West Murray Zone

Webinar April 2020

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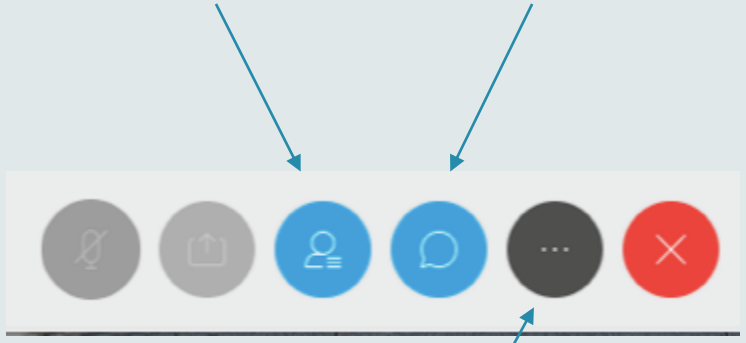
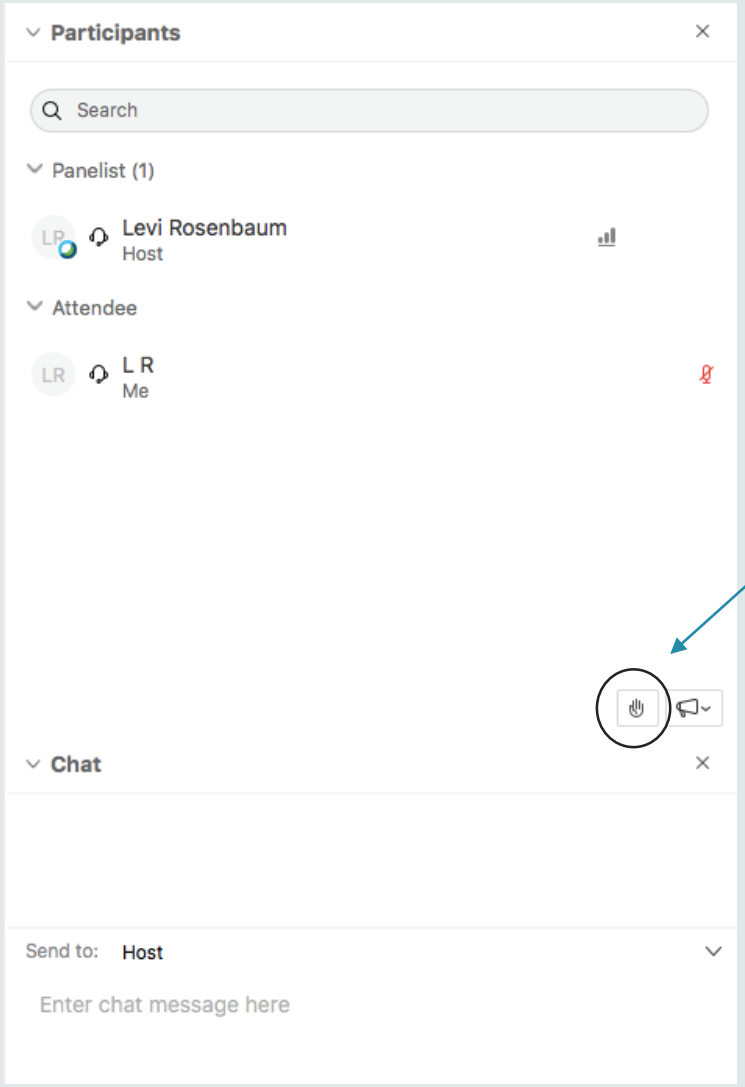
Asking questions

Please use the chat for technical assistance

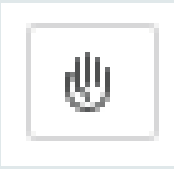
1
Press ‘Participants’ and ‘Chat’ Buttons



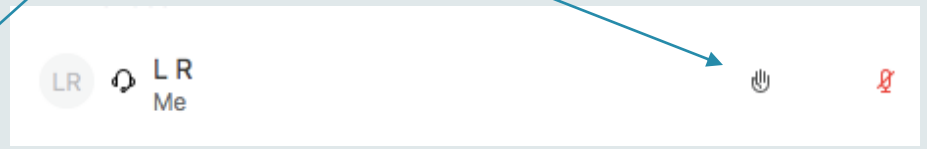
On web browser:
Click the 3 dots:
“raise your hand”
&
“lower your hand”



2
To ask a question put your hand up



3
A hand icon will appear next to your name



4
The host will unmute you when it’s your turn

5
Press the hand icon to put your hand down

Agenda

- Welcome
- Overview of the issue facing generation connections in the West Murray Zone including a brief technical discussion of:
    - Oscillations in the network
    - AEMO's role managing system security
- AEMO's approach to lifting constraints and progress in doing so
- AEMO's approach to connecting additional generators
- Q&A session (using Webex chat)
- Close

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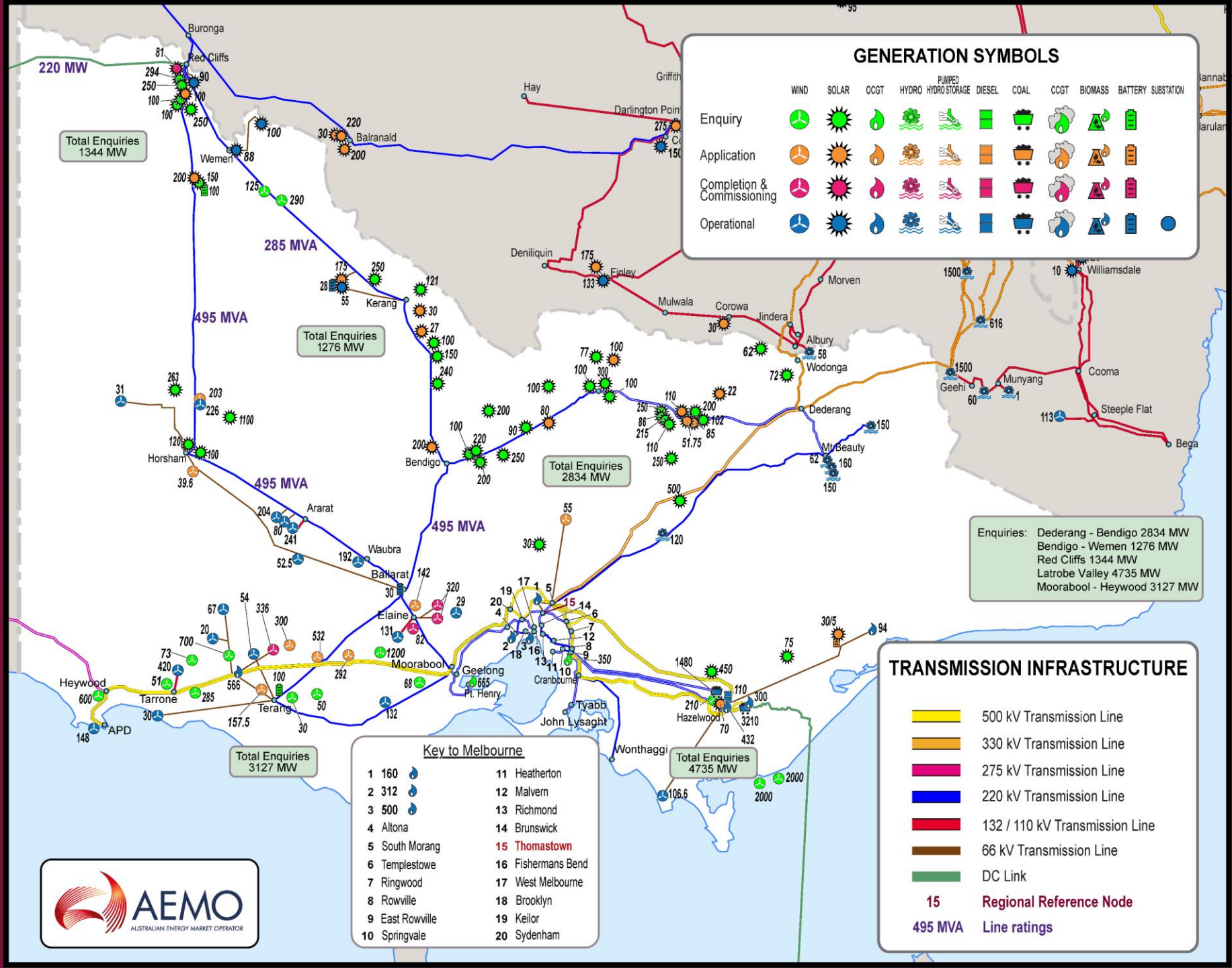
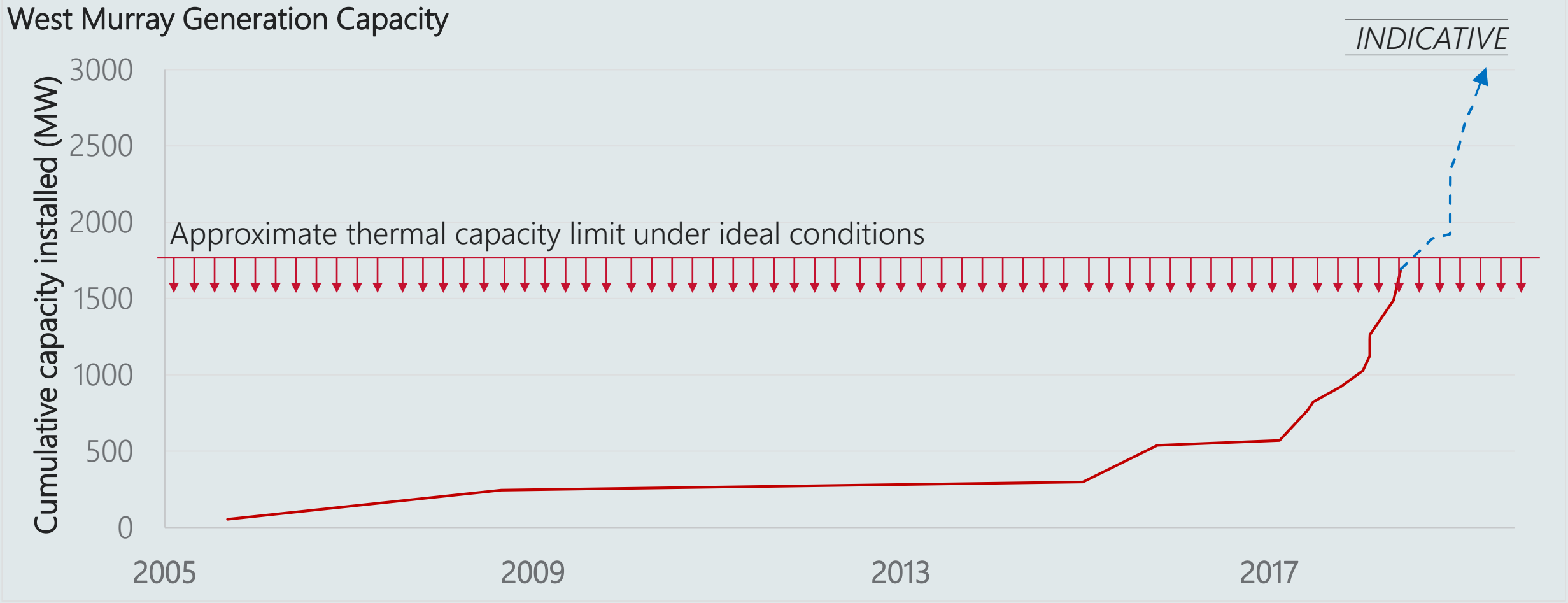
Overview of the issue

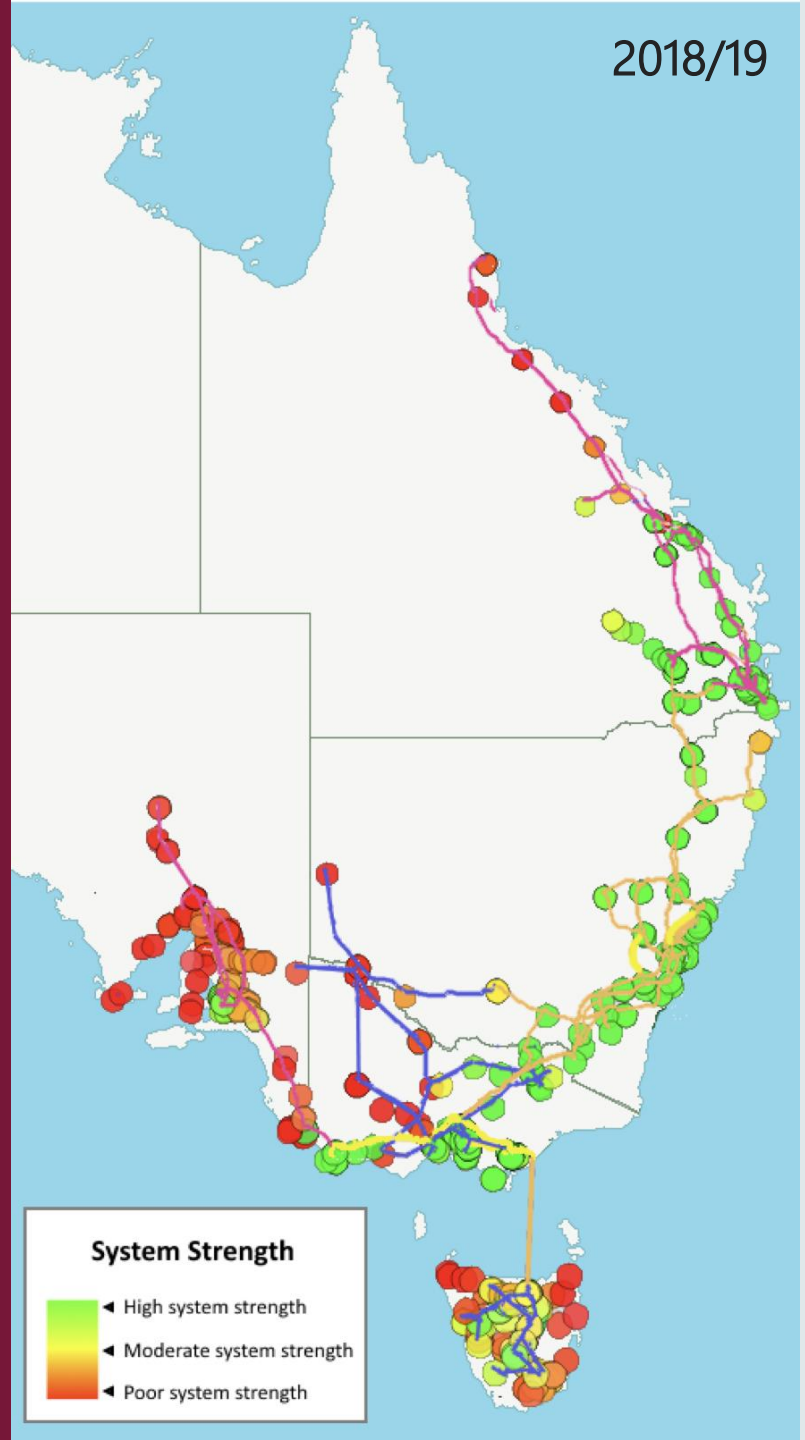
Operational overview



West Murray has reached its thermal capacity limit



Weak system strength in West Murray



Root cause of weak system strength:

- Low capacity (220 kV) transmission network
- Long distance (~500 km) from major load centre
- Long distance from conventional sources of system strength, e.g. synchronous generators
- High density of inverter-based generation

Source: 2018 ISP

Other contributing factors

Key regulatory principles:

- Provide '**open access**' when it can be done securely
- Ensure new generators '**do no harm**'
- Maintain **confidentiality** of each generator's technical parameters and all power system model source codes

Complex multi-stakeholder process:

- AEMO
- Network Service Providers
- Original Equipment Manufacturer
- Consultants
- Investors
- Governments

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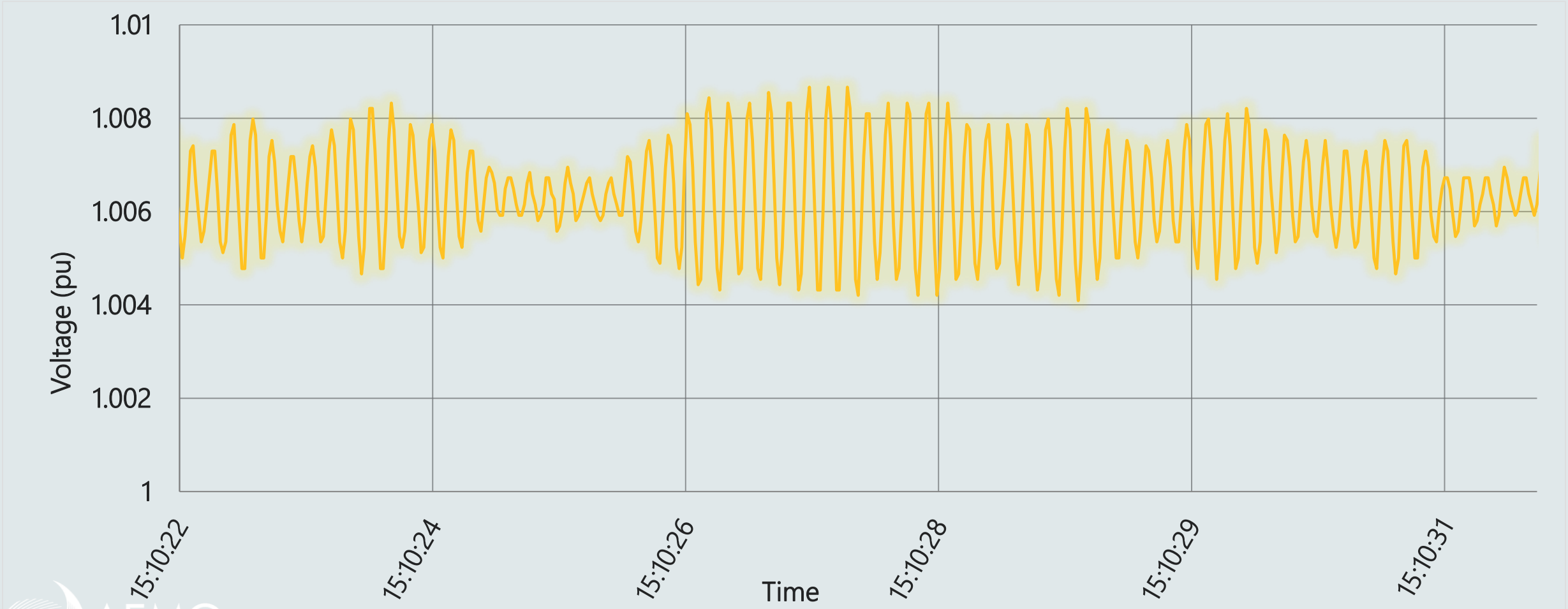
Converter oscillatory excitation – control test

Actual system test 220 kV 30 November in West Murray (50% constraints applied)



Credible contingency events

Contingency events which are considered reasonably possible in the surrounding circumstances.

Trip of 220 kV line in WMZ

Events which are considered to be ***credible contingency events*** at all times include but are not limited to the following:

The trip of any single generating unit

The trip of any single transmission line or cable

The trip of any single transformer

The trip of any single item of reactive plant including a capacitor, a reactor or any other plant providing reactive support to the network

System security summary

To maintain system security output of solar farms in the WMZ had to be constrained:

- Both output and online inverters constrained
- Needed to maintain adequate oscillation damping and stable voltage control following a trip of a 220 kV circuit in WMZ

- Analysis based on modelling, confirmed by online testing

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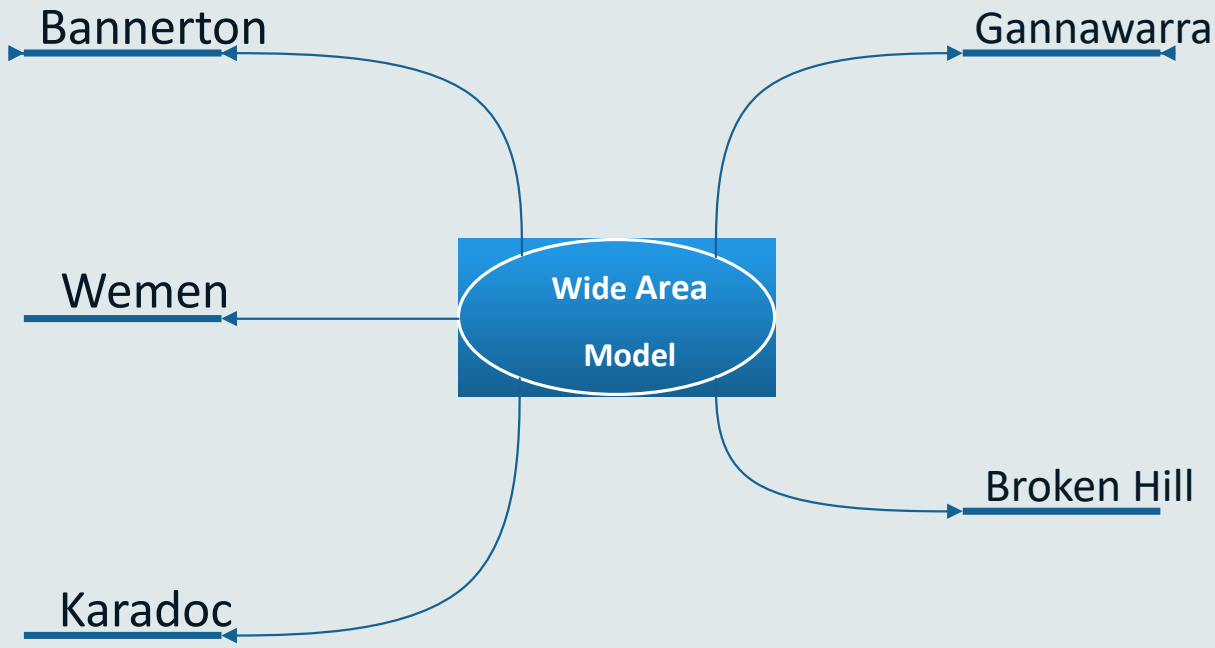
Approach to lifting constraints and progress in closing the system strength gap

Tuning of affected generators



AEMO engaged with SMA Germany (inverter manufacturer), NSPs and modelling experts to work with the inverter controls to find a combination of settings that would provide a suitable improvement in performance in the area.

Change process

- To implement the tuning changes, the generators had to make material alterations to firmware and settings, resulting in performance standard updates.
- Applicable change processes were followed under the National Electricity Rules (NER).
- AEMO and the NSPs have been working closely with the generators, their consultants and OEMs to obtain and assess the necessary data for the alterations to be; assessed, approved, updated and commissioned.

Key milestones:

- AEMO and NSP approvals to proceed issued late March
- Solar farms are now implementing and preparing to test the new ‘tuning solution’ in April
- Testing is underway, with the first generator tested yesterday and more to come tomorrow.

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Approach to connecting additional generators

High volume of connections requires a sequenced assessment approach

Group	Project stage	Parameters
Group A	In commissioning	The position in the sequence is determined by the registration date or the most recent submission date of a hold point assessment report of the commissioning project, whichever is the latest. This will allow projects to proceed as they finish hold point testing and prevent delays waiting for projects that may have encountered difficulties in completing their hold point tests.
Group B	Pre-registration	The position in the sequence is determined by the date when the application for registration has been received, including all required supporting information.
Group C	Alteration of committed projects (clause 5.3.9 process)	The position in the sequence is determined by: i. if unregistered, date of grid connection agreement, NER 5.3.4A letter, or NER 5.3.4B approval, whichever is the latest; or ii. if registered, date of registration.

Indicative timing

Committed projects only

	Timing	Projects to be assessed
Phase 1	April - May 2020	Generators, operational but currently constrained
Phase 2	Q2-Q3 2020	Projects in commissioning
Phase 3	Q3 2020 – Q1 2021	Projects awaiting registration
Phase 4	2021 onwards	Uncommitted generation

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Progress update

- Declared a system strength gap on 13 Dec ✅
- Restructured AEMO's connection teams ✅
- Establish a well defined and transparent assessment sequence for committed projects ✅
  - All commissioning and committed projects in the WMZ have now been informed of their assessment status based on our proposed sequencing approach
- Engaging more closely with OEMs to investigate how more efficient iterations of PSCAD modelling can be achieved. ✅
- Working to lift constraints very soon
  - solar farms are now implementing and preparing to test the new 'tuning solution' in mid-April
- Working on defining WMZ boundaries to share with industry
  - AEMO has received feedback from NSPs on the proposed methodology, and is working on finalising the methodology with the NSPs.
- Grow AEMO's account management capability
- Beta testing a shareable PSCAD modelling platform
- Continue to encourage combined connections groups and consider sequencing options for uncommitted projects

Questions

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Thanks

Please get in contact if you have further feedback or questions on Stakeholderrelations@aemo.com.au

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