



EDISON AWARD

International Nominees and Winners

EEI



Background

Each year, Edison Electric Institute (EEI) presents the Edison Award to U.S. and international member companies. The award honors distinguished leadership, innovation, and contribution to the advancement of the electric industry, with a panel of former energy industry executives selecting the winners. It is the electric power industry's most prestigious honor.

EEI's international members have been recognized with the Edison Award since 1994, with winners exemplifying the strategic innovation taking place across the global energy sector. As the industry continues to lead the energy transition, electric companies are leveraging new technologies, developing innovative business models, and advocating for enabling policies and regulations.

In 2020, eight international members were nominated for the Edison Award, with projects ranging from digital transformation, to customer-centric strategies, to the world's most efficient Natural Gas Combined Cycle plants. After evaluating all the nominations, the selection committee awarded two companies with the International Edison Award: ATCO (Canada) and Compagnie Ivoirienne d'Electricité (Côte d'Ivoire). This booklet highlights the projects of both winners, as well as each of the international nominees' impressive work to continue driving innovation in the electric power industry.



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Alberta PowerLine – ATCO, in partnership with Quanta Services

OVERVIEW

The Alberta PowerLine (APL) is a success story exemplifying how the electric power industry and Indigenous Peoples can work together to develop innovative energy infrastructure that benefits both customers and communities. Through a partnership between Canadian Utilities Limited (an ATCO company) and Quanta Services Inc., APL built the longest 500-kV AC transmission line in Canada, spanning 508km (316mi). The Fort McMurray 500-kV West Transmission Project serves northern Alberta and is a model for successful stakeholder engagement.

The project began in 2014 when ATCO and Quanta set out to develop, design, finance, construct, and operate the longest 500-kV AC transmission line in Canada, across some of the world's most difficult terrain and in its most challenging climate.

APL worked in close partnership with Indigenous communities throughout each stage of the project. Over a three-year period, APL engaged with 27 Indigenous communities with traditional land use in proximity to the transmission line. Centuries-old culture, histories, and local knowledge helped shape the route and develop the Caribou Protection Program, which has set a new standard for construction. APL also established a Historical and Archaeological Resource Protection Plan to identify and preserve historical assets. Through contracts totaling CAD \$85 million, APL worked with these communities to provide job opportunities, skills training, and local economic development. After the transmission line was energized in March 2019, seven Indigenous communities invested in the project and secured 40 percent equity ownership of the APL in December 2019.

During construction, APL implemented innovative engineering solutions to overcome challenging terrain and an extremely cold climate. Much of the route of the transmission line crosses muskeg, a fragile bog-like terrain that retains water. In many areas the construction was condensed to two winter seasons, each only three months long, to allow safe access to the right-of-way and limit impacts to the environment. APL also designed fit-for-purpose guyed-V towers, which allowed for safer and more efficient construction. These innovations contributed to energization three months ahead of schedule with an excellent safety record.

From the initial bid stage to the sale to Indigenous communities, APL's innovative financing mechanisms unlocked numerous opportunities for the project and the people and communities involved. Valued at CAD \$1.6 billion, APL made Canadian history as the largest P3 bond and the first transmission infrastructure P3 to be procured in the country.

KEY ACCOMPLISHMENTS

- ▶ Canada's largest P3 bond transaction, valued at CAD \$1.6 billion (USD \$1.15 billion).
- ▶ Named one of Canada's top 50 infrastructure projects.
- ▶ More than 3,000 in-person meetings to engage Indigenous communities and landowners.
- ▶ Seven Indigenous communities secured 40 percent equity ownership in project.
- ▶ Project construction completed three months ahead of schedule with impeccable safety record.



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The logo for the Edison Electric Institute (EEI), consisting of the letters 'EEI' in a bold, white, sans-serif font.



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ABOUT ATCO

With approximately 6,500 employees and assets of \$22 billion, ATCO is a diversified global corporation with investments in the essential services of Structures & Logistics (workforce and residential housing, innovative modular facilities, construction, site support services, workforce lodging services, facility operations and maintenance, defense operations services, and disaster and emergency management services); Utilities (electricity and natural gas transmission and distribution and international electricity operations); Energy Infrastructure (electricity generation, energy storage and industrial water solutions); Retail Energy (electricity and natural gas retail sales); Transportation (ports and transportation logistics); and Commercial Real Estate.



Crews string cable that stretches more than 500 km along the route of the Fort McMurray West 500-kV Transmission Project



More than 1,350 transmission towers make up the Fort McMurray West 500-kV Transmission Project

Electricity for All - CIE

OVERVIEW

Compagnie Ivoirienne d'Electricité (CIE) launched its "Electricity for All" Program (PEPT, from its French name, Programme Electricité Pour Tous) to increase electricity access in Côte d'Ivoire. In an effort to address the main barriers to access on the customer side and accelerate electricity access for the most vulnerable populations, CIE completed a deep analysis and proposed PEPT to the government.

Through its analysis, CIE identified the "last mile" cost in the distribution system as a significant barrier to electricity access. Among other factors, the lack of infrastructure and remoteness of the population result in high connection costs, with the average connection cost being around U.S. \$300. This is more than half the yearly income for the bottom 10 percent of Côte d'Ivoire's earners, which deters customers who cannot afford to pay for grid connection. To address this barrier, CIE partnered with several state and non-state entities and enacted PEPT to make last mile connections more affordable.

In October 2014, PEPT was launched as a pilot program which has now grown and been implemented in much of the country's rural areas. The program allows customers to connect to CIE's distribution system via a smart meter that gives them control to adjust the electricity they use. The initial cost is less than U.S. \$2, with the remaining balance paid over a span of three to ten years. Electricity usage is charged under a linear tariff based on a preset amount of kWh every month, giving customers clear expectations each month and allowing them to calibrate payments to quantities within their means.

CIE is the program operator and administrator and has partnered with subcontractors to manage connections, installations, and payment collection. PEPT received U.S. \$25 million in support from the World Bank, with U.S. \$10 million used to connect 40,000 customers in 2018 and the remainder expected to fund another 60,000 in 2019. The African Development Bank and E.U. also have contributed €30 million to the program, with disbursement anticipated in 2019. Côte d'Ivoire's government also has established a special revolving fund that allows CIE to be reimbursed for PEPT's upfront connection costs.

Although PEPT customers still face challenges in paying off the connection costs, 96 percent of beneficiaries continue to pay their electricity bills under the linear tariff. This high proportion of continued electricity payments indicates that the country is reaching development goals.

In 2020, the program expects to connect at least 220,00 households, with plans to connect 200,000 households per year until 2025 to provide electricity access to more than 90 percent of the country



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KEY ACCOMPLISHMENTS

- › 3.7 million people gained access to electricity through PEPT by the end of 2019.
- › 97 percent of beneficiaries have an active connection with CIE.
- › Of the 202,991 households connected, 58,099 were in rural areas.

ABOUT CIE

Compagnie Ivoirienne d'Electricité (CIE) has been supplying electricity in Côte d'Ivoire since 1990. Through a concession agreement with the government, CIE manages the operation of generation facilities owned by the State, transmission and distribution, marketing, and import and export of electricity throughout the country and sub-region.



Customers receive electricity connections through PEPT



Program beneficiaries can now use electricity for lighting and entertainment



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Digital Utility - Endeavour Energy

OVERVIEW

Endeavour Energy has embraced a digital transformation strategy to better serve both current and emerging customer needs while keeping electricity affordable. The company's "Digital Utility" project utilizes spatial data to enhance asset management, workforce scheduling, and customer engagement.

The project has resulted in the creation of a three dimensional (3D) digital model of Endeavour's entire electrical network asset base, covering a total area of 24,000km² across New South Wales, Australia. By harnessing existing and emerging technology and data sources, Endeavour aims to transform its fundamental processes with respect to asset management. The Digital 3D model captures real-world spatial information through light-based radar (LiDAR) technology to develop the "virtual world" model of all line assets and surrounding terrain. The model also includes condition factors such as the location of adjacent infrastructure and vegetation. By using its Digital 3D model, Endeavour has improved and enabled more sophisticated predictive analytics for pole serviceability, reduced bush fire risks, automated segments of its field force, and identified revenue leakage areas in its system.

Furthermore, the digital technology has led to significant improvements in field productivity through detailed productivity insights and dashboards; a geospatial bundling tool for job planning; a scoping tool that provides an electronic break-down of task needs; a scheduling tool to optimize work allocation; and field mobility that uses cloud-based scheduling to issue work and receive results back from the field.

Endeavour has also developed two interactive Customer Mapping Portals to improve customer engagement and information accessibility. These portals use the Distribution Annual Planning Report to create interactive maps that let customers easily identify and download load profile information. For example, the "connection opportunity map" indicates parts of the network where there is considerable capacity headroom available. The "non-network opportunity map," on the other hand, is forward-looking and gives customers information on the best opportunities for non-network service providers to develop proposed alternatives.

KEY ACCOMPLISHMENTS

- › Greater than 30 percent increase in field productivity from FY16 to FY19, with the program on-track to achieve another 10 percent increase in FY20.
- › 100,000 fewer pages being printed across Endeavour Energy's field service centers, thanks to field work transformations achieved through the Digital Utility strategy.
- › Finalist in the 2019 Australian Digital Utility Awards, under the category of Best Customer Innovation for its Customer Mapping Portals.



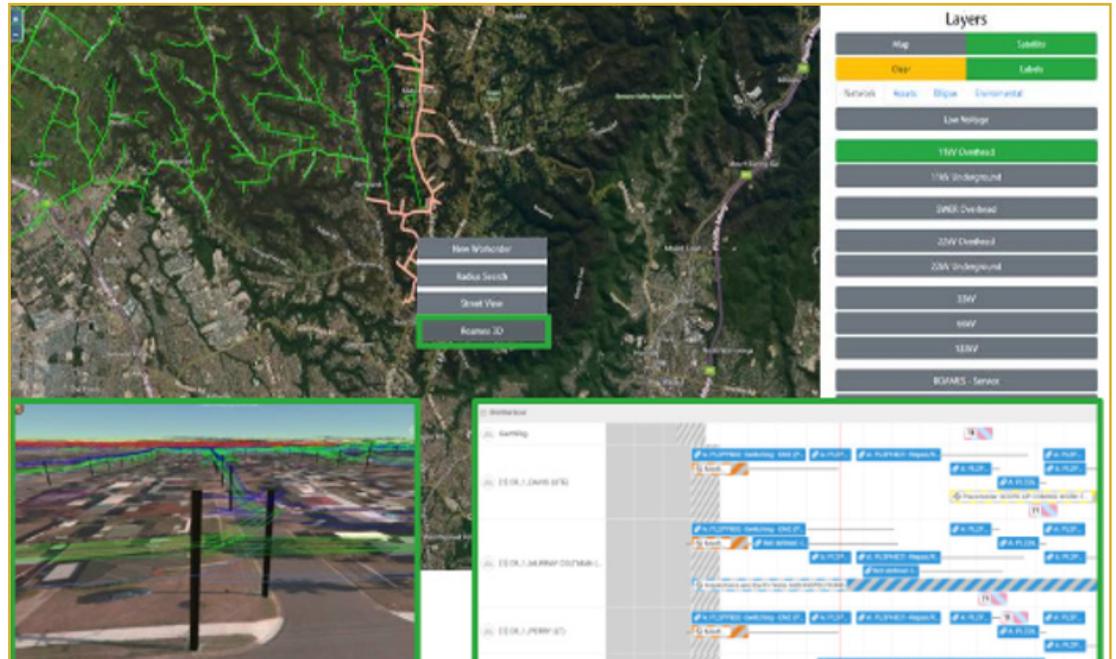
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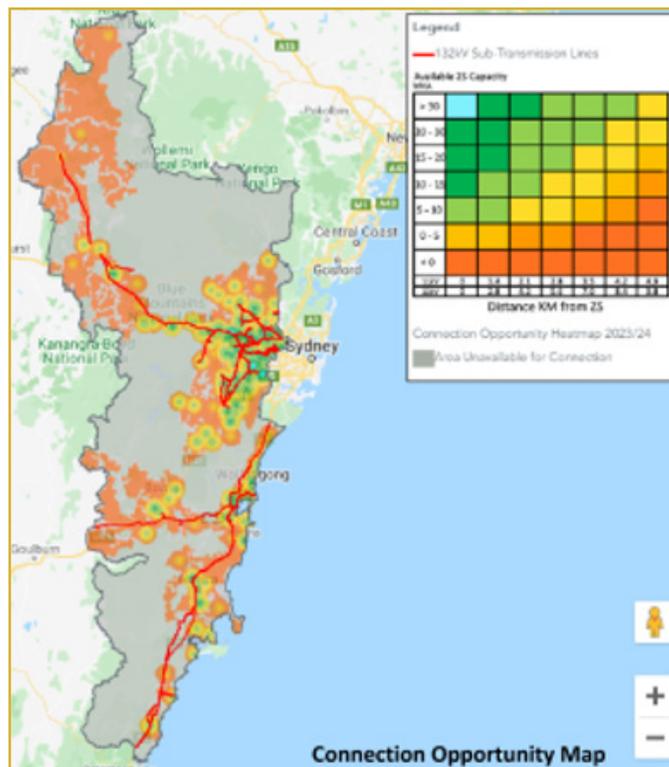


ABOUT ENDEAVOUR ENERGY

Endeavour Energy is a transmission and distribution company serving 2.4 million people in households and businesses across Sydney and other parts of New South Wales, Australia. Around half of the electric company is owned by an Australian-led consortium of long-time investors in the private sector, with the other half owned by the state of New South Wales.



Digital 3D Model



Connection Opportunity Map



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Predictive Analysis for Cable Failure — ENMAX

OVERVIEW

ENMAX Power Corporation, a subsidiary of ENMAX Corporation that owns, operates, maintains, and invests in the transmission and distribution system that delivers electricity to the city of Calgary, developed an innovative predictive analysis model to proactively identify buried cables at high risk of failure. The model provides quantifiable data supporting cost-effective long-range asset management and helps optimize capital spending and resource management. Ultimately, the model is meant to improve the customer experience by addressing reliability concerns due to unplanned cable failures in high-risk areas and help mitigate costs associated with unplanned outages, which can take time to locate and repair.

ENMAX Power identified underground cable failures as the highest contributor to both total customer outage minutes and total customer outage frequency. In response to this finding, ENMAX Power developed this predictive model to address these challenges and ensure it continues to maintain high levels of reliability while meeting electricity demand.

The predictive model identified the top factors that best predict future faults and applied a ranking system similar to that of online search engines to prioritize results. Overall, the model used more than 1.5 million data points to “learn” over a period of thirteen years. This involved data for each asset including physical features such as burial method of the cables and the number of downstream customers, as well as dynamic features such as outage history, previous faults, and ambient relative humidity.

Data gathered between January and July 2019 was used in the testing phase of the model, when ENMAX Power compared predicted outages to actual outages that occurred during that timeframe. The results revealed strong correlations and accuracy in the model’s predictions. The model has received positive feedback after being presented at multiple industry conferences across North America.

ENMAX Power views Digital Predictive Analysis as a way to optimize spending while also improving and maintaining the reliability of the energy grid.

KEY ACCOMPLISHMENTS

- ▶ On average, 70 percent of the top cables predicted to fail experienced at least one outage.
- ▶ The model had access to more than 1.5 million data points.
- ▶ The methodology of the model can be used to predict outcomes in multiple business areas.



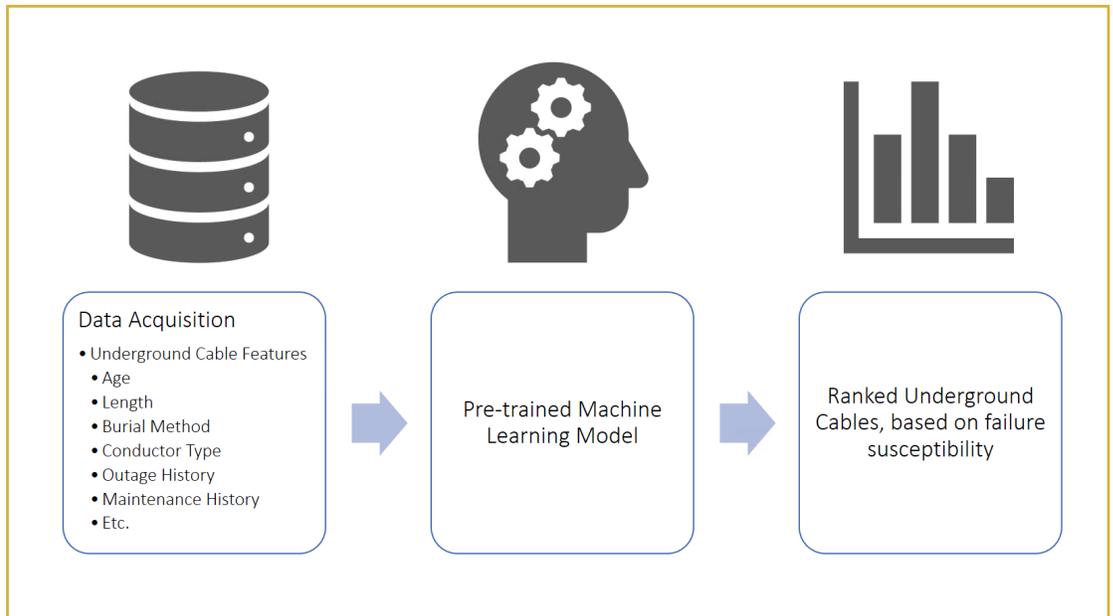
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ABOUT ENMAX

Headquartered in Calgary, Alberta, with operations across Alberta and Maine, ENMAX Corporation (ENMAX) is a leading provider of electricity services, products and solutions. Through its subsidiaries, ENMAX Power Corporation and Versant Power (formerly Emera Maine), ENMAX owns and operates transmission and distribution utilities in Calgary, Alberta and northern and eastern Maine, safely and reliably delivering electricity to all Calgary homes and businesses and more than 159,000 customers in Maine. Through ENMAX Energy Corporation, ENMAX owns and operates 1,509 MW of generation and offers a range of innovative electricity, natural gas, energy and engineering services to more than 674,000 residential, commercial and industrial customers across Alberta.



Depiction of ENMAX Power's Predictive Model Process



Example Cable Fault Repair Site

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Dingle Project – ESB Networks

OVERVIEW

As ESB Networks leads the transition to a lower carbon future, the company chose Ireland's Dingle Peninsula as the location for a three-year innovative project to develop and implement new customer offerings. The €5 million project seeks to understand renewable energy deployment, leveraging smart devices to inform the design of a smart, resilient electricity network of the future.

The Dingle Project is intended to address various company objectives. One objective is to assess the flexibility of distributed energy resources and their potential to accommodate non-wires solutions for the network. To address network reliability, the project intends to demonstrate viable technologies and process changes that reduce Customer Minutes Lost and increase network resiliency. Additionally, the project will develop and document peer-to-peer energy trading schemes. Another key component of the project is to understand what behavior changes and mechanisms are required to transition a network of traditional consumers into a society of active energy citizens. At the end of the project, ESB Networks aims to provide an evaluation of renewable energy testing and outline what enables individuals to become active energy citizens. The company also will consider qualitative benefits in its cost-benefit analysis.

Through the Dingle Project, ESB Networks is engaging a wide assortment of stakeholders, including local community groups, academics, electricity suppliers, new market players (such as electricity aggregators), education and training bodies, industry groups, and equipment providers. The company also has partnered with the Dingle Creativity and Innovation Hub to carry out the project and has created an ESB Networks' Ambassador Program. Through this program, Dingle residents representing various industries have been selected to attend project events, engage with media, and share their experiences with family, friends, and neighbors.

ESB Networks has also invested in an Energy Mentor Course to educate residents on renewable energy, in collaboration with the local Educational and Training Body. In addition, ESB Networks runs renewable energy technology competitions, sponsors local community events, and provides solar PV and energy efficiency alternatives to key community groups such as schools and sporting clubs. With the Dingle Project, ESB Networks hopes to inform how Ireland's electricity network will need to change in the decades to come.

KEY ACCOMPLISHMENTS

- › €5 million project to understand the electricity network of the future.
- › Model for community engagement, with over 10 partners.
- › Deploying a virtual power plant through the "StoreNet" consortium (a collaboration between the International Energy Research Centre, Solo Energy, and Electric Ireland).



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ABOUT ESB NETWORKS

ESB Networks owns and operates the electricity distribution system in the Republic of Ireland, serving 2.3 million customers. The company is working to enable a low-carbon Ireland powered by clean energy, aligning with the Irish Government's National Climate Action Plan.



Clare Duffy, Network Development and Electrification Manager, ESB Networks, hosting a Community Networking Event in Dingle, Co. Kerry



ESB Dingle Project Community Ambassadors

Digital Transformation – Iberdrola

OVERVIEW

The Iberdrola Group is committed to sustainable solutions that require greater electrification of the global economy through clean energy, storage, smart grids, and digitalization. With the speed at which markets, technology, and customer preferences are changing, Iberdrola sees digitalization as a priority, with an innovative transformation process that ensures the full integration of digitalization across its businesses.

The company's digital transformation leverages new technologies such as blockchain, big data, internet of things, virtual reality, and artificial intelligence. To achieve this digital transformation, Iberdrola has invested €5.6 billion in digitization and is expected to invest an additional €4.8 billion between 2018-2022.

Iberdrola has various initiatives to carry out digitalization. To digitalize the distribution grid, the company invested more than €3 billion across its system and deployed 13 million smart meters that incorporate remote management, monitoring, and automation of systems. Additionally, through the Renewables Digital Evolution Plan, Iberdrola set out to create an analysis of recent innovations in the digitalization field and highlight the company's work on digitalization during this period of growth.

The company uses big data and analytics to provide a variety of services such as tailored tariffs, smart heating control, and virtual metering. Iberdrola also sells and bundles clean energy offers with a range of smart home devices that allow customers to better engage with their energy use. Currently, more than half of Iberdrola's customer service is digital, with a target to exceed 75 percent by 2022.

KEY ACCOMPLISHMENTS

- › As of 2017, €5.6 billion invested, including 3,500 in network assets and 1,300 data analytics systems
- › Deployed 13 million smart meters and updated 90,000 substations
- › All new solar PV fleets are 100 percent digital; wind fleet digitalized since 2003
- › 11 thousand wind turbines (18 GW) with 5 million signals make the Renewable Energy Operation Centre the biggest IoT platform for renewable energy
- › 50 percent of customer service digitized
- › Installed a Big Data Analytics platform in the U.S. with advanced hardware and software, including 5.8 TiB of RAM, 1,200 computing cores, and 222 TiB of data storage.
- › Launched big data research into distribution transformer performance monitoring to detect deterioration, overloading, or underutilization. Also launched big data research to automate Estimated Time of Restoration (ETR) predictions.



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KEY ACCOMPLISHMENTS

- › 130MW of controllable DERs, valued at AUD €38.2 million
- › DERMS platform use predictive modelling and automatically issues commands
- › Won the ICMG Digital, Enterprise, and IT Excellence Award in 2019 for the Digital Architecture and Governance framework titled Reference Architecture Templates

ABOUT IBERDROLA

Iberdrola is a Spanish multinational group that produces and supplies electricity to 100 million people across the countries where it operates. The company is the number one producer of wind power and one of the world's biggest electric companies in terms of market capitalization. Recognized as the third most innovative electric company in the world, Iberdrola is a global leader in clean energy.



Left Photo:
Iberdrola Tower in Bilbao, Spain

Bottom Photo:
350MW Wikingier Offshore Wind Farm



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Nishi-Nagoya Thermal Power Station – JERA

OVERVIEW

JERA, a joint venture between Chubu Electric Power Company and Tokyo Electric Power Company, transformed an outdated oil-fired thermal power plant in the Aichi region into a state-of-the-art natural gas combined cycle (NGCC) plant. To upgrade the Nishi-Nagoya Thermal Power Station (built in the 1970s), JERA rebuilt the station, converting it to a high-efficiency NGCC plant that reduces carbon dioxide (CO₂) emissions and fuel consumption.

While the plant was initially intended to begin commercial operations in July 2019, the increased risk of nuclear plant shutdowns after the Great East Japan Earthquake and aging thermal power plant infrastructure led JERA to take on the challenge to scrap and build the power plant simultaneously in order to shorten the project timeline. To accomplish this, JERA moved the main building of the power station, which requires the longest construction period, to an old fuel tank site where it could be scrapped in a relatively short amount of time.

To further shorten the construction period, JERA adopted a special method for the installation of its Heat Recovery Steam Generators (HRSGs). The new HRSGs were assembled at a factory into three large modules and transported by ship to the power station, greatly reducing the need for on-site assembly work. These measures combined allowed the company to achieve commercial operations by March 2018, nearly a year-and-a-half ahead of schedule.

JERA prioritized efficiency and reduction of environmental impact in this new power plant, with a 3-on-1 multi-shaft combined cycle power generation system greatly increasing efficiency and output while reducing NO_x emissions. The system consists of two blocks of three gas turbines, three HRSGs, and one steam turbine that allows for increased efficiency during baseload operation. JERA also reduced losses by incorporating technologies such as improved sealing technology, low-loss direct lubrication pad bearings, and the use of a two-stage combustion system to reduce NO_x emissions. In addition to avoid misidentification during daily inspections and operations, JERA employed large unit numbers, identification colors, and different logos for each unit, thereby improving visibility and reducing the risk of power outages due to operational error.

KEY ACCOMPLISHMENTS

- ▶ Earned Guinness World Record for “most efficient combined cycle power plant” in March 2018, after the power station achieved a thermal efficiency of 63.08 percent in its performance test, the highest thermal efficiency in the world.
- ▶ Reduced CO₂ emissions by around 1.51 million tons in 2019.
- ▶ Lowered LNG consumption by approximately 530,000 tons. Completed one year and four months ahead of schedule, thanks to innovative design and construction.



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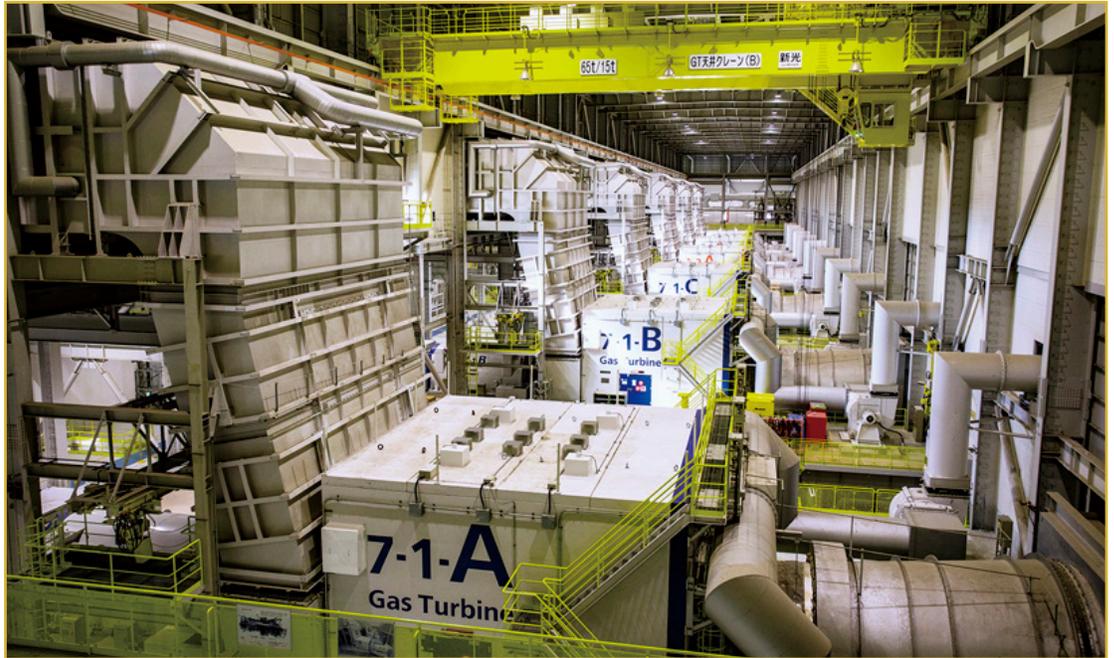


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ABOUT JERA

JERA is a joint venture between Chubu Electric Power Company and Tokyo Electric Power Company Holdings (TEPCO) established in 2015 to lead new business development on an internationally competitive basis. In 2019, JERA took control over the existing thermal power generation of the parent companies, along with their fuel receiving, storage, and gas supply businesses.



Gas Turbines in Nishi-Nagoya Thermal Power Station



Nishi-Nagoya Thermal Power Station



Symphony Strategy — Vector

OVERVIEW

Vector's "Symphony" strategy leverages new energy solutions to deliver optimal outcomes for customers, society, and the environment in the context of disruptive change. The strategy aims to enable the shift to a more customer-centric energy market: a system where customers, communities, and businesses can make, store, trade, and share energy. By implementing this innovative strategy, Vector is preparing for myriad uncertainties created by changes to the electric power industry including technological disruptions, market transformation, and urbanization.

Auckland's population is expected to grow by 20 percent to more than 2 million people over the next 10 years, underlining the importance of investing in analytics and forecasting capabilities to better serve electricity customers. In developing this strategy, Vector conducted a scenario planning exercise in 2018 that identified three alternative scenarios for the next ten years: "Pop," "Rock," and "Symphony." All scenarios considered energy efficiency uptake; steady electric vehicle, solar, and battery uptake; and intelligent management of the network. The main difference between scenarios was the level of management and engagement these technologies had with the network. Under the Pop scenario, network demand was projected to increase by 22 percent, while the Rock scenario projected a 38 percent increase. However, Vector could limit demand increases to 7 percent by following the Symphony scenario, which called for investment in network intelligence and digital platforms, innovative pricing signals, and integration of distributed energy resources (DERs).

In 2019, Vector formalized the Symphony strategy, which now is used as the blueprint for the whole Vector Group of companies. As part of Symphony, the company utilizes its own distributed energy resource management system (DERMS), created in 2017 to control DERs on the network and align them with critical distribution parameters. Vector's system makes use of predictive modelling algorithms to forecast electric company loads, customer demand, capacity, and market dynamics in real time. Vector continues to enhance and grow this program to deliver greater scale and fine-grained control.

To ensure all parts of the Vector Group act in concert, Vector developed an award-winning Digital Architecture and Governance framework spanning both operational and information technology. By combining public cloud infrastructure with open-source automation technologies, Vector has reduced the time and effort required to deliver key initiatives across the group, while maintaining compliance and security standards.

With the enhancements to the DERMS platform and investments in digital architecture and platforms under its Symphony strategy, Vector aims to save between 50-100 percent in network and system growth expenditures between 2019 and 2028, amounting to several billion dollars. These savings will pass on to customers, ensuring the company can meet their needs and expectations while keeping energy affordable and facilitating the transition to a low-carbon world.



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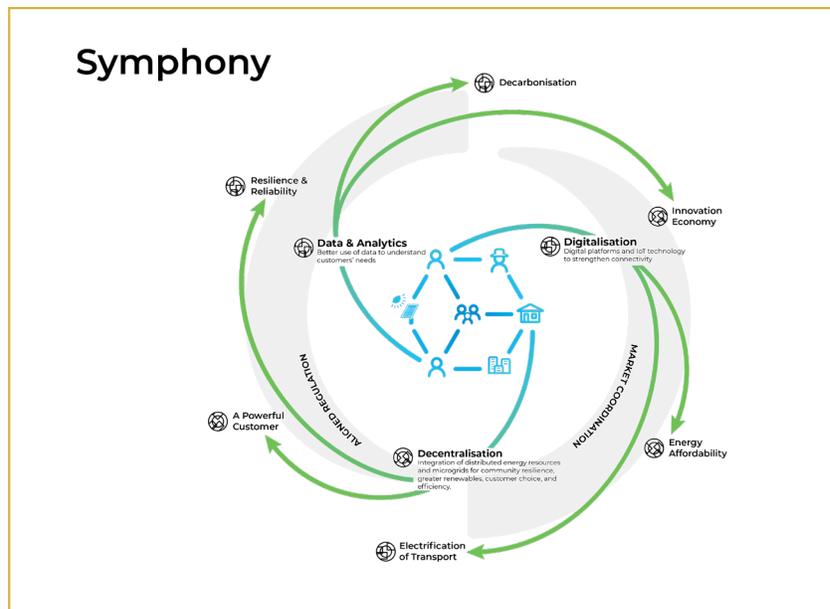


KEY ACCOMPLISHMENTS

- › 130MW of controllable DERs, valued at AUD \$38.2 million
- › DERMS platform use predictive modelling and automatically issues commands
- › Won the ICMG Digital, Enterprise, and IT Excellence Award in 2019 for the Digital Architecture and Governance framework titled Reference Architecture Templates

ABOUT VECTOR

Vector is New Zealand's leading multi-network infrastructure company which delivers energy and communication services to more than one million homes and businesses across the country. Vector is leading the country in creating a new energy future for customers and continues to grow and invest in the growth of Auckland and in a wide range of activities and locations.



Symphony Strategy



An Interconnected Energy Future

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The **Edison Electric Institute** (EEI) is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for about 220 million Americans, and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States. In addition to our U.S. members, EEI has more than 65 international electric companies with operations in more than 90 countries, as International Members, and hundreds of industry suppliers and related organizations as Associate Members.

Organized in 1933, EEI provides public policy leadership, strategic business intelligence, and essential conferences and forums.

For more information about EEI International Programs, contact **international@eei.org**