Emerging Generation and Energy Storage – Grid-scale

Stakeholder Session

November 2018

Agenda

A	**Introduction** to and **objectives** of the Emerging Generation and Energy Storage initiative	5 min
B	Energy storage systems and proposed **bi-directional category**	2 hrs 10 mins
C	Other changes AEMO wants to progress: **Information to project developers** and **exempt networks**	30 mins
D	Other significant areas of change – **separation of financial and operational responsibility** and **logical metering**	45 mins
E	Wrap up and **next steps**	10 mins

SESSION A: Introduction and session goals

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Session goals

- ✓ To explain the improvements AEMO is proposing and the reasons for these
- ✓ To obtain your initial insights and feedback
- ✓ To understand whether the proposed changes meet your needs and the markets prior to pursuing rule changes

AEMO's project priorities will be informed by stakeholders

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SESSION B: Energy Storage Systems (ESS) and Proposed Bi-directional Resource Provider category

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Current ESS participation arrangements

Registration
person **registers** in different categories (e.g. Generator and Customer) and **classifies** different assets (e.g. scheduled, semi-scheduled and market load)

non-energy recovery and intervention mechanisms, **TUoS** and Participant fees

Operation
- separate treatment of generation (export) and load (import)
- two unlinked dispatchable unit identifiers (DUIDs)
- two MLFs (one for import and one for export)
- metering arrangements vary, a minimum of one NER compliant metering installation

can participate in **all NEM markets**

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Proposal

Define ESS

A resource capable of **receiving imported *energy*** from the *national grid* or other energy source and **storing it for later export of energy** to the *national grid* or *Customer* located (or connected) at the same site

New Registered participant category: Bi-directional Resource Provider

- **Stand-alone ESS**: participating as a single asset, including a single offer
- **'Hybrid' system:** ESS or a combination of other resources (ESS, generating unit and/or load) participating as a single facility

Proposal

Bi-directional Resource Provider: resource combinations

- Stand-alone ESS (stream 1 only)
- ESS and generating unit/system
- ESS and load
- ESS, generating unit/system and load
- Load and generating unit/system

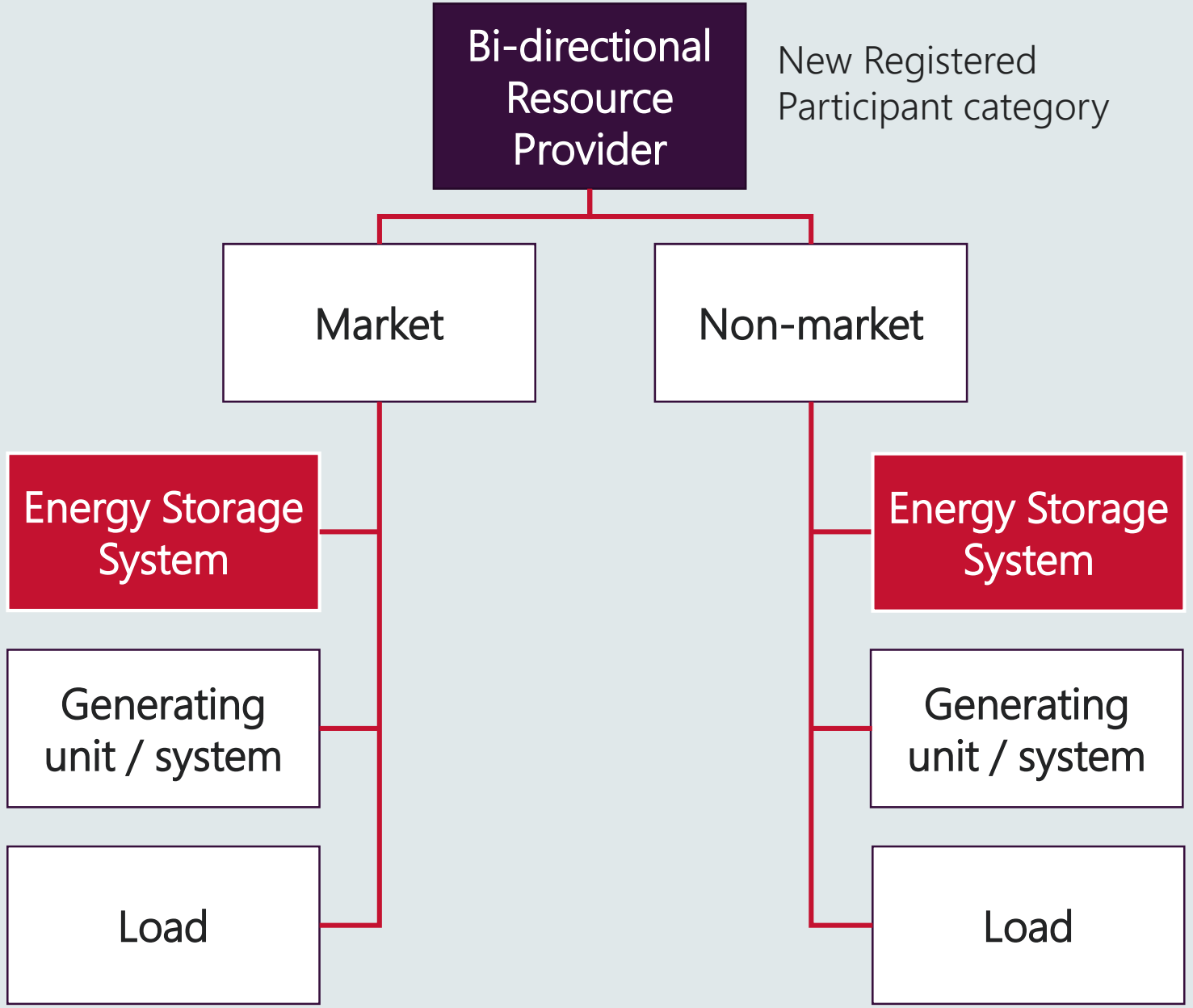
Participation in central dispatch

Single offer, 10 price-quantity bands. Two offers, if ESS has a non-continuous operating range

Fees and charges

- **Non-energy recovery and Participant fees and charges:** import and exported electricity
- **Transmission Use of System (TUoS):** treated in the same way as a generating system, review of distribution and transmission network pricing should be undertaken

Proposed Bi-directional Resource Provider



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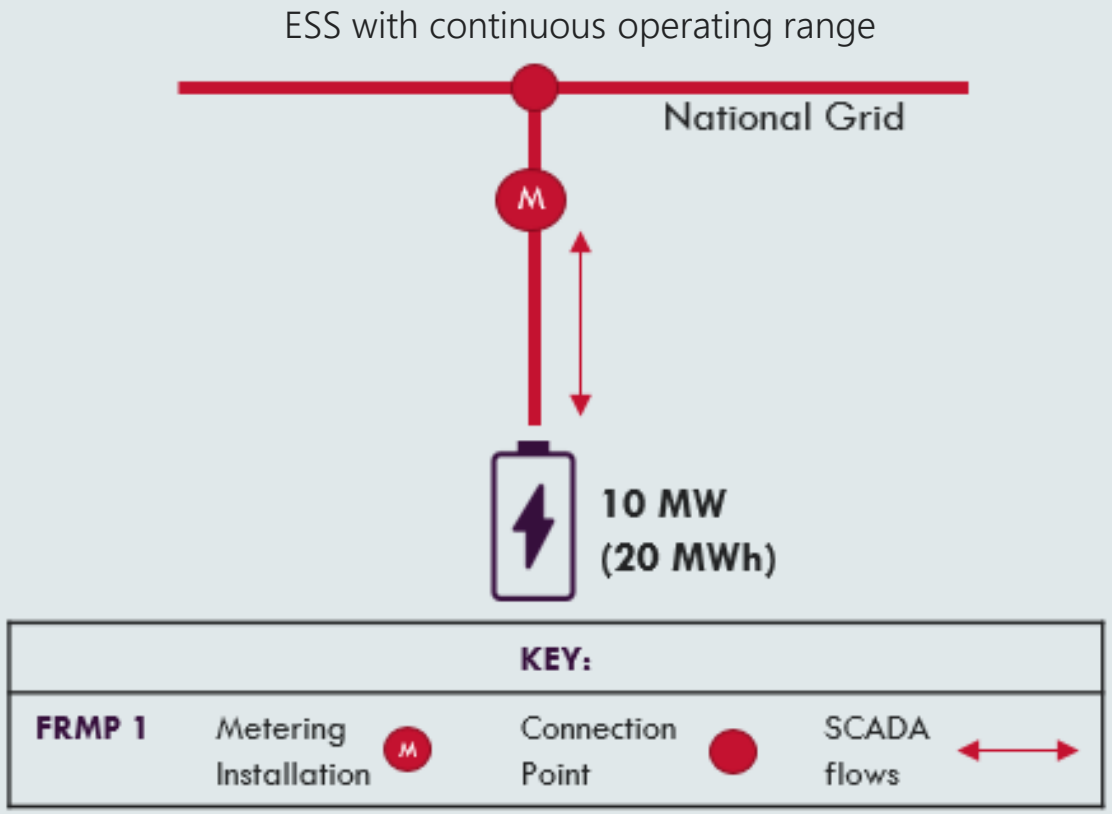
How would a ‘stand-alone’ ESS participate under what’s proposed?

Stream 1

- person registers as Bi-directional Resource Provider for entire system
- scheduled (5 MW and above)
- provides one offer and receives one dispatch target

Stream 2

Same



How would a ‘hybrid’ system participate under what’s proposed?

Stream 1

Person registers as:

- Bi-directional Resource Provider for ESS, scheduled, provides one offer

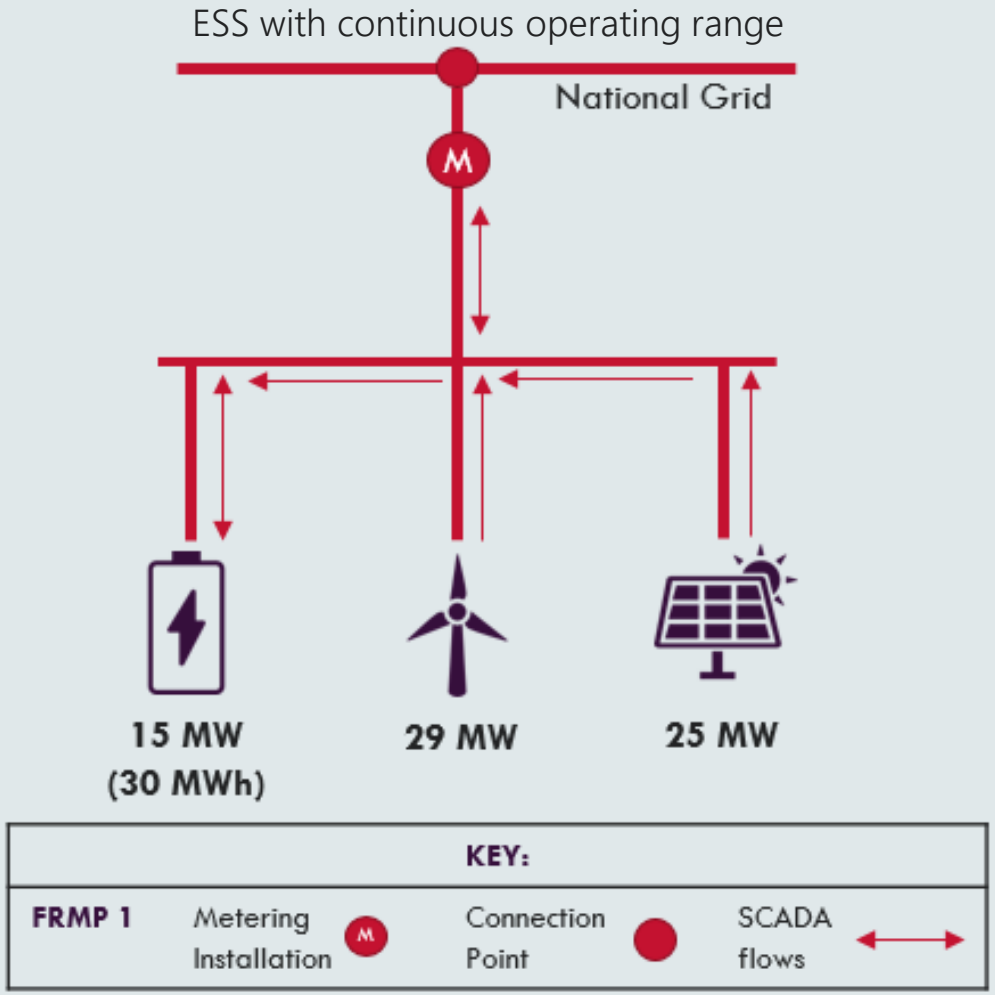
- Generator, classifies as 2 semi-scheduled generating units provides two separate offers and receives two dispatch targets

Stream 2

- person registers as Bi-directional Resource Provider for entire system

- scheduled

- provides one offer and receives one dispatch target

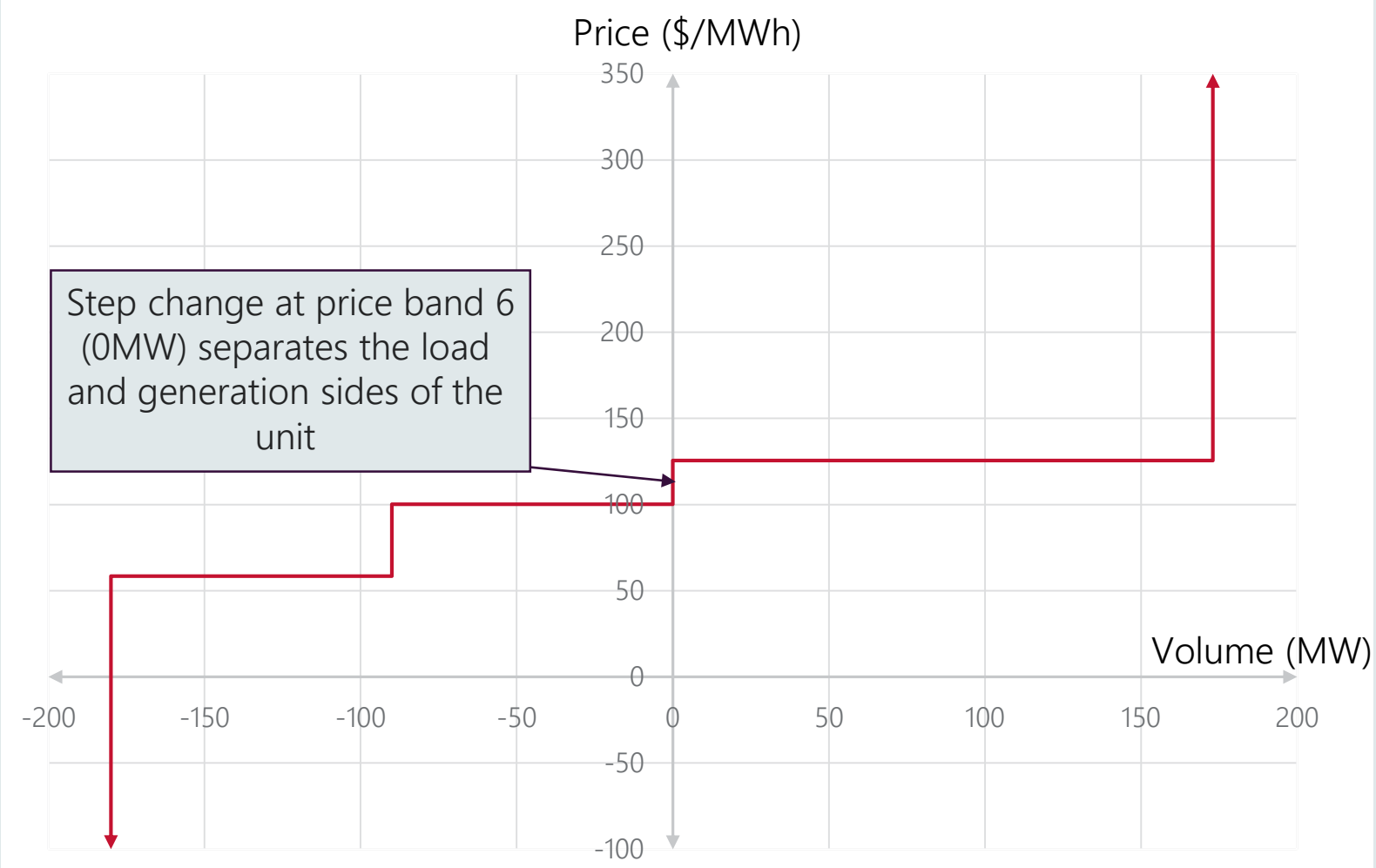


Why is this change important?

Benefits

- Improved understanding through clear NER obligations, including for fees, charges and non-energy recovery
- Single registration and participation model improves operational efficiency by:
  - less complicated registration and participation arrangements
  - more efficient bidding process
  - reduces the risk of dispatching both generating unit and load
  - ESS stand-alone, simpler control system (no need to net off multiple dispatch targets)
- Less complicated IT arrangements
- Improved market information for better decision-making

What would it look like in central dispatch?



What challenges has AEMO identified?

Identified challenge	Stream 1: ESS only	Stream 2: 'hybrid' system aggregation	Options
Single dispatch offer to not be monotonically increasing - application of separate MLFs for imported and exported electricity	Y	Y	**A. Single MLF in dispatch, two in settlements** B. Market participant enters dispatch offer such that offer * MLF is always increasing or it is rejected C. Introduce additional integer variables to NEMDE
Single dispatch offer for non-continuous operating ESS	Y	Y	**A: Non-continuous ESS have separate bid/offer** B: Introduce additional integers to the NEMDE solver

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What challenges has AEMO identified – stream 2 'hybrid' system aggregation ?

1. More sophisticated energy management and bidding systems for individual resources
2. FCAS trapezium for individual resources that are technically dissimilar
3. Providing pre-dispatch and PASA forecasts for individual resources

How this session will work

- Split into table groups
- Each group to discuss the 2 themes:
  - Theme 1 – current challenges associated with ESS and 'hybrid' systems – 30 minutes
  - Theme 2 – defining ESS, proposed participation model, including challenges/risks and NEM recovery mechanisms – 30 minutes
- 1 representative from each group to report back to room

Questions – are we on track?

Theme 1: Participation challenges for ESS and 'hybrid' systems, and the proposed definition?

1. Are there any other benefits associated with defining and integrating ESS into the NEM?
2. Should the definition of ESS be generic (encompass technologies other than batteries, e.g. pumped hydro)?
3. What do you think of AEMO's proposed ESS definition? Can you suggest any improvements?

Questions – are we on track?

Theme 2: Proposed participation model – Stand-alone ESS

4 Would the stand-alone ESS proposed participation model meet your future needs? Why/ why not?

5 Are all the proposed information requirements able to be provided by ESS proponents? Why/ why not?

6 Would the 'hybrid' system proposed participation model meet your needs? Why/ why not?

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Break

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SESSION C: Immediate work

(i) Exempt networks and application of performance standards
(ii) Providing NEM information to project developers

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Exempt Networks – Current

- A person with a generating system connected to the grid **must be registered** with AEMO, unless exempt from registration
- **Performance standards**
  - Agreed with AEMO as part of registration
  - Used as a tool to manage power system security
- **AER can exempt** from NSP registration or operation of Chapter 5
- Any person applying for NR01/NR02 exemption class needs to confirm with AEMO that the performance standard applies or is unlikely to pose a power system risk

Exempt Networks

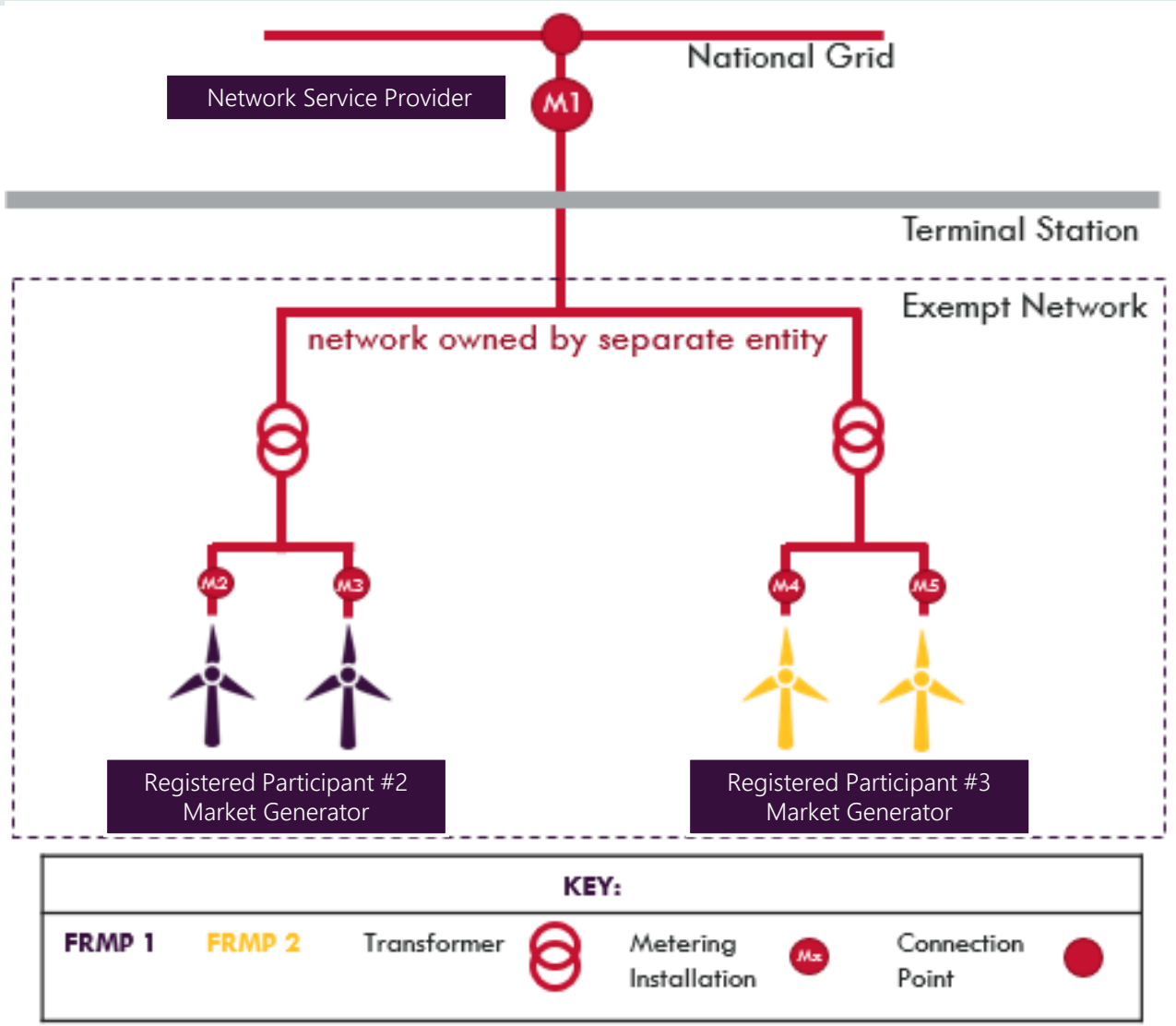
Issue

Where a Registered Participant (financially responsible Market Participant - FRMP) is connecting to an exempt network the **NER is unclear on whether a performance standard applies**

Preferred option

Amend the NER to ensure that relevant clauses of Chapter 5 (including 5.3.4A, 5.3.4B, 5.7.3, etc) and rule 4.14 apply to ensure plant connected to exempt networks by Registered Participants will have agreed access standards that apply as performance standards for the purposes of the NER

Exempt Networks - Example



Note: Generating systems to be individually registered

NEM information to project developers – Current

- AEMO must protect confidential information from unauthorised use or disclosure
- The NER allows AEMO to provide specific information to Registered Participants, including an **Intending Participant**
- Proponents typically register as an Intending Participant to gain **access to information** needed to build a generating system
- One of the 'new' business models is for developers to build generating systems and sell them prior to connection to the grid

NEM information to project developers

Issue

- To be **eligible to be an Intending Participant**, AEMO must be reasonably satisfied that the person "…intends to carry out an activity in respect of which it must or may be registered as a Registered Participant."
- Developers who wish to build a grid-scale resource and sell them prior to connection, do not meet this criteria and may be unable to gain access to the necessary information

Preferred option

Amend Intending Participant category (NER clause 2.7) to include that a person can register to become an Intending Participant for the purposes of building a grid-scale resource (e.g. generating system)

Questions – are we on track?

Exempt networks and application of performance standards

1. Are there any costs, risks and benefits associated with AEMO's preferred option?

NEM information to project developers

2. Should a person intending to develop or build a generating system (and not subsequently register as a Generator) be allowed to register as an Intending Participant?

3. Are there other costs, risks and benefits associated with providing NEM information to project developers?

SESSION D: Future work

(i) Separation of operational and financial responsibilities
(ii) Logical metering arrangements

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Separation of operational and financial responsibilities

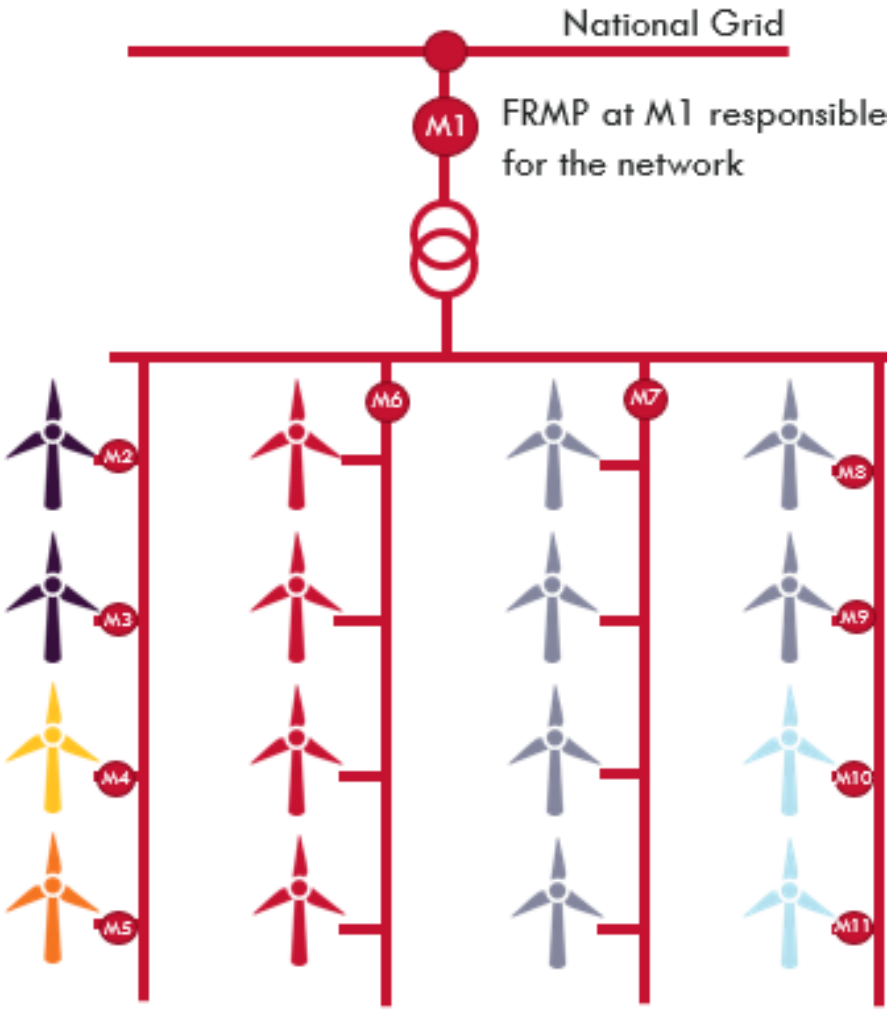
Context

- Under the NER, a Registered Participant is responsible for the connection point, including financially and, in the case of a generating system, for the performance standard
- AEMO is responsible for settlement and prudentials for all Registered Participants
- Where there are 'downstream' financial arrangements, these are settled by the parties involved

Opportunity

- Changing the NEM arrangements to allow separate technical (connection agreement, establishing and compliance with a performance standard, operational (bidding and dispatch)) and financial responsibility of generating systems or units
- Is there an individual and market benefit?

Separation of operational and financial responsibilities – scenario



KEY:		
FRMP 1	FRMP 2	FRMP 3
FRMP 4	FRMP 5	FRMP 6
Metering Installation Mx	Connection Point	Transformer

Separation of operational and financial responsibilities – to consider

- A substantial market change - NER, system and procedure changes would be required
- Each 'off-taker' would need to register with AEMO separately for their generating units and meet individual settlements and prudential requirements
- The responsibilities and arrangements for:
  - default events, NEM suspension or ceasing to be a Registered Participant
  - the sale of the entire generating system to a new owner
  - individual 'off-takers' for dispatch of the 'downstream' generating units.

Logical metering arrangements

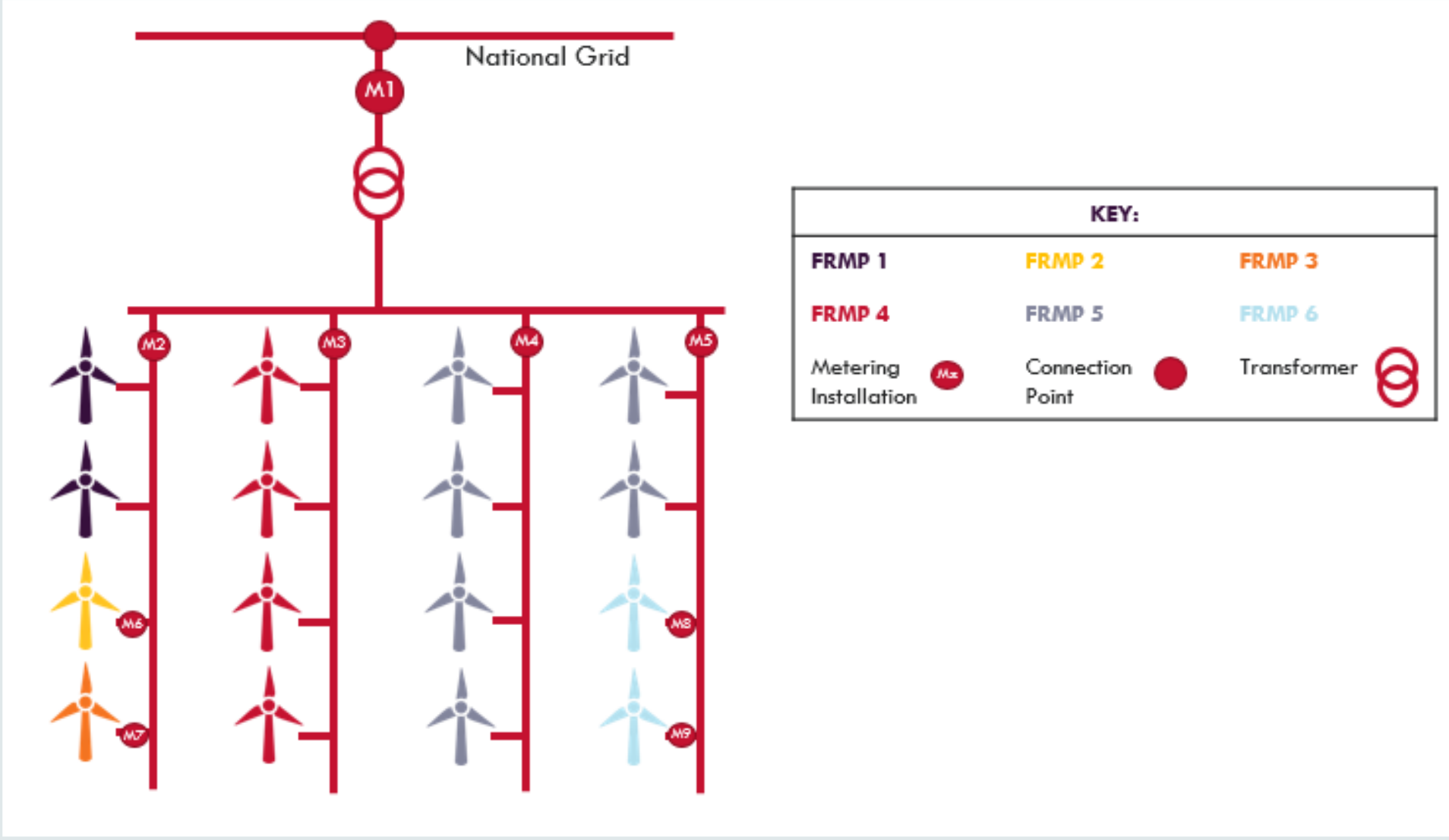
Context

- Logical metering arrangements
  - the assembly of physical metering installations, calculations and processes to derive the metering data for a connection point that does not have a physical metering installation
- NER requirements
  - each connection point, that a Registered Participant is responsible for, must have a NER compliant metering installation
  - there are some special sites where a metering installation could not be installed and a logical metering arrangement exists
- Why do we have a NER compliant metering installation?
  - to measure and value the electricity imported and exported to the grid

Opportunity

- AEMO receives regular requests for logical metering arrangements that do not meet special site conditions
- Should the use of logical metering arrangements be allowed more broadly?

Logical metering arrangements - scenario



Logical metering arrangements – to consider

- A substantial market change - NER, system and procedure changes
- Logical metering arrangements introduce components that may be based on assumptions (e.g. loss factor determination and incorrect application of the logical calculation) that may compromise the accuracy of energy market settlements
- The same Metering Coordinator and Metering Data Provider would be required across the facility
- Arrangements for determining loss factors
- Who should pay to the costs of setting up these arrangements

How this session will work

- Split into table groups
- For each theme, groups have 15 minutes for discussion and to record thoughts
- 1 representative from each group to report back to room

Questions – is this change a priority?

Separation of operational and financial responsibilities

1. Are there market benefits and risks with allowing the separation of operational and financial responsibilities?

Logical metering arrangements

2. Are there market benefits and risks with using logical metering arrangements?

3. If logical metering arrangements are used instead of a NER compliant metering installation, who should pay for these arrangements?

SESSION E: Wrap up and next steps

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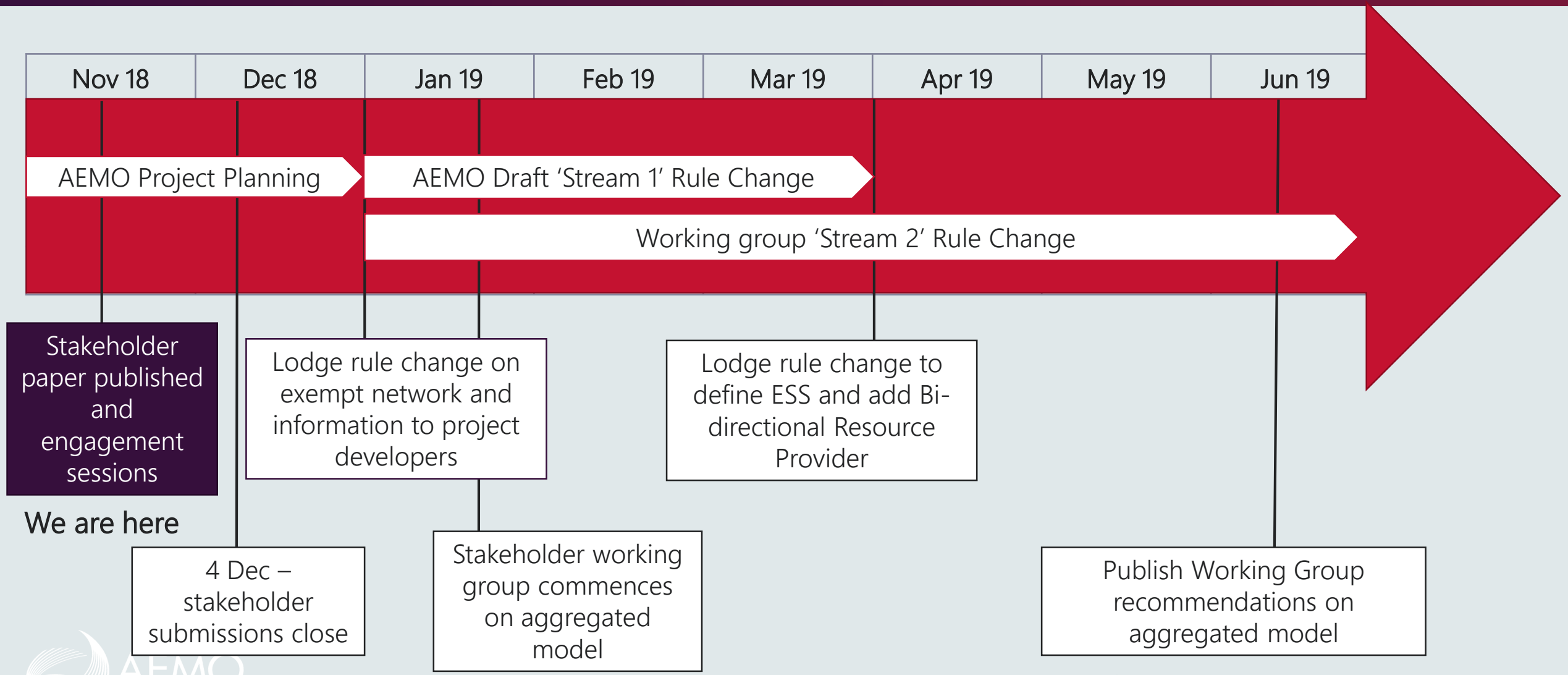
WHERE ARE WE NOW



Contact details

Information on the EGES initiative and todays meeting will be circulated to attendees and available on the **AEMO website**. If you have any questions or feedback please reach out to the **EGES mailbox**.

http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Initiatives/Emerging-Generation-and-Energy-Storage-in-the-NEM---Grid-Scale

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