

PMRG draft minutes of meeting

The minutes of the: PMRG meeting
Held: 9 April 2013

1 Attendees

PMRG members

Don Geddey	TransGrid
Alfred Li	ElectraNet
Babak Badrzadeh	AEMO
Michael Redpath	AEMO
Tom Anderson	Powerlink
Andrew Halley	Transend

Visitors

David Francis	AEMO
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2 Apologies

3 Mobile phones

Please set your mobile phones to meeting or silent mode.

4 Previous minutes

No changes to the previous minutes of meeting were indicated.

5 PMRG document share web access

Link has been emailed.

Additional / backup access will be arranged for

Mark Davies	Transend
Viet Trinh	ElectraNet

6 NEMOC information request

The NEMOC has request information regarding what we expect the transmission network operations will look like in 20 years and impact on PMRG activities.

The challenges as listed by NEMOC were discussed, and agreed that the following are most relevant to the remit of plant modelling reference group:

- Challenges posed by large scale integration of renewables.

- Rationalising of data flows for network model data
- Need for more efficient congestion management processes
- Development of demand response mechanisms

The question of: "What should transmission network operations look like in twenty years' time?" was discussed and the following were concluded:

- Large scale integration of renewables and displacement of synchronous generators would bring about issues such as provision of inertia and damping by renewables, and the minimum fault level required for secure and reliable operation of the system. Staying ahead of the curve on new issues coming out of new technologies will be essential.
- A trend in falling the size of the generating units and generating systems is observed. Large scale integration of distributed energy resources would give rise to a challenge in a way that it will make system operation more complex but at the same time neither AEMO nor TNSPSs have any direct control over those distributed energy resources. More visibility and control over these generating systems would be necessary.
- At present positive sequence-type PSS/E models are predominantly used across the NEM. Investigation of the detailed action of the control of power electronics as utilised in wind turbines/solar panels would necessitate the need for more detailed full three-phase electromagnetic transient (EMT)-type models. This is essential for weak points in the system such as Tasmanian power system, or other weak connection points in the Mainland. Additionally, positive sequence models are not generally sufficiently accurate for calculations of unbalanced fault currents. The working group should continue to investigate the criteria and conditions which may require the use of full-three-phase models.
- Displacement of synchronous generators with variable generation technologies would make the system weaker, and therefore makes the impact of system loads more pronounced. This necessitates improvement in the dynamic load models.
- It is expected that system is pushed harder and harder as it becomes more difficult to install new infrastructure. High quality models are required to ensure maximum utilisation of the system.
- Should any of the proposals for installation of series compensated lines (in particular thyristor controlled series capacitors) between VIC-SA or NSW-QLD go ahead this will impose a challenge in the simulation models required to assess transient stability. The use of full three-phase EMT-type models will be necessary for areas adjacent to those potential series compensated lines. The risk of sub-synchronous control and torsional interaction should be carefully considered.
- Some of the smart grid technology enablers such as integration of electric vehicles and demand response will give rise to modelling complexity.
- Installation of a higher number of phasor measurement units, and gathering more information from these devices will facilitate system operation.
- Rationalising of data flows for network model data was discussed and concluded that it would be prudent to move away from dependence on PSS/E as models and transfer of modelling information becomes application agnostic.
- With regard to the Need for more efficient congestion management processes it was discussed that improved computational power is required to allow for real time calculations of all transfer limits with little or no manual intervention. This cannot be done with present dynamic security

assessment tool. High quality models will be required to calculate the system limits with confidence.

- Introduction of new generation technologies such as solar photovoltaic and thermal, and dc connected wind farms will require revisiting the current practices in terms of modelling, model validation, and commissioning of those generating systems when installed on-site.

7 Mudpack training course

A mudpack training course for September is likely.

8 DVAR modelling

AMSC units - a more PSSe friendly model is required – eliminate auxiliary files.

9 Action items

Action items are attached.

10 Members' activities

Babak Badrzadeh:

- Base case 2013 in development
 - Done
 - 2014/15 developments scripts done
- Cullen Range WF (Goldwind)
 - Assessing PSSe models
 - Suppliers / proponents tending to leave out wind farm reactive control model, including this issue in AEMO model acceptance guidelines
- Mt Mercer WF (RE Power)
 - Model development starts with Simulink, converted to C/C++
 - Supplied 3 sub models, instead of a single model
 - Don't get meaningful flx / for code
 - They have agreed to provide a meaningful source code in flx or for and submitted
 - RE Power want to submit C code for model assessment – don't have compiler
- DVAR modelling
 - AMSC units - a more PSSe friendly model is required – eliminate auxiliary files.
 - Auxiliary files make it difficult to simulate more than one unit.
 - A more suitable model is available (CDVAR1) and being discussed with AMSC
 - AEMO to assess the CDVAR1 model, will consult with PMRG

Michael Redpath:

- Continuing wind farm connection applications, network agreements have not been signed.

- Ararat Wind Farm to be connected at 220 kV between Waubra and Horsham, to be rated at 255 MW and to comprise 75 * 3.4 MW DFIG WTGs
- Crowlands Wind Farm to be connected at 220 kV between Waubra and Horsham, to be rated at 82 MW and to comprise 41 * 2 MW DFIG WTGs
- Several wind farm connection enquires on the 500 kV lines between Moorabool and Heywood.
- RE Power wind turbine models have been updated

Alfred Li:

- Snowtown 2 under construction
 - Snowtown 2 owners proposing 270 MW wind farm – SIEMENS machines (first in Australia)
 - Discussing commissioning requirements
- Some wind farm projects have re-started
 - Network congestion – increased risk of constraints on new units
 - Honesdale in mid North 270 MW wind farm
 - York Peninsula 600 MW, with HVDC undersea cable to Adelaide CBD
- Looking at Alstom turbines (new)
- Hallet (Brown Hill) R2 testing
 - Validation report by the end of May
- Clements Gap R2 testing
 - Progressing
- TIPS A non compliance
 - Excitation non compliance notice provided to rectify
- NPS two unit trip – faulty relay at NPS
 - Investigating extent of trip non-compliance issues

Don Geddey:

- Looking at Kogan Creek trip system response
 - Limiting factor on NSW export
 - Preparing report
 - Accessed voltage angles for trip
- Murray 1 excitation upgrades on 10 units. Rotating exciters to static exciters
 - Units 7 and 8 compliance tests done
 - 8 units to go
- Eraring GT new excitation system design under review
 - Have design report. Issues with modelling – rotating exciter field is supplied from single phase rectifier, +ve voltages only to field
 - Waiting on information from tests for development of model
- Eraring 4, 500 kV
 - Testing (720 MW), waiting for test reports

- Tumut 1 and 2 starting
 - Keeping some brushless rotating exciters – preparing models with consultants (DigSilent)
- Benchmarking transient limit calculations with Powerlink
 - Differences in answers
 - Updating TSTAB models from updated block diagrams
- Capital wind farm real / reactive power analysis (described above)
 - Wind was strong enough that turbines were operating near rated value
 - Can repeat tests at lower wind levels
- Oricon developing model for Vales Point rotating exciters
 - Issues are well understood (pu values and saturation, model needs to be usable)
- Wind farm connection agreements (2)
 - Taro
 - Oakara

Tom Anderson:

- Commissioning statcoms, rail load balancing, 3 locations
 - R2 reports ready
 - releasable user guides almost ready
- Ross SVC control system upgrade commissioning
 - Test reports complete
 - POD assessment under way
- Wivenhoe governor replacement and AVR refurbishment
 - R2 reports complete
 - Reviewing governor R2 data validation report
 - Fire damaged unit 1 expected back in service by end April, unit 2 work will then commence
- Condamine 2nd stage commissioning
 - Report complete
 - Issued source code and RUG to client, copies received by AEMO.
 - Awaiting comment from AEMO
 - Rotating exciter model provided by David Vowles from commissioning tests
 - C turbine RUG and R2 test report complete and under internal review
- Provided updated transient models in connection with QNI transient stability simulations
- Working on Hunter Valley trip QNI constraint equation
- Invicta Mill upgrading excitation controller
 - Commissioning mid / end of May
- Mobile phasor monitoring unit complete
 - Preparing field tests

- Looking at under frequency event, assembling model

Andrew Halley:

- Musselroe wind farm
 - commissioning has paused for a switchgear failure
 - Working through OMW hold point tests – reactive plant tests
 - Next is 42 MW hold point
- Discussing FCAS requirements with AEMO
 - Possibility of placing cap on requirements – very high for Basslink import and low inertia
 - DFIG fault ride through a factor – slow to come back after a fault
 - Transient loss of capacity is significant
- NCSNPS
 - Reviewing constraint equations

11 Next meeting

1-2 May

PMRG draft action items

Action items from: PMRG meeting

Held on: 9 April 2013

12 New action items

	ACTION ITEM	WHO	STATUS	TARGET DATE
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13 Action items carried forward

	ACTION ITEM	WHO	STATUS	TARGET DATE
1.	Gather numbers for a PSSE dynamic models writing course	BB	Numbers so far are low Doubt over whether course will proceed AEMO may provide 3 to 4 participants Transend and Powerlink (2) to advise numbers	August meeting
2.	Produce Model Acceptance Guideline	BB	Done, actual project experience is not included at this stage.	1 st stage Publication in June 2013
		BB	Practical experiences of the issues experienced with wind farm models will be included.	2 nd stage Publication by June 2014
3.	Generating systems R2 Guideline	BB	In progress, two documents are expected by end of June: <ul style="list-style-type: none"> • Wind farm R2 testing guideline • Rule change requirements for R2 	1 st stage Publication in June 2013
		PMRG	The second stage of the work will encompass creating a document which discusses practical experiences. It makes sense to combine the practical experiences for commissioning and R2 testing. Examples will include: <ul style="list-style-type: none"> • Type 2: Hallet and Clements Gap • Type 3: Musselroe, Mt Mercer • Type 4: MacArthur, Snow Town 2 	2 nd stage Publication by June 2014
4.	Wind farm commissioning	BB	This is to a large extent incorporated in the AEMO R2 Testing Guideline and	June 2014

	ACTION ITEM	WHO	STATUS	TARGET DATE
	tests.		Commissioning Requirements for Generating Systems. AEMO will start to produce a document which consolidates practical experiences of commissioning and model validation of wind farms. The same examples as above.	
5.	PSSE solution parameters tests Prepare settings sensitivities studies, in particular filter time constant of which the limit is dependent on At Check impacts on TRANSLIM results	MR	Report issued and reviewed MR looking to check the filter time constant as well AL: Is suitable for SA issues Powerlink is using parameters suggested with no problems Transend use solution parameters according to their own user guide, 1ms 0.3 acceleration AEMO's TRANSLIM (transient limit calculation) program runs with different settings to those tested, acceleration factor of 0.1 is necessary for some faults Changing the acceleration factor does not require a change to the tolerance of the solution. Acceleration factor can influence numerical stability and non-convergence (egg wind farm models)	June 2013 meeting

14 Completed action items

	ACTION ITEM	WHO	STATUS	COMMENT
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15 Long term goals

	ACTION ITEM	WHO	STATUS	TARGET DATE
6.	Connection study requirements for wind farms comments AH to collate feedback on "Connection study requirements for wind farms" and allocate sections of the document to PMRG members. The document is to be written up into a first draft.	AH	Progressing slowly, have had a lot of feedback and continuing to collate what has been provided. Looking at frequency control issues. Musselroe wind farm experience proving to be instructional and on the critical path	TBA

7.	<p>Options for clarifying Rules requirements for model derivation tests</p> <p>Prepare a 'more substantial' note and send around.</p>	AEMO	Held off until R2 Test Guideline has been progressed	TBA
8.	<p>Update document prepared on WTG factory tests to include comments fed back from Powerlink</p>	AEMO	Held off until R2 Test Guideline has been progressed	TBA
9.	<p>Check availability of governor testing papers / references</p> <p>Articles received to date are not greatly relevant. To go through IEEEExplore for further articles.</p>	AEMO		TBA
10.	<p>Effect of excitation systems upgrades and testing on mode estimation accuracy</p> <p>Recalibrate Mudpack model</p>	AEMO	<p>Needed for review of inter-connector capability</p> <p>Oscillatory limits may bring about limits on QNI flow</p> <p>This items depends on the review of PSSE2Mud models and Electranet's network damping investigation</p>	TBA