



## 2026 Finalists: Engineering and Technology Excellence Awards

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## Category: Engineering for value

A team, individual or organisation that has applied best-practice design and value principles to improve outcomes, as demonstrated by the greatest whole-of-life net benefits.

### **1. AECOM, Aurecon, Do Consulting, Niko Engineering, Value at Speed, XER Graphic Design and Transpower: *Power transformer in-bund oil containment design***

This initiative unlocked a significant value engineering opportunity for in-bund oil containment across Transpower's substation programme by challenging long-standing tertiary containment approaches. Traditional designs—relying on large tanks, extensive civil works, and complex pipe networks—met compliance requirements but introduced high cost, construction complexity, carbon footprint, and programme risk.

The need emerged from increasing delivery pressure, rising transformer costs within RCP4 & RCP5, and the opportunity to rethink solutions using a whole-of-life lens. Tactical Engineering led a collaborative effort with Asset Planning, delivery teams, and industry partners including AECOM, Niko, and Value at Speed to redefine the problem and explore credible alternatives.

A structured value engineering process was developed to systematically assess options through technical analysis, constructability reviews, environmental and safety risk assessments, and alignment with operational requirements and governance hold points. The resulting in-bund containment solution maintained the desired performance and compliance while significantly reducing complexity and construction impact.

Importantly, the solution has already been successfully designed and constructed across multiple sites, with Invercargill GXP as the first application, demonstrating practical implementation and stakeholder confidence.

This approach is expected to deliver savings of at least \$0.5M per transformer site, with over 50 replacement and new sites anticipated over the next 10 years—equating to \$25M+ in programme savings, alongside reductions in construction energy use and carbon emissions.

Beyond the technical outcome, the initiative has strengthened cross-functional collaboration and improved decision-making transparency. It demonstrates how disciplined engineering and clear governance can shift engineering practice—delivering better whole-of-life value while enabling more sustainable and efficient infrastructure investment.

### **2. Niko Engineering: *The Islington 66kV circuit breaker replacement project***

The Islington 66kV Circuit Breaker Replacement Project requires a high-performing solution to be delivered, within constrained substation bays, while preserving the availability of critical circuits. The project brief required the circuit breakers (CB) to be replaced while retaining the existing bus selection disconnectors. The project team recognised the limited remaining service life of the bus selection disconnectors and the challenges that would be faced when these disconnectors are to be replaced in the future.

The Niko project team proposed a unique primary arrangement to overcome the foreseeable issues. The Transpower Value Engineering process was used to develop the opportunity and get key stakeholder buy in.

The unique primary arrangement consists of using bus selection disconnecting circuit breakers (DCB) in place of the bus selection disconnectors. In each bay, the two bus selection DCBs will take the place of two conventional bus selection disconnectors and conventionally located CB/DCB.



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The bespoke primary arrangement greatly improved safety during equipment maintenance, while reducing capital cost, reducing whole-of-life cost, reducing embodied carbon, and eliminating the existing current switching issue.

This project demonstrates how targeted innovation in primary design can overcome physical and operational constraints, while balancing safety, system availability and cost.

### **3. Transpower: *Engineering value from smarter data platform design***

Transpower's data team has delivered a sustained programme of cloud platform optimisation. Rather than defaulting to additional capacity, licensing or brute-force processing, the team applied disciplined engineering methods to reduce unnecessary data movement, tune compute-heavy workloads, and redesign ingestion patterns across the Cloud Data Platform.

The work challenged "load everything, process everything" approaches and replaced them with fit-for-purpose, consumption-aware design. In Installation Works Package, the team reduced the daily dataset from six million records to 35,000 — a 99.42% reduction — improving queue times and lowering Informatica usage. They optimised data build tool execution patterns, cutting job runtimes by approximately 50% and avoiding an estimated US\$34.2k per year in additional Snowflake costs. They also prevented an unnecessary Power BI capacity uplift, avoiding around \$5k per month in additional licensing.

At Market Systems scale, the team redesigned the ingestion approach for approximately 97 billion records, stretching the data ingestion as background incremental tasks, reducing estimated implementation cost from around \$100k to between \$10k and \$20k. Further optimisation reduced a high-consumption Informatica job from around 1,154 Information Processing Units (IPU) per year to just 47 (our entire Informatica monthly IPU maximum usage is 520 IPU), while Snowflake query improvements reduced annual cost from approximately US\$17k to only a few hundred dollars.

This work has delivered stronger performance, lower operating cost and reusable engineering patterns for future data products and ingestion workloads.



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## Category: Innovating for outcomes

An engineering or technology initiative that has redefined how things are done, delivering valuable and enduring impacts.

### 1. Transpower: *Invisible risk to managed risk - redefining asset management*

Substation structures and buswork is one of the most complex and difficult-to-manage asset classes on New Zealand's transmission network. Comprising of tens of thousands of interconnected components with diverse failure modes, these assets are difficult to access; requiring climbing, temporary access systems, or major outages for inspection. Historically, fragmented information, inconsistent condition data, and limited visibility of risk meant the portfolio could not be managed systematically at a national scale. This was a known problem for over 10 years and previous attempts made to solve it, weren't successful.

To address this challenge, Transpower developed and embedded the first integrated asset management system for structures and buswork. Through a whole-of-system review and close collaboration with service providers, grid delivery, and asset managers, we created an end-to-end framework linking inspection, condition assessment, defect identification, project development, and investment decision making. The introduction of drone-based inspection technology enabled safe, repeatable assessment of previously inaccessible assets.

After two years in operation, the new asset management system has created approximately 24,000 managed assets, 65,000 condition measurements, and 1,500 defect work orders. It has prevented failures and loss of supply; uncovered previously hidden safety and reliability risks; enabled data-based planning for 31 substations; supported \$43 million in newly planned projects; cancelled \$11 million of unnecessary expenditure and deferred \$22 million of expenditure.

By converting a historically unmanaged risk into a managed one, Transpower has improved safety, strengthened grid reliability, and established an enduring, risk-based approach to managing critical national infrastructure.

### 2. Transpower: *Safer, scalable digital switching execution in Transpower control rooms*

Switch execution is the step-by-step operation of high-voltage equipment to safely take assets in and out of service for maintenance or fault response. It is one of the most safety-critical activities in grid operations, where a single error can endanger lives or disrupt electricity supply.

Digital Switch Management Switch Execution transformed this process by replacing paper-based, manually coordinated switching with system-driven, real-time digital execution. The solution embeds structured workflows directly into DSM, enforcing sequential steps, validating live device state, surfacing cautionary and prohibitive tags, showing control ownership, and enabling single-click control invocation to reduce wrong-device operations. It also supports transfer of switching sequences between control rooms if one site becomes unavailable.

Live since December 2025, DSM Switch Execution addresses a material operational risk in control room operations, where around 160 grid outages are managed each week. Since go-live, switching-related control room incidents have reduced to zero.

It represents the most significant control room transformation since SCADA was introduced in the early 1980s, establishing a platform for field mobility, analytics, and future automation.



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### **3. Transpower: *Seeing the unseen: reducing risk, time and cost***

We have transformed how we and our partners understand and manage one of its most persistent hidden risks: subsurface utilities. We have spent years lifting the standard for how underground assets are identified, captured, and used across the project lifecycle moving us beyond temporary, project-specific marking methods toward a digital asset that improves safety and decision-making across the asset lifecycle.

A major breakthrough has been the practical use of field technology to make underground services visible in real-world conditions. By connecting the data with iPad-based visualisation, they enabled teams on site to see underground utilities, future designs in context, to potential flooding levels. This has unlocked instant value each time it is used

- Edgecumbe ODJB vertical position and access with flooding level informed through augmented reality
- Growing number of Transpower substation sites reusing existing underground utility locate data saving Transpower hundreds of thousands of dollars annually

This process, data and technology enables coordinated design, safer excavation, better asset identification and clearer understanding of site constraints. This evolution of how we capture and use data is being embedded through standards, documentation, and on-site implementation so others can repeat it with confidence, reducing uncertainty and delivering better cost and safety outcomes.



## Category: Investing in our industry's future

A team, individual or organisation making a bold investment in engineering or technology to deliver high-value outcomes for the future of the industry.

### 1. DIALOG Fitzroy: *Closing the loop. Transforming abrasive blasting through circular resource recovery*

Faced with the long-standing practice of sending spent abrasive garnet from transmission tower blasting operations to landfill, David recognised an opportunity to transform a costly waste stream into a valuable resource. Rather than accepting the status quo, he partnered with a local technology provider and led the implementation of an innovative garnet recovery process that supports a circular economy approach within New Zealand's electricity transmission industry.

The solution combines smarter work practices, local processing technology and industry collaboration to recover, test and recycle spent garnet that would otherwise be disposed of. Crews now collect and prepare the material for recovery, with approximately 75% successfully recycled and supplied to other industries where it remains fit for purpose.

This investment has reduced landfill disposal, lowered waste management costs, minimised transport requirements and created a sustainable reuse pathway for a material previously regarded as waste. Most importantly, it has established a practical model for future industry change, demonstrating how leadership, innovation and partnership can improve environmental outcomes while delivering commercial value. By challenging traditional practices and enabling a circular supply chain, David has helped create a more sustainable future for the engineering and infrastructure sectors.

### 2. ElectroNet Consulting: *Graduate programme*

Over 26 years ago, the EEA identified that the demand for qualified and experienced power engineers was going to increase. In 2002 the New Zealand power industry, together with the University of Canterbury, established the EPECentre at the University of Canterbury to focus on developing power engineers. In 2026 the EEA released the "Re-Energise 26" report, that highlighted that supply of new workers and engineering graduates is failing to keep pace with the workforce demands.

ElectroNet Consulting's two-year Graduate Programme demonstrates a strong commitment to developing New Zealand's future electrical engineers. Building on a proud 30-year history of supporting graduates and interns, the programme was formalised in 2020 to provide a structured and comprehensive development pathway. Graduates gain practical exposure to the design, maintenance, and expansion of electricity networks through six-month rotations across diverse technical and operational teams.

The programme's flexible, tailored approach enables graduates to align rotations with their interests, strengths, and career goals while building valuable internal networks. This model ensures meaningful on-the-job learning, strengthens technical capability, and fosters engagement and retention. Ultimately, the programme delivers lasting value to both graduates and the organisation, supporting a sustainable and capable engineering workforce.

At ElectroNet consulting we have "grow our own talent" approach which resulted in our graduate program being the largest contributor of new appointments within the business ensuring New Zealand has a "brighter" future.



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### **3. Northpower: *Building future inspection capability for New Zealand's transmission network***

Inspecting New Zealand's high-voltage transmission network has traditionally relied on ground-based visual and helicopter inspections, with limitations in data resolution, consistency, and condition visibility required for advanced asset management.

Over more than a decade, Northpower, in partnership with Transpower, has developed two specialist inspection capabilities. The first is acoustic partial discharge inspection, utilising new-generation acoustic technology from South Korea deployed in outdoor switchyards. This enables early detection of emerging electrical defects not visible through conventional methods, strengthening condition-based understanding of asset health. This required development of methodologies and the establishment of a specialist workforce, including acoustic inspection engineers.

The second is drone-based inspection of transmission conductor assets, supported by a dedicated workforce of drone pilots, data processors, and inspection engineers. A recent programme covered 667 km of conductor assets, capturing over 148,000 images at approximately 60% of forecast cost.

We successfully trialled the use of AI technology for post processing and put forward an innovation opportunity to Transpower for consideration. This is still being worked through.

Together, these capabilities deliver a scalable, condition-based inspection model that enhances data quality, improves asset visibility, and supports Transpower in delivering safer, more reliable electricity supply for New Zealanders.



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## Category: Partnering for success

An engineering or technology initiative that delivered significant value, where partnering was essential to achieving a successful outcome.

### 1. Contact Energy, Fonterra and Transpower: *Delivering electrification at Ohangai through partnership*

Delivering large-scale electrification at pace requires close coordination across multiple organisations, particularly where infrastructure, planning, and commercial constraints must align. To support Fonterra's rapid decarbonisation of its Whareroa site, Transpower, Fonterra and Contact Energy have worked in partnership to deliver a new greenfield grid exit point at Ohangai – commissioned in June 2026 an unprecedented timeframe of under 16 months.

Collaboration across all parties has been critical to enabling the project. Fonterra played a key role in securing a suitable site and working with local stakeholders, while Contact Energy (Manawa Energy at the time) agreed to divest a section of its Hāwera-Pātea 110 kV circuit during a period of corporate transition. This has enabled Transpower to establish the new substation at the intersection with a 220 kV circuit, creating a more robust and future-ready supply solution for the region.

Delivery has been accelerated through coordinated decision-making and shared commitment to timelines. This includes relocating a spare interconnecting transformer from Auckland and implementing Transpower's first digital substation, enabling a simplified and faster delivery approach.

The project at pace toward a very challenging commissioning date. As completed, the solution provides a resilient, scalable network solution that enables rapid electrification while demonstrating the value of strong industry partnerships under tight time constraints – outcomes that would not have been achievable by any single party acting independently.

### 2. Hayes Metals, Macaulay Metals, Phoenix Recycling and Transpower: *From grid assets to new value. A national recycling partnership*

What links a statue of Colin Meads in Te Kuiti to the electricity transmission network? The copper content of its bronze is from recycled transformer windings!

With scrap metal quantities forecast to increase threefold from 300 tonnes per annum today to 900 tonnes per annum in RCP5, Transpower, its service providers and specialist metal recyclers have partnered in readiness. In 2026, with commitment from our service providers, Transpower established a national metal recycling panel with Hayes Metals, Macaulay Metals and Phoenix Recycling. It replaced a fragmented approach involving more than 30 separate recyclers.

The partnership delivers modern, data-rich financial and sustainability reporting, lifting probity and transparency to contemporary standards. We have improved assurance in safety, quality and environmental performance, through prequalification, streamlined engagement and expanded recycling pathways.

Our recyclers contribute advanced technology, bespoke engineering solutions and decades of network experience. With our service providers overseeing work in the field, our partnerships providing efficient resource recovery across activities ranging from tower deconstruction and transformer separation to complex cable processing. We've lifted sustainability, expanding recycling beyond metals to include batteries, concrete, glass insulators and relays.



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Together we can achieve what we cannot alone. We've positioned ourselves to efficiently manage and recover \$19m worth of materials through to 2035.

### **3. Northpower: *Overcoming complexity. A partnership-driven engineering solution at joint bay 11***

The Brownhill-Pakuranga (BHL-PAK) A and B circuits are critical 220kV transmission assets supplying Auckland and Northland. Following two cable joint failures, Transpower initiated a proactive programme that ran from 2024 to 2026 to replace all original joints and strengthen network reliability.

Joint Bay 11 presented one of the most complex challenges within the programme. Located within a constrained road corridor adjacent to a steep embankment, the site required bespoke engineering solutions, including a tailored joint bay extension and specialised enclosure design, modified cable jointing methodologies, and engineered temporary works to ensure geotechnical stability. The works also required a full road closure on a route carrying approximately 5,000 vehicles per day, requiring significant stakeholder co-ordination and creating programme pressures.

This challenge was successfully overcome through a highly collaborative, partnership-driven approach involving Transpower as the client, designers, contractors and specialist jointing teams. Early engagement, shared problem solving as well as the use of advanced digital tools to enable risks to be identified and mitigated effectively.

The outcome was the safe delivery of a robust, fit-for-purpose solution with minimal stakeholder disruption, completed 33 days ahead of schedule with no rework. This project demonstrates how engineering innovation, combined with strong partnership, can successfully deliver complex infrastructure outcomes.



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## Category: Solving complex challenges

A team, individual or organisation that tackled a complex engineering or technology challenge and delivered an elegant solution, embedding both the solution and lessons learned into practice.

### 1. APD Global, Calibre, Heron Construction and Transpower: *Marine tower foundations - neither land nor sea*

The HEN-OTA-A 220 kV line is critical to security of supply for North Auckland and Northland. Five of its towers stand in the Whau Estuary on marine foundations built in 1965. After almost six decades in a harsh marine environment, the foundations are at end of life, with cracking through the pile caps.

Bringing a specialist marine contractor in during design, the team developed engineering and construction approaches together, treating access, logistical and environmental limits as core design inputs. Taking a staged construction sequence to install new piles around each existing foundation, joining the piles with a reinforced concrete ring beam, erecting a temporary steel frame and support for the tower, allowed the demolition of the existing foundation and building of the concrete structural raft and upstand inside the ring beam completing the foundation all the while insuring the tower remained fully supported, and operational while providing power security.

At this time, we have built four of the five towers and the fifth is underway. To date there have been zero: unplanned outages, significant injuries, or concrete releases, across 64 new piles,  $\pm 988$  m<sup>3</sup> of concrete and 165+ barge movements. The selected approach assured a repeatable methodology for rebuilding foundations in a highly sensitive environment for this critical infrastructure.

### 2. Transpower: *Building a resilience capability to mitigate solar flares impacts*

Transpower has developed an innovative monitoring and predictive analytics capability to strengthen the resilience of New Zealand's electricity grid against solar flare events. Solar storms can trigger geomagnetic disturbances that induce harmful currents in long conductive assets such as transmission lines and connected power transformers, creating a low frequency but high-consequence system risk.

To address this, Transpower installed neutral current monitoring on originally 16 growing to 81 transformers across the network (now 113), creating a real-time monitoring system for geomagnetically induced currents. This gives control room operators immediate visibility of emerging risks and supports post-event analysis for Transpower, external partners, and the wider electricity industry. Building on this foundation, a Machine Learning model was developed to forecast the severity of impending solar storms for multiple regions across New Zealand.

The model integrates Transpower operational data with external inputs from GNS magnetometers, NOAA satellites, and other international space weather sources. Running every five minutes, it provides short-term forecasts that support critical operational decisions, including rerouting power flows, temporarily switching circuits out of service, and restoring supply at the optimal time. This initiative can shift Transpower from reactive response to proactive risk mitigation, improving asset safety, reducing the likelihood of customer disruption, and enabling coordinated industry-wide action.



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### **3. Transpower: *From complexity to confidence. Future-ready cost allocations for grid investments***

This project resulted in a significant reduction in the time required to calculate the beneficiaries of major grid investments. For major investments in the grid, Transpower is required to identify the beneficiaries of the investment to allocate costs to customers. Where investments have impacts on the electricity market, Transpower assesses how relieving transmission constraints affects customer prices and, consequently, the benefits customers receive from the investment. The modelling is done using a dispatch model, SDDP, which calculates half-hourly future prices across all nodes for a range of hydro inflow sequences and future scenarios, over a horizon of at least 20 years. The modelling generates a very large volume of data that must be processed to determine cost allocations to beneficiaries.

Previously, the process for processing this data and producing allocations relied on a combination of Julia code and Excel spreadsheets. This approach was complex to review, maintain, and update, and as a result, calculating allocations could take several weeks.

As part of this project, the team reviewed the existing implementation and then leveraged the Python eco-system and Gitlab to deliver a process that reduced the time taken to calculate allocations from 1-2 week to less than two days. The new system also covers significantly more investment projects by accounting for variations within the relevant pricing regulations. The new system was developed with formal code review steps and automated testing.

As this process is applied to many investment projects this has resulted in significant time savings (e.g. 1 week per project) and has improved the confidence in, and auditability, of the results.