

# CEO's Report



**Tsai Chao Chung, Charles**  
Chief Executive Officer

Welcome to the 2019 operating results of the Power Assets Group.





As a global investor in companies in energy generation, transmission, and distribution and working with the spectrum of fuels including coal, gas, renewables, waste and oil, we currently serve a total of over 19 million customers worldwide and have interests in over 10,000 MW of power generation assets and 511,400 km of power, gas and oil networks.

All companies in the Group operate in stable, well-regulated and mature energy markets across Asia, Australia, Europe and North America. Our diversified asset base and emphasis on secure, regulated income streams have enabled us to address economic cycles and commodity price fluctuations. Despite the Brexit uncertainty, the fact that none of our regulated infrastructure businesses in the UK is affected clearly exemplifies the merits of our investment strategy.


## United Kingdom

-  UK Power Networks
-  Northern Gas Networks
-  Wales & West Utilities
-  Seabank Power
-  Energy Developments


## Canada

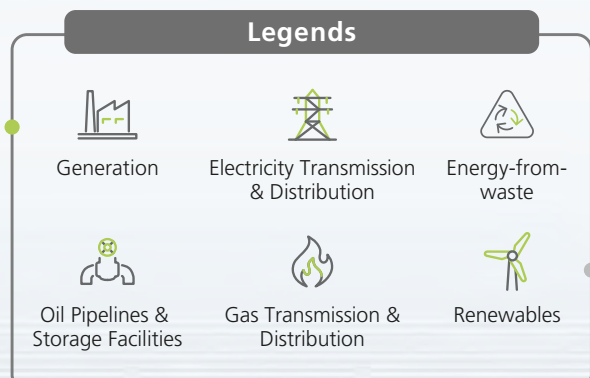
-  TransAlta Cogeneration
-  Meridian
-  Husky Midstream Limited Partnership
-  Energy Developments

## Netherlands

-  Dutch Enviro Energy Holdings B.V.

## United States of America

-  Energy Developments



We have achieved consistent performance over the years through organic growth as well as acquisition and green field development activities based on a solid ethos of delivering long-term value for our shareholders. This continued in 2019, with all our operating companies meeting performance targets.

With ever tighter emissions targets and community aspirations for a sustainable lifestyle, our operating companies continued to invest in greener generation. Our plants in Canada and Hong Kong are moving towards increased gas-fired generation while in Mainland China, we have transitioned one of our 200-MW coal-fired plants to our joint venture partners under the co-operative agreement. Operation rights of another 1,400-MW coal-fired plant expired in 2019 and the transfer is in progress. This is in alignment with our global decarbonisation goals and has reduced our total installed coal-fired generation capacity by 1,600 MW.

In the Netherlands, our incineration plant in Rotterdam, AVR, has installed and commissioned the first carbon capture and utilising plant transporting compressed CO<sub>2</sub> to nearby greenhouses. In the gas distribution sector, our UK gas distribution companies are working with the authorities to inject 20% of hydrogen into existing network with a view to ultimately replacing natural gas with hydrogen. In Australia, our network is constructing the largest commercial-scale electrolyser to produce green hydrogen and blending it into the existing network to capitalise on free transport and storage of green energy.

One of our core strengths as a group is our customer-focused management and engaged colleagues. Our inclusive culture empowers our people and makes them accountable for delivering excellent service, and local management teams are embedded in their respective communities, allowing us to achieve industry-leading customer satisfaction scores.




## Australia

-  Australian Gas Networks
-  SA Power Networks
-  Victoria Power Networks
-  Australian Energy Operations
-  United Energy
-  Dampier Bunbury Pipeline & DBP Development Group
-  Multinet Gas
-  Energy Developments

## Portugal

-  Iberwind

## Mainland China

-  Jinwan Power
-  Dali Wind Power
-  Laoting Wind Power


## Hong Kong

-    HK Electric

## Thailand

-  Ratchaburi Power

## New Zealand

-  Wellington Electricity Lines



## UNITED KINGDOM



The UK remains our largest geography of operation, where we have four companies across the electricity generation and distribution, and gas distribution sectors. The four companies deliver guaranteed income streams to the Group that are based on regulated outputs with tariffs pegged to the retail price index, or long-term offtake contracts.

A dual focus on operating efficiencies and excellent customer service allowed our electricity and gas distribution companies to deliver stable operating performance in 2019 in line with budget. Our operating companies retained their positions at the top of the regulator's league tables for customer service and efficiency, thereby securing incentive payments. While the persistently weak consumer confidence and uncertainties surrounding the terms of Britain's exit from the European Union led to currency instability, our core businesses in the infrastructure sector have not been adversely affected.

The UK government is calling for a major revamp of the energy sector with decarbonisation as the main theme. One area of focus is the decarbonisation of transport including automotive, freight and rail. To support this, we progressed infrastructure deployments for charging and refuelling of low-carbon road transport. This included electric vehicle (EV) charging, gas-refuelling for buses, and smart meter projects across England and Wales. In addition, in support

of decarbonisation, our two gas companies are working relentlessly on the injection of biogas and the H21 (hydrogen in the 21st Century) projects with a view to ultimately replacing natural gas with hydrogen – a crucial step towards UK's Net-Zero aspiration given home heating represents almost 50% of UK's annual energy consumption.



NGN's advanced network infrastructure is the foundation of its customer satisfaction performance.

## UK Power Networks

**UK Power Networks (UKPN) is the Group's largest electricity distribution business. It owns, operates and manages three of the UK's 14 regulated distribution networks in London, the East and the South East of England. UKPN serves end-user customers via its grid as well as private electricity networks for strategic clients.**

### UK Power Networks

Power Assets share: **40%**

Joined since: **October 2010**

Network length: **188,500 km**

No. of customers: **8,300,000**



In 2019, UKPN distributed 77,155 GWh of electricity (2018: 79,639 GWh). It improved on its own customer satisfaction ratings as benchmarked by the regulator Ofgem, achieving its highest ever score of 90%. It also delivered strongly on all operating parameters maintaining its position as both the safest and most reliable network operator offering the lowest use of system charges in the market.

UKPN retained its position as the consistently best performing electricity distribution network owner (DNO) group in the UK from 2015/16 to 2018/19. It is the only DNO to be included in the Institute of Customer Service's UK Customer Satisfaction Index.

UKPN continued with its planned programme of investment and in 2019 invested around £666 million in its regulated networks (2018: around £620 million). As a member of the EDISON industry alliance set up by UKPN in March 2016, it generated revenues through approximately 290 projects in construction.

UKPN plays a key role in helping the UK decarbonise through support for the transition to EVs. Nearly 70,000 EVs operate in its area of operation, growing to an estimated 4 million EVs by 2030. The company ran 'Optimise Prime', an Ofgem funded innovation project trialling solutions that will help networks and fleet operators prepare for the transition to the use of commercial EVs. Over 18.5 million low-carbon passenger



At UKPN, proactive maintenance takes place routinely to ensure reliability levels.

journeys were completed in 2019 as a result of the electric bus garages that UKPN connected.

The company developed its Green Action Plan taking a holistic approach to sustainability, covering carbon emission, energy reduction and waste recycling. In 2019, UKPN successfully reduced its carbon footprint by nearly 21% from the start of its current regulatory period.

## A smart, agile network of the future

UKPN is transforming from being a distribution network operator (DNO) which simply manages the network, to a distribution system operator (DSO) which uses a mixture of traditional and smart 'flexible' solutions to respond to customers' energy needs which include EVs and renewable energy generated at their own premises.



One key strategy is to deploy an intelligent software platform and Active Network Management technologies. This new advanced automated control system will enable over 500 MW of additional distributed energy resources, mostly renewable energy like wind and solar, to connect to the network cheaper and faster, which is enough to power more than a quarter of a million homes. At the end of 2019, UKPN had over 6 GW of renewable generation connected to its networks, with the capability to seamlessly accommodate more as needed.



## Northern Gas Networks

**Northern Gas Networks (NGN) transports natural gas across rural and urban areas in north England. It also conducts maintenance of mains and provides emergency services related to gas supply.**

NGN's total gas throughput for 2019 was 69,343 GWh (2018: 69,727 GWh) and the company met all its performance targets for the period. It achieved its goal of being a consistent leader in safety and efficiency and was named by the regulator Ofgem as the most efficient of the UK's gas distribution networks overall across the current regulatory period.

NGN is another operating company within the Group with a market-leading track record for customer satisfaction, as measured by the regulator's periodic surveys. During 2019, the company invested £153.4 million in capital expenditure



NGN's emergency response engineers carry out roadside works. Systematic network maintenance underpins its high reliability levels.

## Seabank Power

**Seabank Power (SPL) is the Group's generation business in the UK, operating two combined-cycle gas turbine units. SPL's output is governed by a multi-year Power Purchase Agreement based on plant availability, which provides an assured revenue stream insulated from demand variability.**

SPL delivered stable revenues based on plant availability, which stood at 97.5% in 2019. In alignment with its customer's running regime requirements, SPL delivered a lower number of starts and generating hours when compared to 2018. Total power generated during the

### Northern Gas Networks

Power Assets share: **41.29%**

Joined since: **June 2005**

Gas pipeline length: **36,100 km**

No. of customers: **2,700,000**



projects for network improvement and extension, mains replacement, and IT infrastructure.

Several innovative programmes to decarbonise household heating were carried out during the year. The H21 phase 1 programme, originally initiated by NGN, moved into testing at Health and Safety Executive (HSE)'s Science and Research Centre in Buxton, with the report and project closure due for publication by mid-2020. Following further stakeholder engagement, H21 phase 2 funding was sanctioned by Ofgem, which explores the impact on network operations. The learnings from the project will be implemented in day-to-day network operations with a view to initially blending 20% hydrogen into existing networks and ultimately, replacing natural gas by hydrogen. Under the project code named HyDeploy, the trial has started at Keele University's private gas network and another trial will take place in Gateshead, with over 670 customers receiving gas blended with 20% hydrogen.

The company also became a member of the Hydrogen Transformation Group (subsequently taken over by the UK department of Business, Energy and Industrial Strategy and renamed the Hydrogen Programme Development Group), a high-profile group involving representation from the UK industry, regulators and policymakers, which will focus on rolling out a long-term strategy to make hydrogen gas networks a reality in the UK.

### Seabank Power

Power Assets share: **25%**

Joined since: **June 2010**

Gas-fired combined cycle gas turbine: **1,148 MW**



year was 3,029 GWh. In addition, the UK Government has reinstated the Capacity Mechanism allowing SPL to earn additional income based on its high availability and reliability.

Operationally, the plant met or exceeded targets during the year on parameters such as overall station availability, forced outage, efficiency and exceptional starting performance. There were no plant trips during the year.

## Wales & West Utilities

**Wales & West Utilities (WWU) is a regulated gas distribution network operator in the UK, covering the areas of Wales and South West England.**



WWU's high pressure gas storage facilities are being expanded to support the UK government's goal to make public transportation greener.

WWU's total gas throughput for 2019 was 61,800 GWh (2018: 64,981 GWh). The company met all 2018/19 regulatory targets and is on track to achieve 2019/20 targets as well. Like other Group companies in the market, WWU has achieved an excellent customer satisfaction score with customers rating us over nine out of 10 in Ofgem surveys consistently since 2014/15. As the only gas distribution network to be awarded contracts to deliver smart meter installation, the company has installed approximately 30,000 meters in its areas of operation since the end of 2016.

### Wales & West Utilities

Power Assets share: **36%**

Joined since: **October 2012**

Gas pipeline length: **35,000 km**

No. of customers: **2,549,000**



Biomethane and green gas solutions continue to be a core focus for WWU to meet forecast changes associated with climate change to deliver a low-carbon gas network. To date 19 biomethane sites are connected to the WWU gas distribution network with a connected annual capacity of 1.7 TWh enough to heat around 130,000 homes, with a further seven sites having booked network capacity. WWU has seen continued interest from gas-fired power generation customers with 26 connections into its gas distribution network planned for the future, in addition to the 35 already connected.

WWU continued development work on the Pathfinder 2050 model that allows cities, regions and countries to evaluate future scenarios of low-carbon supplies for heat, power and transport, allowing them to view the impact of increased integration of the gas and electricity networks in terms of costs and CO<sub>2</sub> reduction, collaborating with other industry players to share these insights.

In addition, a new investment model was developed to assess how the network was impacted by changes to customer behaviour and the installation of new technologies, such as hybrid heating systems that allow customers to arbitrage between natural gas and electricity.

## Greening the public transport network

WWU is supporting the UK Government's goal to make public transport greener by facilitating the installation of gas filling stations for public bus fleets, significantly reducing carbon emissions and improving roadside air quality.

The company has connected two compressed natural gas bus fleets during the past three years and has operated a freight refuelling station on the network since 2013. There has been an uptick in enquiries for connecting gas vehicle hubs to the network, including both fleet-specific connections such as buses and distribution fleets for large retailers, and public access sites. During the year, a compressed natural gas filling station was connected at a bus depot in Bristol, and a further site in Avonmouth is being evaluated for a high-pressure connection.



## HONG KONG

### The Hongkong Electric Company

HK Electric, based in Hong Kong, generates and supplies electricity to Hong Kong Island and Lamma Island. It provides highly reliable electricity and is integral to Hong Kong's role as a business hub.

#### The Hongkong Electric Company



Power Assets share: **33.37%**

Year established: **1889**

Total installed capacity: **3,237 MW**

Network length: **6,500 km**

No. of customers: **581,000**



Extensive capital works on two new gas-fired units in progress at HK Electric's Lamma Power Station with minimal disruption to normal operations.

In 2019, HK Electric reported electricity sales of 10,519 GWh (2018: 10,537 GWh) for a customer base of 581,000 consisting of residential and non-residential customers. The company maintained its customary high reliability levels throughout the year, achieving a rating in excess of 99.999% for a record 23rd year in a row. Customer satisfaction remained high with the company achieving or surpassing all of its targets while emissions performance was better than mandated levels.

Major capital works projects to decarbonise generation remained the focal point of activity. This aligns with the company's goals under the new 15-year Scheme of Control Agreement (SCA), the regulatory regime governing Hong Kong's electricity sector, which came into effect in January 2019.

Solid progress has been made on the construction of three new 380-MW gas-fired generating units, which will help meet the stringent obligations in line with the new SCA and develop a more sustainable Hong Kong. The first of these units, L10, was synchronised in October 2019 and commissioned in February 2020. Construction of the other two units is carried out in parallel. Both are on schedule and to budget for completion in 2022 and 2023 respectively. When all three units are operational, approximately 70% of electricity supplied by HK Electric will come from gas-fired generation.

In order to enhance the security of gas supply and to achieve competitive prices, HK Electric in partnership with CLP Power progressed with the construction of an offshore liquefied natural gas receiving terminal using Floating Storage and Regasification Unit technology after all required approvals have been secured. The terminal is on track to enter commercial operation in 2022 and will form an integral part of the infrastructure essential for increased gas-fired generation.



To address the government's focus on energy efficiency and conservation, HK Electric conducted extensive outreach and promotion for its Smart Power Services. The Feed-in Tariff Scheme, launched in 2018 to encourage customers to invest in renewables installations, continued to attract interest from the community. 130 applications have been received, from commercial and residential sectors, as well as academic and the service industry.

HK Electric is in support of the Hong Kong government's vision to turn Hong Kong into a smart green city. It will commence the full-scale rollout of smart meters by phases across its supply territory and continue to provide free electric vehicle charging while educating the community on sustainability, energy efficiency, and renewable energy.



Ocean Park's rooftop solar power system is the largest commercial scale installation under HK Electric's Feed-in Tariff Scheme, supporting greater use of renewable energy.



HK Electric's offshore natural gas receiving terminal will ensure a reliable supply of natural gas via marine routes to support greater gas-fired generation.

To reflect rising fuel costs and increasing capital expenditure, the company increased its net tariff for 2020 by 5.2% to 126.4 cents per unit of electricity, which is lower than the 130.8 cents as envisaged in the 2019-2023 Development Plan. Excluding the impact of the reduction in two special rebates, the rate of increase is 1.7%.

Against a backdrop of social unrest and economic downturn in Hong Kong, HK Electric has introduced a package of five relief measures to help small businesses tide over the challenging times. Non-residential accounts with low electricity consumption will receive a six-month grace period on tariff increase scheduled for 2020. In addition, SME caterers were allowed to defer electricity bill payment of December 2019 and January 2020 for two months, while dining coupons will be distributed to help stimulate the catering trade.



## AUSTRALIA



Australia has developed into one of the Group's most important markets, accounting for 21% of our total profit contribution from reportable business segment in 2019. It is our most operationally diverse market with a presence in renewables, energy from waste, as well as electricity and gas transmission and distribution.

The market has seen an explosion in renewables generation, primarily solar. November 2019 marked the first time where the renewable energy powered more than 50% of Australia's main electricity grid, with solar fulfilling 24% of all demand. This milestone clearly brings to life the changing nature of Australia's electricity setup. As a Group, our focus in the market is to further enhance our systems and migrate from being a distribution network operator to becoming a distribution system operator. This transition will create the agility and technology needed in

the network to support energy storage, back-up power supply and two-way energy flows.

In the context of upcoming regulatory resets, the operating companies in Australia delivered satisfactory results in 2019 while making good progress with capital projects to increase support for renewable generation.

Australia faced one of the worst bushfires in the summer of 2019. Our electricity distribution networks in the state of Victoria were largely unaffected. However, in South Australia, the bushfire damaged many homes in Adelaide Hills and Kangaroo Island; fortunately, the impact on our assets was minimal. We remain grateful to our staff members who volunteered to combat the bushfire together with the fire-fighters.



VPN uses Light Detection & Ranging technology to conduct aerial inspections to ensure network safety.

## SA Power Networks

**SA Power Networks (SAPN) is the sole electricity distributor in the state of South Australia, serving residential and business customers. It also builds electricity networks for strategic private organisations.**

In 2019, SAPN distributed 10,075 GWh of electricity (2018: 10,100 GWh). The company outperformed its reliability targets, achieving a System Average Interruption Duration Index (SAIDI) of 146 minutes against a target of 168 minutes. In terms of customer service, SAPN once again outperformed its targets, achieving an incentive bonus for the 2018/19 regulatory year.

The next five-year regulatory reset scheduled to commence on 1 July 2020 was a key focus for SAPN during the year. Following initial submissions and reviews in 2019, SAPN has submitted its final Regulatory Proposal 2020-2025 to the Australian Energy Regulator (AER). A final decision by the AER is expected in April 2020.

One of the major capital projects completed during the year was a new undersea cable connecting Kangaroo Island to the South Australian mainland, which was placed into service in May 2019. The new undersea cable replaces the existing cable that was placed into service in 1993 with a notional service life of 30 years. Therefore we consider that it was prudent to replace the existing cable before its notional end of service life in 2023.

### SA Power Networks



Power Assets share: **27.93%**  
 Joined since: **January 2000**  
 Network length: **89,200 km**  
 No. of customers: **887,000**

Australia faced one of the worst bushfires in 2019. In South Australia, over 180 homes in Kangaroo Island and Adelaide Hills were damaged. SAPN's network sustained minimal damage as our electricity poles are made of concrete and steel.



SAPN engineers carry out work on the powerline along the coast at Victor Harbour, South Australia to maintain reliability.

## Enerven delivering a low-cost energy future

South Australia today has more than 264,000 small-scale solar PV systems installed across the state, representing 1.18 GW of capacity. Another 175 MW of distribution network-connected solar PV generation has been added to the growing large-scale and commercial sectors over the last three years. SAPN subsidiary, Enerven, is actively involved in supporting the development of this clean energy sector and won a series of commercial and industrial solar installation projects in 2019.



In February 2019, Enerven secured a framework contract with SA Water for the design, procurement, construction and commissioning of 154 MW of solar PV systems and 32 MWh of storage across a number of SA Water's sites around metropolitan and regional South Australia. The customer's goal with this high-profile project, the Zero Cost Energy Future programme, is to offset the cost of the electricity that they draw from the grid and network charges with renewable energy fed into the grid. The contract framework was executed with a value up to AUD304 million and is expected to be completed in December 2020.

## Victoria Power Networks

**Victoria Power Networks (VPN), comprises the CitiPower and Powercor electricity distribution businesses, which distribute energy in the state of Victoria, also serving the metropolitan area of Melbourne. VPN supports around 50% of Victoria's GDP overall, spanning commercial and industrial entities, small businesses, and major sporting facilities like the Melbourne Cricket Ground.**

VPN distributed 16,688 GWh of electricity during the year (2018: 16,550 GWh) and secured 25,299 new customer connections. Operational efficiency and all performance metrics improved following the rollout of an online platform for field scheduling, allowing the company to outperform regulatory targets.



### Victoria Power Networks



Power Assets share: **27.93%**

#### CitiPower

Joined since: **July 2002**

Network length: **7,500 km**

No. of customers: **334,000**

#### Powercor

Joined since: **September 2000**

Network length: **89,100 km**

No. of customers: **831,000**

The region is also seeing a huge growth in photovoltaic installations: connections of rooftop solar doubled in 2019 as a result of Victorian Government incentives. VPN supported this transition to a decarbonised electricity supply by connecting several major installations to the grid. To allow the grid to accept energy generated by residential solar power systems, the company conducted analytics of more than 38 billion data points collected by smart meters.

A total of 345 MW generated by large-scale solar and wind farms was connected to the Powercor network in 2019, bringing the total connected since 2000 to 1,112 MW. In addition, there have been 115 connection enquiries from proponents of new large-scale renewable generators this year. Beon Energy Solutions, a VPN undertaking, began construction on the 120-MW Bomen Solar Farm and associated network assets, involving 310,000 bi-facial panels.

Work also progressed on the Yatpool Solar Farm and network infrastructure to connect and energise the Cherry Tree, Moorabool and Elaine Wind Farms.

A range of transport projects are underway as part of a major infrastructure programme in Victoria. Beon supported Public Transport Victoria, Metro Trains Melbourne and Yarra Trams to energise new lines and improve supporting substation infrastructure.

Underground cables will meet overhead powerlines in VPN's West Gate Tunnel network modernisation project.



## Reducing risk of powerline-related bushfires



Bushfires can cause catastrophic destruction in Australia. A common cause is damage to overhead power lines: when a line comes into contact with the ground or a tree, the energy released can spark a bushfire. VPN supported the Victorian Government's Bushfire Safety Programme by introducing Rapid Earth Fault Current Limiter (REFCL) technology across its network in 2019. Monitoring devices are being installed at Powercor's substations to check the performance of all powerline and detect when there is a fault. REFCL technology then instantaneously restricts the voltage on that line while boosting voltage across the remaining lines in service, reducing the risk of a bushfire without cutting supply to homes and businesses.

VPN is rolling out these monitoring devices over the next three years, ensuring the safety of its network. By 2023, 22 REFCLs will be deployed at electricity substations across those areas in Western Victoria at greatest risk of bushfires. The 2019 bushfire has not infringed upon any of VPN's supply areas and hence, our networks are not affected.

## Australian Gas Networks

**Australian Gas Networks (AGN) is one of Australia's largest distributors of natural gas, serving customers in Victoria, South Australia, Queensland, as well as in smaller centres in New South Wales and the Northern Territory.**

In 2019, AGN delivered 101 million GJ of gas (2018: 102 million GJ), due to slightly lower volumes in the industrial and commercial sectors. Customer satisfaction was above target levels across all areas of operation. 287 km of mains were replaced across the network to improve efficiency and reliability.

A number of major capital projects were completed on schedule. In South Australia, the Adelaide Central Business District East augmentation project was completed in April, which included the construction of a 1.7 km-long high-pressure steel main. In Queensland, construction was completed on the second stage of the Kingsford Smith Drive high-pressure steel relocation project. The Murrarie Looping project, including the installation of a second gas pipe crossing across the Brisbane River to increase reliability, was completed in November 2019.

In preparation for the impending regulatory reset in 2021 in South Australia and Queensland, customer and stakeholder engagement workshops were held during the year. These workshops informed the development of a Draft Plan

### Australian Gas Networks



Power Assets share: **27.51%**

Joined since: **August 2014**

Gas pipeline length: **26,100 km**

No. of customers: **1,322,000**

released in February 2020, with the draft South Australian Access Arrangement proposal due to be submitted to the AER by July 2020.

During the year, work continued on the 1.25-MW hydrogen electrolyser plant at the Tonsley Innovation District in South Australia, scheduled for launch in mid-2020 to decarbonise gas supply.



An AGN representative consults with a customer. Customer satisfaction is a priority and exceeded targets in 2019.

## CK William

**CK William owns and operates four energy companies – Dampier Bunbury Pipeline and DBP Development Group (collectively known as “DBP”), Energy Developments Pty Ltd (EDL), a global generation company specialising in sustainable distributed energy, Multinet Gas (MG), one of Victoria’s three gas distribution networks, and United Energy (UE), an electricity distribution business in Victoria.**

Total gas throughput on DBP in 2019 was 383 million GJ (2018: 351 million GJ). System reliability remained strong at 100%, while asset utilisation was 75% against a forecast of 72%. Major capital projects such as the Tanami Gas Pipeline were completed ahead of schedule, under budget and with no injuries. The Tubridgi gas storage project expanded its capacity from 42 PJ to 57 PJ. DBP secured a new project on the Pluto to North West Shelf interconnector pipeline which is in the early works phase. DBP submitted its Final Plan to the Economic Regulation Authority (ERA) in Western Australia for the regulatory reset beginning in January 2021. The Final Plan is now being considered by the ERA, with a final decision expected in late 2020.

EDL’s generation output in 2019 was 4,830 GWh (2018: 4,679 GWh), offsetting approximately 17 million tonnes of greenhouse gas emissions. During the year, EDL expanded its low-emission energy portfolio with the purchase of Broadrock Renewables, a landfill gas energy producer operating approximately 65 MW across two sites in the US. Stage 1 of its Gold Fields Agnew Renewable Hybrid Project in Western Australia was commissioned in July 2019,



DBP’s Tanami Gas Pipeline construction project is completed ahead of schedule, under budget, and with no injuries.

### CK William



Power Assets share: **20%**

Joined since: **May 2017**

Gas pipeline length: **12,900 km**

Network length: **13,400 km**

No. of customers: **1,409,000**

Total installed capacity: **1,078 MW**



Technicians calibrating a gas well at EDL’s Lucas Heights power station in New South Wales. EDL has led the way for the landfill gas generation sector in Australia for decades.

comprising 18 MW of gas, 3.2 MW of diesel and 4 MW of PV solar generation. A contract for Stage 2 of the project was executed in June 2019 and is in construction phase. EDL secured a 20-year tolling agreement with a new customer, Centennial Coal, and commenced construction of a new Waste Coal Mine Gas Power Station in New South Wales.

MG’s gas deliveries in 2019 were 56.1 million GJ during the year (2018: 56.9 million GJ), due to slightly lower residential and industrial volumes. Customer service performance exceeded targets. A major project to relocate MG’s Network Control Centre (NCC) commenced in 2019, which will create a new NCC Centre of Excellence in Perth that will enhance efficiency and customer service capabilities.

UE sold 7,668 GWh (2018: 7,663 GWh) of electricity over the course of the year and increased its customer base by 12,205. Customer service and reliability metrics both exceeded target levels. UE made strategic investments in advanced network analytics to improve asset and hazard management, and enhance its response to extreme weather and heat events.

## Australian Energy Operations

**Australian Energy Operations (AEO) builds, owns and operates electricity transmission lines and terminal stations that connect the Mt Mercer, Ararat, Moorabool and Elaine wind farms to the national power grid.**

In June the connections for the 321-MW Moorabool Wind Farm and the 85-MW Elaine Wind Farm to the grid were completed and operations commenced. Total network length stood at 71 km of 132-kV cables. AEO continued to yield stable revenues for the Group based on long-term contracts with the four wind farms.

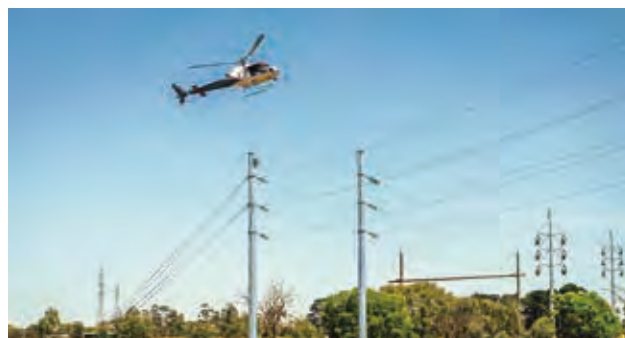
AEO's transmission lines connect the wind farms to the grid.

### Australian Energy Operations

Power Assets share: **50%**

Joined since: **July 2012**

Network length: **71 km**



## NEW ZEALAND



## Wellington Electricity Lines

**Wellington Electricity Lines Limited (WELL) owns and operates the electricity distribution network in the Wellington metropolitan area of New Zealand. Its network serves customers across the domestic, commercial, and industrial sectors, including major organisations such as the New Zealand Parliament, Wellington Airport and the hospitals in the region.**



### Wellington Electricity Lines

Power Assets share: **50%**

Joined since: **July 2008**

Network length: **4,800 km**

No. of customers: **170,000**



WELL distributed 2,277 GWh (2018: 2,303 GWh) of electricity during the year. The company has continued to invest in the reliability of its network and introduced a number of enhancements to ensure it outperforms regulatory targets for efficiency, reliability and customer service. In 2019, both the supply disruption and interruption figures were below regulatory limits. During the year, WELL completed the seismic reinforcement of 70 buildings as part of the earthquake readiness programme initiated in 2018.

A site visit by a WELL engineer. WELL has invested in a number of enhancements to further modernise its network.



## MAINLAND CHINA

Since 2007, the Power Assets Group has had a presence in Mainland China. Today, the Group has three power plants that have a combined capacity of 1,298 MW: two wind farms in Dali (Yunnan province) and Laoting (Hebei province) and a coal-fired plant in Jinwan (Guangdong province).

The electricity market in the mainland has witnessed further reform and changes in environmental regulations, moving away from fossil fuels and supporting green energy with tradeable green certificates.



Jinwan Power Plant in Zhuhai increases its output of steam to support the region's industries.

## Zhuhai, Jinwan and Siping power plants

**Jinwan power plant located in Guangdong province has two coal-fired generating units with a combined capacity of 1,200 MW. Both Zhuhai and Siping power plants operated under co-operative joint venture and their operation rights ended in 2019.**

The three plants sold a total of 9,250 GWh of electricity (2018: 12,210 GWh) and 4.27 million GJ of steam (2018: 5.34 million GJ) during the year. Power imported from the western part of China and ongoing power sector reform continued to exert a dampening effect on demand for coal-fired generation capacity in the mainland. All three plants achieved smooth operations and met all environmental targets during the year.



### Jinwan Power

Power Assets share: **45%**

Joined since: **April 2009**

Coal-fired: **1,200 MW**



The Jinwan power plant participated in trials of a new spot market trading platform to reflect spot price according to power demand in real time. Steady growth in industrial demand for low pressure steam enabled Jinwan to increase revenues from heat. The plant's steam production capabilities were doubled during the year to 200 t/hr for each unit. Increasing revenues from heat have enabled the plant to operate at a higher efficiency and achieve co-generation certification, which will allow it to enjoy favourable dispatching arrangements.

Ownership of the 200-MW Siping plant was transferred back to the Chinese joint venture partners upon the expiry of the co-operative joint venture agreement signed in 1997, while transferring of ownership of the 1,400-MW Zhuhai plant is in progress. In line with the Group's long-term decarbonisation strategy, upon completion of the two power stations' transfer to our partners in Mainland China, the Group will have reduced our coal-fired generation capacity by 1,600 MW.

Routine inspections at Zhuhai Power Plant ensure smooth operations and help the plant meet all its environmental targets.

## Dali and Laoting wind farms

The Dali and Laoting wind farms have a combined capacity of 97.5 MW.



Laoting Wind Farm is performing reliably, delivering cleaner energy in Hebei Province.

### Dali Wind Power

Power Assets share: **45%**

Joined since: **December 2007**

Wind turbine: **48 MW**

### Laoting Wind Power

Power Assets share: **45%**

Joined since: **June 2008**

Wind turbine: **49.5 MW**

The two wind farms continued to perform reliably in 2019, generating 216 GWh (2018: 210 GWh) of electricity over the year and offsetting 209,600 tonnes of carbon emissions.

## THAILAND



## Ratchaburi Power Company

**Ratchaburi Power Company (RPCL) has consistently delivered stable revenues for the Group, guaranteed by a 25-year take-or-pay Power Purchase Agreement with Thailand's Electricity Generating Authority.**

In 2019, RPCL generated 5,899 GWh of electricity. It received guaranteed revenues based on availability from the national off-taker, Electricity Generating Authority of Thailand (EGAT). Blocks 1 and 2 at the plant achieved an equivalent availability factor of about 86.6% and 92.9% respectively. Together, this resulted in the plant generating electricity for 15,731 contracted available hours, exceeding the 2019 production plan.

New initiatives to enhance operational efficiency brought additional revenues through savings on fuel costs and government incentives due to higher than forecast availability.

### Ratchaburi Power

Power Assets share: **25%**

Joined since: **October 2001**

Gas-fired combined cycle gas turbine: **1,400 MW**



RPCL's power plant generates electricity which yields stable revenues, under a long-term guaranteed offtake scheme.

## CANADA



Over the last decade, the Canadian companies in the Power Assets Group have delivered consistent performance based on long-term assured revenue streams. Operating in the power generation and oil transmission and storage space, they have invested in new capital works in 2019 that will further enhance their supply volume capabilities going forward.

Decarbonisation remains an important trend in the Canadian market, driven by government initiatives. Our operating companies in the market support this goal and in 2019 have also taken steps towards further reducing emissions and delivering more sustainable energy in the long term.

Construction takes place at HMLP's Hardisty Storage Tank - one of the major capital projects undertaken to expand the terminal.



## Canadian Power Holdings

**Canadian Power Holdings (Canadian Power) operates the gas-fired Meridian cogeneration power plant in Saskatchewan. It also has a 49.99% holding in TransAlta Cogeneration, which operates four power plants in Ontario and Alberta.**

In 2019, the Meridian cogeneration plant generated 1,648 GWh of electricity (2018: 1,790 GWh) and 1,471 kT of steam (2018: 1,534 kT). The TransAlta plants produced a further 2,912 GWh (2018: 3,025 GWh) of electricity during the year.

### TransAlta Cogeneration



Power Assets share: **25%**

Joined since: **December 2007**

Total installed capacity: **1,054 MW**

### Meridian



Power Assets share: **50%**

Joined since: **December 2007**

Gas-fired combined cycle cogeneration: **220 MW**



To ensure plant reliability and safety, Canadian Power successfully executed a planned gas and steam turbine outage at the Meridian plant in Saskatchewan. Following the outage, the plant returned to steady operation and resumed normal operations.

The Sheerness power station, one of the plants operated by TransAlta, began its transition to gas-firing energy production in 2019 with the conversion of two coal-fired units to gas. The two 395-MW units are scheduled for conversion in 2020/2021.



Planned gas and steam outages, such as this one in progress at the Canadian Power's Meridian Cogen Gas Turbine, ensure optimal performance.

## Husky Midstream Limited Partnership

**Husky Midstream Limited Partnership (HMLP) operates a substantial network of oil gathering systems and pipelines, transporting crude oil from producing fields to processing facilities, as well as operating the Hardisty oil storage terminal. It serves oil companies and crude oil producers from its headquarters in Alberta.**

### Husky Midstream Limited Partnership



Power Assets share: **48.75%**

Joined since: **July 2016**

Oil pipeline length: **2,200 km**

Oil storage capacity: **4.4 million barrels**

Pipeline gathering system capacity: **409,000 bbls/day**



In 2019, HMLP served 12 pipeline customers and 61 other customers within the Hardisty terminal. Construction of its first natural gas processing plant, located in Alberta, was completed within budget and on schedule and commenced commercial operations in Q4 2019.

The company continued to expand its pipeline network and storage capacity, thereby growing its customer base. A major capital project at the Hardisty terminal is under way, including the construction of three long-term crude oil storage tanks with a 1.5-million-barrel capacity.

An HMLP employee at a receiving terminal. Husky's networks generate stable revenues with no exposure to commodity risk.



## NETHERLANDS

### Dutch Enviro Energy Holdings B.V.

**Dutch Enviro Energy Holdings B.V., which owns AVR-Afvalverwerking B.V. (AVR), is an energy-from-waste producer based in Rotterdam. It currently serves 20-24% of all household and commercial waste incinerated in the Netherlands. Together with waste from other EU countries, AVR treats a total of 1.7 million tonnes of residual waste per year.**

AVR delivered consistent results in 2019, achieving another year of high availability and efficiency across all sites. To maintain this track record for the future, AVR conducted its first planned facility-wide shutdown at its Rozenburg facility in September 2019, when operation was halted for two weeks while maintenance work was carried out on vital parts of the common energy systems and cooling water installations. This process will ensure the key common facilities in AVR's network can deliver reliable 24-hour operation in the years to come.

In August 2019, AVR became the first waste-to-energy company in Europe to harness CO<sub>2</sub> from energy generation for agriculture on a commercial scale, through the launch of its carbon capture and liquefaction system. CO<sub>2</sub> is captured, liquified and used for horticulture across the Netherlands as a fertilizer to stimulate the growth of plants and vegetables. This initiative will reduce greenhouse gas emissions by 60 kT a year at AVR's plant in Duiven, which represents 15% of the total CO<sub>2</sub> emissions from that facility.

Building on its goal to create a greener operating footprint, the company also expanded its plastics separation facility with the addition of a second line

#### Dutch Enviro Energy Holdings B.V.



Power Assets share: **27%**

Joined since: **August 2013**

Waste-to-energy units: **115 MW**

Biomass-fired units: **30 MW**

Energy-from-waste: **1,621 kT/yr**

Biomass energy: **146 kT/yr**

Liquid waste treatment: **247 kT/yr**

Paper residue incineration: **140 kT/yr**



The launch of AVR's capture and liquefaction systems has reduced greenhouse gas emissions by 60 kT a year at its plant in Duiven.

in April 2019. With the new line, total capacity has increased to 430,000 tonnes, making the installation one of the largest in the Netherlands and will help AVR meet recycling targets.



## Using CO<sub>2</sub> emissions for agriculture

As an extension of the waste incineration system, AVR has installed and taken into operation a carbon capture plant. CO<sub>2</sub> is captured before the gas is released into the atmosphere. It is then liquified and used for agricultural purposes in the Netherlands.

AVR's provision of an external CO<sub>2</sub> supply to farmers is particularly important in the summer months where it is used as a fertilizer to stimulate the growth of crops. In turn, this helps enhance the green energy consumption of Dutch greenhouses and marks an important step in AVR's ultimate goal to become CO<sub>2</sub> neutral.

## PORTUGAL



### Iberwind

**Iberwind is a renewable energy provider that operates 323 wind turbines across 31 wind farms in Portugal. The company is responsible for generating approximately 15% of electricity produced by wind power in Portugal and about 3% of the electricity consumed, which is equivalent to the energy consumption of about 550,000 households.**

During the year, Iberwind produced 1,892 GWh (2018: 1,783 GWh) of electricity and achieved an overall availability of 97.6%. This level of output resulted in the offset of 730,000 tonnes of CO<sub>2</sub> emissions. To drive new efficiencies, Iberwind continued its ongoing modernisation project to upgrade its IT systems and introduce new modules that will enhance functionality and performance in the coming years.

With the strategic goal of expanding its renewable energy generation capabilities, in July 2019 Iberwind put forward a tender for the Portuguese government's first solar energy auction.

#### Iberwind

Power Assets share: **50%**

Joined since: **November 2015**

Wind turbine: **726 MW**



Iberwind's wind farms across Oeiras, Portugal are an essential component of the Group's decarbonisation efforts.