

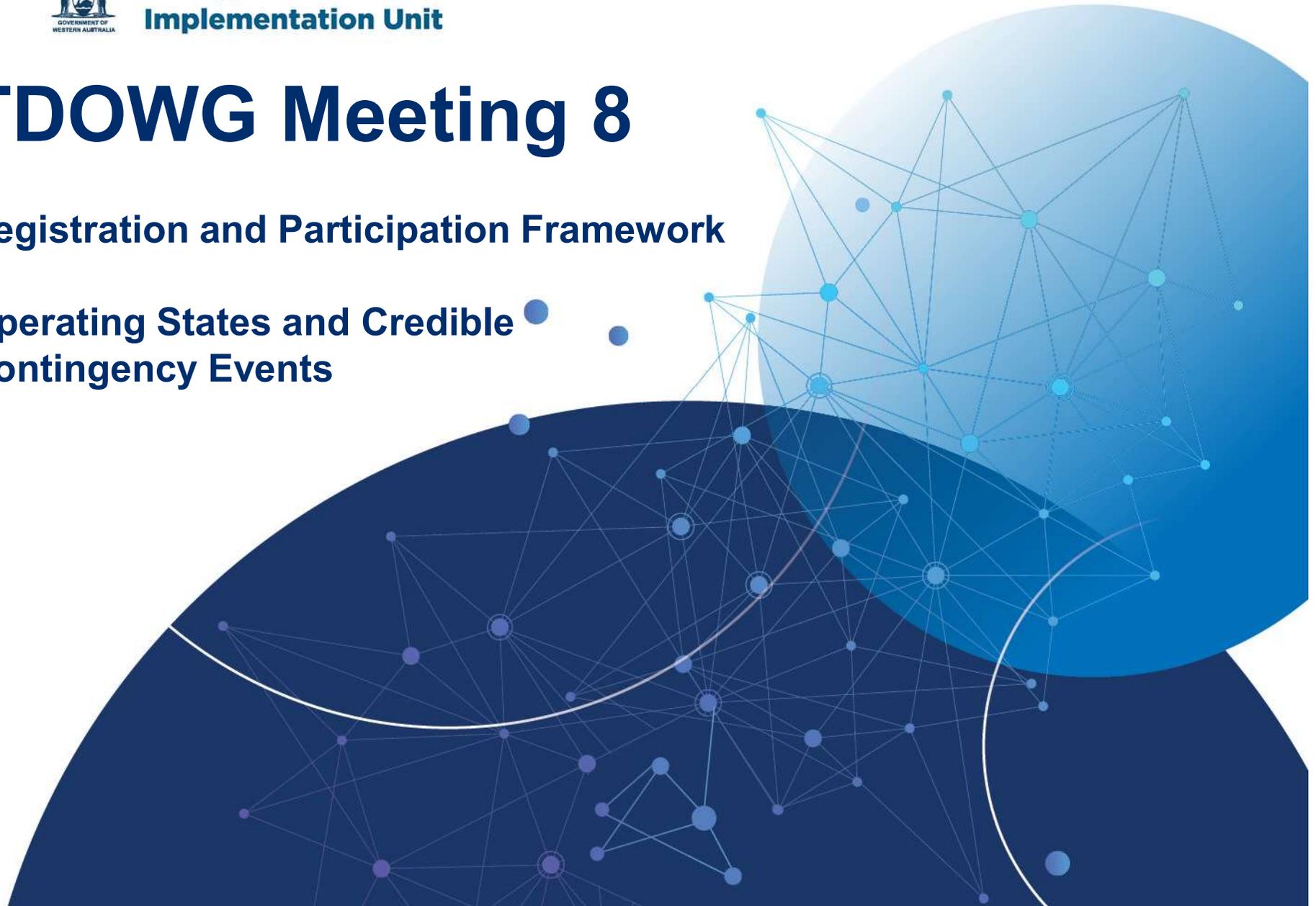


**Energy Transformation  
Implementation Unit**

# **TDOWG Meeting 8**

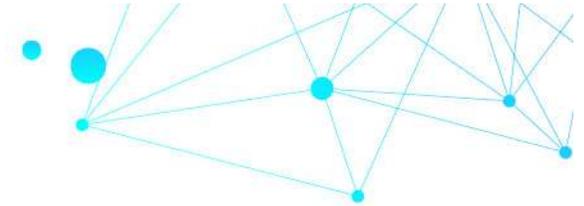
**Registration and Participation Framework**

**Operating States and Credible  
Contingency Events**





# Ground Rules



- The Chair will aim to keep the meeting on time so that we can get through the large volume of material for discussion.
- Questions and issues raised must be kept relevant to the discussion. Other matters can be raised at the end of the meeting or via email to [TDOWG@energy.wa.gov.au](mailto:TDOWG@energy.wa.gov.au)
- Please state your name and organisations when you ask a question to assist with meeting minutes.
- This meeting will be recorded for minute taking.



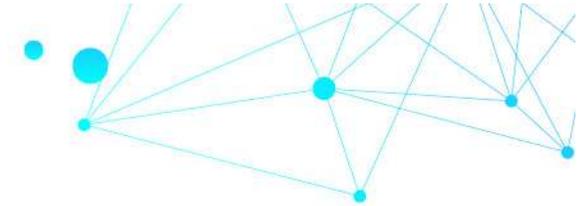
**Energy Transformation  
Implementation Unit**

# **Registration and participation framework in the new WEM**





# Agenda



1.

**Purpose**

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2.

**Drivers for change**

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3.

**Principles**

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4.

**Registration taxonomy**

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5.

**Facility definition**

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6.

**Facility attributes**

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7.

**Facility classes**

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8.

**Criteria for classification**

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9.

**Transitioning to the new framework**

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10.

**Minimum threshold for registration**

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11.

**Electrical location**

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12.

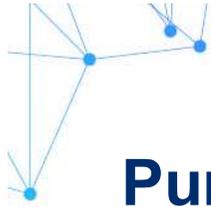
**Intermittent loads**

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13.

**Registration processes and lifecycle**

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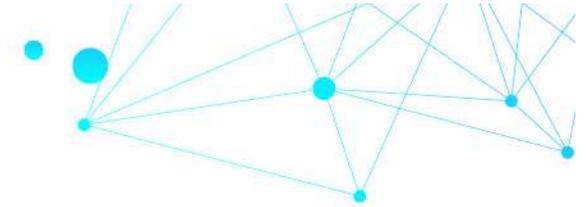


## Purpose of registration taxonomy and framework

- WEM Rules require entities to register in different classes to ensure obligations can be placed on groups with similar characteristics (in respect of the facilities which they own, operate or control).
  - Registration requirement exists for legal reasons to enable rule enforcement
- Registration taxonomy groups participants and facilities into similar groupings to facilitate rule enforcement
- Previous work streams have already identified rule requirements governing participation
  - Registration is consequential to these requirements



## Drivers for change



Technological changes



Enable participation of storage & DER

Market changes

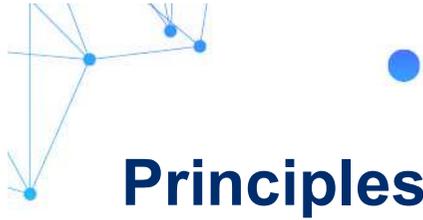


SCED and ESS  
Service orientation

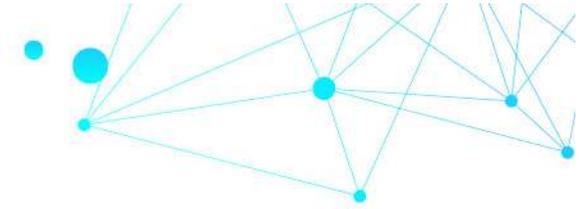
Improvements



Equitable cost recovery  
Dynamic registration  
process



# Principles



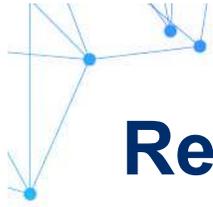
WEM objectives

Reform guiding principles

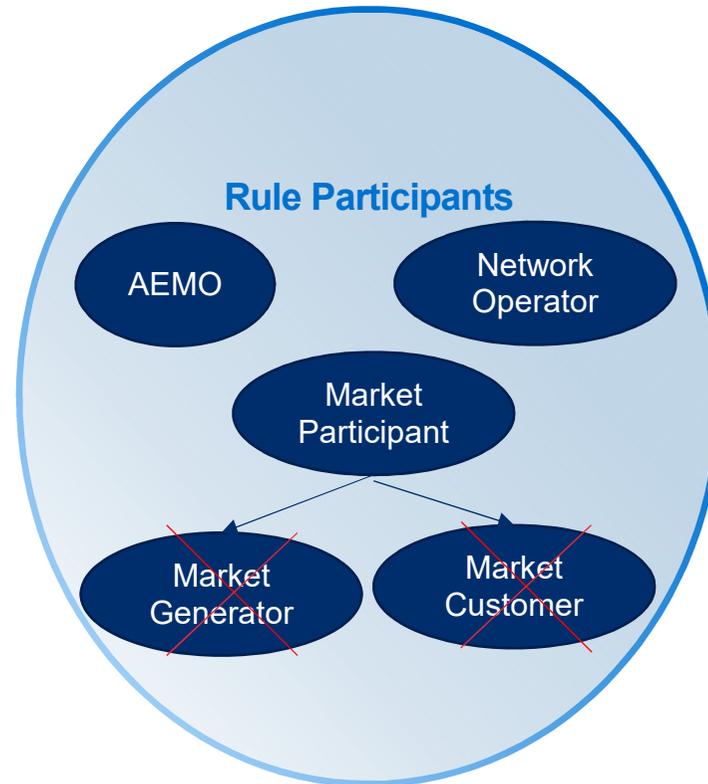
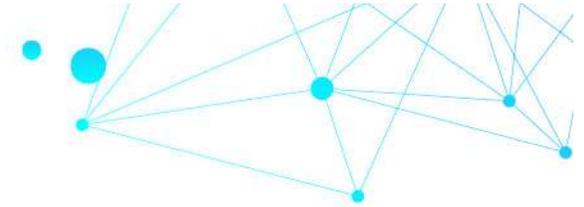
The taxonomy and framework should not restrict participation in specific services, such as essential system services (ESS) or reserve capacity.

The taxonomy and framework must facilitate the participation of new technologies using new business models.

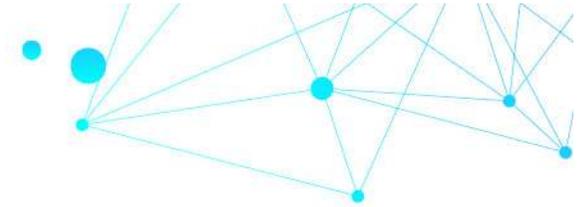
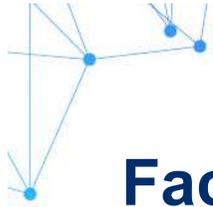
Cost recovery of WEM products and services should not be explicitly linked to a participant or facility type but should instead reflect the extent to which the relevant facility contributed to the need for that product or service



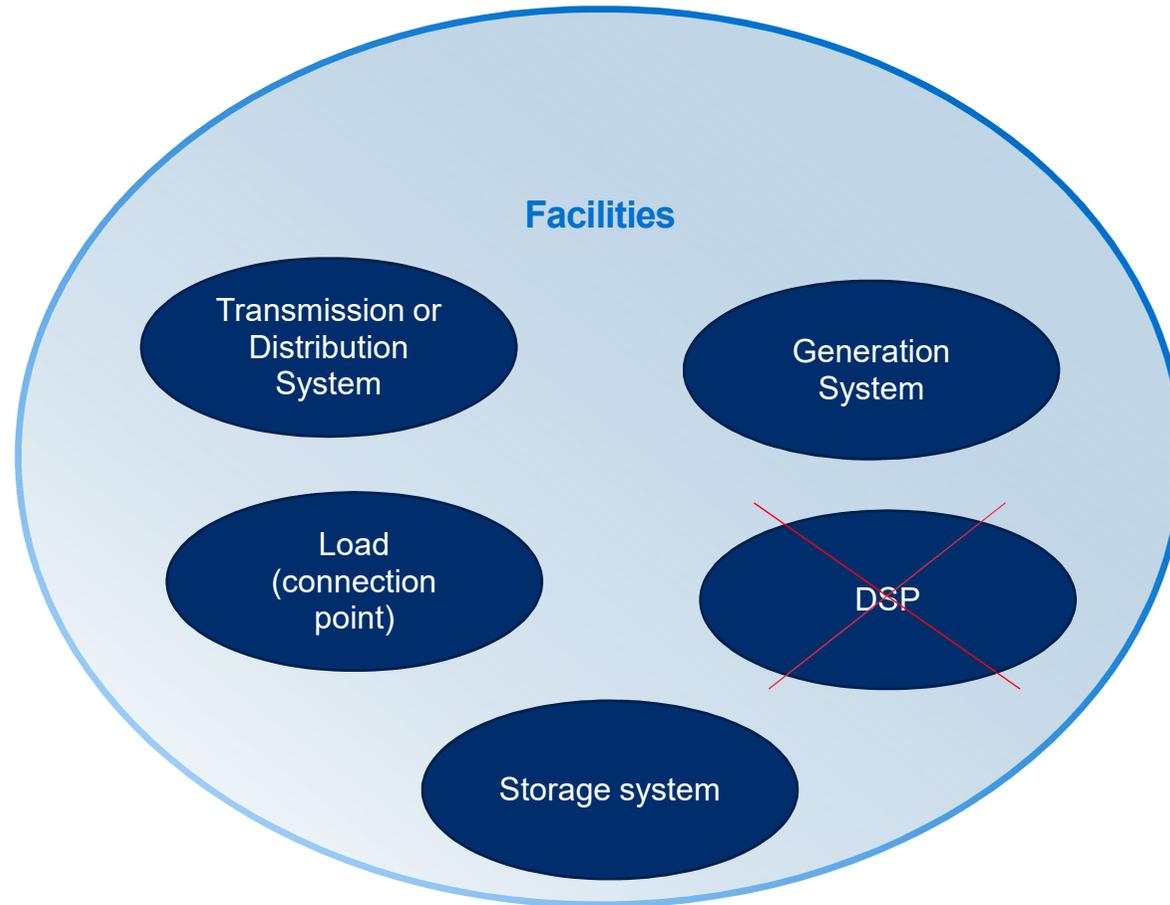
# Registration taxonomy



*Remove Ancillary Services Provider, System Management and System Operator classes*



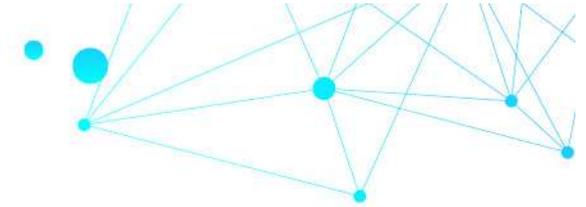
# Facility definition



Remove *DSP* and add storage system



## Facility Attributes



Controllability

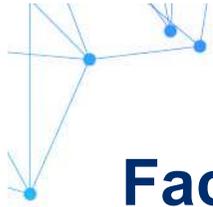


Affects dispatch obligations

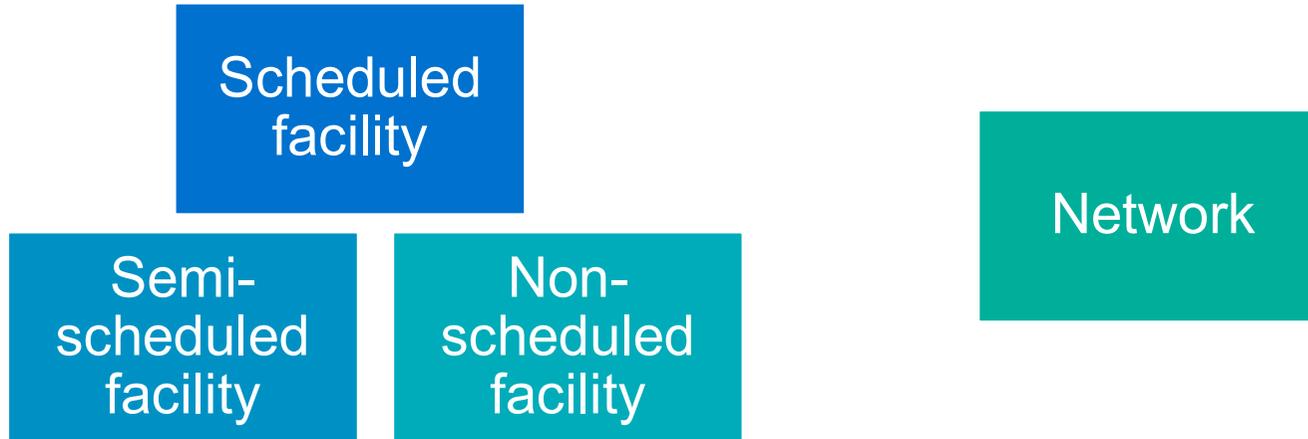
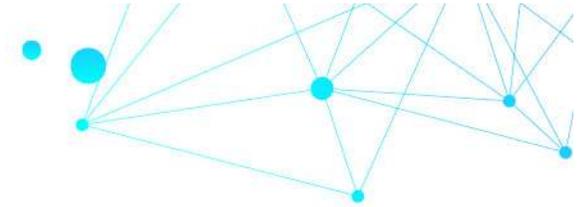
Configuration –  
standalone or  
distributed



Will influence DER participation

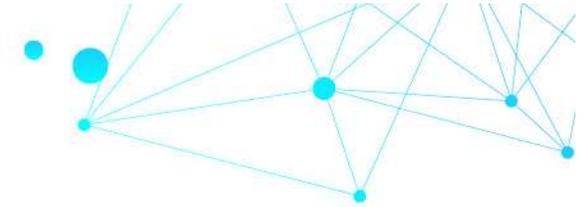
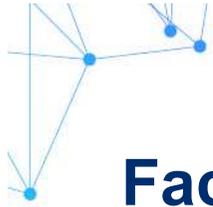


## Facility Classes



Facilities may have specific “elements”:

- storage element or Electric Storage Resource (either as a standalone storage system or as part of a hybrid system)
- a controllable or “Scheduled Load” component.
- an aggregated virtual power plant (i.e. DER)



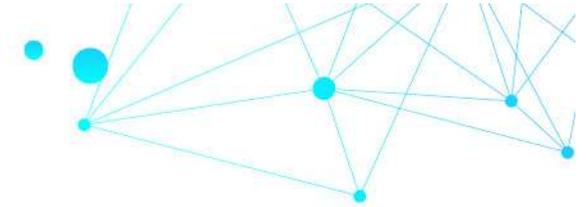
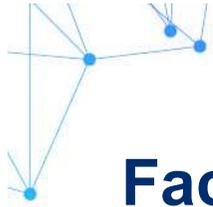
## Facility Classes

Two additional facility classes which do not fit into a classification system based on dispatch compliance obligations

Demand side  
program

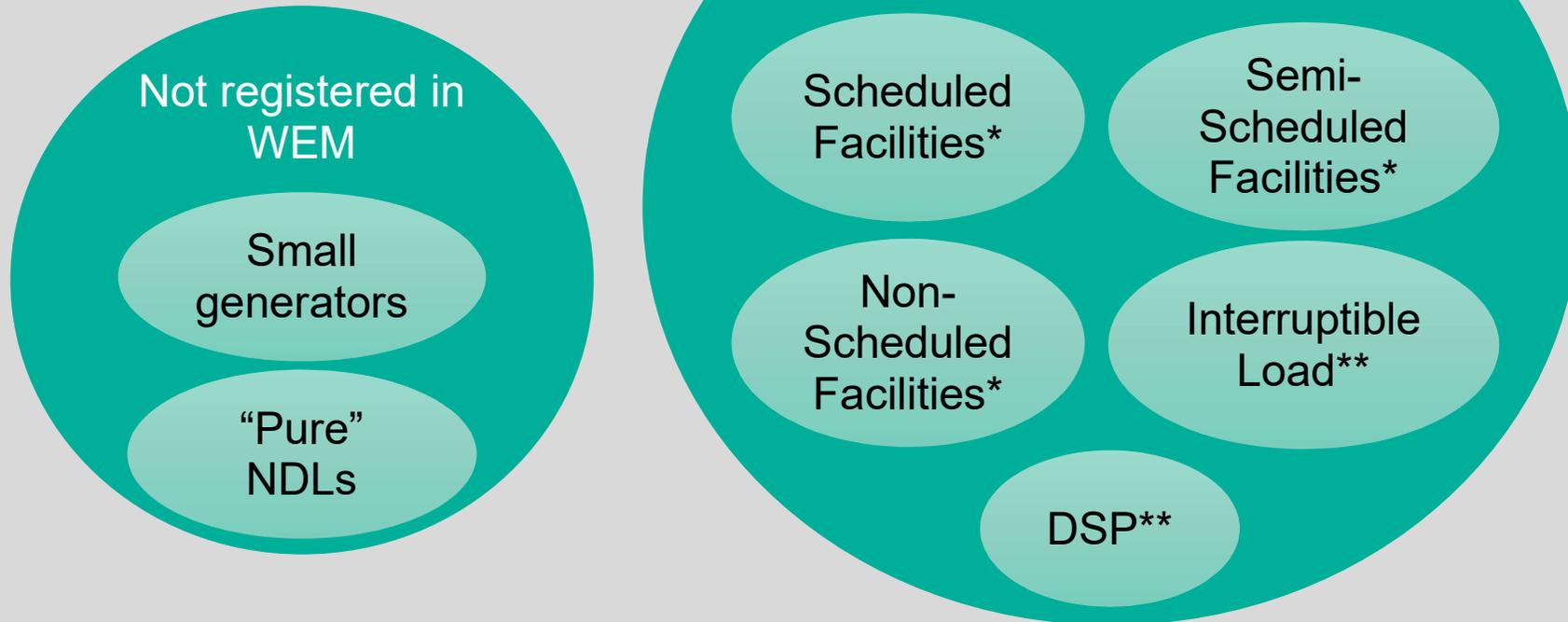
Interruptible load

- DSP is an RCM construct with unique RCM and dispatch obligations
- Interruptible load provides Contingency Raise only:
  - Cleared in an “all or nothing” manner
  - Use to classify aggregated non-dispatchable loads providing interruptible load service only



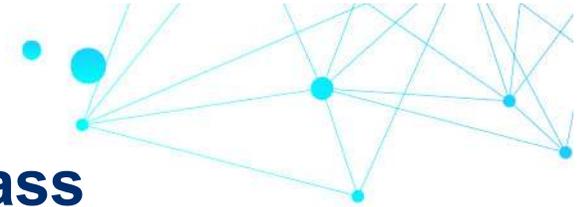
# Facility Class summary

All connection points (NMI)



\*May include aggregation of NDLS providing WEM services (DER)

\*\*Can only be an aggregation of NDLS providing a specific WEM service



## Criterion for classification in a facility class

Controllability: the ability of a facility to control output in any direction in response to a dispatch instruction, for specified period of time

AEMO will determine a facility's controllability and its facility class as part of the registration process using the following design principles:

### Requirement

Scheduled facilities must meet dispatch instruction within tolerance range for specified period

Semi-scheduled facilities not required to meet dispatch instructions, but must respect curtailment cap

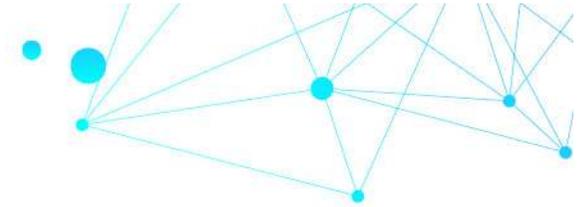
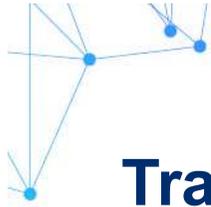
Non-scheduled facilities are not required to meet dispatch instructions or curtailment caps, but must follow direction

### Considerations

Reliability and accuracy meeting dispatch target

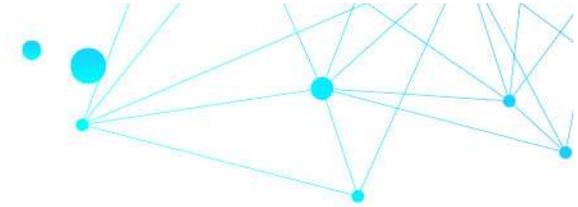
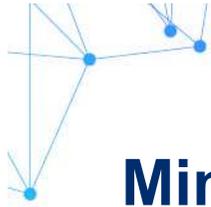
Configuration

Fuel



## Transitioning to new facility classes

Existing facility class	New facility class
Scheduled Generator	Automatically registered as Scheduled Facility
Non-scheduled Generator	>10MW: Automatically registered as Semi-scheduled. If firming resource added, or facility self-nominated as Scheduled, AEMO registration process will apply
	<10MW: Automatically registered as Non-scheduled Facility If self-nominated as Scheduled or Semi-scheduled, AEMO registration process will apply
Interruptible Load	Interruptible Load
Demand Side Programme	Demand Side Programme



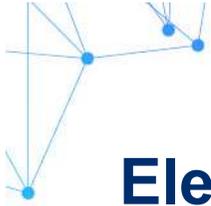
## Minimum threshold for registration

### Current

- Mandatory registration is required for generators above 10MW to ensure AEMO has enough visibility and control to ensure power system security and economically efficient dispatch.
- As the generation mix changes and DER becomes more prevalent, there may be a need for different thresholds for different technologies or generators in different locations, as their impact on system security or system costs may be different.

### Future

- Move from “opt-in” to “opt-out” paradigm
  - Retain the current threshold, but adopt framework that allows AEMO more flexibility to determine if facilities below the current minimum threshold (10MW) need to register.
  - AEMO to set out standing exemption criteria in Market Procedure
- Consider the difference between the absolute value of max withdrawal and max injection for bi-directional facilities, rather than just nameplate capacity.



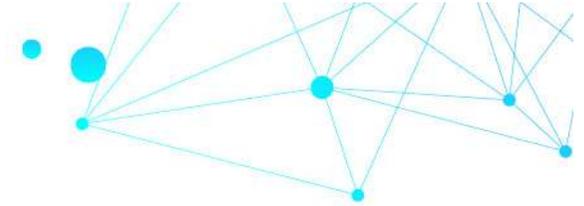
## Electrical location

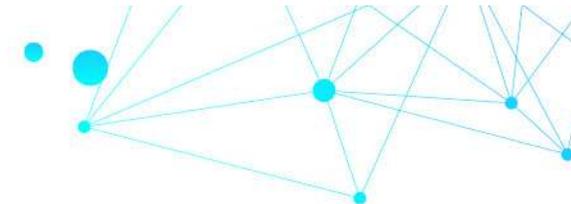
### Current

- Electrical location is not a consideration for dispatch purposes
- However, location is defined for loss adjustment purposes through TLFs and DLFs

### Future

- Move to locational dispatch means electrical location must be defined explicitly for dispatch in a way that:
  - Ensures facilities cannot be aggregated across diverse network connections
  - Does not preclude the participation of DER across the network
- For traditional grid connected facilities, the electrical location is the relevant zone substation (TNI) at which the facility's TLF is defined.
- For DER facilities, the electrical location is the relevant zone substation (TNI) that the distribution network containing the DER facility sits behind.





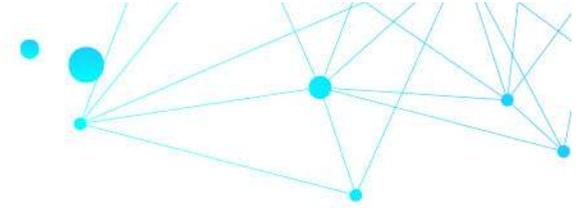
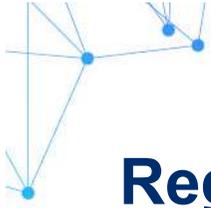
## Intermittent loads

### Current

- Intermittent loads are large loads with embedded generation that are net metered and have unique IRCR obligations.
- These arrangements can create system complexities, inequities in cost recovery and potentially adverse power system security outcomes.
  - If embedded generation gets too large, can lead to under-specification of Contingency Reserve requirement (as gross energy dispatch is required for co-optimisation purposes)

### Future

- New intermittent loads:
  - Net metering arrangements will be allowed in certain circumstances.
  - IRCR arrangements will cease to exist – IRCR based on net consumption
- Existing intermittent loads:
  - Metering arrangements will remain as is
  - ETIU will discuss IRCR arrangements with affected participants



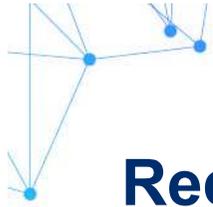
# Registration processes

## Current

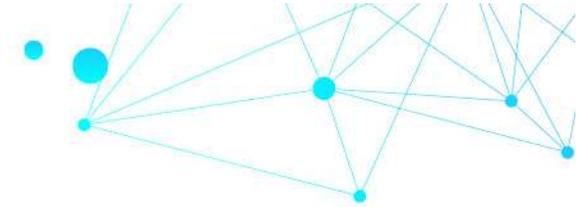
- Registration is largely a one-off process in the current WEM.
  - Participants not required to notify material changes to facilities
  - This creates issues currently, likely to become more problematic in the future as new technologies and more dynamic business models enter.

## Future

- Registration processes will be reformed to reflect a 'lifecycle' approach to registration that recognises that the characteristics of a facility may change over time.
- Consequential changes to operationalise previous Taskforce decisions will be made



# Registration lifecycle overview



## Certification

- Participant registration prerequisite to get capacity
- Facility registration not required
  - Controllability is not a capacity criterion

## Registration\*

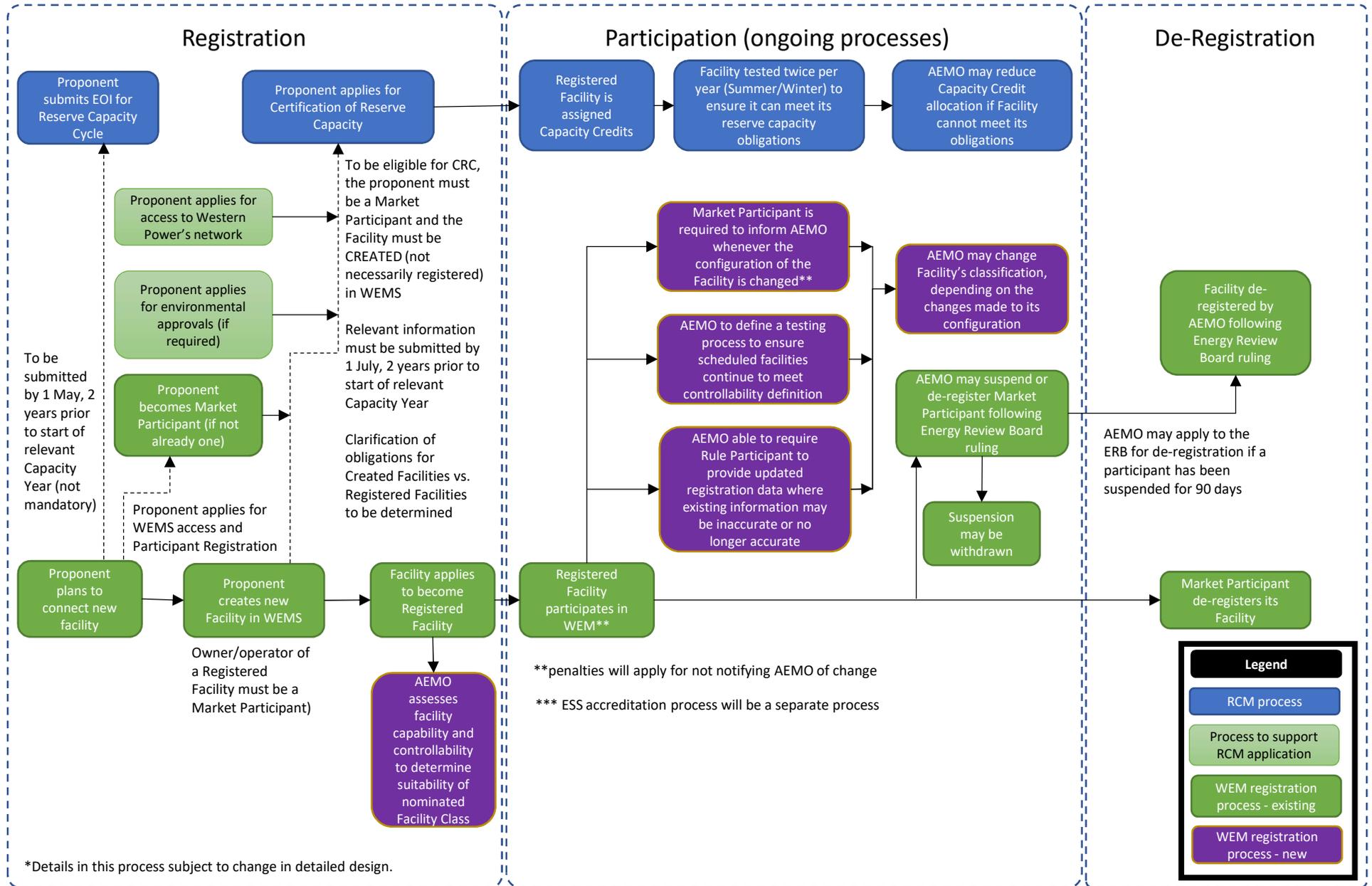
- Controllability assessment occurs before WEM obligations start to apply
  - Will affect facility class and dispatch compliance obligations
- Participants must notify AEMO of configurational changes
  - May affect facility class

## Suspension/de-registration

Current process to be retained

\*ESS accreditation process is separate to registration and can occur during or after registration

# Proposed high level registration process\* - Appendix





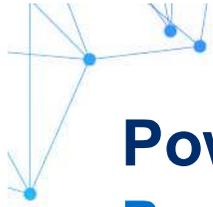
**Energy Transformation  
Implementation Unit**

# **Operating states and credible contingency events**



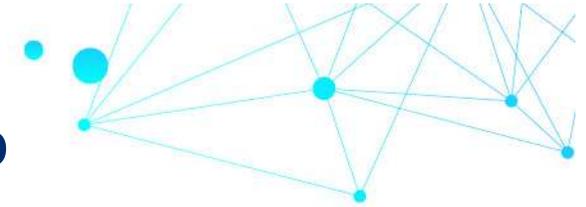
# Overview of past PSOWG decisions





# Power System Operation Working Group

## Recap

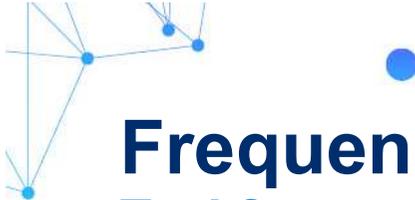


Meetings of the Power System Operation Working Group (PSOWG) held between September and November 2018 supported proposed changes to:

- Frequency Operating Standards
- Contingency Events Framework
- Operating States Framework

All presentations and minutes are available here:

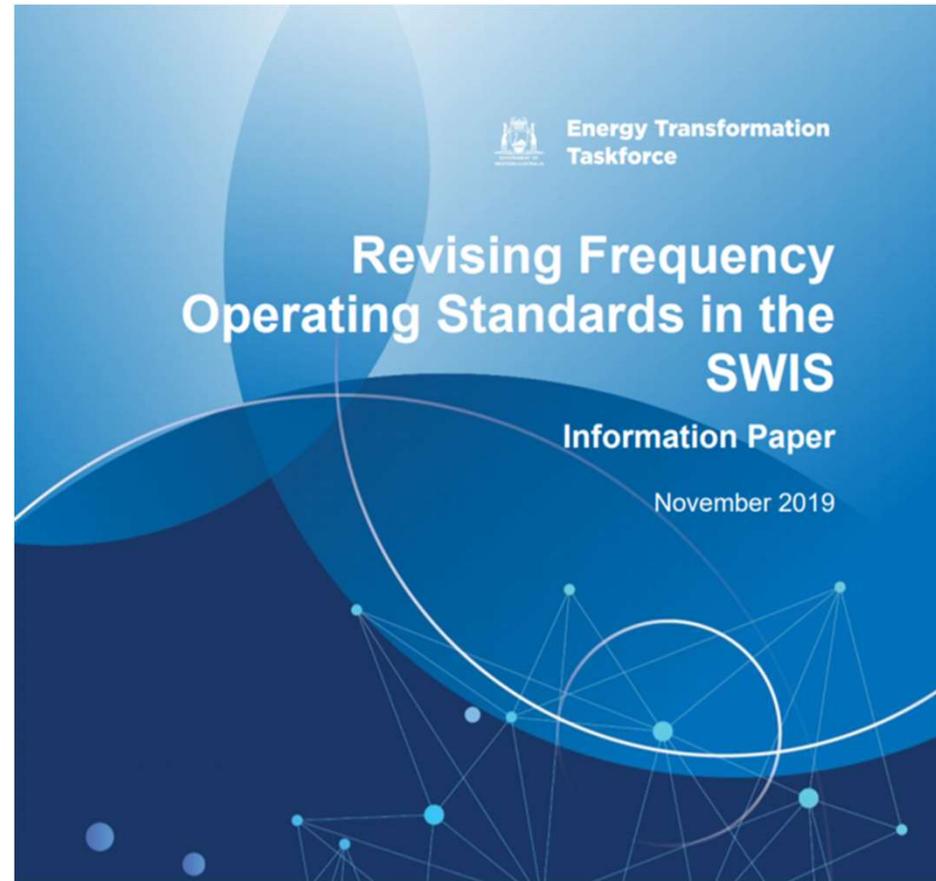
<https://www.erawa.com.au/rule-change-panel-psowg>



# Frequency Operating Standards

Taskforce paper published November 2019

- Use existing settings from Technical Rules within revised framework
- Implement via WEM Rules
- Consultation on draft WEM Rules scheduled for Q2 2020

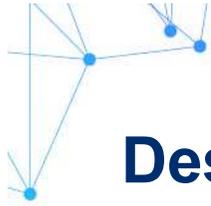


<https://www.wa.gov.au/government/document-collections/taskforce-publications>

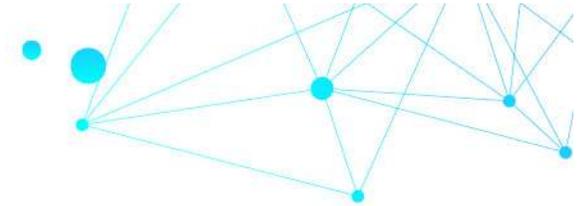
# Operating States and Contingency Events Framework - Recap

Taskforce paper - February





## Design Outcomes



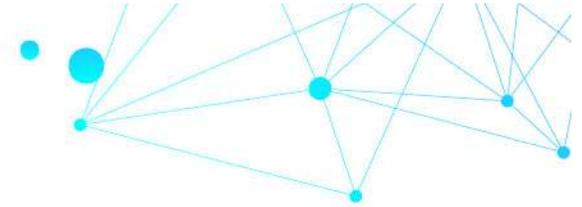
PSOWG agreed the revised Operating States and Contingency Events framework should incorporate the following design outcomes:

- Remove the “hard coding” of specific conditions within the definitions
- Remove the “blending” of reliability and security concepts
- Ensure AEMO has reasonable powers as necessary to manage the reliability and security of the power system
- Provide clarity and transparency on how power system security is maintained
- Address ambiguities in the application of the Operating States framework
- Be consistent with a move towards SCED.



# Contingency Events Framework Recap

## PSOWG Outcomes

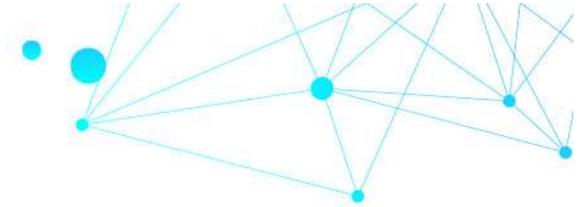


- Create new definition for *contingency event* which includes generating units, facilities and network elements and allows for consideration of large swings in load or non-scheduled generation
- Create a new definition of *credible contingency event* which allows for AEMO to determine events that it considers likely to occur that could impact power system security or reliability
- Create a new framework for classifying *contingency events* as either *credible* or *non-credible* based on circumstances on the power system
- Require AEMO to describe in a Market Procedure what is included as a *credible contingency event*, and the process for re-classification



# Contingency Events Framework Usage

## Linkages to other design principles



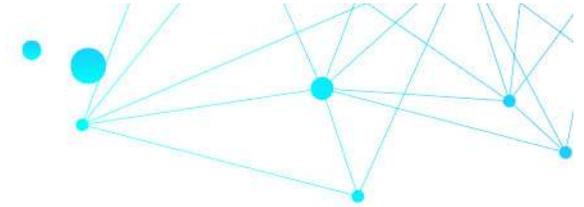
Design element	Linkage
Frequency Operating Standard (FOS)	Ties to the <i>credible contingency event frequency tolerance band</i> with allowable for “single contingency event” (48.75 - 51 Hz), and definition and settings for <i>multiple contingency event</i> .
Constraints Framework	Development of constraints to maintain power system security and reliability considering the occurrence of <i>credible contingency events</i> . Enablement/disablement of constraints in dispatch where a contingency event is classified as <i>credible</i> or <i>non-credible</i> .
Outages Framework	Assessment and approval of outages allowing for the occurrence of <i>credible contingency events</i> .
Generator Performance Standards	Assessment of negotiated performance standards considering the occurrence of <i>credible contingency events</i> .
PASA Framework*	Assessment of risks to power system security and reliability based on the occurrence of <i>credible contingency events</i> .

\* Note that the PASA framework is currently under development and will be a future TDOWG discussion item



# Operating States Recap

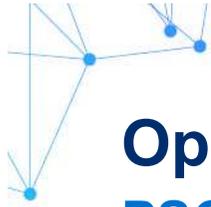
## PSOWG Outcomes



- Replace ‘Normal’ and ‘High Risk’ operating states with:
  - *Satisfactory Operating State*
  - *Secure Operating State*

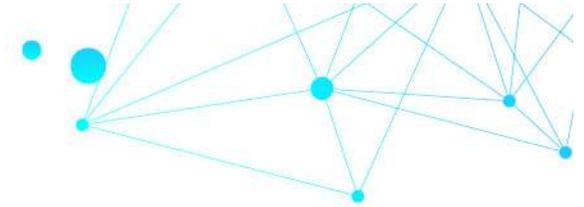
with new definitions

- Add a defined set of *Power System Security Principles* for AEMO to follow in maintaining a *Secure Operating State*, including a timeframe to return to a *Secure Operating State*
- Retain the ability for AEMO to access broader powers to ensure the power system operates within, or can be returned to, a *Secure Operating State*
- Introduce a new term, *Stable*, required for the *Satisfactory Operating State*
- Retain *Emergency Operating State* concept but with revised definition and retain AEMO’s powers to manage *Emergency Operating States*
- Introduce new *Reliable Operating State* concept:
  - Further work on ‘power system reliability’ and the associated framework to be progressed at a later date...

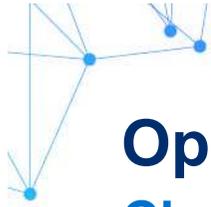


# Operating States Recap

## PSOWG Outcomes

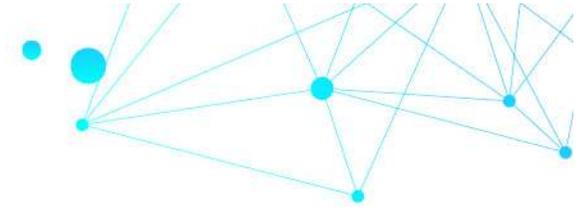


- Retain requirement to develop Market Procedures to document process AEMO follows in determining each operating state
- Agreed to revised definitions for:
  - *Equipment Limit*
  - *Power System Security*
  - *Technical Envelope*
- Agreed to develop revised definitions for:
  - *Power System Reliability*
  - *Power System Adequacy*
- Create new definitions for:
  - *Inertia*
  - *Inertia Requirements*
  - *Fault Level*
  - *System Strength Requirements*

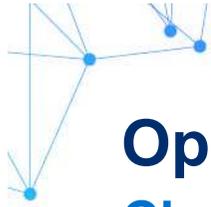


# Operating States

## Changes since PSOWG

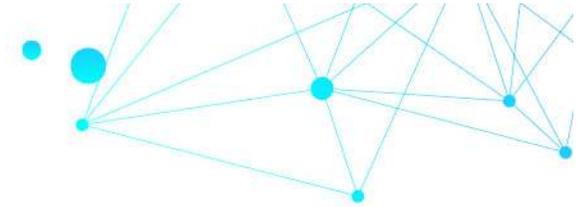


- Satisfactory Operating State:
  - AEMO will be required to develop a **Power System Stability Implementation Procedure** for how it assesses when the SWIS is 'stable' to support the *Satisfactory Operating State*.
  - This will be linked to other processes such as GPS Negotiation, Outage assessment, development of Constraints.
- Reliable Operating State:
  - The WEM Rules do not currently define/describe 'reliability standard(s)'.
    - To give effect to the proposed definition of the *Reliable Operating State*, a set of reliable operating principles will be added to the WEM Rules and AEMO will be required to develop a **Reliability Standards Implementation Procedure**.
    - This will provide transparency on the processes AEMO will follow in assessing whether the SWIS is operating reliably, and allow AEMO to continue work on implementation activities, such as the development of Constraints
  - The Taskforce will consider a broader review of the reliability framework later in the year.

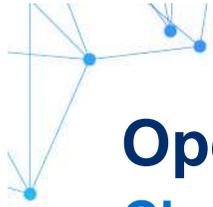


# Operating States

## Changes since PSOWG

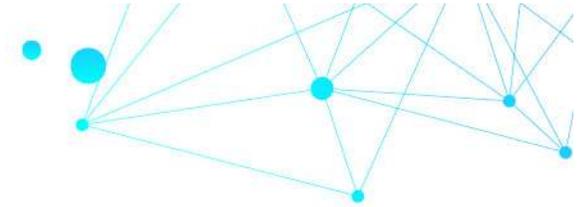


- Revised definitions for:
  - *Power System Reliability*
    - » The ability of the SWIS to operate in accordance with the *Power System Reliability Principles*
  - *Power System Adequacy*
    - » The ability of the SWIS to supply all demand for electricity in the SWIS at the time, allowing for scheduled and unscheduled outages, taking into account the *Reliability Standard Implementation Procedure*
  - *Reliable Operating State*
    - » The SWIS is in a Reliable Operating State when AEMO has not initiated any manual load shedding instructions, and does not expect to initiate any manual load shedding instructions in accordance with the assessments and criteria identified in the *Reliability Standard Implementation Procedure*



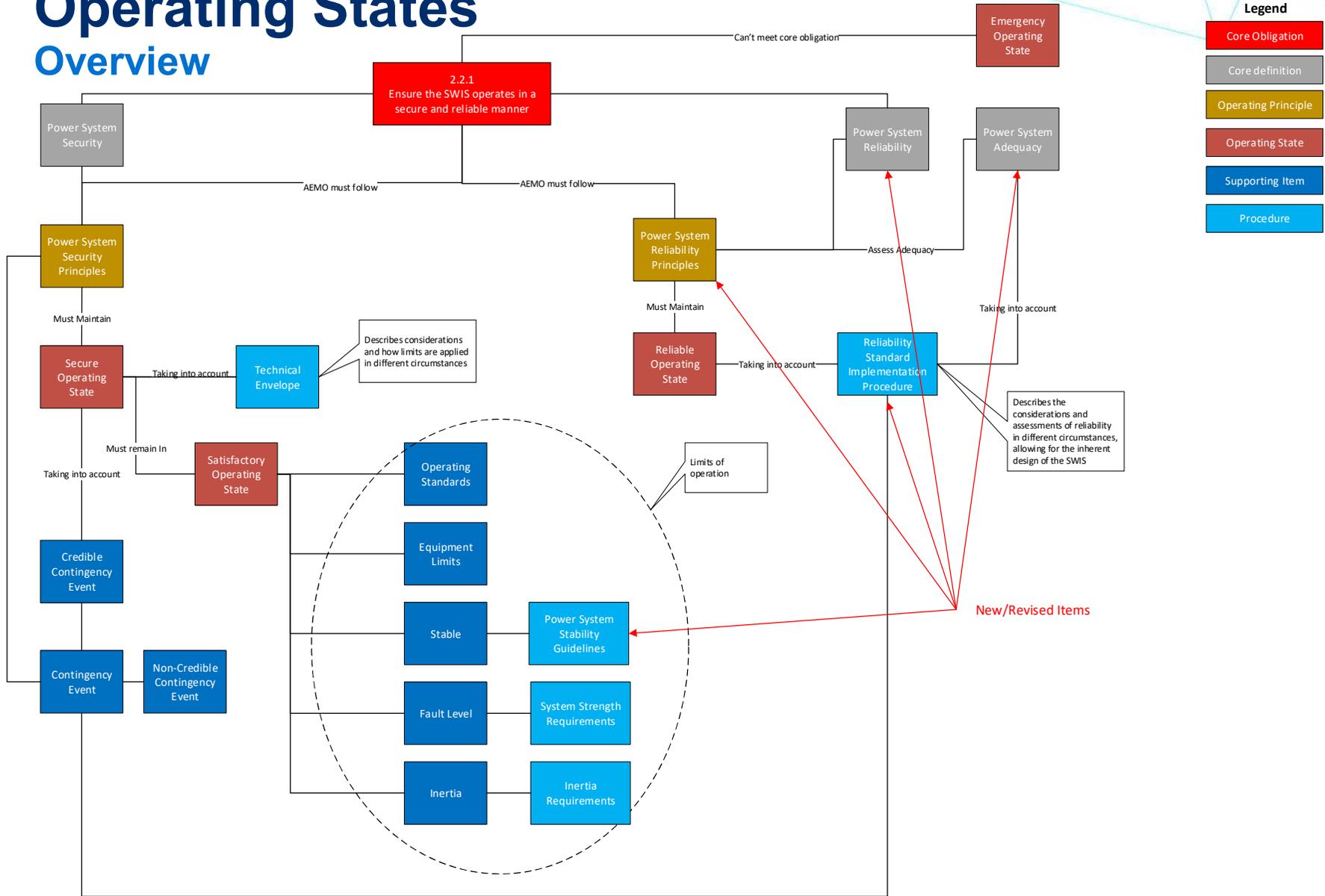
# Operating States

## Changes since PSOWG



- New principles:
  - *Power System Reliability Principles*
    - » To the extent practicable, the SWIS should be operated such that it is in a *Reliable Operating State*.
    - » Where the SWIS is not in, or is forecast not to be in, a *Reliable Operating State*, AEMO must take action to restore or maintain a *Reliable Operating State* as soon as practicable, subject to maintaining *Power System Security*.
    - » AEMO will assess risks to *Power System Adequacy* and act to minimise the risks in accordance with the *Reliability Standard Implementation Procedure*.

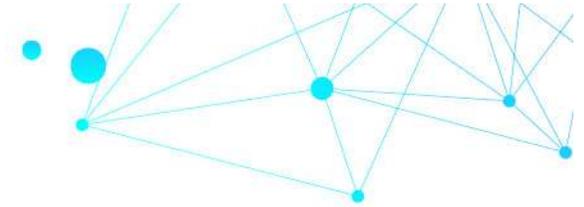
# Operating States Overview



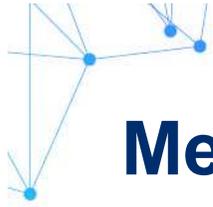


## Next Steps

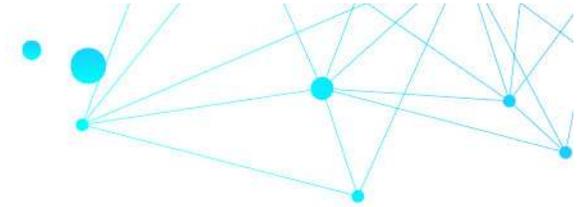
Taskforce paper – published March 2020



- Taskforce to consider Operating States and Contingency Events Framework – late February
- AEMO, ETIU and WP work draft WEM Rules to implement design
- Consultation on draft WEM Rules scheduled for Q2 2020 (with FOS)



## Meeting close



- Questions or feedback can be emailed to [TDOWG@energy.wa.gov.au](mailto:TDOWG@energy.wa.gov.au)
- The next meeting will be communicated via email.