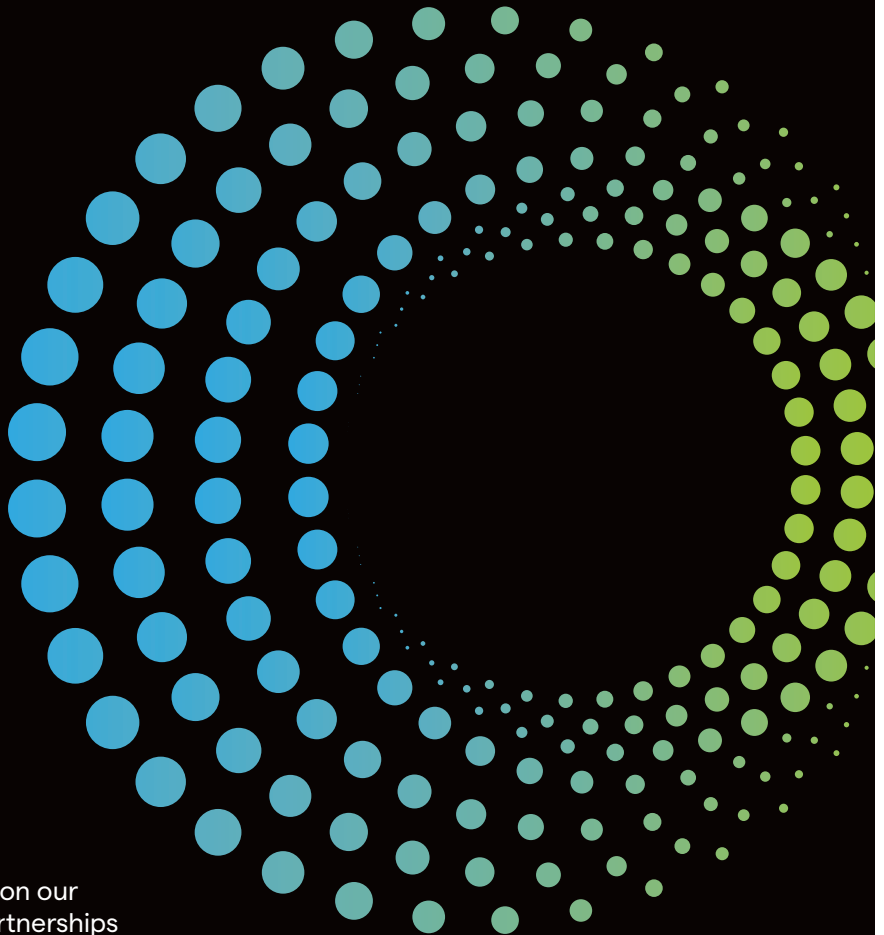




TRANSPOWER

**Engineering
and Technology**
Excellence Awards 2022
Awards ceremony programme



Shining a light on our
people and partnerships

Nau mai haere mai ki Engineering and Technology Excellence Awards 2022



A warm welcome to you all.

We appreciate you joining us tonight.

Congratulations to our 22 finalists across the six award categories, from AECOM, Beca, Electrix, Gridworks, Mitton ElectroNet, Northpower, Solnet, Ventia, and several Transpower teams.

Whether or not you are a winner tonight, I want to acknowledge all the Engineering and Technology Excellence Awards nominees. Thank you to our judges, Dr Keith Turner, Liz Yeaman and Dr Mark Sagar. Our judges were impressed with the number and quality of the nominations, which made it particularly challenging to select the finalists. To all our nominators and nominees, your contribution to championing and celebrating excellence in engineering and technology in Aotearoa New Zealand's transmission industry is greatly appreciated.

Tonight is about sharing stories of pride and excellence and coming together to strengthen connections, celebrate our craft, and congratulate the award winners.

This is our chance to recognise our engineering and technology specialists who demonstrate excellence and deliver innovative solutions that empower the energy future.

Our Engineering and Technology Excellence Awards are for Transpower engineering and technology specialists and our wider Transpower whānau – our engineering consultant panel members,

our service providers, and other external consultants, contractors, and sub-contractors we work closely with.

Engineering and technology sits at the very core of what we do at Transpower. As the owner and operator of New Zealand's national electricity transmission system we rely on engineering solutions and the use of technology to solve complex problems and deliver our services.

We are proud to have people working with us who engage in problem solving and find solutions that improve the way we work, consider the wider impact, and raise our standards. We want to shine a light on our people and celebrate their work.

A handwritten signature in black ink that reads "Alison Andrew". The signature is fluid and cursive.

**Alison Andrew, Chief Executive
Transpower New Zealand**

Hosted by Transpower, the Engineering and Technology Excellence Awards are the highest accolades in Aotearoa New Zealand's electricity transmission industry along with our biennial STAR Awards.

Programme



6:10pm	Mihi whakatau Taranaki Whānui ki Te Upoko o Te Ika - Mana Whenua
6:20pm	Welcome from our Master of Ceremonies, Mike McRoberts
6:30pm	Opening of the awards ceremony Transpower Board Chair Dr Keith Turner

ENTRÉE

6:55pm	Engineering and Technology Excellence Awards category presentations → Engineering by design → Investment in our industry future → Collaboration
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MAINS

8:20pm	Engineering and Technology Excellence Awards category presentations → Sustainability → Value engineering → Complex and challenging
8:55pm	Closing of the awards ceremony Transpower Chief Executive Alison Andrew

9:00pm	Closing karakia
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DESSERT

9:15pm	Networking
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Meet Mike McRoberts, our Master of Ceremonies

One of New Zealand's most recognisable faces, Mike McRoberts has been bringing us our six o'clock news bulletin on TV3 for many years.

With an award-winning career spanning more than 20 years, the former 60 Minutes current affairs host knows more than most about excellence, finding solutions to tricky problems, and considering the wider impacts of his work.

Journalism has taken him around the world, including to Afghanistan, Iraq, Lebanon, Gaza, East Timor, and the Solomon Islands. He's covered significant disasters in China, Haiti, Pakistan and South-East Asia; as well as the devastating Christchurch Earthquake in 2011. A keen sports follower, Mike has also presented and reported from several Rugby World Cups and Olympic Games.

Most recently, Mike filmed a documentary 'Kia Ora, Good Evening', which follows his journey with te reo Māori – unearthing the powerful story of connection and what it means to be Māori in contemporary Aotearoa.

Our 2022 Finalists

Engineering by design

Demonstrating best practice engineering and technology by design to deliver an improved engineering and technology outcome.



AECOM

Karapiro 110kV equipment replacement and switchyard rationalisation

Karapiro Substation is essential to Transpower's 110kV network as it provides generation infeed for Mercury's Karapiro Power Station and is the sole supply to Hinuera Substation. The project team's objective was to replace the existing 110kV Karapiro Switchyard Buswork built in the 1940s and simplify the arrangement to improve operation and maintenance flexibility whilst maintaining security and reliability of supply. This was achieved by the design team developing innovative engineering solutions throughout the feasibility, preliminary and detailed design replacing the busbar with a single 110kV sectionalised busbar to optimise the three generator connections—all while the substation was live.



Northpower

Re-engineering tower refurbishment

Northpower is renowned for innovation, and its tower refurbishment team has an appetite for continuous improvement. Evidence of engineering excellence is showcased in four core pieces of equipment that deliver this service. Since Northpower's founding in 1920, it has focused on safety while maintaining and upgrading electricity networks throughout New Zealand. As technology has evolved, it has embraced the development of new equipment associated with transmission tower refurbishment. Working with specialist engineering partners, it has completely redesigned equipment and work practices, including four key components in tower maintenance: a blast suit; blast remote; reel trucks; and blast trucks.



Transpower

Generator reactive capability modelling

The team, which sits within the System Operator function at Transpower, developed a new process to model the capability of generating machines in SCADA. The new process leverages historical operating data and compares it with existing capability curves, allowing an improved approximation of what a machine can do. In practice, these new curves will make outages easier to secure and reduce the requirement for new assets. This has direct impacts on service providers, distribution companies, asset owners and ultimately benefits New Zealand electricity consumers through reduced wholesale electricity prices.

Investment in our industry future

Making a significant investment in the engineering and technology future of our industry.



Northpower

Attracting and growing talent for New Zealand's new energy future

For years, the electricity supply industry has suffered from a lack of investment in training and a shortage of career pathways for young people. This has led to an ageing workforce across the sector, creating significant challenges for the industry's future. In 2018, Northpower set out to address this issue, making significant investments in training programmes for young people, launching trade and engineering cadetships, both with pathways into full-time employment. Northpower has trained and hired the next generation of industry leaders and begun the process of addressing the electricity sector's long-term skills gap.



Transpower Mātai

Mātai is a digital application that enables streamlined data collection by Transpower and its service providers in the field. Rather than a paper-based approach, staff now use tablets to accurately collect data. This ensures real-time knowledge on the state of all assets on the grid. Built in-house by Transpower and application partner Alphero and using a user-based project approach, with Mātai, it means saying goodbye to messy paperwork and double handling and hello to a future of field mobility.



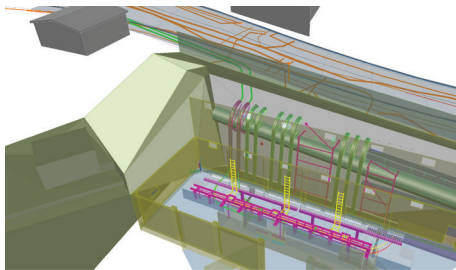
Ventia

Ventia Transformer oil laboratory

Testing transformer oils has numerous advantages for power transmission, distribution, and industrial companies. Preventative maintenance can substantially increase the service life of an asset. Test results are more valuable over time as sudden changes may indicate leaks or underlying problems. When potential issues are identified, repairs and oil filtering can be significantly cheaper than replacement costs. To support the industry, Ventia's Oil Laboratory team has been servicing New Zealand's high voltage and distribution industry since 1987, specialising in testing and analysis of insulating oils for high voltage equipment.

Collaboration

Collaboration that results in an improved project outcome, innovation, growth of our engineering and technology capability, or has a significant positive impact on progress towards our energy future.



AECOM

Frederick St 33kV cable and protection upgrade – detailed design

This project involved feasibility, preliminary and detailed design for the replacement of Wellington Electricity's 33 kV sub-transmission cable between Transpower's Central Park Substation and Wellington Electricity's Frederick St Zone Substation. Through a collaborative effort the cable was successfully installed and commissioned into service on time (prior to deadline). The team developed a constructible solution, which required a multistage cable route assessment, Transpower substation modifications, Wellington Electricity Zone Substation modifications and 33 kV cable calculation (rating, configuration and sheath bonding). To ensure success, they managed complex underground service constraints, achieved a crossing of State Highway 1 through engagement with WCC and NZTA, proactive and prompt construction support, and the utilisation of 3D modelling.



Gridworks

Competency assessment in a locked down world using connected worker technology

Facing constant COVID-related delays and challenges to deliver essential competency assessments to Transpower MV cable jointers, multiple organisations collaborated to deliver crucial refresher training using modern augmented reality technology while ensuring the health and safety of all involved. This nomination is a collaboration between Cuthbert Stewart Ltd, Gridworks, HV Power, Telepresenz, Transpower Grid Skills, Nexans Power Accessories and of course the Cable jointers. The success of this undertaking proved the effectiveness of a training approach that is more efficient, flexible, cost effective, and more easily undertaken than conventional approaches. It has been well received and considered a viable approach to training and assurance.



Transpower

Improving community wellbeing by researching and controlling noise from new overhead transmission line conductors

Maintaining good relationships with landowners and communities is a priority at Transpower. During a significant rewiring project, the team discovered the conductor was not performing as expected in relation to noise, which had potential to cause noise concerns with communities living under the lines. In wet conditions the new wires were noisier than the ones we were replacing. The issue was solved through collaboration and ground-breaking engineering and technology, achieving some world firsts. Now new conductors can be tested, treated and monitored to prevent the potential for noise disturbance in communities when the grid is upgraded.

TPM Design Principles

As an overarching principle, any new TPM proposal will be consistent with the TPM Guidelines, the Electricity Authority's statutory objective and any determination by the Commerce Commission under Part 4 of the Commerce Act.

 <p>Prices are explainable, including in the way they change over time</p>	 <p>The methodology is robust and transparent</p>	 <p>The methodology limits reliance on undue discretion or subjective judgement</p>	 <p>The methodology works constructively alongside the investment test</p>	 <p>The pricing model is cost-effective to administer</p>
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Transpower

Transmission Pricing Methodology (TPM) proposal to the Electricity Authority

In June 2020 the Electricity Authority gave Transpower 12 months to deliver a Transmission Pricing Methodology proposal. Creating a TPM workable for Transpower and its customers needed a dedicated, multi-disciplinary team to apply deep expertise to solve complex technical problems. The team included engineers, economists, pricing practitioners, energy market specialists and lawyers. Early momentum was created with a design sprint, implemented gold standard project management and governance practices, and prioritised meaningful engagement with stakeholders. The project was delivered on time to a standard the team are super proud of.

Sustainability

An engineering or technology initiative or strategy that has or will provide long-term positive impacts on the environment.



Beca

Future proofing the New Zealand grid through sustainable innovations – Clutha Upper Waitaki Lines Project (CUWLP)

The objective of Clutha Upper Waitaki Lines Project (CUWLP) was to increase the capacity of the transmission lines in the Clutha and Upper Waitaki Valley regions to meet the ongoing electricity needs of New Zealand. It has not only paved the way for a resilient electricity network but also a small step to building a more sustainable future. A project of this size requires a considerable amount of concrete and steel. Instead of the standard approach of demolishing the old and installing new, the team opted for re-using as much of the existing as possible. Through clever innovations such as optimisation of standard designs, infrastructure reuse and thinking smarter, not harder, CUWLP shows what small but important steps can be done on our journey to achieving a greater outcome.



Transpower

Our SF6 Management Strategy to support NZ carbon emission reduction targets

Through extensive engagement - including with international peers – the New Zealand transmission industry's first Sulphur Hexafluoride Gas (SF6) Management Strategy was developed. This includes the creation of a new emission forecast tool. SF6 is a non-toxic gas with great insulating properties, of which Transpower has 48.5 tonnes in our assets. However, if leaked, SF6 has a global warming potential of 23,500 times that of CO2 and remains in the atmosphere for over 3000 years. The team are leading the way with research and implementation of sustainable solutions and now share best practice approaches with distributors and generators. The target is to achieve a 60% reduction in SF6 emissions by 2030.



Value engineering

An engineering or technology project, initiative, innovation or strategy that demonstrates the greatest whole of life nett benefits that support our energy future.



Mitton ElectroNet

Speeding up electrification – the ElectroNet modular switch room solution (MOSS)

Since being awarded the Transpower 33 kV Outdoor to Indoor (ODID) conversion design project in 2010, Mitton ElectroNet have designed 350 ODID conversions for Transpower, with this experience culminating in the development of its design and build Modular Switchroom Solution (MOSS) product. This nomination is focused on the MOSS story, and the journey Mitton ElectroNet have taken with Transpower over the past decade. It led to the development of an innovative, value engineered product that addressed challenges Transpower were facing with regards to ODID project timeframes, ensuring they could be commissioned sooner than traditional solutions with tilt slab/ masonry block switchrooms.

Transpower

Automated PL/SQL code conversion to Java (as part of Market System Simplification programme)

This was a technologically complex project and a world-first in terms of the automated PL/SQL code conversion to the Java language. Through value engineering the team provided a \$50 million plus cost saving by modernising the market system, and delivered a fit-for-purpose, reliable, easier to maintain system. Major industry-led initiatives, like the Real Time Pricing project, can now leverage off the modern architecture and software code base. The world-class team assembled from Transpower and its contractors, TSRI (USA), Qual IT Solutions and PSC took on and conquered the significant engineering challenges encountered.

Transpower

Development of localised degradation model

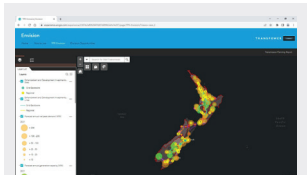
Corrosion drives a significant amount of replacement and refurbishment investment. For over 10 years Transpower used six externally developed corrosion codes as the primary input for life and degradation. However, upon review, it was discovered Transpower's own data - that it has been collecting since 1998 - and techniques like filtering, multiple regression and geospatial smoothing, are actually better for predicting corrosion. The super data set is from five million condition scores and provides greater understanding of corrosion at a local level, which helps better manage assets. Others in the industry are now keen to utilise the data and techniques.



Transpower

Extending the Canterbury Engineering (CE) outdoor disconnectors asset life to defer \$17.5 million of capital expenditure per RCP

Disconnectors are repairable and maintainable, provided the parts and skilled people to undertake the work are available. To extend the operating life of outdoor disconnectors, the team opted for a condition-based refurbishment strategy with a commitment to continuous improvement. This was achieved by creating maintenance specifications and procedures from scratch, developing intellectual property to ensure asset life extension requirements are achieved, and enabling knowledge sharing in the field. The approach has enabled the deferral of \$17.5 million in capital expenditure.



Transpower

Envision opportunities

Deciding on the right location of new electricity generation is typically the first step for developers. Envision Opportunities is a new geospatial tool that provides customers with transmission capacity information, allowing them to screen potential locations for new generation. There are many factors taken into consideration in a new connection proposal, including energy source, environmental approvals, constructability, and property rights. By providing detailed information about viable capacity at specific locations, Envision Opportunities has helped developers and Transpower save time as well as cost by focusing efforts on areas with the best opportunities.



Complex and challenging

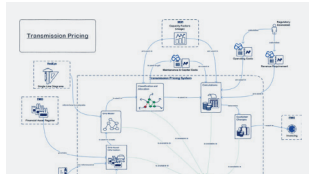
A complex engineering or technology challenge resolved in an elegant and straightforward manner.



Electrix

Cromwell container-based water-ballasted hurdle

When Transpower approached Electrix for a solution to re-string/upgrade a critical piece of infrastructure suspended over a live 220kV solid bus, the team said, “On it!” Time was tight with the start of the Clutha Upper Waitaki lines project in less than two months. Within the timeframe, the team conceived an elegant, structurally efficient solution – right in the heart of the ‘live’ Cromwell substation! With this unique innovative answer to a complex challenging problem, the substation continued to supply power to approximately 30,000 homes in Queenstown/Wanaka without disruption.



Solnet

Transmission Pricing System

This nomination emphasises how Solnet and Transpower worked jointly to solve an important, complex and challenging technological issue in an elegant, innovative and ground-breaking way. This flexible solution accommodates change and enables operational efficiency by providing a Transmission Pricing System that exceeded initial expectations. Solnet and Transpower collaborated to solve a complex problem by exploring options and validating assumptions using agile techniques and proof of concepts (POC). This resulted in fit-for-purpose solution—delivered ahead of time and on budget.



Transpower

The ICON life extension defect model

Transpower’s transmission lines span 12,000 km and are exposed to highly corrosive environments. The corrosion bulge defects on conductors are captured by a drone program and the ICON defect model uses this data to provide a fitness for service assessment, a technique used in the petrochemical industry. The fitness for service application to conductors is novel, and a first for power transmission asset management. It means better management of risk and deliverability all the while delivering a cost deferral of \$300m over 5 years.



Transpower

Development of new benefit-based charge methodologies for a new Transmission Pricing Methodology

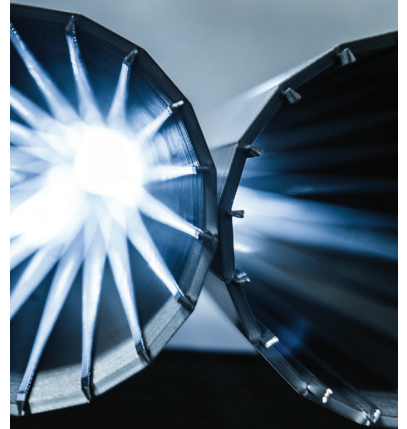
The new Transmission Pricing Guidelines published by the Electricity Authority required Transpower to develop a complex benefit-based charging methodology, under which estimates are made of individual transmission customer's expected private benefits from Transpower's investments. It is an inherently complex and internationally unprecedented method for transmission pricing. A dedicated team of Transpower specialists applied deep knowledge of transmission economics, modelling, and legal drafting to develop methods for calculating benefit-based charges that we will now implement into prices from April 2023.



Ventia

Judgeford Tee protection upgrade – innovative new commissioning method

Utilising leading-edge software and protection test equipment, the Judgeford Tee project commissioning team successfully completed a series of complex outages within an unprecedented timeframe, achieving a 40% reduction in outage duration. This significantly reduced the risk exposure of a wide area blackout to the Wellington CBD during the protection upgrade works. The key challenge for this project was implementing a leading edge, advanced protection commissioning method from zero prior application, to fully implemented within a 3-month period. All while ensuring the project was not negatively impacted. Through agile collaboration, all technical challenges were quickly addressed and successfully implemented.



Kia ora and thank you to our judges

The experience of our independent panel of judges for the Engineering and Technology Excellence Awards 2022 means they understand what it takes, and the difference it makes, to think outside the box.

Dr Keith Turner

Transpower Board of Directors Chair

Dr Turner is the Chair of Transpower's Board of Directors. He has 40 years' experience in the electricity industry, having held senior executive positions in Meridian Energy, the former Electricity Corporation of New Zealand, and its predecessor NZED. Since 2008, he has been a professional Chair, Deputy Chair and Director on major New Zealand and Australian Boards including Auckland International Airport, Chorus NZ, Spark Infrastructure, and Fisher & Paykel. In 2018, he was appointed as a member of the Interim Climate Change Committee by the New Zealand Government, which began crucial work on how Aotearoa transitions to a net zero carbon economy by 2050. Dr Turner has a PhD in engineering, is a Distinguished Fellow of Engineering New Zealand and holds the Sir William Pickering Medal for Engineering Leadership.

Elizabeth Yeaman

Managing Director Retyna Ltd

Elizabeth (Liz) Yeaman has over 30 years' experience in the transport and renewable energy sectors, particularly in renewable energy for transport. In a former role as General Manager Transport at the Energy Efficiency and Conservation Authority, she led the design and implementation of the electric vehicle programme. Recent projects include selecting and coordinating charging infrastructure for the Southern hemisphere's first fast electric ferry, project design for an electric trucks pilot project in the proposed Auckland Zero Emissions Area, writing a series of papers for the Climate Change Commission, and delivering training materials for the Asia Pacific Economic Cooperation (APEC). Liz holds a MAppIsc in Natural Resource Engineering and is a Fellow of Engineering New Zealand and a Chartered Member of the Institute of Logistics and Transport.





Dr Mark Sagar

Director for the Auckland Bioengineering Institute's Laboratory for Animate Technologies

Dr Mark Sagar is the Director for the Auckland Bioengineering Institute's Laboratory for Animate Technologies. He is the co-founder of Soul Machines (a 220-strong global team with R&D based in Auckland) and he and his team are pioneering new technology to create virtual humans with virtual brains. For example, developing Florence, a digital health worker for the WHO to help combat smoking and Covid-19 misinformation. Mark was elected as a Fellow of the Royal Society of NZ in 2019 for his world-leading research. He has a PhD in Engineering from the University of Auckland and was a postdoctoral fellow at MIT. For his work in visual effects, he was awarded two Scientific and Engineering Academy Awards for his innovations in animation which have become industry standard in feature films such as Avatar.

Transpower is making a koha (donation) to each judge's nominated charity.



For more information visit
www.transpower.co.nz/excellence



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TRANSPOWER

