Meeting Notes – Emerging Generation and Energy Storage

MEETING: MELBOURNE STAKEHOLDER SESSION

DATE: Thursday, 22 November 2018

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ATTENDEES:

NAME	ORGANISATION
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Ross Gillett	AEMO
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Allicia Volvricht	AEMO
Luke Robinson	AEMO (Partial)
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Rajesh Arora	AECOM
Victoria Mollard	AEMC
Paul Dunn	AER
Anthony Seipolt	AER
Dan Mascarenhas	AGL
Mark Riley	AGL
Michael Zammit	AGL
Lucy Cooper	ARENA
Jon Sibley	ARENA
Luke Clough	AusNet Services
Lauren Fetherston	AusNet Services
Erika Twining	AusNet Services
Thiago Costa	Canadian Solar
Prem Panickar	Department of Environment, Land, Water & Planning
Joy DSouza	Department of Environment, Land, Water and Planning
Steve Foster	Department of Environment, Land, Water and Planning
Brittany Pistevos	Diamond Energy
Claire Richards	Enel X
Georgina Snelling	EnergyAustralia
Simon Vanderzalm	Greenview Strategic Consulting
Peter Nunn	HARDSoftware
Prajit Parameswar	Hydro Tasmania
Greg Allen	Hydrostor Australia
Keith Frearson	Jacobs
Luis Esteban	Lightsource BP
Luke Brown	Lyon Infrastructure
Tom Geiser	Neoen
Maja Barnett	Pacific Hydro
Jonathon Sarah	R.V.S. INDUSTRIES PTY. LTD (Partial)
Julian Dichiera	Reach Solar Energy
Jiufu Lim	Renewable Intelligence
Michael Chiang	Risen Energy
Jill Cainey	S&C Electric Company

Warwick Heaney	Siemens Gamesa
Panos Priftakis	Snowy Hydro
Elias Abou-Saba	Tesla
Emma Fagan	Tesla
Antonie Riboulon	Tesla
Marcelle Gannon	Tilt Renewables
Jennifer Sai	TransGrid
Nicola Tully	TransGrid
Max Willrath	UPC Renewables Australia

These meeting notes reflect key stakeholder discussion points to the questions in the presentation. AEMO will consider each of these points in developing future rule changes and its project priorities.

Section B: Energy Storage Systems (ESS) and proposed Bi-directional Resource Provider category

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?
    - Participants agreed that defining ESS was necessary and the benefits were captured well in the Emerging Generation and Energy Storage (EGES) stakeholder paper.
    - Improving clarity and transparency under the National Electricity Rules (NER) was a benefit. Examples of these benefits:
        - Easier for participants to understand registration and participation in the NEM.
        - Avoiding misinterpretation under the NER.
        - Increased transparency of operational activities related to generation and load.
        - Clarify the performance standard that apply to the import or load component of an ESS.
    - Other benefits included:
        - Future proofing the NEM arrangements, including:
            - Recognition of new technologies and provides an opportunity to discuss and address the challenges facing them, including valuing and utilising ESS capability.
            - Facilitate understanding of issues and value of 'hybrids'.
            - Bidding simplicity and avoiding dual clearing (of load and generation sides of the asset), which currently needs to be carefully managed.
        - Inclusion of 'other energy source' in the definition recognises that imported electricity could be sourced locally (i.e. at a site), not necessarily imported from the grid.
        - It was noted that this may work with proposals for demand response, e.g. it could allow the site to be treated as demand response.
    - As a negative, one participant identified that a single offer would halve the number of bands now available. In discussion it was not clear whether this was a major issue.
    - Participants were unsure how the single offer could be used to achieve specific outcomes and requested some worked examples.

2. Should the definition of ESS be generic (encompass technologies other than batteries, e.g. pumped hydro)?
    - All participants agreed the definition should be generic covering all ESS. Reasons for this support included:
        - Maintenance of a technology-neutral approach, in line with NER design principles.
        - Future-proofing the definition.
        - There are risks associated with too much specificity in the definition.
3. What do you think of AEMO's proposed ESS definition? Can you suggest any improvements?
    - Several participants noted that the definition should reference electricity only, rather than energy.
        - AEMO explained that *energy* is a defined term in the NER. *Energy* is *active energy* and/or *reactive energy.*
        - *Secretariat note:*

          Active energy is defined as a measure of electrical energy flow, being the time integral of the product of *voltage* and the in-phase component of current flow across a *connection point*, expressed in watthour (Wh).

          Reactive energy is defined as a measure, in varhour (varh), of the alternating exchange of stored energy in inductors and capacitors, which is the time-integral of the product of *voltage* and the out-of-phase component of current flow across a *connection point*.
    - Some participants also indicated a preference for the definition to refer to a 'connection point' rather than a 'site'. Some participants suggested that the definition could be at the connection point and not require it to be storage, instead only refer to the imports and exports at the connection point and these are greater than a defined threshold.
    - Some participants suggested that the definition needs to be as general as possible, noting that we risk the objective of 'future proofing' arrangements if it is too specific.
    - One participant group suggested that the definition could be considered in two components:
        - An asset definition to define what storage is, and
        - A registration category definition.
    - Some stakeholders suggested that the definition could be further generalised to reflect 'bi-directional energy systems', which support import from and export to the grid at the connection point.
    - Questions raised in this session included:
        - Does Basslink fit into this definition? Answer: No, Basslink would continue to be considered a Network Service Provider.
        - Does pumped hydro fit into this definition? Answer: Yes. If the pumped hydro has a non-continuous operating range, it would need to operate as two DUIDs for the import and export.
        - How is auxiliary load treated in this definition? Most generators in the NEM use some power to start up or for other operational purposes, so may be considered bi-directional. Is there a load threshold for the unit to be considered bi-directional? Answer: Under the proposed ESS definition, imported electricity for

an ESS is not auxiliary load. If an asset is a generating unit or generating system, it would continue to register under the Generator category and for its small amount of imported electricity would be treated as auxiliary load.

- If using "national grid" in the definition, would it apply at the distribution level? Answer: The NER defined term "national grid" refers to both transmission and distribution systems.
- Does this apply if in an exempt network? Does the exempt network constitute the 'national grid'. Answer: Yes, it is either a transmission or distribution system.

Theme 2: Proposed participation model – ESS and hybrid system

4. Would the stand-alone ESS proposed participation model meet your future needs? Why/ why not?
   - Most participants agreed that, on face value, the stand-alone ESS model would theoretically meet their needs. It was noted that these concepts need to be stress tested with willing stakeholders.
   - Other comments from stakeholders included:
     - Single energy offer is simpler, however there was a request for worked examples to better understand the details and mechanism of bids/ offers.
     - May be simpler for retrofitting a battery to an existing asset:
       - Does not reopen the performance standard.
       - But may not be able to combine other costs including causer pays.
   - Question: Are two DUIDs and offers still required for FCAS under this model? Answer: No, a single DUID would apply if the ESS has a continuous operating range. Energy and FCAS require separate offers, as per any plant.
5. Are all the proposed information requirements able to be provided by ESS proponents? Why/ why not?
   - A participant with battery experience expressed that the proposed data is all available and providing to AEMO would not be an issue.
   - A concern around confidentiality of information (e.g. state of charge (SoC)) was expressed. There is no issue with sharing with AEMO but the concern is if that information was available publicly.
   - Stakeholders requested information on how the variables would be used in NEMDE and PASA. It was noted that examples would be useful.
   - On the actual proposed information, some participants identified some other quantities that should be added:
     - SCADA: min state of charge.
     - need to have PASA discharge and charge.
   - The information terms appear to be very battery-focussed, and there was a suggestion to change the names to make it more general across pumped storage and other storage technologies.
   - AEMO might need this information even without a change to ESS registration because AEMO will still need to reflect the energy limitations.
   - PASA requirements may be tricky. In a hybrid, the forecast for storage will rely on VRE forecasts.
   - Are there any other variables that AEMO needs, e.g. temperature (note, temperature affects battery performance)?
6. Would the 'hybrid' system proposed participation model meet your needs? Why/ why not?

- A hybrid model is needed as there is an increase in projects with multiple participants, so we need a model to cope with this.
- Hybrid solution should allow for different 'modes' of operation, e.g. smoothing, arbitrage, grid services, etc.
- There may be a role for demonstrations of hybrid arrangements/ registrations.
- It should be optional whether to aggregate or not even if all the assets are owned by the same party - nobody is obliged to aggregate all generating units in a single power station either.
- Need a greater understanding of how FCAS would work for hybrid arrangements. This would be complex.
- From a participant perspective, there was discussion about the additional complexity, including that managing dispatch schedules would be difficult. Other questions included:
    - How are you going to be compliant?
    - How do you predict and verify performance?
- Complexity arises when AEMO looks behind the connection point:
    - Different constraints.
    - Not convinced hybrid model works for energy and FCAS.
    - Complicated – too many factors hard to predict/ verify performance.
- Hybrid arrangements could simplify environmental approvals.
- PASA would be quite tricky given that your forecasts would require forecasts of the variable component.
- Questions raised:
    - Clarification requested around the combination of semi-scheduled generation with batteries, being considered scheduled in the hybrid arrangement?
    - Should the capacity of the hybrid system be the intended export / import capacity at the connection point versus the sum of nameplate ratings of the components?
- Stakeholders noted that potential use cases for aggregating hybrid facilities require further thinking to understand how they would work in practice and what opportunities and risks they bring and whether there are ways to manage this currently or with other changes:
    - Curtailment management. A single offer may allow constrained flows from the connection point but the participant could charge some storage locally with output that would otherwise be spilled. This case needs to be unpacked and considered what happens in a thermal constraint versus stability constraints where the different components of the hybrid facility may be differently affected.
    - DC coupled battery and solar. Can this be operated as a disaggregated facility?

Section C: Immediate work

(i) Exempt networks and application of performance standards

- P. Dunn expressed the AER's support for this change and that any significant generation source needs to have enforceable performance standards.

(ii) Providing NEM information to project developers

No stakeholder feedback was received.

Section D: Future work

(i) Separation of operational and financial responsibilities

10. Are there market benefits and risks with allowing the separation of operational and financial responsibilities?
    - Benefits:
        - Supports different business models and operational structures. Some participants considered that this operation would unleash value and there could be benefits (such as transferring the prudential responsibility to the off-taker).
        - Cost effective approach for the project.
    - Some participants could not identify tangible benefits and noted that anything that is trying to be achieved here could equally be achieved through private arrangements.
    - Risks:
        - Complexity in applying dispatch requirements to multiple parties with different interests/ bidding strategies.
        - Where Intermediaries are involved, it adds to the risk.
        - Potential contradiction between multiple PPAs.
        - How people are responsible for parts of a performance standard is not clear.
    - If the arrangements are re-designed to allow for this separation, the following was suggested or noted:
        - It would work better if it was on a physical basis (e.g. turbines) as opposed to a proportion of output – easier to allocate risks and responsibilities.
        - The arrangements would need to be flexible enough to change over time. PPAs often cannot be lined up at the same time and have different duration

(ii) Logical metering arrangements

11. Are there market benefits and risks with using logical metering arrangements?
    - Benefits:
        - Reduces individual costs to proponent.
        - Benefit could be quite small in comparison to the potential complications associated with the changes.
    - Risks:
        - Potentially compromises integrity of system data.
        - Who calculates payments? AEMO? Proponent?
12. If logical metering arrangements are used instead of a NER compliant metering installation, who should pay for these arrangements?
    - Participants had divergent views, including:
        - Most people thought that the benefits would be quite small in comparison with the extra complication.
        - Some could not identify benefits beyond the avoided cost of NEM-compliant metering.

- The logical metering diagram shown (refer to slide 32 of EGES presentation) fits with what an exempt network might be and the AER requires NEM-compliant metering for any financial transactions between different parties.
- Participants agrees that the entity receiving the benefit should pay for implementation.
- Another complication identified was the creation of LGCs, which is just as tricky to allocate with logical metering arrangements as energy allocations.
- Some potential benefits discussed by participants included:
    - Could provide a good interim solution (while a company awaits formal metering arrangements perhaps?).
    - They may be a good redundancy solution in the event of technical failure of the physical meter.
    - Logical metering could be more reliable than many physical meters (summing several physical meters may be less accurate than a simple logical subtraction).

Parking Lot Questions

- Should the load component of an ESS be a bit like demand response?
- For areas where participants have requested worked examples, can participants identify the scenarios that they would like to see and AEMO will circulate responses. Potentially, there may be another session to discuss.