

# MINUTES

**MEETING:** National Electricity Market Operations Committee (NEMOC) #20  
**DATE:** Friday, 19 June 2020  
**TIME:** 10:00AM – 1:00PM (Central Standard Time)

## ATTENDEES:

NAME	COMPANY
Ken Harper (Chair)	AEMO
Teresa Smit	AEMO
Andrew Power	TransGrid
Ben Skinner	Australian Energy Council
Blake Harvey (Item 8.0)	Energy Queensland
Lillian Paterson	Clean Energy Council
Martin Cavanagh	AusNet Services
Mike Paine	TasNetworks
Naresh David	Australian Energy Council/Energy Australia
Randall Jones	Powerlink
Simon Emms	ElectraNet
Tim Lloyd	AusNet Services
Verity Watson	Energy Networks Australia
Wai-Kin Wong	Clean Energy Council/AGL

## PRESENTERS:

NAME	COMPANY
Babak Badrzadeh (Item 6.2)	AEMO
Chris Davies (Item 7.0)	AEMO
Daniel Lavis (Item 4.0 & 6.1)	AEMO
Darren Spoor (Item 6.4)	AEMO
Jenny Riesz (Item 3.0)	AEMO
Sujeewa Rajapakse (Item 6.3)	AEMO
Tim Daly (Item 9.0)	AEMO

## APOLOGIES:

NAME	COMPANY
Gary Edwards	Powerlink
Lenard Bayne (Secretariat)	AEMO

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## 1. Welcome and introductions

KHarper welcomed members and noted those apologies.

## 2. Minutes of Previous meeting and Actions

Previous meeting minutes were accepted with no changes made. Actions were updated accordingly, and amendments made.

## 3. Low Load Operation

JRiesz joined the meeting to present on Low Load Operation to provide members an understanding of the emerging security issues that AEMO is observing within the NEM. The presentation focused on South Australia (SA) initially in low load periods which was triggered due to large quantities of distributed rooftop photovoltaic (PV) in the SA region. It was noted that the amount of rooftop PV that has been installed in the region, AEMO anticipates that this will decrease significantly to a zero operational demand in SA in some periods in the very near future.

JRiesz raised concerns to members about how the power system would operate when the vast majority is being supplied by distributed resources. In brief, there were three main challenges that AEMO had identified. The first challenge was in relation to disconnection behaviour of distributed PV which resulted to poor voltage capabilities. The second challenge was whether there was enough load to operate the minimum number of units required online to maintain system security under island conditions. This challenge also identified the need to ascertain what type of services would be required, E.g. frequency control, voltage control and inertia control. The third challenge was regarding the capability of under-frequency load shedding and emergency frequency control schemes.

JRiesz provided a comprehensive overview of the identified challenges to the NEMOC members. A copy of this presentation was also provided.

## 4. NERC Presentation

DLavis provided a brief overview of the North American Electric Reliability Corporation (NERC) presentation which was initially prepared by Essential Energy. In addition, this presentation was also presented to the Power System Security working group (PSSWG) in February 2020 and the Operations Training working group (OTWG) in May 2020.

The presentation and discussion paper were considered read. The presentation highlighted a training scheme initiative to enable a suitable nationwide certification and accreditation for power system operators.

DLavis commented that the dynamics of the power system are continuously changing which were having a profound impact on how the modern-day market operates. The impact from these changes require a need to identify new training modules in conjunction with current training practices. It has been an observation that operators are entering the control room

workforce from various backgrounds, higher education and qualification levels, in contrast to traditional recruitment methods such as field staff.

The following questions were raised to the members.

- Do we need a certification for control room operators?
- What would be the best way to implement this across industry and should a regulatory body be involved?
- Should AEMO consult with the OTWG to develop a training benchmark and allow individual businesses to implement into their control rooms?

DLavis added that the NERC presentation provided a comprehensive and robust training framework and courses which highlighted common international practices, designed to accommodate current control room environments. In addition, the training modules incorporate an exam process to certify controllers of their knowledge and competency prior to performing their duties as a control room operator.

DLavis added that a survey was conducted with the OTWG members to establish where training areas of improvement were most needed. The survey questions were primarily “focused based” to ascertain members views on what a national training framework would look like for Australia. From the results, majority of members indicated that sharing best practices and material was key. DLavis added that there would be benefits of developing a similar framework for the NEM, utilising the NERC training model as a guide. In addition, funding and content management would also need to be considered and agreed.

Moving forward, the OTWG will continue to work on developing a training framework structure and an implementation strategy. The OTWG anticipate having an update for the NEMOC members at the December 2020 meeting.

## **5. Working Group Updates**

### **5.1. Operations Training Working Group (OTWG)**

DLavis provided an update on the recent OTWG meeting which was held on 21 May 2020. Powerlink, TasNetworks and APA provided presentations to the group which focused on their current training frameworks, succession pathways and cross skilling between transmission and distribution areas. The presentation also captured lessons learnt from recent events i.e. Summer 2019-20 and their response to the current Covid19 pandemic. It was noted that online training was a focus pre Covid19 but now is a necessity due to the current situation.

The OTWG discussed the current Covid19 pandemic. Key points from this discussion were that there were minimal interruptions to training overall. Some operators experienced some issues with access to laptops for their operators and with some technology constraints mainly around accessing simulator training components remotely. It was also noted that there were benefits to remote training as this had provided greater flexibility to controller’s availability. This enabled greater attendance for specialist training services.

DLavis added that the OTWG discussed the past summer events and touched on some of the preparedness training that was provided to NEM operations staff in November 2019 with similar

training being provided in the coming months. DLavis also advised the OTWG with some of the preparation work for summer 2020/21. This will include lessons learnt from the last summer period and some new additional areas being included into the upcoming summer readiness plan.

The OTWG plan to reconvene in November 2020.

## **5.2. Power System Modelling Reference Group (PSMRG)**

BBadrzadeh joined the meeting to provide a brief overview from the PSMRG meeting which was held on 20 May 2020.

In April 2020 the PSMRG initiated a training course which commenced between AEMO and TNSPs on SSAT which was provided by Poupan Pourbeik. This is a tool for signal stability analysis which provides an excellent platform for the PSMRG to form a taskforce on migrating from mudpack which is used for small signal stability analysis. It is expected that the use of mudpack will cease within three years. The overall feedback received was positive.

It was noted that the Power System Dynamic training had progressed well with 50 attendees across AEMO and TNSP's. Feedback so far has been positive.

A PSMRG/CIGRE System Strength Workshop preparations are underway via online and are scheduled to commence on 24 August 2020. The PSMRG will discuss in July to ascertain if a physical meeting would be possible in the coming weeks/months.

In addition, a Power Quality Course was tentatively scheduled for Mid-late July with content summarised in the below dot points.

- Focus on emerging trends associated with increased uptake of inverter-based resources
- Contemporary measurements/analytics for higher order harmonics (above 40/50th for which mandatory requirements typically stop)
- Impact of low order resonances (could be both sub and super-synchronous but in the case of the latter it would still be relatively low order)
- Measurement approaches/techniques
- Standards and requirements for harmonics
- Delineation between planning standards and compatibility standards
- Harmonic allocations methods
- How to distinguish causality of harmonics
- How to isolate or quantify contribution from plant vs network
- Amplification factors from reticulation (when inverters/turbines disconnected)
- Pros and cons of harmonic filters (passive harmonic filters)
- What is more optimal: harmonic filters for each generating system or a network-wide harmonic filter for several generating systems?
- Harmonic model validation

- Saturation/impact of inverter transformers on harmonics

It was noted that the PSMRG have been discussing on the behaviour of loads and the veracity of protection systems. PSMRG will continue to discuss this topic in detail with TNSP's.

BBadrzadeh added that there have been increasing discussions on application of performing inverters also known as virtual synchronous machines and what value or services they would provide in the power system and to what extent. BBadrzadeh added that the PSMRG members would collectively work together with forming a short reference paper for discussion at an upcoming NEMOC meeting.

A question was raised by VWatson about the PSMRG/CIGRE System Strength Workshop in August and if it was open to a broader audience such as Powers System groups. BBadrzadeh confirmed that the workshop was open to anyone and advised of the registration requirements. BBadrzadeh added that this workshop is intended as an educational opportunity.

MPaine raised the question around the governance of the System Strength framework. BBadrzadeh advised that AEMO is working closely with the Australian Energy Market Commission (AEMC). KHarper noted that Meryn York from the AEMC was the main commissioner. MPaine added that it would be of benefit for the NEMOC members to be provided regular updates on this program of work moving forward.

### **5.3. Operations Planning Working Group (OPWG)**

SRajapakse provided a brief overview from the OPWG meeting which was held on the 2 June 2020.

It was noted that AEMO's Systems Capability division are building a new set of models for modelling battery storages, over-frequency generator shedding settings for SA and VIC and rooftop PV in SA. It was noted that after the new modelling is completed, the plan is to benchmark it against recent major system events which will assist with calibration requirements.

SRajapakse provided a brief in relation to the implementation of over frequency generator shedding settings (OFGS) to understand why certain windfarms with OFGS settings of 52 Hz tripped off at 51 Hz during recent system events. Currently there are eight windfarms being investigated which has taken precedence and is being pursued with the highest priority. Once this investigation is concluded, the system performance group will concentrate on Queensland's over frequency generation sharing settings.

A discussion paper was provided to the NEMOC members on voltage control in the NEM under light load conditions which was a follow-on discussion at the March 2020 NEMOC meeting. It was noted that information was collected from DNSP's. The final draft was provided to the NEMOC members for their comments and or concerns. OPWG requested feedback from the NEMOC members and will incorporate and distribute a final report with recommendations.

Sujeewa provided an update on the Summer Network Outage Planning guidelines for network outage planning and how that would be managed for the next summer period. OPWG haven't received any comments regarding the guidelines, however SRajapakse did express that some flexibility was required this time around as some of these outages were delayed due to the

implications of Covid19. It was noted that this program of work would be finalised in September 2020.

OPWG added that there were some actions regarding management of non-schedule generation being connected to the NEM. With this said, several parties identified increasing issues associated with these connections. It was noted that TasNetworks recommended providing a discussion paper to the NEMOC for their advice and guidance.

The OPWG are next scheduled to meet on the 1 September 2020.

#### **5.4. PSSWG**

DSpoor provided a brief overview from the PSSWG meeting which was held on the 8 May 2020.

Following on from the previous NEMOC meeting in March 2020, the PSSWG provided a brief on the 330kV line between Wagga to Lower Tunit trip which occurred on the 30<sup>th</sup> of December 2019. This resulted in a deep LOR2 in the Victorian region. The NEMOC requested that the PSSWG discuss the implications and assess whether this contingency was an economic or reliability issue and if it required operational actions to be applied. It was noted that the PSSWG had discussed it at great length with the PSSWG concluding that this is primarily a reliability issue and be referred to the reliability panel for further discussion and appropriate action. KHarper requested DSpoor to collaborate with AEMO's Systems Design and Engineering team to include this recent event into AEMO's event report and incorporate lessons learnt. This would form context when discussing with the Reliability panel. It was noted by BSkinner that this event required the need to structure all the issues and to use this event as an example and to strongly suggest solutions. BSkinner added that the network should be planned as such that a contingency of this size should be impossible and consider consulting with planners when they are planning the network.

DSpoor noted that the PSSWG were having regular correspondence across the NEM control rooms regarding the operational response to Covid19. Several initiatives have included restricting access to control rooms and splitting shift staff into different teams across physical locations. These initiatives will remain in place until the pandemic threat is fully abated.

In September 2019 the NEMOC requested the PSSWG to establish a communications taskforce to look at more robust means of communication between control rooms. DSpoor provided some statistics on satellite phone tests, which were conducted between various control rooms which are outlined below.

- 39% of 57 connection attempts were recorded as successful
- 49% of 57 connection attempts failed to connect
- 68% of 19 connection attempts during cloudy conditions failed

The PSSWG have explored several options for a conceptual design and recommended the NEMOC consider a NEM wide HF communication link. This link would require HF/UHF linked repeaters to be installed in each of the NEM capital cities. These HF repeaters would be linked using eight frequencies and in addition there would be a UHF link from these repeaters into the various control rooms, which will enable communication between each other. A summary of the costings for this facility are outlined below.

- \$95k - 100W HF (voice only)
- \$135k - 100W HF (voice and data messaging)
- \$215k - 400W HF (voice only)
- \$260k - 400W HF (voice and data messaging)

The PSSWG recommendation would be the 400W HF voice and data installation as this was seen to provide greater benefits for the power system given its high-power linkage and improved availability. It was noted that this option also provided data messaging to cater for the worst atmospheric conditions. TLloyd raised the question around what the \$260K would include. DSpoor advised that this was the complete installation cost for the entire NEM with a small portion for Opex at approximately 2 to 3 thousand dollars per year. The NEMOC endorsed this approach and requested Darren to provide a detailed design and include Capex and Opex figures for their review.

## **6. Incident Reports**

### **6.1. Non-credible contingencies**

DSpoor provided a brief summary of Non-credible contingencies to the NEMOC members. Currently there was a total of 6 events being reviewed and reported on by AEMO. It was noted that these events were related to control protection schemes, incorrect settings or manual errors. With this said, there wasn't a need to heavily dive in to details due to the current re-classification framework as these events had been resolved.

It was noted by TLloyd that during the last NEMOC meeting, there was a discussion on trends of failures and whether the trends failure to type was seen as a pattern over the last 12 months and if there was potential for more work required on protection. DSpoor acknowledged that there had been several protection events across the NEM and added that trends that were emerging over decades would be difficult to quantify without a more detailed review. KHarper suggested more commentary was necessary on categorizing these non-credible contingency trends and requested DSpoor to present on this at the September NEMOC meeting. BSkinner raised a question as to why this type of information wasn't available on AEMO's website as it was seen to be a worthwhile document for industry. TLloyd responded that there is a huge level of sensitivity with this type of reporting. AEMO responded that these events do require up to six months to obtain all the necessary data and to analyse in order to identify where the opportunities are. AEMO added that publishing such material on the AEMO's website could be pre-emptively and detrimental.

### **6.2. January Incident Report Update**

This presentation was deferred to the September 2020 NEMOC meeting.

## **7. Renewable Integration Study**

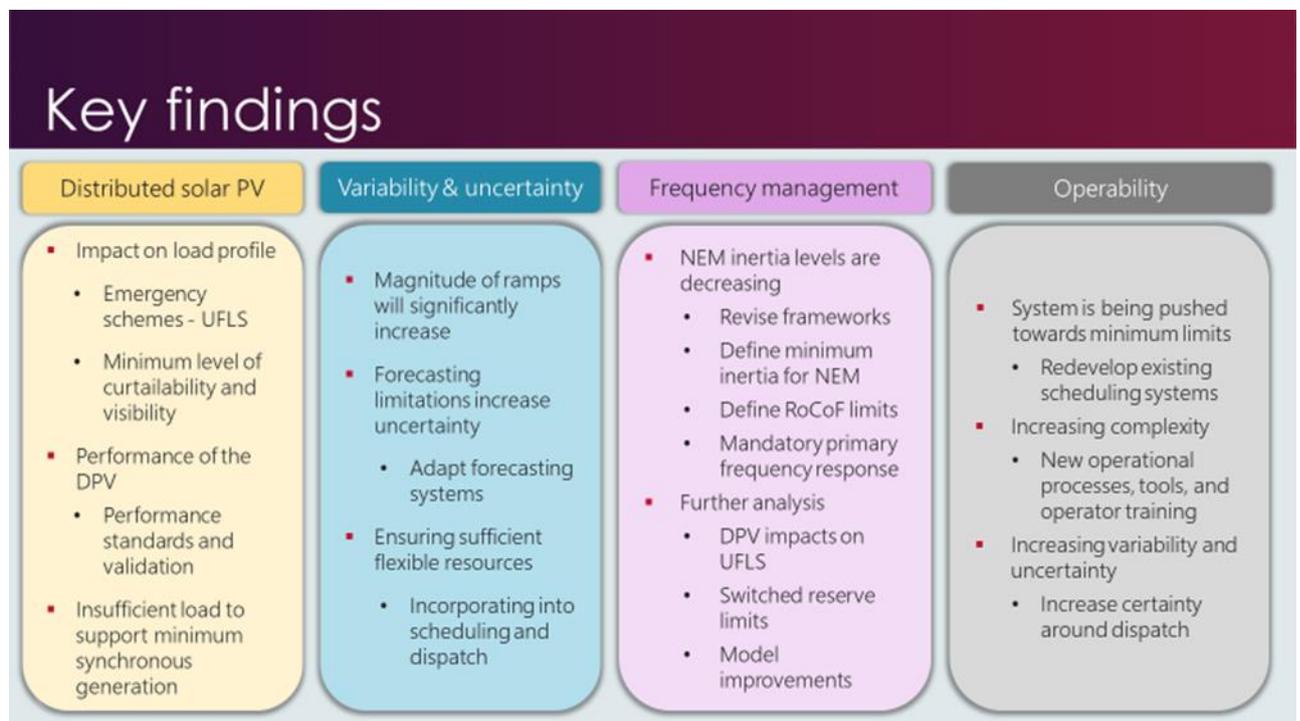
CDavies provided a presentation on the new Renewable Integration Study (RIS). This study was published at the end of April 2020 with collaboration from a variety of stakeholders. CDavies also added that there were several pre-recorded webinars available on AEMO's website that provided a high-level overview as well as a deep dive into specific areas of this study. It was

noted that in October 2019, AEMO had published an international insights paper which provided a view of how Australia compares to other large international power systems.

The RIS was initiated by AEMO in 2019 which complimented the Integrated System Plan (ISP) by taking the least cost generation network expansion projections from the ISP and taking a snapshot five years out to 2025. This enabled AEMO to delve into what the system may look like on a day to day operational basis with significantly more wind and solar generation and the technical security challenges that the system may face. CDavies also noted that there would be some priority actions required to manage these emerging issues which were captured in this presentation.

CDavies elaborated that the emerging issues five years out would potentially see 10 and 26 GW for new wind and solar generation on top of the existing 19 GW which included distributed solar PV.

The four focus areas and key findings of the study are outlined below.



WWong raised a question, asking if check studies were done with PSCAD in relation to some of the extreme corners of these scenarios. CDavies advised that the frequency studies did, with some scenarios looking at what happens under less credible and non-credible contingency events and added that it wasn't a definitive outcome.

### 8. Under Frequency Load Shedding Presentation

The September 2019 NEMOC meeting tasked BHarvey to provide a presentation on Network Operations & Distributed Energy Resources (DER). This was in relation to an international review of system black events that occurred late last year. The NEMOC tasked an action relating to PV impacts on under frequency load shedding. In addition, broadly assess those international incidents to understand what that would look like should a similar system black

event occur in Australia. The focus of this presentation was to highlight the program of work that was currently underway and seek NEMOC members guidance on how they would like to be involved and kept updated.

BHarvey added that in October 2019 the Energy Security Board (ESB) released the DER integration workplan. BHarvey added that from a NEMOC perspective the most relevant components of this workplan were the Technical integration initiatives. As part of the DER workplan the ESB published in March 2020 a Review of Governance of DER Technical Standard and as a result of this rule change the ESB are progressing a rule change for the introduction and mandating of standards related to DER and progressing work to assess a new national governance.

BHarvey briefly touched on the AEMC discussion paper on system strength frameworks in the NEM and how this fits in with the ISP and distribution. It was added that this was more of a transmission focussed document and how it would cascade down to distribution.

A brief insight to the Open Energy Network project which is a collaboration between AEMO and Energy Networks Australia (ENA). BHarvey added that one of the big questions was how would AEMO as market operator, ensure they have the tools and powers to operate under increasing penetration of renewables and determining when those capabilities would need to be implemented.

It was noted that in November 2019, the Council of Australian Governments (COAG) had approved a rule change for the mandatory inclusion of Demand Response capabilities via AS4755 for Electric Hot-Water, Air-conditioners, Pool pumps and Electric Vehicle (EV) Charges . BHarvey added that there is some debate on if there was an enough economic assessment conducted to justify it.

BHarvey added that the Australian Energy Regulator (AER) published a consultation paper late last year, on how it may assess DNSP's proposed expenditure when managing DER on their networks. It was noted that the paper considered the AER's current approach to assessing DER expenditure and if the current assessment tools where fit for purpose both now and into the future. CDavies commented, that as part of the RIS study the aim was to present a holistic view of not only system security challenges, but also the distribution level challenges to identify synergies as a solution for both and assist with the AER's decision processes and funding approval.

## **9. Cyber Security Update**

TDaly Chief Security Officer at AEMO provided a brief overview of the program of work regarding Cyber Security.

TDaly spoke of the recent public announcement from the Australian Prime Minister in relation to sophisticated cyber-attack activity on Australian entities across government and private sectors. It was noted that ransomware attacks were increasing with TDaly providing a brief outline on how ransomware attacks occur and the motivation. It was emphasised that with this type of threat, NEM participants must have a reasonable cyber hygiene protocol in place such as multi factor authentication and anything that would have a strong internet exposure. TDaly added that participants would need to have some form of non-destructible backups offline in

order to recover in a timely manner. It was noted that this level of cyber activity wouldn't be decreasing anytime soon.

TDaly elaborated on the Finkel review that was published a few years ago, in which AEMO was obligated to produce an annual report into cyber preparedness of the NEM. The Australian Energy Sector Cyber Security Framework was established as a result. Market participants were asked to voluntarily fill out or assess themselves against that framework. In 2018 & 2019, two reports were produced as a result, which indicated that there was more work required in this space.

TDaly covered off on the industry wide national cyber exercise which occurred late last year. Protocols and processes for managing and responding to a significant cyber-attack were currently being developed. Actions from this exercise are being worked through with participants.

### **10. Terms of Reference & NEMOC/EJPC Draft Strategic Action Plan**

KHarper requested NEMOC members to provide any feedback offline in relation to the NEMOC's Terms of Reference (ToR) and NEMOC & EJPC Draft Strategic Action Plan.

### **11. Other Business**

KHarper raised a question in relation to the next NEMOC/EJPC workshop in July 2020. AEMO proposed that this workshop be differed to October 2020 due to several major publications being prepared E.g. Electricity Statement of Opportunities (ESOO). NEMOC members supported this approach.

In addition, it was advised that there were some calendar conflicts regarding the next NEMOC meeting in September 2020. KHarper advised that alternative dates will be issued to members for their consideration with a revised date to be issued. It was also decided that the NEMOC meetings will include an additional half hour.

KHarper added that due to the current Covid19 pandemic, AEMO has now started to allow staff members back into their offices, except Melbourne. KHarper added that locations which have control rooms, continue to be restricted to control room staff only.