

## CIGRE Australia : - Paris Session Attendance – Next Generation Network (NGN)



**Matthew Zillmann**

Last August I had the opportunity to attend CIGRE Paris Session 2022 where I was one of two Aussies to receive the NGN Significant Contribution Award (shout out to NGN Co-Chair [Madeline Binet](#)). While I was fortunate to be recognised for my contribution, the achievement is the result of the efforts and collaboration of many professionals who make CIGRE Australia and the Australian NGN function. Thanks in particular to [Terry Killen](#), [Phillip Coughlan](#) and [Madeline Binet](#), but also to the entire NGN Committee – past and present, as well as [Energy Queensland](#) for supporting me in my endeavours.

There were many interesting discussions over the 6 days of group discussion meetings, workshops, tutorials, and poster sessions, but some of my key themes and challenges were:

- The focus on net zero and the energy transition – not just in generation but in the lifecycle carbon emissions of equipment that we use (with SF6 being a big GHG contributor).
- The fact that we're only a very small portion of the way to net zero and the need to expedite this change through to 2050 (or sooner), all in an environment where delivering major generation and network projects can take many years.
- The need to be aware of the price of energy and energy affordability while delivering this transition.
- The prevailing issues with low-synchronous inertia grids around the world.
- The need for market and regulatory reform to support and manage this changing generation mix.
- The changing role and complexity within the distribution industry resulting from embedded generation, electric vehicles, and energy storage – to name a few.

It was exciting to hear about, and be involved in, discussions around solutions to some of these challenges, including:

- The need for more transparent direction between the electricity utilities and generation developers to streamline the connection process and provide direction on preferred connection locations. AEMO's ISP was flagged as a good example of this.
- The reliance on increasingly-more-complex (EMT) modelling in assessing the performance of the electricity network and the many challenges that doing this accurately entails.

- The role of synchronous condensers and grid-forming inverters in proving a stable grid, and the fact that there's still much debate around whether grid-forming inverters can replace the need for synchronous condensers.
- Learnings from and opportunities for capacity markets.
- The need for greater granularity of control and management of network, generation and load within distribution networks.

Amongst all of this, it was great to see many Australian representatives leading these discussions and sharing best practice and learnings from Australia. We really do punch above our weight when it comes to being a nation of problem solvers and answering many of the challenges that will deliver the electricity industry of tomorrow!

Thanks again to [CIGRE](#), [CIGRE Australia](#), and [Energy Queensland](#) for the support in attending and to my many industry colleagues who made Paris Session 2022 such an engaging session to be a part of.



### **Nathan Crooks**

Two months ago, I was fortunate enough to be able to attend the long awaited CIGRE Paris Session 2022 after COVID-19 put a hold on in-person events for nearly three years. I was fortunate enough to be the only one of three Next Generation Network (NGN) Paris Session Scholarship recipients for the 2020 Paris Session who was able to attend. And I must provide a massive thankyou to CIGRE Australia and the CIGRE Australian NGN for providing me the opportunity and allowing me to hold a spot and participate in the 2022 Session.

Spread across 6 days, the Session was host to many interesting discussions and presentations through a range of activities. The various group discussion meetings, workshops, tutorials and poster sessions covered more than any one person can attend or digest. Kicking off with the opening ceremony, some of the important key themes of the week were around:

- Climate change and the transition to net zero carbon emissions, not just looking at a changing generation mix but the entire life cycle of the power system and considerations for future operability and design.
- The rapid change occurring in the energy transition and that we're just at the start, with acceleration of the transition to renewables needed to meet net emission targets in many jurisdictions around the world.
- The critical impact of regulation and markets to facilitate the energy transition, ensuring a balance between affordability and reliability.

- Emphasis on the next generation of power engineers and the new ideas and capabilities they can offer to facilitate the rapid energy transition we face.

I was personally able to take away some great learnings from many of the tutorials and workshops across the week, seeing some international experiences and noting some changes in how we look at fundamental aspects of power systems. Some of the noteworthy topics I was fortunate enough to learn about were:

- System Integrity Protection Schemes in the Context of the Evolving Power Grids
- Oscillatory Instabilities and Interactions in Inver Based Resource (IBR) Dominated Power Systems
- Global Interconnected and Sustainable Electricity System: Effects of Storage, Demand Response and Trading Rules
- Evaluation of Temporary Overvoltages in Power Systems Due to Low Order Harmonic Resonances

I was also fortunate enough to be able to give back to the Paris Session and CIGRE community with delivery of three presentations. Having the honour to contribute to global problem solving in the power industry was humbling.

- Next generation network presentation on “Virtual Synchronous Machine Battery System Ancillary Service Support”
- C4 Group Discussion special contribution on “Weak Grid Connection Challenges of Virtual Synchronous Machine Battery System”
- C4 Group Discussion special contribution on “Weak Grid Connection Tuning Considerations of Virtual Synchronous Machine Battery System”

Receiving the NGN scholarship also gave me an excellent opportunity to get more involved in the NGN community, attending the NGN Forum, manning the NGN booth, and meeting a range of NGN CIGRE members from across the world. The social opportunities were invaluable, with the chance to meet other power system experts, share knowledge and connect. Several poster sessions were instrumental to meeting and learning about other countries faced with difficulties around inertia and system strength, and how different groups are tackling these technical challenges.

Finally, the opportunity to meet and connect with a number of Australian CIGRE members face to face was excellent, and the sheer number of Australian participants present at the Paris Session 2022 even more impressive. Another big thank you to CIGRE, CIGRE Australia, CIGRE NGN and Aurecon for the support and opportunity to attend, it was an invaluable experience which I hope to be able to participate in again in the future.



## **YiSiang Ooi**

I had the tremendous opportunity to attend the CIGRE Paris Session 2022 as one of the CIGRE Australia NGN Young Engineer Scholar. I would like to extend my thanks to CIGRE Australia and AEMO for all the given support.

The 6 day long Paris Session exceeded my expectations in both the sheer scale and depth of the session. I was impressed with the quality and technical depth of discussion that took place in the Group Discussion Meetings, Poster sessions, tutorials and workshop. I particularly enjoyed and learnt a lot from the Large Disturbance Workshop, Oscillatory Stability Workshop and the System Integrity Protection Scheme Tutorial.

The exhibition floor presented the chance to learn the latest development of products and tools that are available in the market. This is especially true for products and tools that do not have a presence in Australia, which help broaden my understanding on how other countries utilises the various products and tool. I was also excited by the Start Up corner where it was refreshing to learn how new technologies and novel approaches are used to address the challenges we face today.

In addition to that, I also had the opportunity to attend the C1 panel plenary meeting. Updates were provided by the working group convenor with lively discussions taking place. I found the working group discussing stakeholder engagement in planning particularly relevant and interesting to the work I am currently doing. Further to that, the meeting discussed the future topic of interest for future papers which provided me insight on the key trends and challenges in the system planning space.

Lastly, I could not understate how much I have benefitted from meeting fellow power system professionals from around the world and also Australia. I have gained some much from learning from the challenges they face as well as the different approach taken. Gaining an international perspective on the challenges Australia faces

This Paris Session experience has definitely enabled a leap in my career development as a power system engineer, enriching me with new ideas and a renewed passion to enable the net zero power system transition.



**Neha Moturi**

As one of the two recipients to receive the 2022 Young Engineers Scholarship, I was given the incredible opportunity to attend the CIGRE Paris Session earlier this year in August. The international CIGRE community was incredibly welcoming, and I feel so fortunate to have met many power system professionals from both academia and industry. I'd also like to give a shoutout to all the other Australian representatives at the CIGRE Session, who fostered a very collaborative learning environment and made the session very memorable.

The conference was a reminder of the fact that the power industry is a key player in meeting net zero goals, both through direct emission reductions, and by enabling reductions in other industries (e.g., transportation, buildings etc.) This calls for innovative low carbon electric generation technologies, clean energy carriers and of course collaboration across these sectors to enable electrification. Below are just a few of the key takeaways from the session:

1. Optionality enables affordability
  - Access to a broad set of low-carbon technologies will help achieve economy wide net zero CO<sub>2</sub> emissions whilst also maintaining reliable delivery of energy and energy services. For example, carbon capture and storage (CCS), a technology that I learnt has many conflicting opinions, can enable negative CO<sub>2</sub> flows, meaning positive emissions can be offset in applications where direct abatement is too expensive. We need to holistically assess all solutions available and recognise that some will be short-term solutions and others longer-term.
2. The climate does not recognise boundaries
  - Whilst the power grid in each country looks different and progresses at different speeds, we need to collaborate on a global scale to deliver a decarbonised electrical system. For example, there were plenty of discussions around the potential of HVDC meshed grids, particularly in Europe and Asia, to enable access to large scale renewable resources and opportunities.
3. Customers will shape the future grid
  - There is a growing interest in customer-owned technologies (e.g., rooftop PV, energy management technologies, smart devices etc.) and managing these at their point-of-use. Utilities should be capable of meeting a variety of customer demands and do so in a rapidly changing regulatory environment.
4. Data and digitalisation are crucial for network planning, asset management and decision-making

- We need to understand if and how existing infrastructure can operate on a level that is beyond their original purpose. In addition to this, current upgrades and future upgrades will form the backbone of the energy transition. These upgrades can take years to implement and reap benefits from, so action must be taken now to meet future energy targets.

The conference covered a breadth of knowledge throughout the workshops, tutorials and group discussion meetings during the week. Below are just a few of the topic areas discussed:

- Applications of non-SF6 gases for gas insulated systems and their associated challenges.
- The need for wide area protection and control systems (WAPCS) and System Integrity Protection Schemes (SIPs) to prevent blackouts and ensure security of power supply.
- Impacts of carbon prices on wholesale electricity markets and the electric power sector
- The potential of grid-forming control capabilities of inverters to improve the reliability and stability of a power system dominated by renewable generation and battery storage technologies.
- Development of multiple EMT benchmark models, particularly in the HVDC space, which encompass a wide array of power system applications.

A huge thank you to Terry Killen, the NGN Committee and Energy Queensland for supporting my career and enabling this opportunity for me. I look forward to continuing my involvement with CIGRE and following the developments made in other countries.