MINUTES - Final

MEETING:	Control Room Operations Working Group (CROWG)
DATE:	Wednesday, 29 April 2020
TIME:	10:00AM – 12:00PM (EST)
LOCATION:	Via Teleconference
TELECONFERENCE DETAILS:	1800 468 102
ACCESS CODE:	587 994 369

ATTENDEES:

NAME	COMPANY / DEPARTMENT
Mario Rositano	AEMO (Chair)
Darren Spoor	AEMO
Malcolm McNicol	AEMO
Bashar Derbas	AEMO
Raj Ippiliapiah	AEMO
Caroline Ferris	AEMO
Daniel Lavis	AEMO
James Hadley	AEMO
Kin Wong	AEMO
Peter Sanderson	AEMO
Alan Jenkinson	AGL Loy Yang
Paul McNamara	AGL Macquarie (Bayswater)
James Mortimer	APA
Christopher Migocki	Ausgrid
Kylie Mcclafferty	Ausgrid
Phil Gay	Ausnet
Simon Bolt	Delta Electricity
Henry Rich	Delta Electricity
Colin Taylor	ElectraNet
Doug Deans	ElectraNet
Duane Brooks	ElectraNet
Robert Armstrong	Endeavour Energy
Rod Joyce	Endeavour Energy
Ken Wilby	Endeavour Energy
Gayle McAllister	Energy Australia (Yallourn)
David Gray	Energy QLD
Simon Ahrens	Engie
Edward Sellwood	Essential Energy
Wahid Ibrahim	EVO Energy
Vedran Kovac	Hydro Tas
David Elkington	Loy Yang B

Mike Griffiths	Origin Energy
Robert Chapman	Origin Energy
Leanne Maurice	Powerlink
Duncan Griffin	Powerwater
Ali Walsh	SA Power Networks
Michael Edmonds	SA Power Networks
Michael Paine	Snowy Hydro
Brad Perry	Stanwell
Colin Sharp	TasNetworks
Geoff Cook	TransGrid
Bradley Shipp	TransGrid

APOLOGIES:

NAME	COMPANY / DEPARTMENT
Lenard Bayne	AEMO
Mark Pollock	AEMO
Paul Elliott	AEMO
Brenton Medlin	AGL
Garry Paterson	AGL
Grant Matherson	AGL
Stephan Laucht	AGL Macquarie
Rob Krueger	APA
Joo Wee	Ausgrid
Joo Ean Prasad	Ausgrid
Martin Cavanagh	Ausnet
Greg Dale	CS Energy
Ian Swift	CS Energy
M Greenaway	CS Energy
Anthony Ham	CS Energy
Tim Gray	ElectraNet
David Molla	Energy Australia
Craig Flanigan	Energy Australia (ECOGEN)
Brett Harrington	Energy Australia (ECOGEN)
Nikki Barbi	Energy QLD
Matthew Turner	EVO Energy
Leylann Hinch	EVO Energy
S Burge	Intergen
Brett Wills	Origin Energy
Chad Thompson	Origin Energy
Corney Matthew	Powerlink
Steve Saunders	Powerlink
Vernon Lee	Powerwater
Ian Fergurson	Powerwater
Michael Edmonds	SA Power Networks
Matthew Sands	Stanwell
Elizabeth Beavis	Stanwell

1. Welcome and Introduction

Mario Rositano (Chair) took a roll call and welcomed attendees and provided an overview of the meeting agenda.

Formally welcome representatives from the generators in the NEM that have joined the CROWG today.

2. Previous Minutes/ Review of actions items

Previous minutes were accepted. Phil Gay, from AusNet, formally accepted the minutes. Key point – update to the Terms of Reference to include generators

The action items were discussed, and Mario confirmed that Actions Register Activities: 1, 7 and 9 are complete.

3. Electricity Industry Terminology and Phraseology

Objective of this work is to develop a guideline that will be agreed upon and distributed in the energy industry.

Mario provided a recap from the previous meeting. F*rom Section 4.4 of the October Minutes:*

- Distributed draft document Standard Terminology Operating Protocol Annexure
- Ed Selwood presented/discussed the document and work thus far – it's a start.
- Some crossover with the AEMO training group
- Detailed some of the sources that each of the entities use. Added from the meeting:
    - WA Region – there is a guideline for AEMO-WP Inter Control Room Communication Protocol
    - Loy Yang and Yallourn Generators indicated that their terminology lines up with the SECV
    - Bayswater Generator indicated that their terminology lines up with that of TransGrid
- Detailed some of issues at play – particularly with wind and solar farms.
- "Agreed across the group to aim to create complete set of terminology that goes across the NEM"

Ed Selwood provided an update to the use of the distributed document, in that it has been incorporated into various Essential Energy procedures.

Mario indicated he would really like to put a group together from the CROWG representing each of the regions and the various disciplines, to try to move this forward. The group supported framing the task in this manner. Ed Selwood was happy to be part of this task.

Action Item: Mario to canvas the CROWG for volunteers to participate in this task.

4. Control Room Benchmarking

- Doug Deans (ElectraNet) is researching Control Room Benchmarking and looking to compare the way operators and control rooms are set up. Daniel Lavis has provided information on AEMO's set up which Doug has taken on board.

- Doug is also interested to obtain feedback from the group on what organisations do with regards to security screening, psychometric testing, etc during the recruitment process. Doug is keen to hear about current practices and whether other organisations conduct positive/negative vetting for high security roles such as control room staff, including health checks, suitability for shift work, etc.
- Operations Training & Challenges paper – from November NEMOC is still very relevant (age of staff, etc.) and current although it does date back to December 2019.
- Daniel Lavis (RTO Training) made brief mention of the number of training challenges we are currently faced with:
    - System Strength & Inertia
    - Trying to manage minimum demand
    - Behind the meter generation

Providing greater interaction between AEMO, TNSPs and generators via training exchanges is still a priority but will obviously have to wait until COVID-19 restrictions are lifted. AEMO extended an invitation to participants to spend time in the control room/training facilities when the current situation allows.

Action Item: Doug to seek feedback from CROWG on what organisations do with regards to security screening, psychometric testing, etc during the recruitment process. Doug is keen to hear about current practices and whether other organisations conduct positive/negative vetting for high security roles such as control room staff, including health checks, suitability for shift work, etc.

5. Summer Review – Lessons Learned

Obviously, everyone agreed that it has been a big summer. Mario introduced the discussion recapping some of the major events, including fires, separation events, reserves (LORs, RERT, etc.), weather events, etc. Outlined below are the main challenges and experiences for the summer from the perspective of AEMO, TNSPs, DNSPs and Generators including lessons learned, communication and situational awareness, etc.

5.1. TNSPs – Lessons Learned over the Summer

- NSW (TransGrid – Bradley Shipp)
    - Separation on 7 January – potentially due to damp dirt ash on the lines. There was a lot of ash and fine mist on and around at that time which contributed to the events. The experience helped us develop relationships with Emergency Services. This was one of the positives to come out of it. Communication between AEMO and TNSPs due to the fires and weather was good.
- VIC (AusNet – Phil Gay)
    - Incredibly busy. Never seen so many weather events due to fires and weather. Showed how robust our networks are. Lost 500kV towers in the lead up to summer which has never happened before. The separation between NSW - VIC and VIC – SA was handled well for an extended period of time. Stunned that the temporary towers were put together so quickly.
- TAS (TasNetworks – Colin Sharp)

- Had a lot of fire ban days during December and January. There were expected outages but overall the system hung in pretty well.

- QLD (Powerlink – Leanne Maurice)
  - Lots of weather events but network held together quite well.
- SA (ElectraNet – Colin Taylor)
  - Probably the most interesting event was the extended SA – VIC separation. Plenty of people around on the Friday afternoon to help complete studies. Coordinated with AusNet Services and AEMO. Did something that the system was never designed to do - support a 500kV smelter at APD from SA. The nearest generation is some 350 kilometres away. Once the initial problems were overcome, we got into a new way of operating with new load and new generation. Kept the load to zero on the interconnector boundary. Ended up in a situation where the demand got pretty low. Had bright blue sunny skies, mild weather which presented problems with System Strength. Very low lows. For two or three days there was a need to constrain the generation and SA Power Networks' solar farms. Overall it was a good team effort. AEMO, particularly Mark Stedwell, did a good job coordinating.
  - Fire damage - it was a relatively low impact season. From a fire perspective, only had one line trip due to smoke.
  - Lost a telecommunication site (that was due to be decommissioned anyway)

5.2. DNSPs – Lessons Learned over the Summer

- NSW (AusGrid – Chris Migocki)
  - Came close to having a non-secure network at times so had to juggle loads to manage that issue. 330kV assets tripped out due to prolonged fire periods and dust settling on assets – including flashovers. Long periods of no rain contributed to the problems. Bushings weren't getting washed naturally by the rain so tracking and other issues started to occur.
- NSW (Essential Energy – Edward Sellwood)
  - There were competing agendas in terms of what to support. Earlier the season we had fires on the North Coast and then there were fires in the Snowy Mountains. There was a lot of urgent work to mitigate risk. There were a lot of learnings as the season progressed. In terms of volume of work, we found ourselves relocating staff from other regions and then relocating them again, as things were happening everywhere. Well over a month of restoration work was conducted on the south coast. The challenge was trying to keep work force resourced and ensuring they weren't fatigued to the point of being dangerous.
- NSW (Endeavour Energy - Rod Joyce)
  - Fires up and down the mountains. Crews were getting fatigued. Worked really well with Essential down on the south coast. There were communication challenges dealing with emergency services (RFS). In the space of a few weeks we went from fire to floods in the Hawkesbury area. Straight after that we had some fairly major storms.

- NSW (EVO Energy – Wahid Ibrahim)
    - Looked at planned outages in advance from an early point. Considered cancellations/deferring outages. Had some success with deferrals. Managed the fire situation quite well. Established a team to focus on fire response. Contacted major customers in advance about the possibility of load shedding and looked at supply with back-up generators.
- NSW (APA - James Mortimer)
    - On the gas transmission side, focus was on keeping supply up to the communities around northern NSW and whether to isolate.
- SA (SA Power Networks – Ali Walsh)
    - Interaction with RFS was excellent. Great success stationing a SAPN person in the RFS control centre. Experienced resourcing and fatigue issues with restoration efforts on Kangaroo Island. We were repairing while fires were still going. Needed to re-repair things. They actually had to evacuate a control centre at one stage. Approximately 500 kilometres of power network infrastructure was lost requiring relatively extensive repair work there.
    - Another challenge was the curtailing of the large-scale solar farms. We are discussing what the plans are moving forward with that. It was a struggle to get things off very quickly. Minimum load problems and an excess of solar are going to be ongoing problems. Would like to be more strategic and less knee jerk with curtailments in future. There were three large scale disconnections across the summer.
    - Reacting a lot earlier with bushfire season.
- TAS (Tas Networks – Colin Sharp)
    - Noticed the BOM and TFS more conservative and required “recalibration” on our side.
    - Only issue was Burnie Island – cable got taken out by an anchor. Had to get additional switch gear out for controls on the island.

5.3. Generators – Lesson Learned this Summer. What challenges were you guys coming up against?

- NSW (Bayswater PS – Paul McNamara)
    - Extended periods of hot weather and massive loads. Some supply issues. A lot of discussion with TransGrid. Overnight changes to our voltage control was a big issue but managed pretty well most of the time.
- VIC (Yallourn PS – Gayle McAllister, Energy Australia)
    - Had a summer preparedness plan this year. Put in quite a lot of work into improving reliability (reducing boiler pressure, reducing risk of tube failures, reduction of station output). From a network point of view this was a good outcome. Felt the effect of the separation events in terms of managing frequency. Units had a better ability to respond to frequency if required.
- SA (Origin Energy – Mike Griffith)

- Biggest event was the SA – VIC separation. Glad the units were able to stay in over the summer. Many challenges in doing that.

- SA (Pelican Point PS – Simon Ahrens, Engie)
  - Fairly routine preparation for the summer. One of the standout challenges was dealing with frequency response during the VIC – SA separation for a prolonged period. It was an unusually long period where frequency was all over the place and certainly unusual. Units were able to handle it.

- NSW (DELTA – Simon Bolt)
  - Simon emailed questions through to Mario regarding frequency event on 28th January. Over the summer, lake temperatures gave Vales Point environmental issues.
  - Eraring was involved in a pollution event during the summer (one of the two busses tripped). At any time, anything else in the switch yard could have tripped the other bus.
  - Saw a lot of frequency issues – especially on January 4th. From our perspective, it looked like frequency issues on January 28th hadn't been noticed. Made a call as to why the frequency was made above 50 for a period of 60 minutes. Wanted to know why it wasn't picked up. Mario confirmed this was an IT related issue that has been investigated and that should never happen again. If similar events were to occur in the future, market notices would be issued promptly. Provides an opportunity for an AGC design review in light of the elongated frequency events.
  - Simon Ahrens from Engie concurs with Simon Bolt. During a sustained frequency situation, the market systems seemed intent on holding us there. Did query James Lindley about this but there was no real indication as to what could be done about it.

- AEMO – Darren Spoor on the issue of managing frequency:

  It is good to know that the stations can manage frequency and maintain it over time. Darren encourages plants to have a go at managing frequency. Simon Bolt – for many the frequency response is on top of the dispatch system. We could go to local and try to manage things manually, but this is a bit of a maverick approach/buccaneer style. Mario happy to work with Simon Bolt on his questions regarding the frequency events (high one and low one)

- NSW (DELTA - Henry Rich)
  - Low frequency event was a bit more worrying. Two options – allow the system to keep driving us higher and higher in load or curtail the generation enough to leave the unit still stable and able to provide extra generation. Two different types of events that left us things to worry about not just for the station but for the system generally.

5.4. AEMO – Lessons Learned over the Summer

- AEMO (Mario Rositano)

  From AEMO's perspective the following observations were made.

- How resilient the power system is – if set up correctly for these events (Snowy i/c backed off, etc.)
- Excellent communication between AEMO and TNSP's regarding fire and severe weather
- Communication to semi-scheduled units and loads (particularly when urgent action like directions, and disconnecting inverters, etc. required)
- Load on Manager role at peak times – value of having Acting Manager's on shift to take some of the load at critical times.
- Management of significant events was excellent across the board. Amazing there weren't major disruptions to customers and market in general.
- Use of temporary structures following the 2 lines/multiple towers down in VIC was very impressive
- The ability of the power system and the market to come up with new, unique problems, just never fails to astound! No two days the same!
- The reviewing of events by those involved soon after the event (ie: Bill Webb [AEMO]) was extremely valuable.

Action Items: Various

- SA Power Networks to discuss with AEMO on Solar PV curtailment.
- Mario to work with Simon Bolt regarding AGC review and frequency issues.

6. Low Demand Periods – Bashar Derbas

Bashar Derbas talked about the challenges AEMO is facing in the control room and discussed Voltage Control and System Strength from the perspective of an AEMO control room operator.

Minimum demand is the period of time that NEM operational demand is at its lowest within a day, traditionally this has occurred overnight and has been manageable. However, parts of Australia are now experiencing severe midday minimum demand values. Seen as troughs in demand graphs, the new lows stretch through the daylight hours and are the result of rooftop solar PV output outstripping demand.

These daytime troughs have been occurring with increasing regularity in particular in South Australia (SA).

The shapes in demand are different due to COVID-19. Peaks are half an hour later in the morning and half an hour earlier in the afternoon with people working from home.

Voltage Control

In regard to voltage control these low demand periods are generating new challenges in real time operations. These challenges come in the way of dynamic system conditions. In particular the early morning trough (0430 hrs) and is dependent on various system conditions.

The impact of these low demand periods includes

- Pushing generators to absorb maximum MVArs more consistently for longer periods
- Increased switching of transmission lines for voltage control
- Utilising NMAS contracts more frequently (cost to the market)

- Increased Switching of reactive plant (reactors in service then out of service depending on i/c flows)

System Strength

- Available fault current at a specified location in the power system, where higher fault current indicates higher system strength. System strength at a given location is usually determined by two factors:
    - the number of Synchronous Machines connected nearby; and
    - the number of transmission lines or distribution lines (or both) connecting Synchronous Machines to the rest of the network.
- AEMO seeks to maintain minimum synchronous generation requirements and is needing to direct a lot more.
- AEMO has developed procedures and implemented tools in the control room to monitor and manage shortfalls in system strength and inertia.

The following points were made from the CROWG discussion on Voltage Control and System Strength:

- SA (ElectraNet – Doug Deans) advised that the first synchronous condenser machines are due at Davenport around Christmas time and then six months later at Robertstown. Some risk to the timelines due to COVID-19.
- SA (SA Power Networks – Ali Walsh) looking at a dozen different systems to manage voltage control and system strength. Several projected going on at the moment.
- VIC (Yallourn PS – Gayle McAllister, Energy Australia) Saturation of roof top solar is approximately 60% in SA as opposed to 28% and growing in Victoria. Need to be proactive in managing these issues.
- NSW (EVO Energy – Wahid Ibrahim) Voltage fluctuation – doing studies at the distribution level. Stage one: Rolling out monitoring devices.
- NSW (Bayswater PS – Paul McNamara) Ageing plant was designed for maximum demand operation. This is having an affect on the availability of plant and is something that needs to be taken into consideration with PV input. We see the system fluctuate more than it ever has and it's only going to get worse. Difficult to maintain this going forward. We are consistently operating at lower levels which is of concern – accelerates the wear and age on the plant.
- NSW (DELTA – Simon Bolt) The system is fluctuating in part due to frequency. Many units in NSW have additional import capability that is not used – revision of the service agreements could make use of this in the future.
- NSW (Transgrid – Brad Shipp)
    - Sydney Metro doesn't really have enough Reactors to deal with low demand, especially when two or more are out of service as we presently see.
    - Ausgrid have numerous substations that are on bottom tap calling for lowering and they are forced into making tap changers non-auto to prevent continual alarms. These alarms occur long before the 4:30am load trough.

- Volts at substations like Sydney East and Sydney North are greater than 340kV overnight and they should be lower. Having only one Rx at Sydney East and none at Mason Park doesn't help.
- After hearing the comments from NSW generators it would be good to investigate if they can be used to absorb more VArs during low load times because we at Transgrid know they can be pushed a bit harder without exceeding limitations and wonder at times why AEMO are not pro-active in doing this.
- Over recent weeks with low loads the Sydney West SVC has been absorbing 70 to 100MVArs for long periods at night which significantly reduces it's ability to react to any system disturbances. Generally on a night shift the set-point is reduced to 338kV because of the low load but we have been forced to run it at 339kV recently to reduce the amount of VArs and alarms due to exceeding the high limit. This causes all Sydney Metro Transmission substations to run with higher volts. Using the generators to absorb more VArs would help greatly.

- TAS (TasNetworks – Colin Sharp) Tasmania starting to have issues with low inertia and system strength (Fault Levels). High wind farm output and Basslink import we have had up to 84% non-synchronous generation penetration in periods of low load and at least one occurrence of inertia levels outside the technical envelope. With the current situation and two additional wind farms being commissioned it will only get worse. We have set up a contract with one of our Generators to provide inertia by running generators in synchronous mode.

Action Items:

- Bashar Derbas to distribute presentation once AEMO approved.
- Mario to capture these discussion points and forward to PSSWG with a view to further discuss and investigate these issues.

7. COVID-19 Impacts

Group was asked if there were any impacts to operating the power system with the effect of COVID-19. No adverse effects at this stage other than the abundance of processes and provisions, etc. put in place. Happy to take further comments.

8. Communications

Agenda Item 7 – The CROWG was comfortable in participating in the audit of Communication requested by NEMMOC. Will seek further information from the PSSWG.

- Suggestions from the CROWG – Direct dial phones are still available at certain generators (ie:. Bayswater PS, Yallourn PS, etc.). Copper lines still work although they are now seen as obsolete. Need reassurance that these won't be decommissioned though. In Victoria (with the exception of pre-2000 power stations), these direct dial phones are still in place.
- Update from Neil Grigg (30/7/2020) – with regards to the above dot point which mentions that YWPS has "direct dial" OTN phones. They are phones with speed dial to appropriate Control Rooms (Aunet TOC, AEMO north, AEMO south). Those

phones should be able to be used to contact others on the OTN, if we had their phone number. (we used to have a phone book of other sites in Victoria OSU/OTN)

Action Item: Darren Spoor to provide questions/survey to the group (via Mario)

9. Directions

Mario updated the group on Directions. AEMO no longer need to outline the liability part of the direction when verbally issuing the direction. That part is however still issued as part of the accompanying market notice.

10. Other business

Final questions/observations just before closing.

- The group was asked to provide feedback on:
  - Agenda Item 9 - Do we incorporate semi-scheduled wind and solar farms to participate in the CROWG? If so, how?
  - Agenda Item 11
    - Use MS Teams for the next meeting?
    - Please feel free to provide any feedback on any aspect of the CROWG meeting. Your suggestions and comments will be welcomed.

11. Next meeting

Meeting Forward Plan

Date	Host	Location
Thursday, 30th July 2020	TBA	TBA
Friday, 9th October 2020	TBA	TBA