – This will include the associated impacts related to Embedded network management to ensure that the parent has the appropriate gross energy volumes available for settlement, which has resulted in the netting of children reads moving to the Metering system. • Execute a mix of daily, interim, prelim, final and revision bill runs. • Provide participant RM Reports to support participant settlement reconciliation processes. • Provide participants confidential settlement and billing reports for executed settlement runs. • Confirm the Direction and Ancillary Service recovery changes under the new NECR logic. • Confirm the market fee calculations under the new database structure. • Confirm participants can access information in prudential dashboard and forecast dashboard under new methodology. • Refer to Appendix A2. changes to non-energy cost recovery.
Market Test Type	<ul style="list-style-type: none"> • Market Trial – scheduled scenarios
Timeframe	<ul style="list-style-type: none"> • Settlements test phase commences: April 2024 • Settlements test phase finishes: May 2024

Table 7 Market Trial Phase 3: Bidirectional unit bidding and dispatch

03 June 2024: BDU bidding & dispatch	
Affected participants	<ul style="list-style-type: none"> • Market Generators (Battery - Gen Only) • Market Customer (Battery – Load Only)
Description	<ul style="list-style-type: none"> • BDUs with 1DUID can bid and be dispatched. • Existing BESS transition from 2DUID to 1 DUID. <p>Note: The proposed test phase will isolate BDU testing from settlement calculations testing which is handled in Test Phases 1 & 2.</p>
Test objective e/s	<ul style="list-style-type: none"> • Confirm ability for 1 DUID BDU to bid and be dispatched. <ul style="list-style-type: none"> – Enable bidding of BDUs (10 Load Bands and 10 Generation Bands) through FTP, API and web interfaces for Energy and Regulation FCAS. – Enable bidding of BDUs (10 bid bands) through FTP, API, and web interfaces for Contingency FCAS. – Validation of Bids. – Confirm participants can bid within new validation rules for IESS June 2024. – Review submitted bids using NEM Reports, API and web interface. – Confirm dispatch instructions. – Test optional bidding of Energy Storage Limits in Predispatch (PD/7DayPD only) • Confirm existing bidding and dispatch functionality still works for 2 DUID BDU arrangement. • Test transition of 2DUID BDU to 1DUID BDU
Market Test Type	<ul style="list-style-type: none"> • Invitational industry testing • Self-initiated industry testing
Timeframe	<ul style="list-style-type: none"> • BDU test phase commences: April 2024 • BDU test phase finishes: May 2024

3.2 Assumptions

There are several key assumptions underpinning the industry testing and market trials strategy:

1. AEMO will provide and maintain the single Pre-Production environment which will be used for market testing phases.
2. Any change that is linked to or deployed to support a procedural or technical specification change will ensure the procedure(s) or technical specification(s) are documented and approved prior to the commencement of market testing.
3. As part of any changes to Pre-Production AEMO will give notice to participants of outages or code changes and provide release notes for the changes.
4. AEMO will back-up production data and upload into the pre-production environment prior to testing of any system changes. AEMO will communicate the details and dates of this activity to all participants as part of the test phase planning and in consultation with the ITWG. The data refresh strategy covering both wholesale and retail will be part of the AEMO IESS June 2024 Industry test and market trial plan and support the agreed AEMO IESS June 2024 Industry test and market trial strategy.

5. AEMO will provide and upload agreed test cases for any AEMO coordinated testing activities to Practitest⁴ Testing Modules and provide Practitest support during the market testing.
6. AEMO will perform all internal functional testing prior to the release of any changes into pre-production. AEMO will perform internal non-functional testing prior to the release of any changes into pre-production for all IESS June 2024 changes that AEMO is coordinating.
7. Participants will register their interest in participating in any of the market testing phases prior to their commencement, as detailed in the respective test plans.
8. Participants will perform internal testing prior to connecting to the AEMO pre-production environment.
9. Participants will have appropriately skilled resource capability for execution and support requirements during market testing.
10. Participants will ensure that the appropriate access to AEMO's pre-production environment is in place to support their market testing requirements.
11. Participants will ensure that defined test data is prepared and available within their test environments for market testing and that this data is appropriately baselined and backed up.
12. AEMO will provide support to investigate and resolve issues and defects identified during industry test.
13. All participants engaging in invitation industry testing or market trials will use Practitest as the central test management tool to:
 - execute test cases
 - undertake defect management
 - produce dashboard reporting
14. Results from market testing may be used by participants as one factor in AEMO's and their own assessment of go-live criteria.
15. AEMO will support participants to resolve any connectivity issues within the pre-production environment.

⁴ Practitest is AEMO's test management tool. For more information, see section 4.2.

4 Strategy implementation: Market testing management

This chapter explains sets out how AEMO and participants will interact through each testing phase.

4.1 Industry testing working group

The ITWG will co-ordinate and execute industry testing and market trials for the IESS market reforms to:

- Engage in detail on IESS industry testing matters.
- Collaborate on the development of the detailed testing plans where required.

Each participant will provide market test resources to be part of the ITWG for the duration of market testing preparation and execution activity. It is expected that those resources will be adequately skilled to meet the needs of the preparation activity. The ITWG will meet as required to drive the planning and preparation and execution process. High-level ITWG roles and responsibilities and ITWG's relationship with the various IESS stakeholder forums are set out in Appendix A3.

4.2 Test management tool

Practitest will be used to manage the market testing, including test scenarios, test script development, test execution, test results, the tracking of test defects during all cycles and dashboard reporting.

Practitest will be configured by AEMO with all required information and will be monitored and supported by AEMO. AEMO will provide one free dedicated licence to each organisation. If any organisation requires additional licences, AEMO will purchase on the organisations' behalf at a cost charged back to the organisation.

This tool is available over the internet and the link will be provided closer to the test commencement date and AEMO will provide training to participants on request.

4.3 Participant test registration

Each participant will need to register with AEMO their intention to undertake market testing prior to each market testing phase. Test registration is required so that multi-party test scenarios can be planned and scheduled from an end-to-end perspective.

Registration requirements and templates will be included in the Test Plans. AEMO will prompt for test registration requests and may request participants to complete templates or checklists as part of the registration activities. Participants will need to register each role within the market that they are responsible for. Where they have multiple ID's for the one role, a single registration with all IDs is required.

All registration requests and queries for market testing should be sent through using the NEM Reform inbox: nemreform@aemo.com.au

Each Registration will be given two login ID's with additional logins available dependant on the number of participants engaging in the testing activities.

4.3.1 Participant ID and roles

The term 'Participant' is used to indicate a unique role that a given business is to adopt for the purpose of testing. For example, where a participating business fulfils the role of LNSP and MDP, these roles are classed as different participants for testing purposes.

If an organisation has more than one role (i.e. is more than one 'Participant ID', then it may need to separately carry out testing for each role (as each participant role has different B2B and B2M transactions).

If an organisation has more than one participant ID but they are all for the same role, then as long as the participant is using the same set of systems for each ID, the participant would only need to perform testing one for those IDs.

Participants will detail which participant roles and ID they will be testing under as part of their Test Registration.

4.4 Communication and status reporting

Commencement of status reporting will be aligned with the test execution for invitation industry testing and market trials. Commencement of daily status meetings will align with test execution periods for all test phases.

Table 7 describes how the progress of market testing will be monitored and reported. Communications and status reporting will involve both AEMO and participants.

Table 8 Communications and status reporting

Frequency	Type	Responsible
Continuous	<ul style="list-style-type: none"> • Updates in Practitest for status of test cases and defects 	AEMO and Participants
Daily	<ul style="list-style-type: none"> • Status reports & Traffic light reports readiness reports • Test status meetings 	AEMO
Milestone based	<ul style="list-style-type: none"> • Milestone reports, Test Completion Reports 	AEMO

4.5 Risk and issues management

Market testing-related risks and issues with the potential to affect program readiness should be raised via the Implementation Forum.

5 Strategy implementation: Market test planning and preparation

The strategy sets out the approach and high-level timing for IESS June 2024 industry and market testing. To operationalise the strategy, more detailed test plans will be developed by AEMO in consultation with participants to set out the details associated with the market testing activities.

5.1 Test Plan

As part of the preparation for testing, a series of workshops will be held by the ITWG to develop the IESS June 2024 Industry Test and Market Trial Plan covering the different phases of testing with the content and level of detail as appropriate for the type of testing to be conducted.

The Test Plan will include:

- Test phase objectives
- Detailed scope of testing
- Pre-requisite activities
- Entry and exit criteria
- Test cycle approach and dates
- Data management
- Defect management
- Test reporting requirements.

Table 9 sets out the timetable for the development of the test planning activities and Table 10 sets out the timeline for market trials implementation. 0 shows the consolidated overview of the market testing approach.

Table 9 Timeframes for IESS Market Trials June 2024 planning and preparation

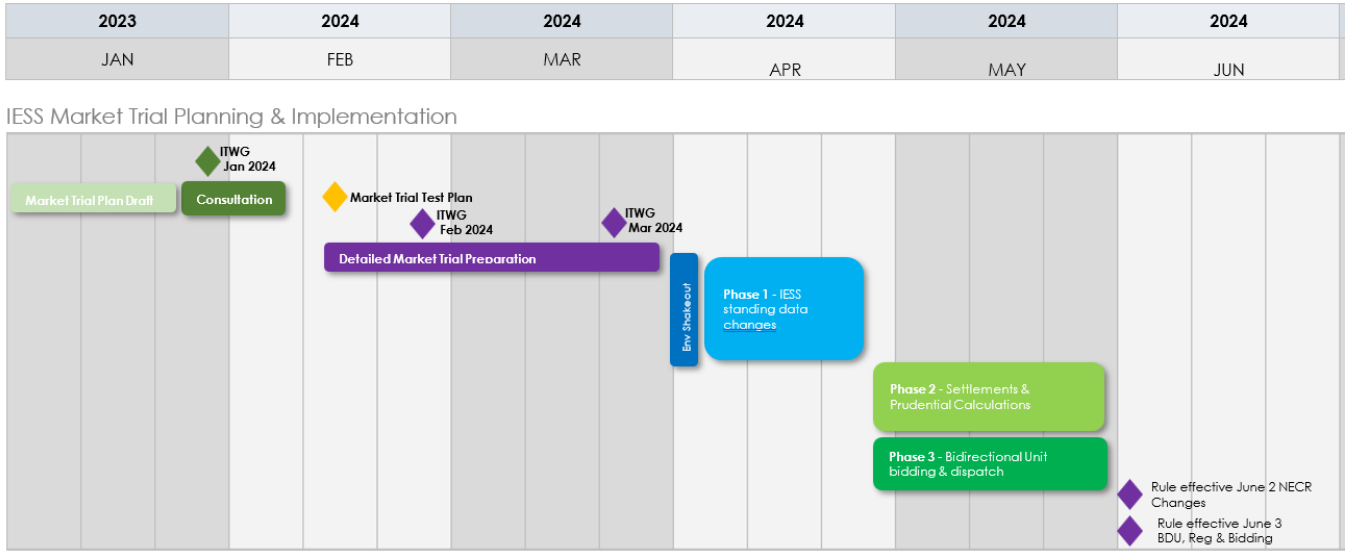
Test planning	ITWG Engagement	Draft Plan	Consultation	Finalised Plan
Industry test and market trial <i>strategy</i> (doc)	Sep 2023	22 Sep 2023	06 Oct 2023	17 Oct 2023
Industry test and market trial <i>plan</i> (doc)	Nov 2023 to Jan 2024	19 Jan 2024	02 Feb 2024	16 Feb 2024
Test/trial preparation activities (aligned with plan)	Feb & Mar 2024	N/A	N/A	03 Apr 2024

Table 10 Timeframes for IESS market testing

IESS market trial phase	Description	Duration	Timing
Phase 1	IESS standing data changes	~2-3 weeks*	April 2024
Phase 2	Settlements & Prudential calculations	~4-5 weeks*	April/May 2024
Phase 3	BDU bidding and dispatch	~4-5 weeks*	April/May 2024

*Exact durations to be confirmed as part of the development of the IESS June 2024 Industry and Market Trials Test Plan

Figure 1 Overview of IESS industry testing and market trials timeline



Detailed preparation will be completed by early April 2024 ready for the Market Trial commencement period.

5.1.1 Test Workbooks

The test plans for industry testing and market trials will include test workbooks if scope indicates these are needed. These workbooks will document the test scenarios, data requirements, registered test participants and test calendar. The test calendar will include the test participant matrix, detailing who each participant will test with and when.

The ITWG will develop the test workbooks, and associated scenarios, scripts and calendar, by:

- Defining the test scenarios required for industry testing and market trial, including identifying:
 - Scenario priority
 - Testing counterparties
 - Data requirements
- Defining and preparing the subsequent test scripts that will need to be executed.
- Defining the approach and timing of test script execution.

5.2 Test data

5.2.1 Data requirements

Data requirements will be developed during the test planning stage, and the approach to data management will be detailed in the respective Test Plans.

At a high-level:

- Data requirements will be identified for each test scenario as part of the test scenario development. These data requirements will be detailed in the Test Workbook
- For relevant scenarios, AEMO will work with participants to register/transition DUID's
- Back dating of the Mock Go-Live will be used to enable production meter data to enable settlement runs.

Data identified will be mapped against every scenario in the Description field in Practitest.

Participants are responsible for ensuring that any required data is available within their test environments for industry testing and market trials test execution.

5.2.2 Data refresh

AEMO will undertake a data refresh prior to deployment to pre-production for market trials. The details of these will be discussed and communicated via the ITWG in the lead up to each go live. Participants are encouraged to align their pre-production data if possible, as this will make aligning data between participants easier.

5.3 Market test environment: AEMO's pre-production

AEMO will prepare and maintain the single pre-production environment prior to the commencement of market testing and throughout the test execution phases for the duration of market testing. All participants with valid participants IDs will have access to the pre-production environment for industry testing and market trials. AEMO will back-up and refresh the data and support the pre-production environment.

The Market Test environment is separate to the participant development support environment, which has been provided as a basis for supporting participant systems development ahead of market testing.

All participant test environments will be maintained and managed by the respective participants.

5.3.1 Test support

Test support for IESS June 2024 during the test phases in pre-production environment will be provided between 09:00 and 17:00 Hrs (AEST) on business days.

6 Strategy implementation: Market test execution approach

The ITWG will monitor and manage all industry testing and market trial execution activities. Participants are responsible for supplying their own teams for test execution for the duration of market testing.

6.1 Market Test Entry and Exit Criteria

The entry and exit criteria for each market test phase will be defined in the relevant Test Plans. Depending on the testing defined, the criteria are likely to be based on those listed below.

6.1.1 Entry criteria

Participants wanting to participate in market testing are expected to have fulfilled entry criteria prior to the commencement of market testing. This may include, but is not limited to the following criteria:

- Participants internal testing completed
- Pre-production participant ID received for new participants (via registration), if relevant
- Connectivity testing complete
- Test data preparation (in line with test scripts/cases, i.e. roles and NMI ranges) is complete, if required
- Appropriately skilled resource capability available to execute and support testing.

AEMO will confirm the following:

- Internal AEMO testing has completed
- Pre-production environment available
- The relevant IESS June 2024 Industry Test and Market Trials Plan is complete, agreed and delivered to the ITWG
- Practitest is configured with all required test information and is accessible and useable by all testing participants
- Registration of participants in the test phase with nominated role ID's to be used in testing
- Testing participants have confirmed readiness (through the submission of completed entry criteria checklist).

6.1.2 Exit criteria

Exit criteria for the text execution phase may include:

- Successful completion of all high-priority test scenarios
- No outstanding Severity 1 or Severity 2 defects

- Any open defects (Severity 3 or 4) have agreed resolutions or work around in place and published. Where appropriate and efficient, AEMO can discuss options for resolving a defect/s with the ITWG
- Final Test Summary Report completed
- The overall result market testing will be one factor included in the assessment of the overall market readiness for implementation.

6.2 Test scenario and script execution

Test execution will be undertaken as follows:

- Respective test plans are created in Practitest Test Execution modules for all participants to facilitate testing
- Tests scenarios and scripts that are in scope for participants will be set-up in their respective test plans of Practitest Test execution module
- Execution of the testing will be undertaken according to execution calendar made available as part of the preparation activities
- Informal testing may occur between participants, however reporting of the market testing will be based on the defined execution calendar
- Test execution information will be updated in Practitest as it occurs, i.e. in as close to real time as possible. This will include test progress, status and data used
- An audit trail of test execution can be undertaken by participants. This includes capture of positive results to prove that a test met expected results. For example, participants can use screen shot or test output as evidence of their test results. Where applicable, this information will be maintained in Practitest. Where this is not applicable, e.g. particularly large files, participants should store the required information accordingly, so it can be referenced as positive proof of testing.
- To assist in defect resolution participants should capture negative results in practitest against the defect. In the case of sensitive information, please keep the information so AEMO can work through troubleshooting, if required.

6.2.1 Test status

After running each test script, participants will update the test script status in Practitest as below:

- Unexecuted
- In progress
- Blocked
- Failed
- Passed
- Not applicable.

AEMO will use these test statuses to generate the status traffic light reports and circulate prior to the daily test status meetings.



6.2.2 Test metrics

Test measurement during market testing will be based on but not limited to the following metrics:

- Number of test scenarios executed versus the number planned
- Number of passed test scenarios versus test scenarios executed
- Number of failed test scenarios versus test scenarios executed
- Number of test scenarios blocked versus test scenarios planned
- Number of test scenarios deferred/not applicable versus number planned
- Outstanding defects including the impact and agreed date of resolution.

These metrics will be reported as appropriate in the test status reports which AEMO will generate and circulate prior to daily test status meetings.

6.3 Daily process

The daily process to be adopted during each market testing phase will be detailed in their respective Test Plans, including:

- Frequency of daily test status meetings (number of meetings per day – which may be adjusted as testing execution progresses)
- Number and scheduled time/s of daily test status meetings
- Meeting attendees (one meeting for all attendees or multiple meetings with targeted attendees)
- Meeting agenda templates.

To prepare for the scheduled meetings:

- Participants will be asked to update Practitest prior to the meeting
- AEMO will generate and circulate the test status report and status traffic light report prior to the meeting.

The daily test status meeting agenda will include:

- Confirm attendance
- Test execution progress
 - Review planned against actual progress for test execution. Discuss exceptions against planned execution
 - Confirmation of readiness to commence scheduled tests
- Review defect status – outstanding defects.

6.4 Test management activities

Table 11 shows the activities which will occur during market testing and who is responsible for them.

Table 11 Test management activities

Activities	Description	Timing	Responsibility
Prepare tests	Configure Practitest with test scenarios and test scripts.	Prior to the commencement of test phase execution	AEMO
Identify data	Identify data sets for each test scenario, enter in Practitest and confirm with testing partners.	Prior to the commencement of test phase execution	Participants, AEMO may assist if required
Execute tests	Individual testers to perform test execution and capture actual results of testing in Practitest.	Daily	Participants
Update progress	Progressively update the status of each script tested in Practitest.	Daily	Participants
Raising defects	Raising defects from failed scripts or any other root cause in Practitest.	Real time immediate as soon as the script has failed.	AEMO and Participants
Managing defects	Review defects logged in the Practitest to identify major defects and determine the impact of those defects.	Daily	AEMO and Impacted Participants
Retesting defects	Retesting defects once they are available to testers is a priority.	Defect retests are to be completed prior to commencing new scripts.	AEMO and Participants
Test phase entry	Complete entry criteria checklist	Prior to the commencement of test phase execution	AEMO and Participants
Test phase exit	Complete exit criteria check	At the completion of test phase execution	AEMO and Participants
Test status meetings	Test status meeting to be attended by test representatives from all participants to discuss progress, issues and defects.	Daily (or as detailed in the Test Plan)	AEMO and Participants

7 Strategy implementation: Defect management

Market testing defect management will be a collaborative effort, principally involving AEMO's and participants' testing teams, development teams and business analysis teams. There will, at times, be a need to consult other projects' team members for advice and assistance on the resolution of defects. Defect management will be managed entirely within Practitest.

The objective of defect management is to resolve all defects within the project lifecycle. However, this objective must be balanced against other project objectives, such as achieving the schedule and the system impact and priority of the defect (discussed below). The acceptable level of defects within each stage of testing is typically defined as part of the 'exit criteria' for that stage.

AEMO will manage and report on all defects identified during test execution. Where it is determined that it is not an AEMO defect, AEMO will coordinate with market participants to obtain the status of the defect.

A template will be provided to assist participants with the creation of defects.

7.1 Defect management approach

7.1.1 Raising defects

Defects raised during market testing will be captured in Practitest, with the following information:

- Description of defect
- The test scenario and/or test script associated with the defect
- Who detected it and the date it was detected
- Defect owner (entered after gaining agreement between testing counterparties as to who owns the defect)
- Target fix date (entered by defect owner)
- Defect severity
- Defect priority
- Defect status
- Defect root cause (entered by defect owner).

For IESS implementation, the term "defect" is used broadly to include defects that would ordinarily fall outside of a narrow "IT" definition. For example.

- Information could be captured regarding lack of required support. This affects test execution from a timing perspective; and

- Testing may indicate that an automated business process needs manual intervention to work correctly and given constrained timings an automated fix cannot be developed and tested in time for go-live. Information such as this can feed into the deployment\cutover planning for go-live.

As a general principle, any information that occurs during market testing and assists with risk mitigation for the “go-live” solution may be captured.

Defect statuses and progress on defect fixes will be discussed in the daily test status meeting.

7.1.2 Defect triage

Defect triage occurs during the daily test status meeting. Test scenarios or scripts that are blocked with critical or high priority defects will be discussed in the meeting. The defect owner and the target fix time will be agreed for critical and high priority defects blocking test execution.

Participants and AEMO should review defects frequently on daily basis and update the target fix date/time in Practitest for everyone’s reference.

Appendix A1 contains a workflow of the Testing issue triage process.

7.1.3 Defect escalation

All open defects will be discussed in the daily test status meeting. If a critical/high priority defect can’t be resolved within the agreed timeframes, it can be escalated in the daily test status meeting. If required AEMO will arrange a separate defect triage meeting with the relevant participants to see that the defect is resolved quickly to progress test execution.

7.1.4 Defect severity and prioritisation

Defects will be classified according to severity and where there are multiple within a severity, they will be address based on priority by the participant test leads in consultation with other affected participants, as described in Table 12. Priority will indicate the degree to which the defect affects both the system capability, testing execution and the overall project. Priority is determined by assessing probability of system and the business impacts. 0 describes each priority classification.

Table 12 Defect severity classification

Severity	Definition
1- Showstopper	Defect is considered critical to business operations and/or testing. Core business and project impact.
2-Major	Defect is considered high impact to the business operations and/or testing. However, core business processes are still able to be completed (possibly via workarounds, etc.) and some testing is still able to continue.
3-Moderate	Defect is considered moderate impact to the business operations and/or testing. Core business processes are unaffected, and workarounds available, with testing still able to continue.
4-Minor	Defect is considered low impact to the business operations and/or testing. Core business processes are unaffected, and testing is still able to continue.

Table 13 Defect priority classification

Priority	Definition
1- Blocker	Entire functionality is blocked, and no testing can be conducted. Fix/resolution turnaround time best endeavour effort in first 4 hours or provide update on impact.
2-Highest	Defect is considered high impact to testing, multiple tests are blocked/failed due to the defect and no workaround is available
3-High	Defect is considered high impact to testing one or more tests can be linked to the defect, but workaround is available, and testing is still able to continue.
4-Medium	Defect is considered moderate impact to testing with one or more tests can be linked to the defect, but workaround is available and none of these tests are currently a priority.
5-Low	Defect is considered low impact to testing, no tests are failed or blocked due to this defect.

Post triage and acceptance of a defect, a resolution date will be added and published in the daily status report for all identified defects.

7.1.5 Defect management status

Table 14 shows the valid defect management statuses to be selected in Practitest.

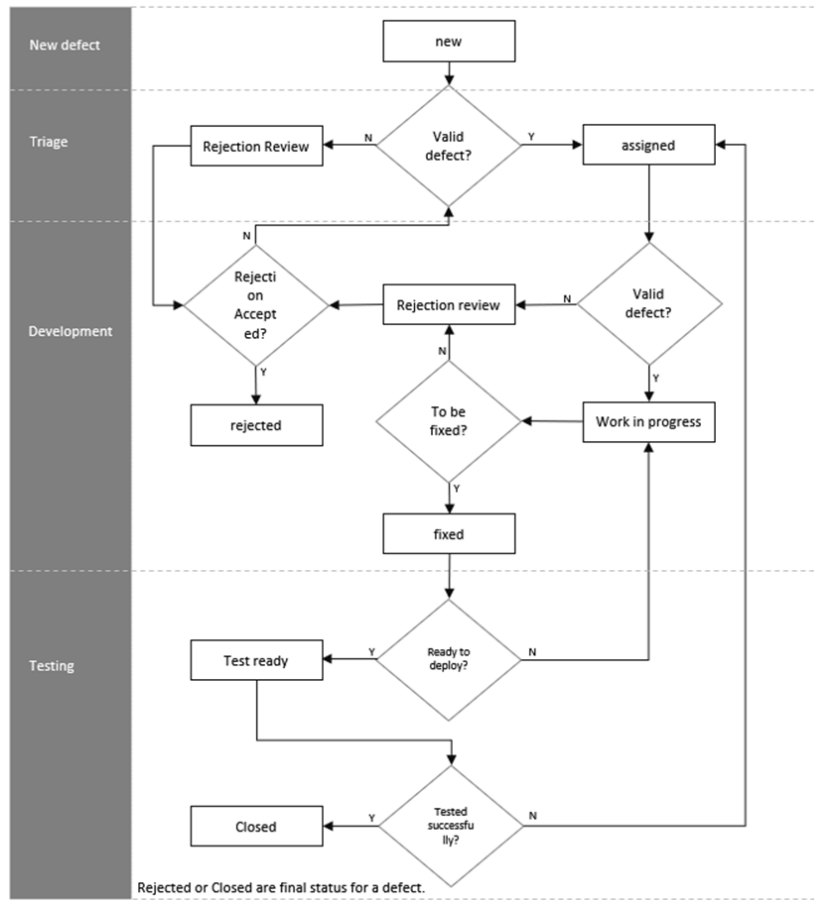
Table 14 Defect management status

Status	Definition
New	Initial defect raised but will require a triage to determine if further analysis is required and whether it is a true defect as such to move to an assigned status.
Assigned	Defect will be assigned to the appropriate development team to be addressed further assessed and progressed.
Work in Progress	Practitest item that is considered valid to be set to 'Work in Progress' to be fixed by development. This status means, a team is working on the Practitest item (analysis or fixing)
Rejection Review	After Triage or review by developer the defect is not considered valid the defect will be assigned to the status of 'Rejection Review' and assigned to the participant whom raised the defect to accept rejection or update defect to allow it to be 'assigned'.
Rejected	Practitest item that is in a 'Rejection Review' status can be progressed to this state. If a participant accepts a defect is not valid they can confirm the acceptance of the defect by changing the status to 'Rejected'.
Fixed	Once Practitest item has been fixed and unit tested by developer the status is set to 'fixed'. This indicates the release of the fix is ready for deployment to a test environment.
Test Ready	Once the fix is released to test environment successfully the status is set to 'Test Ready' and assigned to the participant whom raised it.
Closed	If the participant (defect originator) is satisfied that the testing of the defect is successful they should update the defect

7.1.6 Defect process flow

Figure 2 shows the defect management process throughout the various defect management statuses of the defect lifecycle from its inception through to its closure.

Figure 2 Defect management cycle



7.1.7 Defect cause

Defect root cause will be updated in Practitest once the defect cause is identified. This will help with the defect metrics to identify the impacted area of the issues/defects identified in the testing. Table 15 shows the available defect causes and their descriptions.

Table 15 Defect cause

Defect Cause	Definition
Design	The design of the process does not meet the requirements specified. Defect may include examples, algorithm (incorrect calculation), error handling, creation/release of object or memory, decision logic error, loop control, procedure call, failing to validate data values before being used.
Configuration	The intended outcome of the configuration is not meet.
Data	There are system data issues for the process that may prevent test completion.
Requirements	Unclear or incorrect requirement, Functional and Business specification documentation.
Infrastructure/Hardware	Defect is not in the object being tested but, in the test, set up, for example the wrong configuration or version control of platform, operating system, browser, hardware or networking, system is down, or the environment is down.

7.2 Suspension criteria and resumption requirements

AEMO in consultation with the ITWG will determine if a complete or partial suspension of testing is required during market testing and will also determine when testing will continue. Suspension and resumption criteria and actions are described below.

7.2.1 Suspension criteria

Complete or partial suspension of testing may be required if:

- High density of defects is open impacting the number of test cases that can be executed
- High severity (i.e. showstopper) or combination of defects open
- Significant change to specifications (delaying release of software to the pre-production)
- Quality of software (rated by number of test cases failing).

If these circumstances arise, the following actions will be taken:

- AEMO will make a recommendation to suspend the test activities in consultation with ITWG
- AEMO will advise the industry participants of the potential delays due to the test suspension, and the impact of defect / defects concerned
- AEMO and the ITWG will support and coordinate the development and test efforts to resolve the defects raised.

7.2.2 Resumption criteria

Test resumption can occur after the issues that caused the suspension of testing have been resolved. If these circumstances arise, the following actions will be taken:

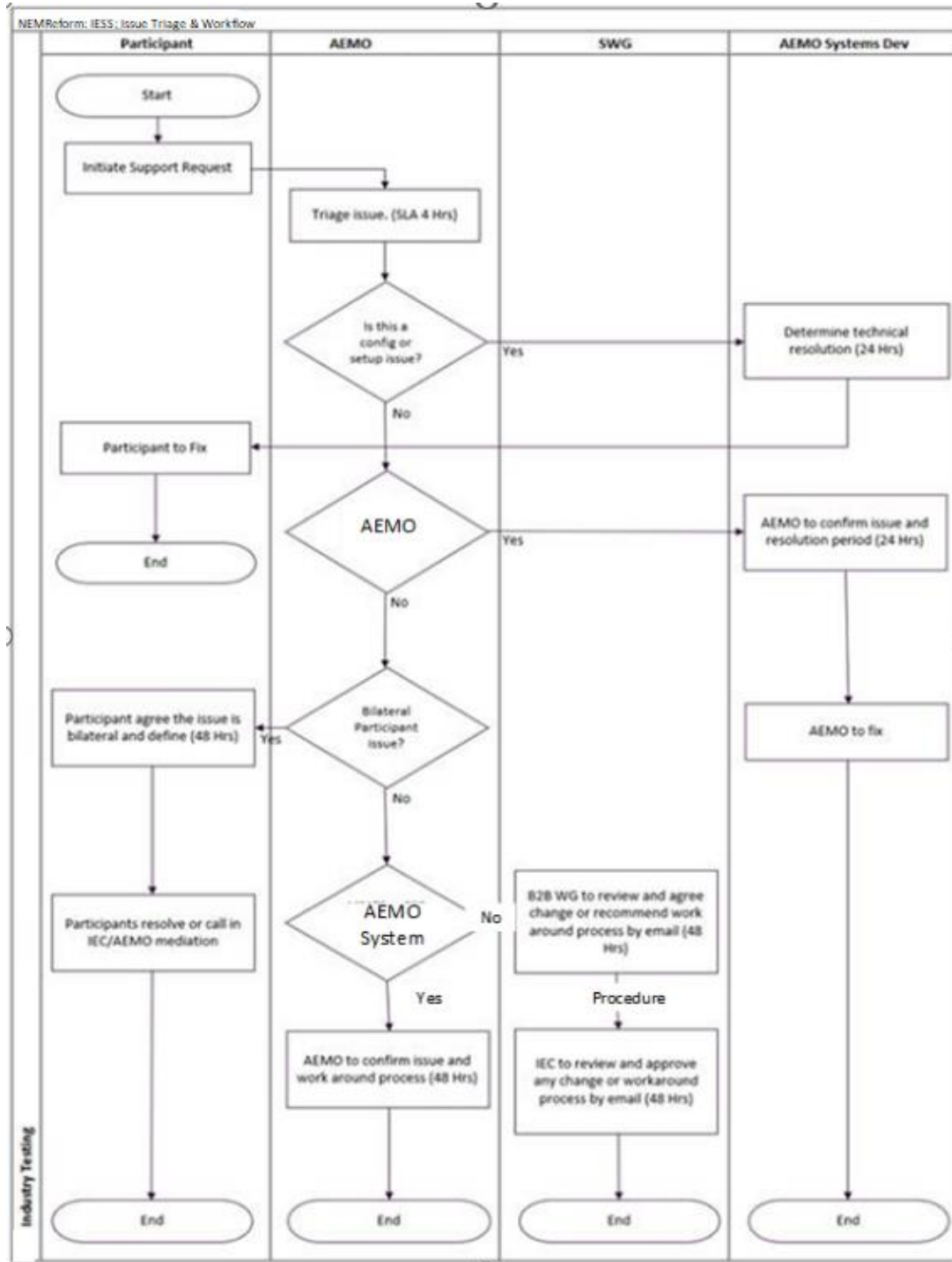
- AEMO will inform the testing participants of the successful deployment of the defect fix(s) and its successful verification
- AEMO will inform the testing participants that the test environment is in a suitable condition to resume the suspended testing
- AEMO in consultation with the participant who raised the defect, will inform the participants of the impact(s) of the defect fix on the previously executed test cases and suggest if any re-execution must be done.

GLOSSARY

This document uses many terms that have meanings defined in the National Electricity Rules (NER). The NER meanings are adopted unless otherwise specified.

TERM	DEFINITION
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
B2B	Business-to-business
B2M	Business-to-market
BDU	Bidirectional unit
BESS	Battery energy storage system
Cutover	System implementation event
DUID	Dispatchable unit identifier
FRMP	Financially responsible market participant
IESS	Integrating Energy Storage Systems rule
Industry testing	Informal, uncoordinated testing by participants in AEMO's IT environments. Self-testing of functionality such as connectivity, and/or coordinated multi-party testing of functional scenarios.
Invitation industry testing	Coordinated testing of business process scenarios with a select number or subset of participants with systems ready for testing
IRP	Integrated resource provider
IRS	Integrated resource system
ITWG	Industry testing working group
Market testing	Umbrella term covering industry testing, invitation industry testing and market trials
Market trials	Formal, industry coordinated test activities between participants' and AEMO's IT environments. Involves coordinated multi-party end-to-end testing of business process scenarios.
MSATS	Market settlements and transfer solutions
MSGA	Market small generation aggregator
NCC	NMI classification code
NECR	Non-energy cost recovery
NEM	National electricity market
NEMDE	National electricity market dispatch engine
NER	National electricity rules
NMI	National metering identifier
PAE	Profiling and allocation engine
PCF	Program consultative forum
PDSE	Participant development support environment
SGA	Small generation aggregator
SoC	State of charge
Transition	Process of shifting from current to future operating state
UFE	Unaccounted for energy

APPENDIX A1: Issue Triage Workflow



APPENDIX A2: Changes to non-energy cost recovery

Non-Energy Cost	Current Recovery	IESS Recovery
FCAS Contingency Lower Services	Market Customer participants based on the net energy (imports – exports) from setcpdata	All participants based on ACE from Energy_Transactions
NMAS Network Support Control Ancillary Services (NSCAS) including test payments		
Energy or FCAS Contingency Lower Directions		
RERT (Reliability and Emergency Reserve Trader)		
Market Suspension		
APC (Administered Price Claim)		
FCAS Contingency Raise Services	Market Generator and Market Small Generator Aggregator participants based on the net energy (imports – exports) from setgendata and setsmallgendata	All participants based on ASOE from Energy_Transactions
FCAS Contingency Raise Directions		
NMAS System Restart Ancillary Services (SRAS) including test payments	All participants based on the net energy (imports – exports) from setcpdata , setgendata and setsmallgendata	All participants based on ACE and ASOE from Energy_Transactions
Non-Energy and Non-AS Directions		
FCAS Regulation Services Costs	“Causer Pays” method from those Market Generators with Market Participant Factors (MPFs), with the residual from Market Customers net energy from setcpdata	Same, but with the residual from all participants ACE

APPENDIX A3: Industry Testing Working Group roles, responsibilities and relationships

Industry testing working group roles and responsibilities.

Role	ITWG responsibilities
AEMO and participants' test leads	<ul style="list-style-type: none"> • AEMO to develop test plans (see chapter 5) • Developing all test preparation materials, including test scenarios, test scripts and data sets, as required • Submitting test registration requests, entry and exit criteria checklists, software or connectivity requests to AEMO, when requested • Managing the testing process as prescribed in this strategy and the supporting test plans, including: <ul style="list-style-type: none"> – Undertaking test execution as scheduled – Updating Practitest with test progress and results – Communicating with testing counterparties as required – Attending scheduled stand-up and ad-hoc meetings – Adhering to the defect management process including the retesting of fixed defects.
ITWG facilitator & chair (AEMO Test Lead)	<ul style="list-style-type: none"> • Coordinating the test preparation activities • Initial set-up of Practitest with test scenarios and test scripts for participant review • Requesting and collecting test registration requests, entry criteria checklists, and software and connectivity requests, and coordinating the issuing of any required licences for the testing tool or connectivity credentials • Coordinating test counterparties if required (e.g. arranging pairings or grouping for test scenarios) • Coordinating the test execution process as prescribed in this Industry testing and market trials strategy and the industry test plans including: <ul style="list-style-type: none"> – Scheduling and chairing regular stand-up and ad-hoc meetings – Scheduling and chairing daily meetings during test execution windows – Communicating test readiness (i.e. giving individual participants, participant pairings or participants groups, the go-ahead to begin test activities). • Communicating status reports and updates to the ITWG, and other IESS forums • Where possible, provide initial assistance before escalating participant issues to their ITWG representative. For example, participant non-responsiveness in test execution such as running behind test schedule, not updating Practitest or following the defect management process • Referring defects that cannot be resolved by the individual participant, or at the ITWG, level to the relevant Procedures working group or the IESS-PCF for resolution.

Industry testing working group relationships

NEM Reform group	Relationship with ITWG
Implementation Forum	The Implementation Forum will receive regular status reports from the ITWG on preparations for and execution of Industry Testing. The Implementation Forum may also refer matters to the ITWG for detailed Industry consideration in relation to Testing of IESS capability.
Program consultative forum (PCF)	The PCF and Implementation Forum will receive regular status reports and escalations on testing progress via the ITWG.