

System strength workshop, 10:00-16:30 AEDT, 6 November 2020

This workshop will explore Australia's world-leading experience in managing the 'system strength' implications of the power system transition.

Australia's National Electricity Market (NEM) is experiencing a rapid uptake of inverter-based resources as well as the retirement of conventional synchronous generation. Most new inverter-based resources, such as wind and solar farms, are in remote locations with limited network capacity.

They are also often far from large synchronous generators, which have traditionally provided system strength support to these inverter-based resources. The Australian power industry is delivering state-of-the-art assessment methods and solutions to address the complex and new power system challenges presented by this rapid transition.

The term '**system strength**' has emerged to encompass these trends and their implications on power system operability in terms of system stability, protection system operation and quality of power supply. Despite being a highly technical and complex engineering matter, the impact of system strength is not limited to engineering analysis, but must be considered in many other contexts including regulatory, project management and financial decision making across the sector.

Following stakeholder recommendations, AEMO and CIGRE Australia are hosting a workshop for industry players to promote a common understanding of definitions, problem statements, appropriate solutions, and complementary perspectives relating to system strength. Furthermore, the event will explain the system strength phenomena and solutions in a way that can be clearly understood and consistently applied by practicing engineers and non-engineers across the Australian electricity industry.

This workshop will build on learnings from an internationally-focused system strength workshop organised by Australian CIGRE members for the CIGRE 2020 e-Session held in August 2020. Presenters have been sourced from market institutions, transmission and distribution networks, the generation sector, equipment manufacturers and power system advisors, to give a holistic picture of system strength across five key themes.:

1. Background
 - What is meant by 'system strength' and what are the key issues to be considered. Discussions will review both regulatory and technical standpoints and examine how various issues may evolve going forward.
2. Generator connections
 - Presenters from across the industry will share their experiences on system strength challenges in different parts of NEM, solutions that have been applied, lessons learned and improvement opportunities sought.
3. Power system operation
 - AEMO and a transmission network service provider will share tools and methods implemented to manage the impact of low system strength conditions on real-time power system operation.
4. Power system planning and emerging technologies
 - Discussion will include examples of system strength shortfalls identified in some NEM regions, and explore different network and non-network solutions, their applications and limitations based on existing and emerging technologies.
5. International and academic experiences
 - International and Australian presenters from both industry and academia will share some of the relevant research and development works with regard to system strength.

The workshop will include question and answer opportunities throughout the day, with the detailed agenda provided below.

Please follow [this link](#) to register your attendance. There is no charge for attendance.

Please note, this session will be recorded for the benefit of those who cannot attend on the day.

System strength workshop

Time	Topic and speakers	Speakers	Organisation
Background			
10:00	Overview of the workshop	Babak Badrzadeh	AEMO
10:05	Keynote 1	Alex Wonhas	AEMO
10:15	Keynote 2	David Bones	CIGRE Australia
10:25	Fundamental principles	Babak Badrzadeh	AEMO
10:35	Relevant regulatory frameworks: present and moving forward	James Hyatt and Julian Eggleston	AEMC
10:50	Models and tools: present and moving forward	Sorrell Grogan	AEMO
11:00	Q&A		
Generator connections			
11:15	NEM connections trends: challenges and opportunities	Mark Shilliday	AEMO
11:25	System strength impact assessment explained	Sachin Goyal	Powerlink
11:35	Power quality challenges under low system strength conditions	Prabodha Paravithana	TransGrid
11:45	System strength challenges and solutions in distribution networks	Alan Louis and Hieu Nguyen	Energy Queensland Powercor
12:05	A Generator's perspective	Trevor Lim	Total Eren
12:15	A consultant's perspective	Tony Morton	LR
12:25	A solar inverter manufacturer's perspective	Daniel Premm	SMA (Germany)
12:35	Q&A		
13:05	Lunch break (25 mins)		

Time	Topic and speakers	Speakers	Organisation
Power system operation			
13:30	Outage assessment and constraint development	Ben Blake	AEMO
13:40	System strength in islanded power systems and relation with inertia	Andrew Halley	TasNetworks
13:50	Increasing need for system testing and monitoring	Nilesh Modi	AEMO
14:00	Q&A		
Power system planning and emerging technologies			
14:15	National power system planner's perspective	Samantha Christie	AEMO
14:25	Network investment to improve system strength	Andrew van Eyk	ElectraNet
14:35	The use of existing assets to improve system strength	Sachin Goyal	Powerlink
14:45	Grid-forming inverters explained	Stephen Sproul	Hitachi ABB Power Grids
14:55	Managing system strength during the transition to renewables	Stephen Hinchliffe	GHD
15:05	A Gentailer portfolio perspective	Wai-Kin Wong	AGL
15:15	Q&A		
International and academic experiences			
15:35	Summary of relevant CIGRE activities	Andrew Halley	CIGRE Australia
15:50	Impact of system strength on operation of protection systems	Aboutaleb Haddadi and Jean Mahsredjian	EPRI (US) Polytechnique Montréal (Canada)
16:00	Examples of relevant research	Firuz Zare	University of Queensland
16:10	A wind turbine manufacturer's global experience	Torsten Lund and Gert Karmisholt Andersen	Vestas (Denmark)
16:20	Q&A		
16:30	Workshop closes		