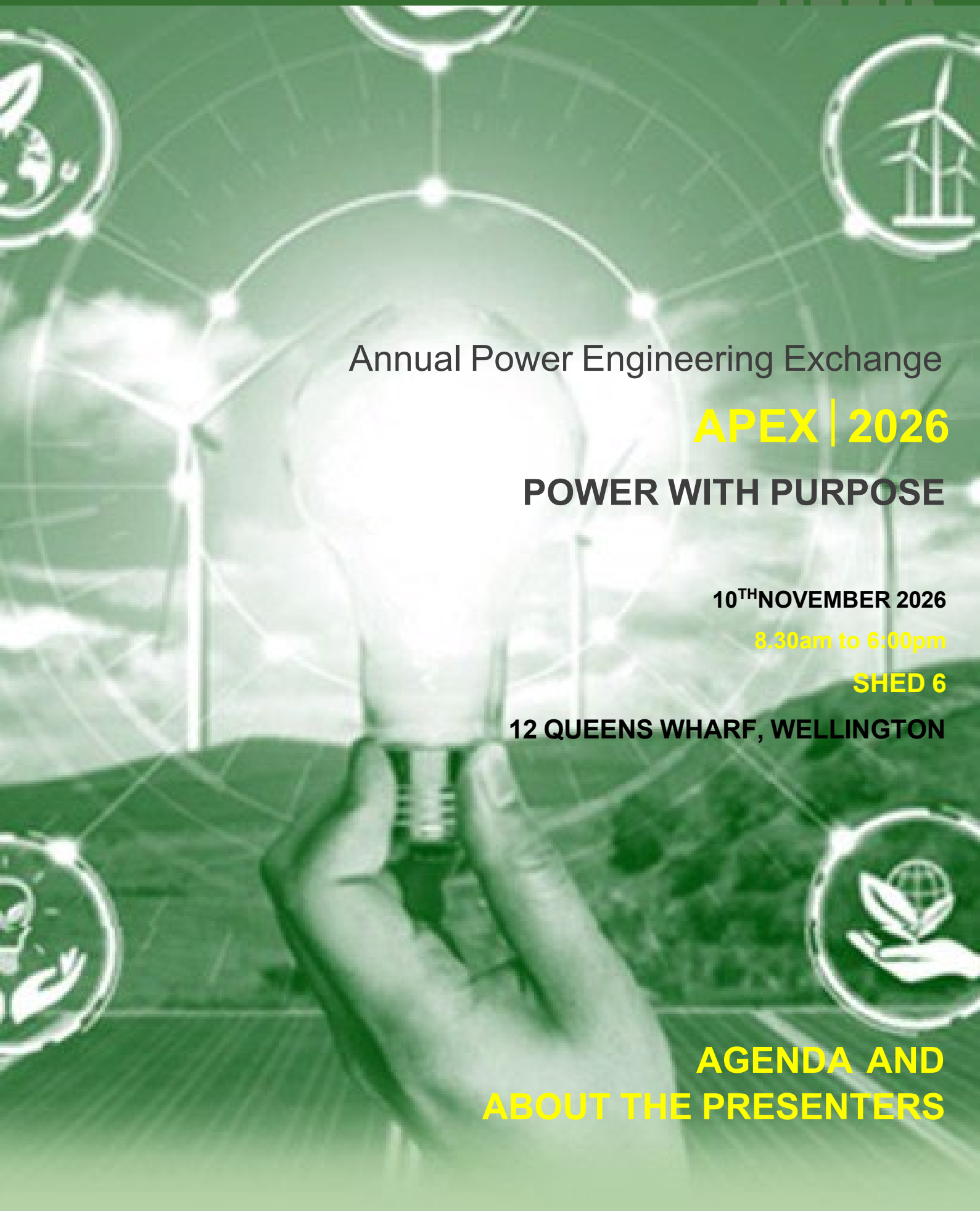
Electricity Engineers' Association

Professional Development



Annual Power Engineering Exchange

APEX | 2026

POWER WITH PURPOSE

10TH NOVEMBER 2026

8.30am to 6:00pm

SHED 6

12 QUEENS WHARF, WELLINGTON

AGENDA AND ABOUT THE PRESENTERS

NOTES

ABOUT THE PRESENTERS

8.30am **Registration, Arrival Tea and Coffee**

8.50am **Welcome from Hayley Head, EEA and Lydia Kerr, Electra APEX Chair**

SESSION 1—ENGINEERING INNOVATION AND ASSET MANAGEMENT

9.00am **Sarah Bell and Kendra van Loon, Meridian**





Sarah Bell is a Mechanical Engineer based in Twizel with Meridian Energy. She supports maintenance, safety improvements, site projects, and strategic initiatives. Through the DigiGEN Asset Health initiative, Sarah has contributed to the Ōhau A Unit 7 pilot by reviewing maintenance tasks, developing practical modification scopes, and undertaking site inspections. Sarah enjoys contributing to a wide range of technical work, from reactive site support through to long-term strategy, and values opportunities to spend time out at the assets.

Kendra van Loon is a Junior Data Analyst based in Christchurch and works within Meridian's Generation team. She creates models to monitor the health of assets using Seeq and Databricks. Through the DigiGEN Asset Health initiative, Kendra has contributed to the Ōhau A Unit 7 pilot by developing and refining condition-based maintenance models, investigating asset behaviour, and working closely with engineering and operational stakeholders.

Asset Health in Action: Rethinking Hydro Maintenance

A changing electricity market in Aotearoa New Zealand requires renewable generators to make faster, better-informed decisions. In response, Meridian Energy established DigiGEN, a three-year programme to digitalise generation by integrating operational knowledge, asset data, and digital tools. There are six different DigiGEN initiatives aimed to improve maintenance, outages, resourcing, investment and procurement. The DigiGEN Asset Health initiate was created to implement a condition-based maintenance approach across all assets. The Asset Health initiative ran a pilot at Ōhau A power station to assess whether selected maintenance tasks could shift from fixed outage intervals to condition monitoring models, run-time triggers, or online inspection.

This presentation covers the maintenance review method and resulting actions from the pilot to demonstrate how findings can drive a range of outcomes, from physical plant modifications to condition monitoring models. It highlights a case where an outage finding reinforced the need to maintain the existing inspection frequency. In addition, it walks through a real-world example of model development, covering problem identification, testing, dashboard development, and stakeholder feedback. Together, these examples show the challenges and opportunities for scaling condition-based maintenance for an aging asset fleet.

9.25am **Sora Araki, Northpower**



Sora Araki is a Project Engineer in Northpower's High Voltage Cables Team, supporting the delivery and maintenance of critical transmission infrastructure across New Zealand. Since graduating with a Bachelor of Engineering Technology in 2023, she has gained experience in underground cable maintenance and construction, project planning, contract and financial management, commissioning and stakeholder engagement. She is passionate about building a resilient and sustainable energy future and supporting women in engineering through STEM leadership and Girls in Infrastructure initiatives.

Delivering resilient infrastructure: Lessons from a critical transmission asset renewal project

As New Zealand's electricity network faces increasing demand and reliability challenges, asset renewal plays a critical role in maintaining a safe, secure and resilient power supply.

As a Project Engineer for Northpower, I was involved for two and a half years in delivering Brownhill Pakuranga circuit cable joint replacement project, a complex underground cable asset remediation project spanning 10.5km in distance, to extend the service life of this transmission asset, while maximising the value of existing infrastructure.

This presentation shares lessons from a large-scale transmission cable joint replacement programme on a critical 220kV underground cable circuit supplying Auckland and Northland.

First of its kind undertaken at this scale in New Zealand, the programme established over 15 work sites and brought together specialists in design, traffic management, civil construction, electrical installation, cable jointing and commissioning. Replacing cable joints while maintaining system reliability required innovative planning, risk management and collaboration on a local and international scale.

Combined with stakeholder engagement and carefully managing works along busy roadways and public areas, the project also delivered strong sustainability outcomes through the recycling and reuse of over 2,000 tonnes of FTB (Fluid Thermal Backfill) concrete material.

The presentation will highlight practical lessons in asset renewal, collaboration, sustainability and project delivery in an urban environment.

9.50am **Sabine Volker, Connetics**



Sabine Volker is a Graduate Design Engineer with Connetics in Christchurch, rotating through the graduate programme. During the program she has worked across multiple teams focusing on substation design, reticulation design, and project management. She holds a Bachelor of Engineering (Honours) in Electrical Engineering from the University of Canterbury and has experience across both asset owner and consultancy environments, having previously worked with Powerco before joining Connetics.

Sawdust to Subdivisions: Lessons from Carpentry for Subdivision Design

One of the most common mistakes I've made as an early design engineer is getting lost in the details. By focusing on the task directly in front of me, I often overlooked the broader project context. Building a cabinet as a personal carpentry project taught me this lesson the hard way. Decisions that seemed minor at the time had a direct impact on the cost, schedule, quality, and constructability of the final product.

Design is rarely a linear process. Requirements change, constraints shift, and designers must constantly switch between detailed technical work and the bigger picture. This presentation explores how lessons learned while building a cabinet have influenced the way I approach subdivision design work.

Through examples from both carpentry and subdivision design, attendees will see how considering the wider environment, thinking about the end result early, and identifying meaningful project drivers can reduce rework and lead to better project outcomes. While the examples are drawn from subdivision design, the lessons are relevant to engineers across the power industry.

10.15am **Kai Ferrier, ElectroNet**



Kai is a first-year graduate at ElectroNet based in Christchurch. In 2025 he graduated from the University of Canterbury with a degree in Electrical Engineering minoring in power. At ElectroNet Kai has completed a rotation with the Transmission team working on Transpower projects including the Ashley-Coldstream Line Bay Design. He currently works in the Electrical Safety and Earthing team.

Ashley-Coldstream Line Bay Project

The Waimakariri district is experiencing growth in both electricity demand and generation, driven by expanding residential areas such as Woodend and Pegasus, new renewable projects like the Mt Cass windfarm, and an uptake of residential solar. To meet this growth and to ensure the security of supply, Mainpower is constructing a new substation, Coldstream, supplied from Transpower's 66 kV Ashley grid exit point (GXP).

Built in the 1970s, the Ashley substation presented a host of engineering challenges when designing a modern line bay to be built inside it more than fifty years after its original construction. Retrofitting the control room to accommodate new protection panels, fitting modern primary equipment into a constrained site without compromising safety, and designing the project to accommodate site expansion all required problem-solving.

This presentation explores how Electronet and Transpower navigated these constraints to deliver a design for the new line bay, while navigating the challenges of legacy infrastructure with the demands of a growing network. It offers lessons in integrating new equipment into old sites and future-proofing ageing GXPs while not compromising on safety.

10.40am **Morning Tea**

SESSION 2—SMARTER NETWORKS AND EMERGING TECHNOLOGIES

11.00am **Annie John, Counties Energy**



Annie is a Technology Engineer at Counties Energy, working in the Connections and DSO Strategy team. With three years of experience in the electricity industry, her current work focuses on enabling the transition of the distribution network into a DSO model which includes developing strategies and commercial models to integrate flexibility and non-network solutions that defer capital infrastructure investment, as well as integrating distributed energy resources and dispatching their controls in real time using dynamic operating envelopes.

Annie holds a bachelor's degree in Electronics and Communication Engineering and is passionate about driving innovative solutions that support a sustainable grid.

Using Hot Water Flexibility to Defer Network Reinforcement: A Real-World Case Study at Opaheke Zone Substation

Counties Energy has transitioned New Zealand's legacy ripple-controlled hot water (HW) load to smart-meter-based control, creating a more targeted, granular, and flexible network capability for managing constraints. Rather than applying broad feeder or zone substation control, HW demand flexibility enables control of specific groups of ICPs associated with constrained areas or distribution transformers.

As part of this transition, Counties Energy has developed new network planning processes and analytical tools to assess the value of targeted hot water flexibility and determine whether it can defer or reduce conventional network investment, reducing consumer costs while maintaining reliability. This presentation demonstrates how these processes and tools have been applied to real network constraints at Opaheke Zone Substation, quantifying the deferral value created by using hot water flexibility as part of the network planning toolkit.

The analysis presents load-flow modelling results, a proposed dispatch hierarchy, and the implications for existing shared-control arrangements with energy retailers. It also discusses algorithmic considerations for managing cold-load pickup (snapback) and approaches to mitigating this effect. The objective is to share practical lessons with the industry on how latent demand flexibility resources can be reliably valued, dispatched, and incorporated into network planning.

11.25am **Daniel Duan, PowerNet**



Daniel is a Graduate Future Networks Engineer at PowerNet, based in Invercargill. He joined PowerNet in July 2025 after graduating from the University of Canterbury with a Bachelor of Electrical and Electronics Engineering in 2024.

Daniel's work focuses on modeling and understanding the network impacts of increasing distributed energy resources (DER) such as rooftop solar, batteries and EVs, and investigating new technologies and solutions to accommodate these within the network.

Calculating and Communicating Rooftop Solar Export Limits Using a Congestion Map

Rooftop solar has grown rapidly in recent years as falling costs and rising electricity prices have made solar systems an attractive investment for households. When deciding whether solar is worthwhile, customers want to understand how much energy they can use themselves and how much they can export back to the network. However, export capacity varies across the network and is constrained by factors such as voltage rise and equipment loading, thus requiring engineering assessment.

Assessing export capacity is a normal part of the solar connection process, but it can cause uncertainty, delays, and confusion. Customers want to understand available export limits, whether additional assessment may be required, and likely application timeframes before finalising a system. Increasing application volume and recent Code changes have also highlighted the need for a more transparent and efficient approach.

To improve visibility and reduce uncertainty, export limits have been calculated across the network and published on a congestion map. Supporting dashboards have also been developed to track application timelines. This presentation outlines the methodology used to calculate export limits, create the geospatial data for the map, and build the supporting dashboards. Together, these tools enable a more transparent, consistent and efficient solar connection process.

11.50am **Andres Pinzon Mendez, Powerco**



Andres is a first-year Graduate Engineer at Powerco, currently working within the Technology and Innovation team. He holds a Master of Energy from the University of Auckland and brings a multidisciplinary background spanning energy engineering, chemistry, and business studies. What excites Andres most about the electricity sector is the opportunity to combine technical problem-solving with a meaningful contribution to society. He enjoys understanding the challenges facing modern electricity networks and exploring how emerging technologies can help deliver a more reliable, resilient, and sustainable energy future.

Rethinking the Battery: Unlocking Network Value from Pole-Mounted BESS

Pole-mounted battery energy storage systems (BESS) are increasingly being considered as non-network alternatives for managing network constraints and supporting distributed energy resources. In response to customer complaints about voltage performance, Powerco deployed five pole-mounted BESS units to investigate whether they could alleviate anticipated undervoltage and defer network reinforcement. However, enhanced low-voltage monitoring provided visibility of network performance at both transformer and customer level, revealing that undervoltage was less prevalent than initially assumed. This prompted a reassessment of how the BESS fleet could deliver value. Rather than focusing solely on voltage support, the project expanded to investigate additional network services, including peak demand reduction, voltage quality improvement, and phase imbalance mitigation. Early operational results demonstrate peak shaving at both distribution transformer and feeder level, while preliminary analysis indicates improved voltage support, reduced phase imbalance and lower associated neutral currents. This project explores how enhanced network visibility challenged initial planning assumptions, enabled more targeted asset utilisation, and uncovered new opportunities for distributed storage to support network optimisation. The findings demonstrate the value of data-driven decision making and show how pole-mounted BESS can provide multiple network services, strengthening the case for distributed energy resources in future distribution networks.

12.15pm **James Davison, Ergo**



James is Graduate Power Systems Engineer at Ergo Consulting. He studied Electrical and Electronic Engineering at the University of Auckland. James' project experience includes network connection studies, earthing design, cable studies and secondary electrical design.

James brings a practical and results oriented focus to engineering, having led a previous career in the Shipping industry. James was an EEA scholarship recipient in 2024.

Beneath the surface; secrets of the underworld powering New Zealand. (Help, my cables can't deliver their datasheet rating!)

Underground cables are the cornerstone of a modern, reliable and secure electricity network. They are safer for people, more resilient to climate events and more acceptable to urban communities than overhead lines. Since the late 1960's, all new residential developments in Auckland have constructed their power distribution network underground. This trend is continuing across the country as Aotearoa New Zealand expands its urban centres.

Cables are a capital-intensive asset. Route selection and cable design require a well-defined methodology to ensure the project runs smoothly and network requirements are met. A successful project will have the following key elements, so far as is reasonably practicable:

- A well understood cable route
- Accurately located existing services
- A well defined scope
- Collaboration between electrical and civil engineers
- Realistic operational goals

This presentation outlines the driving forces behind network undergrounding. Cable thermal rating calculations are explained with a focus on how route and environmental information impact load carrying capacity. Common misconceptions are addressed with examples. Finally, screen bonding choice is discussed to show how design decisions impact interconnected systems.

12.40pm **Lunch**

SESSION 3—FUTURE-READY ASSETS AND DIGITAL SYSTEMS

1.15pm **Jay Nguyen, Transpower**



Jay Nguyen holds a Bachelor of Mechatronic Engineering from Massey University. Jay joined Transpower in February 2025 as a Transmission Line Graduate, with a strong interest in power cable engineering.

Since November 2025, Jay has been working as a Cable Engineer in the Tactical Engineering Lines and Cables team.

New Technology 245 kV Dry-Type Cable Terminations

Dry-type 245 kV cable terminations represent an innovative advancement in high-voltage cable technology, developed to address some of the limitations associated with traditional oil-filled terminations. Key benefits include reduced maintenance requirements, improved environmental performance, and the elimination of risks related to oil leakage and other oil-related failures.

As a Project Engineer at Transpower, I am supporting the assessment and trial deployment of this technology in New Zealand. This work includes technical evaluations, risk assessments, and performance reviews to help inform future investment and application decisions.

Given the novelty of this technology and the unique challenges associated with its implementation, this paper will share Transpower's experience, key lessons learned, and the approach taken to evaluate its suitability for the New Zealand transmission network. The presentation will also discuss the potential benefits, risks, and opportunities that dry-type cable terminations may offer for future cable projects, supporting improved reliability, sustainability, environmental impact and asset management outcomes.

1.40pm **Jefferson Ballesteros, Beca**



Jefferson is an Electrical Engineer at Beca, based in Auckland, working across electrical infrastructure, SCADA, protection systems, and industrial control systems. He has experience integrating, commissioning, and monitoring critical electrical assets, including an airport-wide SCADA system connecting high-voltage switchgear, protection relays, generators, and transfer switches using IEC 61850, DNP3, and Modbus communications. Jefferson works alongside protection engineers, contractors, and operators on a variety of projects.

His focus is on delivering reliable, well-verified SCADA data that supports safe operation, fault investigation, maintenance planning, and informed decision-making across complex electrical networks.

Connecting Critical Infrastructure: Using SCADA to Monitor and Manage Diverse Electrical Assets

Modern infrastructure such as airports relies on a diverse range of critical electrical assets, including high-voltage switchgear, protection relays, transformers, generators, and automatic transfer switches, to maintain safe and reliable operations. These assets are often distributed across large and complex sites, creating challenges in maintaining operational visibility, responding to faults, and managing network risk.

SCADA provides a centralised view of these assets, bringing together legacy and modern equipment through protocols such as IEC 61850, DNP3, and Modbus. By consolidating alarms, status indications, and electrical measurements into a single platform, SCADA improves situational awareness across critical infrastructure.

Drawing on experience with an airport-wide SCADA system, this presentation shares practical lessons learned from integrating, commissioning, and monitoring diverse electrical assets. Topics include communications integration, alarm management, data quality, collaboration with protection engineers on relay configuration and SCADA point mapping, and interfacing equipment from multiple vendors and technology generations. Central to these lessons is the importance of verifying every signal from the field device through to the operator display. Reliable data, in turn, underpins effective fault investigations, maintenance planning, and engineering decision-making.

Attendees will gain practical insight into delivering SCADA systems that operators, contractors, engineers, and asset managers can rely on.

2.05pm **Penelope Keeling, Meridian**



Penelope is a SCADA Engineer based in Twizel with Meridian Energy. She has worked in operational support and on Project Alpha, Meridian's multi-year programme to replace its legacy SCADA system.

As the project's SCADA HMI Lead, Penelope designs and delivers new displays, working closely with internal customers and engineering stakeholders to present information in ways that support safe, consistent, and effective operation. She enjoys the broad perspective that working with SCADA provides across Meridian's generation portfolio.

Designing a Future-Ready SCADA System for an Evolving Generation Portfolio

As electricity systems become more complex and generation portfolios grow, the control systems used to operate critical assets must also adapt. Meridian Energy is undertaking a multi-year programme to replace its 25-year-old legacy SCADA system, which provides 24/7 visibility and central control of 3,100 MW of generation, with further assets in the development pipeline. Beyond renewing the underlying technology, the programme provides an opportunity to reconsider how generation and plant information is structured and displayed to users.

This presentation will explore the human-centred design approach used to develop approximately 300 new displays, ranging from system overviews to detailed equipment pages. It will share lessons from the first 12 months of development, including how early operator engagement helped determine which information should be grouped and presented across displays. It will also look ahead to testing and commissioning, where the project must balance operational familiarity with improvements in usability, consistency, and situational awareness. Rather than undertaking a like-for-like migration, Meridian is challenging legacy design patterns to create a control system that can support new generation assets and changing operational needs.

2.30pm **Seff Figgins, Ergo**



Seff has been a Power Systems Engineer at Ergo Consulting since graduating in early 2024. He holds a Bachelor of Electrical and Electronic Engineering from Auckland University of Technology, where he developed a strong interest in power systems engineering.

At Ergo, Seff has been involved with substation secondary design and protection settings projects for several electricity distribution and generation clients. His recent focus has been on the design of complex protection upgrades, where he is gaining experience in protection scheme design, system integration, and project coordination.

More Than a Protection Upgrade – Using Protection System Modernisation to Extend the Life of a Legacy Hydroelectric Power Station

New Zealand's generation mix continues to evolve through the addition of renewable energy sources like solar, wind, and geothermal generation. Alongside these new developments, the country's existing hydroelectric fleet remains critical to the power system, providing reliable, renewable baseload to several households and businesses throughout New Zealand.

Many of New Zealand's hydroelectric power stations were commissioned several decades ago and are expected to remain in service for years to come. While primary plant (i.e., turbines, generators, transformers, and switchgear) can achieve long operational lives via ongoing maintenance procedures, secondary systems (with an emphasis on protection systems) have a comparatively shorter lifespan.

At Paerau Power Station (commissioned in 1984), aging protection systems present challenges associated with equipment visibility and supervision. Protection system modernisation projects, such as that being carried out at Paerau, provide an opportunity to address several risks through the deployment of modern digital protection schemes.

This presentation will discuss how protection system modernisation can be used to extend the life of aging renewable generation assets through a practical case study of a legacy hydroelectric scheme at Paerau Power Station.

2.55pm **Afternoon Tea** ***** Cast your vote for the People's Choice Award *****

SESSION 4—POWER SYSTEM PERFORMANCE AND RESILIENCE

3.15pm **Treasa Glubb, PSC**



Treasa graduated from the University of Canterbury with a Bachelor of Electrical and Electronic Engineering, including a minor in Power Engineering. She joined PSC's New Zealand Power Networks Team in 2025 and specialises in generator compliance and commissioning testing across New Zealand and Australia.

Her work also includes dynamic model validation and power system analysis studies for a diverse range of generation assets, including hydro, solar, and battery energy storage systems (BESS).

Dynamic Model Validation in New Zealand's Changing Power System

As New Zealand transitions from a power system traditionally dominated by synchronous generation to one with an increasing uptake of inverter-based generation, accurate dynamic power system modelling is becoming increasingly important for maintaining system reliability. To connect to the New Zealand power system, owners are required to demonstrate compliance with the Electricity Industry Participation Code and provide a validated plant model to the System Operator. Dynamic models enable the system operator to understand how generating plants respond to grid disturbances and ensures that system studies used for planning, connection assessments, and real-time operation accurately predict plant performance.

While testing and modelling techniques have been established for synchronous generators, inverter-based generation presents new challenges. Their fast-acting controls and diverse operating modes require the development of new testing methodologies and validation techniques. This presentation explores the evolving approach to dynamic model validation for inverter-based generation in New Zealand and compares the testing and modelling techniques used for recent synchronous and inverter-based generation projects.

3.40pm **Alex Foot, Transpower**



Alex is a Power Systems Engineer at Transpower, joining the System Operator's Power Systems Engineering team in late 2025. After graduating from the University of Canterbury in 2023, he joined Transpower's graduate program where he gained experience in a variety of power systems projects, rotating through several teams.

Since joining the Power Systems Engineering team, he has been involved in commissioning projects, and both dynamic and wider power system studies.

OFR: Managing Over-Frequency Risk in New Zealand's Power System

As the makeup of New Zealand's power system shifts towards higher levels of inverter-based resources and demand for electricity increases, the assumptions that define frequency security are changing. A principal performance obligation of the System Operator is to maintain grid frequency within defined limits, with Over frequency Reserves (OFR) providing a means of arresting frequency rise during major system contingencies that cause generation to greatly exceed load.

This study examines the generation armed and frequency settings to determine OFR requirements and assesses whether the current approach and process remain appropriate for ensuring key performance obligations are met. The study used dynamic power systems models to assess the relationship between the System Operator's frequency requirements, system operating conditions, and frequency performance following major contingency events.

Particular focus is given to the increasing contribution of wind and battery energy storage systems, and how these technologies influence frequency behaviour and reserve requirements. The study also examines how frequency response from these alternative sources compares to current assumptions used in OFR.

The presentation will outline the OFR framework, the process used to determine reserve requirements, and the impact of increasing inverter-based generation on future OFR needs and power system operation.

AWARDS AND SOCIAL FUNCTION

4.15pm

Awards Results — Joint EEA / CIGRE Best APEX Presentation Award **and** People's Choice Award

Closing Comments — APEX Chair

4.30pm to 6.00pm

Social Function

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YOUNG ENGINEER OF THE YEAR AWARD

EEA 2026 Young Engineer

The award winner is Lana Sheerin, Connell Contractors.

Increasingly our young engineers are playing a significant role in shaping the future of our industry.

The EEA wishes to recognise their contribution to our industry and is asking companies and individuals to identify and nominate from within their business, candidates for the EEA Young Engineer of the Year Award. The 2026 award winner will represent New Zealand at the IEC Young Professionals Programme being held in Erbil, Iraq, on February 25-26, 2026. IEC General Meeting in 2027 is scheduled for Singapore (ending on October 22, 2027.

The award will be presented to a young engineer who is judged to have demonstrated great achievement and leadership within the electricity supply industry, community and stakeholders.

The entrant must be aged under 35 as at 31st December 2026 and have tertiary-level engineering or technology qualification and be an individual member of the EEA or staff member of a Corporate Member.

EEA SCHOLARSHIPS

The Electricity Engineers' Association (EEA) is proud to support every year a number of students into engineering careers, help them raise their profile and **recognise the young talents that will contribute to the future of our electricity supply industry**.

We award five undergraduate scholarships annually, in partnership with the University of Canterbury (x2), the University of Auckland (x2) and the Auckland University of Technology (x1). The scholarships are tenable for a period of one year, for a value of NZ$5,000 each.

This initiative is part of the EEA's commitment to the future development of engineers and engineering education in New Zealand and to the ongoing professional development of its members in all sectors of the industry.

Visit https://eea.co.nz/courses-and-careers/scholarships/ to find out more about EEA Scholarships.

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Phone +64 4 473 8600 | admin@eea.co.nz | Website www.eea.co.nz