

# Hong Kong



Decarbonising our generation portfolio to support Hong Kong's carbon neutral target and improving energy efficiency for customers.

> Opening ceremony for a new gas-fired generation unit at Black Point Power Station

## **Hong Kong**

## Overview

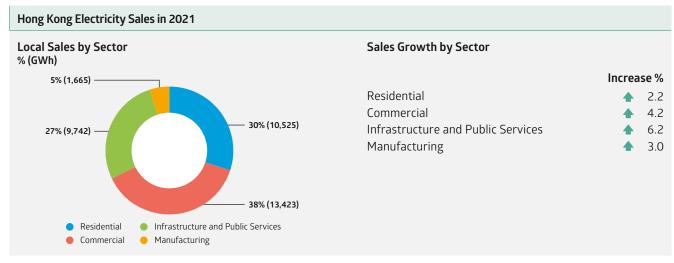
Hong Kong's economy continued to recover from the impact of COVID-19 in 2021 due to rising vaccination rates, falling case number and the Government's stimulus measures that gradually opened up the economy. However, the spread of new variants across the globe and lingering international travel restrictions have made the timeline for full recovery uncertain, with some sectors particularly badly hit. Meanwhile, volatile international fuel prices and supply chain issues led to surging electricity tariffs and even the collapse of some overseas energy companies. Against this challenging backdrop, CLP took decisive and timely steps to ensure the impact of international fuel market volatility could be minimised while its customers continued to receive a stable, safe electricity supply with a world-class 99.999% reliability rate.

Electricity sales in Hong Kong rose 4.1% to 35,355 gigawatt hours (GWh) as easing social restrictions and increased consumer spending spurred economic activity, lifting demand in all sectors. The infrastructure, public services and commercial sectors saw the biggest increases in demand as schools, social activities and government services gradually resumed normal after disruptions caused by the pandemic since 2020. Restaurants, shops and hotels saw increased activity from a low base at the beginning of 2021 as the COVID-19 situation eased. Record temperatures in March, May and September also contributed to higher electricity sales.

In 2021, the number of customer accounts rose to 2.71 million, compared with 2.67 million in 2020.

Operating earnings of Hong Kong electricity business increased 4.7% to HK\$8,189 million from a year earlier on the back of higher investment. The performance of the business is summarised below:





A steep rise in international fuel prices and the increased use of gas in line with environmental targets set by the Government drove up fuel costs, leading to an increase in electricity tariffs for 2022. To ease the financial burden on customers, a total of around HK\$2.5 billion was drawn from the Tariff Stabilisation Fund, the Fuel Clause Recovery Account and the CLP Community Energy Saving Fund, combined with a Rent and Rates Special Rebate. These measures resulted in a freeze in the Basic Tariff, while the deployment of two special rebates reduced the increase in the Average Net Tariff from 10.5 HK cents (8.6%), to 7.1 HK cents (5.8%). CLP also announced a HK\$220 million package of community support programmes for 2022 to encourage energy saving, help people in need and accelerate Hong Kong's economic recovery.

## **Laying Foundations for Growth**

CLP continued to benefit from increased demand created by new projects such as data centres and government infrastructure projects. To meet new growth, CLP expanded investment aimed at ensuring the demand could be met with high levels of safety and reliability, while moving Hong Kong towards a lower-carbon, smart city consistent with the Government's policy objectives.

As part of its ongoing review of CLP's capital expenditure programmes, the Government approved additional projects to meet evolving electricity demand requirements from customers. This will raise the total capital expenditure for the 2018 Development Plan, covering the period of October 2018 to the end of 2023 from HK\$52.9 billion to HK\$56.1 billion.

The Government also announced a number of long-term large-scale infrastructure projects, including the Northern Metropolis Development Strategy and the Lantau Tomorrow Vision, which are expected to create additional growth momentum. CLP will provide the energy infrastructure needed to support these developments as they take shape.



CLP has teamed up with the Airport Authority Hong Kong to design and develop the city's largest battery energy storage system combined with a predictive control system for air conditioning.

## **Cultivating a Greener Future**

At home and overseas, 2021 saw landmark moments in the battle against climate change. Internationally, the 26<sup>th</sup> United Nations Climate Change Conference of the Parties (COP26) was attended by thousands of world leaders, policymakers, business executives, negotiators, scientists and activists. In Hong Kong, the Government published its Climate Action Plan 2050, setting out a clear roadmap to achieve carbon neutrality by 2050.

CLP gave its wholehearted support to Hong Kong's long-term decarbonisation strategy, following the Group's earlier announcement of the updated Climate Vision 2050 with targets to achieve net-zero greenhouse gas emissions across the energy value chain by 2050 and phase out coal in all operations by 2040. CLP will work closely with the Hong Kong Government and its customers to find the best ways to introduce new zero-carbon energy sources, reduce the carbon intensity of the power supply and speed up electrification to reduce carbon emissions from transport and other sectors.

In October, CLP held an official launch ceremony for D1, a combined-cycle gas turbine (CCGT) unit at Black Point Power Station using new generation technology. Unit D1 has been in operation since mid-2020 and lifted the ratio of natural gas in CLP's fuel mix from below 30% in 2019 to around 50% in 2020. D2, a second CCGT unit on an adjacent site due to go into service in 2023, will further add to CLP's gas generation capacity. Construction of unit D2 progressed on schedule in 2021, with CLP deploying mitigation strategies to minimise pandemic-related supply chain disruptions.

CLP meanwhile moved forward with the construction of an offshore LNG terminal in the south-western waters of Hong Kong, which will allow for increased reliability, diversity and competitiveness of our gas supply arrangements. Considerable progress was made with the jacket structures on the jetty site, and subsea pipelaying works were completed. The LNG terminal is expected to go into service in 2022.

Coal-fired generation facilities will be retired in stages as the use of natural gas increases. CLP plans to gradually phase out units at Castle Peak A Power Station in the coming years as it reaches the end of its commercial life. It will stop using coal for day-to-day electricity generation at Castle Peak B Power Station by 2035.

At the same time, CLP is promoting the development of renewable energy. Pre-development studies continued into the feasibility of an offshore wind farm in the south-eastern waters of Hong Kong. Early findings indicate improvements in turbine technology and costs will make offshore wind farms an increasingly viable option in the medium term.

At the end of 2021, 265MW of capacity had been approved or connected to the grid under the Renewable Energy Feedin Tariff scheme, up from 175MW a year earlier. Renewable Energy Certificates received an increasingly positive response with sales growing 185% as more customers committed to larger and longer-term purchases. The biggest buyer, Hang Seng Bank, committed to purchase nearly 154GWh of renewable energy over a 10-year period from 2021, equivalent to a reduction of over 60,000 tonnes of carbon emissions from electricity use.

CLP's waste-to-energy generation station at the West New Territories (WENT) landfill site – Hong Kong's biggest facility using landfill gas for electricity generation which began operations in 2020 – provided 38GWh of clean energy to the grid. Construction meanwhile progressed on Hong Kong's first integrated waste management facility, which will burn municipal waste to produce energy. The facility on an offshore island will be connected to CLP's grid by a subsea cable.

CLP continued to work with the Government to explore ways to enhance regional cooperation on zero-carbon energy and to identify sources of carbon-free energy from neighbouring regions, including joint investment and development opportunities as well as zero-carbon energy projects near Hong Kong. The company will continue to explore emerging technologies and is looking at opportunities to convert its gas generation infrastructure to support the use of green fuels such as zero-carbon hydrogen. Towards this end, the CLP Group signed a Memorandum of Understanding with GE, a multinational company, to jointly develop a decarbonisation roadmap for CLP's gas-fired generation facilities at Black Point Power Station and to explore new technologies for the use of low-carbon fuels such as hydrogen.

## **Enhancing Customer Experience and Empowerment**

The journey to a net-zero future involves not only decarbonising the electricity supply but also encouraging customers to embrace low-carbon lifestyles leveraging the power of digital technologies. CLP promotes energy efficiency to reduce overall electricity demand and is rolling out smart meters across its supply area to allow customers to better manage their electricity use. Smart meters give customers access to detailed consumption data and allow them to participate in demand response programmes. Despite a shortfall in the supply of new meters resulting from a global chip shortage, CLP had connected more than 1.2 million smart meters by the end of 2021. Its goal of replacing conventional electricity meters with smart meters for all customers by 2025 remains on track.

An illustration of the benefits of energy saving by customers came on 27 July when electricity demand reached a new peak of 7,477MW. CLP managed its system load by incentivising more than 30.000 of its commercial, industrial and residential customers to take part in a demand response programme and reduce their energy use in the most critical hours. Without the demand response programme, peak power demand would have been over 70MW higher.

Other smart solutions were deployed to help larger businesses become more energy efficient. CLP teamed up with the Airport Authority Hong Kong to jointly design and develop the city's largest battery energy storage system (BESS) combined with a predictive control system for air conditioning in one of the airport's terminals. With a maximum power output of 4MW, the BESS serves as an emergency back-up power supply system, storing electricity produced by the existing generators during routine testing. The BESS operates without fuel and is more environmentally friendly than existing back-up generators.

The predictive control system, meanwhile, uses big data analytics tools to anticipate the cooling needs of the terminal building 24 hours in advance, then automatically adjusts the air conditioning system to provide the right amount of cooling and eliminate unnecessary energy consumption. The system, co-developed by CLP, the Airport Authority Hong Kong, and the Hong Kong Observatory, was named Energy Project of the Year for the Asia-Pacific Rim region by the US-based Association of Energy Engineers.

CLP launched an Electrical Equipment Upgrade Scheme in 2018 to provide subsidies for commercial and industrial customers to replace or upgrade lighting systems, air conditioners and other electrical equipment with more energy-efficient models. Increased awareness of the programme led to a rise of applications and a total energy saving of 33GWh in 2021.

Meanwhile, a new CLP website was successfully launched in October, upgrading the website from legacy technology to a modern, secure, and scalable cloud-based platform that offers better browsing experience and a new level of digital customer service. Customers are empowered to carry out more self-service in a shorter time thanks to a new help and support centre, personalised content based on their online behaviour, friendly chatbot assistance and a faster loading website. Responses have been positive with increases recorded in new visitors, unique sessions and time spent browsing pages. Feedback on web content and potential improvements will be constantly monitored to keep pace with customer expectations.

CLP continued to support the use of electric vehicles in Hong Kong by providing free charging facilities. In 2020, the company launched a programme called Eco Charge 2.0 to provide one-stop technical and customer support to owners and managers of private residential buildings interested in applying for government funding to install charging infrastructure in car parks. By the end of 2021, CLP had completed preliminary assessments for around 94% of the 451 applications received so far, covering proposals for around 119,000 parking bays.

## Outlook

Power generation currently accounts for about two-thirds of Hong Kong's carbon emissions. As the city's largest electricity supplier, CLP has a key role to play in supporting Hong Kong's journey to a carbon-free future. CLP will continue to focus on the construction and realisation of a number of major decarbonisation infrastructure projects, including the offshore LNG Terminal, the D2 unit at Black Point Power Station, the enhancement of the Clean Energy Transmission System connecting the CLP grid to Guangdong and the possibility of an offshore wind farm.

The commissioning of the offshore LNG Terminal planned for 2022 will mark a significant step forward in the procurement of natural gas, and CLP is determined to work towards the project's successful completion and smooth operation. The company will also explore opportunities in zero-carbon hydrogen and other technologies to further reduce carbon emissions from electricity generation.

As it takes the next steps on the journey to net zero, CLP will continue to encourage customers and the community to be more energy efficient and accelerate the installation of smart meters. CLP is also committed to exploring new technologies to further enhance its digital capabilities, operational reliability and customer service, while promoting energy education and caring for people in need through a broadening range of community initiatives.





CLP Power Hong Kong
th environmental

Managing Director,

TK Chiang

Data centres are a very important part of a smart city such as Hong Kong. With environmental sustainability being increasingly crucial, how can CLP help us decarbonise and become more climate-friendly? And how can CLP ensure a reliable power supply to support our 24/7 mission-critical operations?

A sufficient and reliable power supply is essential for uninterrupted data centre operations. To help reduce carbon footprint, CLP has a key role to play from the power supply side. Currently, over 80% of the electricity we provide in Hong Kong comes from low- or zero-carbon fuel sources, including natural gas and nuclear energy. And we have committed to achieving net-zero emissions by 2050, in line with the Hong Kong Government's decarbonisation target. Unit D1 at Black Point Power Station, commissioned in 2020, helps cut 1 million tonnes of carbon emissions annually already. With the commissioning of unit D2 at Black Point in 2023 and our plans to use more renewable energy, we will continue to improve our emissions performance.

If our data centre customers like SUNeVision want to accelerate decarbonisation, we also have a range of solutions. You could make use of our Renewable Energy Certificates programme to support clean energy generation in a simple and flexible way. CLP works with innovators from around the globe to bring in the best technologies that assist you to conduct building asset health monitoring, optimise energy usage, automate system operations and enhance building management – many of which through artificial intelligence software platforms powered by big data analytics. In addition, we launched the Retro-commissioning (RCx) Charter Programme in 2021 to encourage customers to optimise your buildings' operational performance without the need to replace equipment. Eligible customers can apply for subsidies from the CLP Eco Building Fund to carry out retro-commissioning works at their properties. As of the end of 2021, we have received 130 applications from businesses and organisations from various sectors and have trained 270 of their representatives to help them design suitable RCx solutions for their properties. For data centres, our solutions include intelligent air flow control to optimise cooling efficiency and equipment settings modification to improve energy efficiency.

Data centres are a vital 24/7 business, and it is down to us to provide a secure, reliable power supply as we continue to decarbonise. To do that, we are committed to continued investments to make our services more robust and resilient, including strategies to mitigate the potential impact of extreme weather events as they become more frequent and severe.



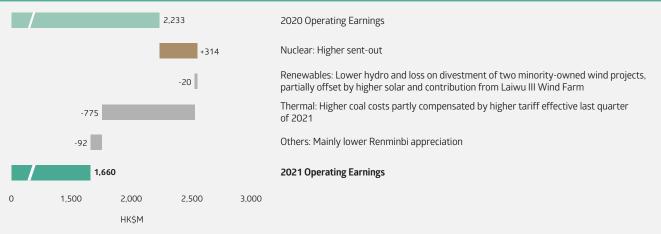
## **Mainland China**

## Overview

China's economy rebounded strongly in 2021 from the early impact of the pandemic, growing 8.1% year on year and driving a 10.3% increase in electricity consumption to meet rising industrial demand, albeit from a low base. However, higher fuel prices put heavy pressure on the margins of CLP's coal operations. Although the performance of the company's non-carbon portfolio was satisfactory, operating earnings in Mainland China decreased 25.7% to HK\$1,660 million because of a loss in the thermal energy segment.

The performance of the business is summarised below:

Operating Earnings	2021	2020	Change
	HK\$M	HK\$M	%
Nuclear Energy	1,908	1,594	19.7
Renewable Energy	545	565	(3.5)
Thermal Energy	(572)	203	N/A
Operating and Development Expenditure	(221)	(129)	71.3
Total	1,660	2,233	(25.7)
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## **Nuclear Energy Brings Stable Contributions**

Nuclear power is a clean energy source that plays a key role in reducing carbon emissions, and its contribution accounted for the bulk of CLP's operating earnings in Mainland China in 2021. Yangjiang Nuclear Power Station reported record generation as users switched to nuclear energy for electricity at a stable cost in times of volatile fuel prices.

The output from Daya Bay Nuclear Power Station remained stable and utilisation was high. The operation of both nuclear plants in Guangdong province remained safe.

## **Green Energy Gathers Momentum**

CLP's renewable energy projects in Mainland China saw stable operations and benefited from the addition of a new wind project. The Laiwu III wind farm in Shandong province, which began commercial operations in September 2020, ran smoothly and provided impetus for additional earnings. The performance of solar projects was sound due to good resources, particularly in Yunnan and Jiangsu provinces.

Hydro projects suffered from decreased water flow, however, and their reduced contributions – combined with CLP's decision to withdraw from two ageing minority-owned wind projects in Liaoning province – contributed to a slight decline in operating earnings from renewable energy projects.

CLP continued to expand its renewable energy portfolio in support of China's decarbonisation strategy. In a milestone for the company, Qian'an III wind farm in Jilin province (100MW) was connected to the grid five months ahead of schedule in December, despite COVID-19 restrictions, torrential rainfall and record-breaking snowfall. The three-phase project, with a combined capacity of 199MW, is the biggest wind farm in the company's Mainland China portfolio and the first CLP project of its kind equipped with a battery energy storage system. Qian'an III is also the company's first grid-parity renewable energy project in the country which does not rely on national subsidy payments. In addition, CLP committed to invest in two more grid-parity wind farms – the 50MW Xundian II farm in Yunnan province and the 150MW

Bobai farm in the Guangxi Zhuang Autonomous Region. Construction is expected to begin in 2022.

By the end of 2021, delayed national subsidy payments for CLP's renewable energy projects amounted to HK\$2,302 million, compared with HK\$1,774 million at the end of 2020. CLP has been receiving continuous settlements over the years.

## **Coal Costs Weigh Heavily on Thermal Projects**

Coal-fired projects in Mainland China had a challenging 2021 with volatile coal costs – which hit a record high during the year – resulting in both majority-owned and minority-owned projects reporting a loss for the year.

Fangchenggang Power Station in Guangxi recorded stable operations, although output was lower than in 2020 because of limited coal supplies. The power station completed the retrofitting of two units to allow it to provide steam to industry users nearby as it transforms itself into an integrated energy provider. When a pipeline to the plant is completed, the power station will be able to sell steam as well as electricity.

Mainland China launched the world's largest carbon market in July to contribute to its decarbonisation objectives. All coalfired projects are required to participate, and are assigned specific allowances based on the types and capacities of their generation units. Fangchenggang Power Station conducted a number of transactions in the market to familiarise itself with the process, ensure it has a robust internal process in place and equip employees with the necessary knowledge. While the power station has a slight surplus allowance because of its advanced technology, it is studying ways to raise efficiency levels as the Government is likely to continue to tighten emission control measures.

## **Greater Bay Area Opportunities**

CLP has set out a strategy to establish a greater presence and pursue opportunities in the Greater Bay Area (GBA). In line with that strategy, CLP signed a contract to invest in and operate a centralised cooling system at Po Park Shopping Plaza in central Guangzhou until 2036. CLP took over the operation of the chilling plant at the 20-year-old complex in November and began modernising it, with retrofitting work expected to be completed in the first quarter of 2022. The project offers a steady income stream and represents the first step into a field with high business potential.

CLP's investment to provide electricity supply services to customers in the Fangchenggang Hi-Tech Zone, which began operations in January 2020, meanwhile continued to attract new users.



CLP's renewable energy portfolio in Mainland China saw stable operations in 2021 as good resources contributed to sound performance of solar projects.

The table below shows the performance of CLP's renewable energy and thermal energy projects in Mainland China:

	Installed Capacity Equity MW	Electricity Sent Out Equity GWh		Availa %	-	Utilisation %	
		2021	2020	2021	2020	2021	2020
Renewable Projects							
Wind	1,010.3	1,893	1,885	99.3	99.0	24.3	24.1
Wholly-owned	643.5	1,184	1,168	99.3	98.8	25.7	26.3
Qian'an I & II & III <sup>1</sup>	199	214	257	99.3	99.4	26.0	30.6
Penglai I	48	99	89	99.5	99.4	24.1	21.6
Laiwu I, II & III	149	270	171	99.7	99.7	21.3	17.7
Xundian I	49.5	129	151	99.5	99.6	30.5	35.4
Sandu	99	217	279	98.4	95.7	25.6	32.9
CLP Laizhou I & II	99	255	222	99.2	99.0	30.1	26.2
Minority-owned <sup>2</sup>	366.8	709	717	99.4	99.4	21.8	21.0
Solar <sup>3</sup>	328.3	603	590	99.9	99.9	21.2	20.6
Jinchang	85	181	181	99.9	100	24.5	24.5
Sihong	93.4	147	137	100	100	18.2	16.7
Xicun	84	168	167	100	100	22.9	22.8
Huai'an	12.8	20	19	99.9	100	18.1	17.3
Lingyuan	17	31	34	100	99.8	22.0	23.7
Meizhou	36.1	56	52	99.8	100	17.7	16.3
Hydro	489.3	1,668	1,879	93.2	94.2	40.4	44.2
Dali Yang_er	49.8	145	147	90.8	92.5	45.3	33.9
Huaiji	109.5	237	284	94.0	92.4	25.5	31.0
Jiangbian	330	1,285	1,448	93.3	95.0	44.6	50.1

Thermal Projects											
Majority-owned											
Fangchenggang I & II	1,806	7,085	7,947	85.3	89.2	47.1	52.7				
Minority-owned	2,147	9,468	8,459	91.8	93.6	54.2	48.3				
Shiheng I & II <sup>4</sup>	370.4	1,345	813	89.7	93.8	45.0	27.3				
Heze II	176.4	865	852	91.4	92.0	60.4	59.1				
Liaocheng I	352.8	1,445	1,487	87.5	98.5	50.6	51.5				
Panshan	206.7	997	871	93.5	92.1	58.7	51.3				
Sanhe I & II	219.5	993	923	89.6	95.7	55.2	51.2				
Suizhong I & II	564	2,379	2,185	94.8	89.8	51.3	47.1				
Zhungeer II & III	257.4	1,443	1,329	94.7	95.1	70.4	64.8				

Any minor discrepancies in totals are due to rounding of figures.

## Notes:

- 1 Qian'an III (100MW) was connected to the grid in December 2021.
- 2 CLP divested its 24.5% stakes in the Mazongshan and Qujiagou wind farms in Liaoning province in March 2021.
- 3 Alternate Current (AC) capacity is used to align with the calculation method for other power plants in the CLP portfolio.
- 4 Ceased owning the projects from 1 January 2022.

## Outlook

China aims to peak carbon emissions before 2030 and to achieve carbon neutrality by 2060, favouring non-carbon projects using renewable and nuclear energy. In the coming years, CLP will focus on expanding its renewable energy portfolio by adding more grid-parity wind and solar projects, including the Xundian II and Bobai wind farms.

To help meet China's climate targets, the use of CLP's nuclear energy projects is likely to remain at a very high level. However, Yangjiang Nuclear Power Station will be exposed to higher market risk as the plant is going to offer more of its output through market sales.

Coal supply shortages combined with strong industrial demand resulted in a severe power crunch in China in 2021. CLP is working closely with the Guangxi Government to support the community and meet demand for electricity. Fangchenggang Power Station will endeavour to maintain stable operations to fulfil its sales commitments, and utilise its jetty to import coal and lower fuel costs. As coal prices

stabilise in 2022, the performance of CLP's coal portfolio in Mainland China is expected to improve. However, to meet CLP's own target to phase out all coal-fired assets by 2040, CLP will start planning ahead for the next step for Fangchenggang Power Station and other minority-owned coal projects.

In the GBA, CLP will explore investment opportunities in two main business models – Energy-as-a-Service (EaaS), and energy infrastructure. The recent investment in Po Park Shopping Plaza highlights a growing potential for centralised cooling systems. Other EaaS solutions under consideration include charging facilities for electric vehicles and energy management systems. CLP is also looking to invest in energy infrastructure projects for industrial parks and commercial sites, including district and multi-building cooling systems as well as data centres. These efforts will be supported by CLP's investment in the CSG Energy Innovation Equity Investment Fund set up by China Southern Power Grid in 2020 which is expected to bring new smart energy and innovation-related opportunities.



**SH Chan**Managing Director – China

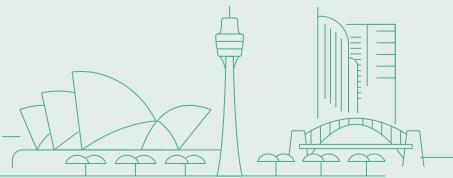
How can CLP develop stronger partnerships in China and the Greater Bay Area in particular to bring more returns to shareholders in the long-term?

CLP entered the Mainland Chinese market in 1979, and our success has been built on the many partnerships we have forged over the years to meet the country's growing energy needs. One of our earliest projects back in the 1980s was our collaboration with China General Nuclear Power Group (CGN) to develop Daya Bay Nuclear Power Station in Guangdong province, which continues to contribute strongly to our non-carbon portfolio.

The Chinese Government has committed to reaching peak carbon emissions by 2030 and achieving carbon neutrality by 2060, and we will continue to work closely with our partners to support the country's decarbonisation efforts and focus on innovative ways to meet energy needs.

We will seek to deepen our partnerships with leading energy companies, including CGN and China Southern Power Grid (CSG). Meanwhile, we are investing in the CSG Energy Innovation Equity Investment Fund and forming new partnerships such as TUS-CLP Smart Energy Technology Co. Ltd. – a joint venture with an affiliate of Tsinghua University – to make full use of the latest energy technologies and develop new products, services, and business models to capture growing demand for smart, sustainable energy solutions.

Our recent investment in a centralised cooling project for Po Park Shopping Plaza in Guangzhou is typical of the new opportunities available to us. We are also keen to be more active in market segments such as electric transport, data centres and energy management, particularly in the Greater Bay Area.



# Australia

Focusing on supporting our customers while investing in the energy transition.

> Tallawarra Gas-fired **Power Station**

## **Australia**

## Overview

EnergyAustralia maintained its support for customers as the national economy continued to be impacted by COVID-19. Despite the pandemic, the company remained focused on developing a portfolio of new projects to provide clean, flexible generation in support of the country's energy transition.

The Customer business improved as levels of bad and doubtful debts related to COVID-19 fell. However, earnings in the Energy business were adversely affected by reduced wholesale electricity prices, accelerated depreciation costs resulting from the advanced retirement plans for Yallourn Power Station, and the replacement of expiring gas purchasing arrangements at higher prices. In addition, roughly one third of the decline in EnergyAustralia's earnings was related to non-cash changes in the fair value of energy hedging contracts. As a result, EnergyAustralia reported an operating loss of HK\$83 million in 2021.

EnergyAustralia's underlying operating performance in 2021 is summarised below:



## **Supporting and Retaining Customers**

EnergyAustralia continued to provide extensive support for customers struggling with the financial pressures of the pandemic. More than 50,000 new payment plans were set up and more than 200,000 payment extensions arranged for residential customers and small businesses under the "EnergyAssist" and "Rapid Business Assist" programmes.

The company continued to record improvements on Net Promoter Score as an increased proportion of its retail customers said they were willing to recommend EnergyAustralia to others. Although overall market churn increased year on year, EnergyAustralia improved its customer churn performance, widening the gap between its own churn rate and the rest of the market to a favourable 2.6%. EnergyAustralia's focus on continuous improvement in customer service led to a record low number of customer complaints, contributing to the overall improved performance. However, total customer accounts fell marginally to 2.44 million in the face of ongoing and intense competition.

## **Ensuring High Reliability**

Major planned maintenance works were carried out at Yallourn Power Station in Victoria between September and December, ahead of the summer peak demand period, to help ensure supply reliability. The critical and complex works were significantly adjusted to ensure the health and safety of the workforce and community in view of the COVID-19 situation.

Earlier in the year, exceptionally heavy rainfall resulted in heightened water flows through the Morwell River Diversion which runs through the mine at Yallourn. The plant was run at restricted capacity for around two weeks as the nearterm impact on the Morwell River Diversion was assessed. A comprehensive damage assessment was launched to determine what long-term repairs are required at a cost of A\$78 million (HK\$452 million). Water diversions were constructed to enable inspection and repairs of the Morwell River Diversion structure over the 2021/22 summer. Despite the disruption, the power station's output was only 4.9% lower than in the previous year.

The Victorian Environmental Protection Authority (EPA) informed EnergyAustralia in February 2022 that it considered a dust complaint against the Yallourn mine in October 2021 to be a licence non-compliance. EnergyAustralia is of the view that it has met relevant obligations as the incident took place on an extremely windy and dry day while all of its operational control measures were in use at the time to minimise fugitive dust emissions. EnergyAustralia is currently liaising with the EPA for a review of the case.

Major planned works at Mount Piper Power Station in New South Wales were deferred to 2022 to ensure the safety of employees, contractors and the community from the escalating COVID-19 situation in the state at the time. Output from the power station increased year on year and works were undertaken to ensure sufficient coal supply to enable uninterrupted running in 2022 and beyond. During the year there were two environmental licence limit exceedances at the plant, relating to total particulates emissions and surface water turbidity respectively. The EPA was notified, and corrective actions have been taken to prevent a repeat of these incidents. There were also two licence non-compliances. One was related to the loss of environmental data associated

with continuous air emissions monitoring for five days following an equipment malfunction. The other case was related to a localised damage to the liner of a brine pond. The damage was detected in an adjacent monitoring bore that is used to ensure integrity of the pond liner. Given the liner is a core element to prevent water pollution, the EPA was notified as a precautionary approach and there has been no further action.

EnergyAustralia's gas-fired power facilities in New South Wales, Victoria and South Australia operated with a high degree of reliability, supporting the company's generation portfolio through a period of fluctuating market conditions. The company has dispatch rights to two grid-scale batteries which helped ensure stability in the National Electricity Market during periods of high volatility.

Forward wholesale electricity prices in Victoria and South Australia remain well below historic levels primarily because of increases in renewable energy generation. In Queensland and New South Wales, prices have recently returned to historic levels, reflecting the higher fuel costs and transmission constraints to deliver excess energy from the south.

The table below shows the performance of EnergyAustralia's renewable energy and thermal energy generation assets:

	· ·		GWh	Out Availability %		Utilisation %	
		2021	2020	2021	2020	2021	2020
Wind							
Cathedral Rocks	32	64	73	98.8	79.3	23.5	26.7
Gas	1,595	1,035	1,268	81.8	91.1	7.7	9.4
Newport	500	256	310	75.2	93.1	6.3	7.8
Jeeralang	440	99	75	89.7	90.7	2.6	2.0
Hallett <sup>1</sup>	235	45	27	76.0	85.8	2.2	1.4
Tallawarra	420	636	856	84.8	92.1	17.7	23.7
Coal	2,910	14,705	14,725	80.7	71.7	62.6	63.2
Mount Piper <sup>2</sup>	1,430	6,737	6,346	87.8	71.4	57.4	55.2
Yallourn	1,480	7,969	8,378	73.8	72.0	67.7	70.8

Any minor discrepancies in totals are due to rounding of figures.

## Notes:

- 1 The plant's capacity increased by 32MW in early 2020 following successful commissioning of a new additional gas turbine.
- 2 The plant's capacity increased by 30MW in Jan 2021 following successful upgrade works.

## **Supporting Australia's Energy Transition**

EnergyAustralia reached an agreement with the Victorian Government in March to bring forward the retirement of Yallourn Power Station to mid-2028, four years before the end of the plant's technical life. The retirement of the power station will reduce EnergyAustralia's direct carbon dioxide emissions by about 60% compared with current levels. To help ensure stability of energy supply in the state and allow for the use of more renewable energy, EnergyAustralia is developing the Wooreen Energy Storage System, which will be the first four-hour utility-scale battery with a 350MW capacity – larger than any battery system operating in Australia today. The Wooreen system is scheduled to go into operation by the end of 2026, ahead of the closure of Yallourn Power Station.

The transition to low-carbon energy inevitably affects lives and has a profound impact on power station employees and communities. EnergyAustralia is committed to providing support for employees and communities throughout the transition. EnergyAustralia will provide a comprehensive package of transitional services at Yallourn including training and skills development, career planning, assistance for redeployment and financial counselling.

EnergyAustralia began preparation works on Tallawarra B, a power plant designed to be net-zero by offsetting its

direct carbon emissions over its operational life, and to use a blend of green hydrogen and natural gas. With a generation capacity of more than 300MW, Tallawarra B is scheduled to enter service in time for the 2023/24 Australian summer, helping provide reliable, affordable and cleaner electricity as coal-fired generation is phased out.

In Queensland, construction began on a 250MW pumped hydro energy storage project on the site of a disused gold mine in Kidston. EnergyAustralia is underpinning the project through a long-term energy dispatch agreement with the developer. The plant is expected to be completed in 2024.

EnergyAustralia continued to assess potential investments in flexible generation and storage projects to accelerate the integration of solar and wind power into the National Electricity Market. One such opportunity is a potential pumped hydro energy storage facility at Lake Lyell, which currently supplies water to Mount Piper Power Station. Early estimates suggest the facility would be capable of producing 350MW of electricity with around eight hours of storage.

In addition, EnergyAustralia has in place power purchase agreements representing a total of more than 870MW of large-scale wind and solar projects in the National Electricity Market. The performance of renewable energy projects for which EnergyAustralia is an offtaker is set out in the table helow.

	Offtake for EnergyAustralia MW	EnergyAustralia Sent	
		2021	2020
Wind			
Boco Rock	113	335 <sup>1</sup>	379 ¹
Bodangora	68	<b>201</b> <sup>1</sup>	212 1
Gullen Range	165.5	<b>480</b> <sup>1</sup>	463 <sup>1</sup>
Mortons Lane	19.5	<b>62</b> <sup>1</sup>	63 <sup>1</sup>
Taralga	107	<b>292</b> <sup>1</sup>	284 <sup>1</sup>
Waterloo <sup>2</sup>	111	281	158 <sup>3</sup>
Solar			
Coleambally	105	218	219
Gannawarra	50	107	87
Manildra	46	69	96
Ross River	93	208	223

## Notes:

- Publicly available data from the Australian Energy Market Operator.
- 2 EnergyAustralia has been taking 100% output from the plant since Nov 2020.
- 3 Reinstated to denote increase in offtake.

## **Broadening Business Opportunities from Innovation**

In an initiative to promote sustainable living, EnergyAustralia has become a partner in a residential microgrid project under which 32 townhouses in a new Melbourne real estate development are fitted with solar panels connected to a microgrid. Energy not consumed within each home is stored at a centralised battery and controlled by an intelligent microgrid platform that manages energy flow across the estate. Any energy generated within the microgrid but not consumed is fed back into the national grid.

EnergyAustralia launched a new product through its "On by EnergyAustralia" platform in September called "Stack On" – a bundled offer that allows customers to pick, mix, and save by choosing from electricity, broadband internet, mobile data, mobile voice and data, and car and home insurance products. The products are all available through one online self-service portal and the more products customers choose, the more they can save.

"On by EnergyAustralia" is also offering eligible homeowners in New South Wales a new integrated solar-plus battery system with no upfront costs called "Solar Home Bundle". This follows a successful trial of the new proposition in 2020. EnergyAustralia uses smart software to balance customers' electricity supply from the grid, solar and battery. The battery setup will form part of EnergyAustralia's Virtual Power Plant – a network of batteries helping to support the grid and meet customer energy needs.

EnergyAustralia's "Go Neutral" remains the leading carbon offsetting programme offered by any energy retailer or generator in Australia and one of the largest certified carbon offset products in the country. About 134,000 residential and small business customers were added to "Go Neutral" in 2021, taking the total to 444,000 since the programme started in 2016. Building on this success, "Business Carbon Neutral" was launched in September 2021, offering the opportunity for commercial customers to offset their carbon emissions.

EnergyAustralia's partnership with the Startupbootcamp programme which fast-tracks new energy-related start-up businesses, continued into its fourth year and its second year online. A total of nine start-ups chosen from an initial pool of 82 shortlisted applicants pitched their concepts from home in a live-streamed demo day in December. EnergyAustralia has been in further discussions with three of those candidates to explore collaboration opportunities.

## **Ensuring a Safe Working Environment**

WorkSafe Victoria, the Victorian health and safety regulator, in December charged EnergyAustralia with three breaches of the Occupational Health and Safety Act in relation to a fatal incident in 2018.

Graeme Edwards's loss is deeply felt by his friends at Yallourn and by everyone who knew him.



EnergyAustralia offers eligible homeowners a smart solar and battery system with no upfront costs, making access to solar and batteries easy and affordable.

EnergyAustralia subsequently conducted a thorough review of the incident and introduced new equipment to eliminate the hazards identified.

EnergyAustralia will continue to find and implement improvements across all sites to ensure a safe workplace for its employees.

## Outlook

Looking ahead, while wholesale forward prices have strengthened, it will take some time for EnergyAustralia to improve its gross margins given its progressive hedging. Intense retail competition, meanwhile, is likely to continue from both existing participants and new market entrants, maintaining pressure on margins.

On the energy policy front, policymakers in Australia have continued to recognise the need for greater levels of investment in low-carbon, reliable power generation.

The Energy Security Board released a study in April proposing four reform pathways to address Australia's energy transition needs beyond 2025. The document, to which EnergyAustralia contributed, is part of a broad proposal advocating the timely entry of new generation capacity and steps to ensure existing facilities remain until they are no longer required to support system stability. The Federal Budget in May also included initiatives to support investment in new and emerging low-emission technologies prioritised under the Government's Technology Investment Roadmap.

EnergyAustralia will continue to invest in the energy transition. Deployment of customer solutions like the Solar Home Bundle will provide customers with the opportunity to see the transition come to life in their home. EnergyAustralia's large projects including the Tallawarra B power plant, Wooreen Energy Storage System and the Kidston pumped hydro energy storage facility will support the broader grid. The company will also continue to assess the potential of the Lake Lyell pumped hydro energy storage facility, and carefully manage the retirement of Yallourn Power Station.

In addition, EnergyAustralia is exploring potential synergies from working with the CLP Group on technologies including hydrogen, microgrids, batteries and energy storage, further strengthening its capability to help build a cleaner energy future for Australia underpinned by renewable energy.





**Mark Collette** Managing Director, EnergyAustralia

I understand Yallourn Power Station will be retired in mid-2028. What support will EnergyAustralia give to the power station's employees and the community of the Latrobe Valley?

While it is still six years away, it is important to recognise that the retirement of Yallourn will mean different things to different people, and we will work to ensure our approach is a respectful and collaborative one that addresses individual needs.

For our people, we will be supporting them through a multi-million dollar package, which will include training and skills development, career planning, assistance for redeployment and financial counselling. Our trainee and apprenticeship programmes will also continue through to the power station's retirement, and we will maintain our focus on the safety, health and wellbeing of our people.

For the wider community, we will ensure our approach over the next six years delivers on the high standards the community expects of us. We will hold forums and smaller face-to-face sessions so that people within the community and interest groups are clear about our plans, and so that we can manage the impact of the closure sensitively. In addition, we will continue to invest in the Latrobe Valley with the construction and ongoing operation of a utility-scale battery storage facility alongside Jeeralang Power Station.





With a strategic focus on clean energy and non-generation businesses, Apraava Energy is well placed to be an important contributor to India's new energy future.

Tejuva Wind Farm

## India

## Overview

A resurgence of COVID-19 in the second and third quarters took a heavy toll on India, straining healthcare systems in some states and putting the brakes on a previously fast-growing national economy. With increased precautions and comprehensive protection for employees, CLP's rebranded business in India, Apraava Energy, was able to maintain stable operations, although the construction and approval of new projects were affected by strict lockdown measures.

The economy rebounded sharply in the final quarter as the pandemic situation stabilised. However, the resumption of economic activities – combined with coal production and dispatch issues resulting from heavy monsoon rainfall – led to a severe power crunch and rolling blackouts in some areas.

As one of India's top 10 private power producers, Apraava Energy worked hard to ensure it could meet surging demand, although its performance was limited by coal shortages. The earnings of Jhajjar Power Station were affected by lower capacity tariff, the level of which was reduced by about 10% from April 2020 under its long-term power purchase agreements. However, thanks to better efficiency at Jhajjar and a higher level of output from renewable projects, CLP's operating earnings in India increased 26.3% to HK\$221 million. The performance of the business is summarised below:

					2021	2020	Change
Operating Earn	ings 1				HK\$M	HK\$M	%
Renewable Ene	rgy				186	104	78.8
Thermal Energy					28	66	(57.6)
Transmission					7	5	40.0
Total					221	175	26.3
Note: 1 Net of the 40%	share held by Caiss	se de dépôt et pla	acemei	nt du Québec (CDPQ).			
	175			2020 Operating Earnings			
		+82		Renewables: Higher wind generation and	d full-year contrib	ution from two sol	ar projects
	-	38		Thermal: Lower capacity tariff and highe Jhajjar due to major planned maintenance		naintenance costs a	at
		+2		Transmission: Acquisition of KMTL project	ct in December 20	)21	
		221		2021 Operating Earnings			
0 10	00 20	0 3	300				
	HK\$M						

## Wind and Solar Projects Flourish

Output from Apraava Energy's renewable energy portfolio rose, with both wind and solar projects performing well. Wind projects benefited from good resources in all states and higher availability. Upgrading works to wind farms in Tejuva, Chandgarh and Harapanahalli also boosted productivity.

Construction of a wind power plant in Sidhpur in Gujarat state moved forward, although some work was held up by the pandemic. The project is expected to go into operation in the second half of 2022 after the Government agreed to extend its commissioning deadline.

The addition of two new plants in Telangana state in 2020, meanwhile, contributed to increased solar power generation. Output from other plants was lower, partly because of land disputes affecting the Tornado and Gale projects in Maharashtra state which are now nearing resolution.

Apraava Energy continued to receive payments from local distribution companies for the purchase of renewable energy. However, the level of outstanding receivables rose 14.5% to HK\$883 million, largely because of disruption caused by the pandemic.

The table below shows the performance of CLP's renewable energy projects in India:

	Installed Capacity Equity MW	Electricity Sent Out Equity GWh		Availa %	-	Utilisation %	
	, ,	2021	2020	2021	2020	2021	2020
Wind	554.5	1,002	927	96.6	95.6	21.2	19.6
Andhra Lake	63.8	113	103	95.8	93.8	20.9	18.9
Bhakrani	61.4	97	84	96.3	93.9	18.2	15.6
Chandgarh	55.2	104	96	97.8	98.5	22.7	21.1
Harapanahalli	23.8	49	48	97.4	96.5	24.1	23.9
Jath	36	60	58	97.4	97.5	19.9	19.3
Khandke	30.2	54	50	96.3	93.5	20.7	19.4
Mahidad	30.2	55	46	97.3	87.1	21.2	17.8
Samana I	30.2	50	45	96.0	93.9	19.6	17.6
Samana II	30.2	55	51	96.2	94.7	21.5	19.7
Saundatti	43.2	70	71	98.3	98.6	18.8	19.1
Sipla	30.2	54	50	95.2	96.9	20.6	18.8
Tejuva	60.5	132	118	97.3	98.1	25.0	22.4
Theni I	29.7	59	54	95.2	96.4	23.1	21.2
Theni II	29.7	51	53	94.6	96.9	20.2	20.8
Solar <sup>1</sup>	150	278	267	95.0	96.4	21.2	21.9
CREPL <sup>2</sup>	18	31	23	99.7	99.5	19.3	19.2
DSPL <sup>3</sup>	30	55	38	100	99.4	20.7	20.4
Gale	30	51	57	82.8	86.8	19.5	21.5
Tornado	12	20	25	82.4	93.7	19.5	22.7
Veltoor	60	122	123	99.8	99.2	23.2	23.4

Any minor discrepancies in totals are due to rounding of figures.

## Notes:

- 1 Alternate Current (AC) capacity is used to align with the calculation method for other power plants in the CLP portfolio.
- 2 Project transferred to Apraava Energy in March 2020.
- 3 Project transferred to Apraava Energy in April 2020.

## **Venturing into Transmission Sector**

In December, Apraava Energy was successful in receiving regulatory approvals under the new foreign investment rules for it to complete the acquisition of a 49% stake in Kohima-Mariani Transmission Limited (KMTL), owner of an interstate transmission project which began operations in northeast India in 2020. Under the terms of the agreement, Apraava Energy will acquire the remaining stake in two tranches by December 2025.

The company first entered the power transmission sector in November 2019 by taking a 100% stake in Satpura Transco Private Limited (STPL), which owns an intrastate project in Madhya Pradesh state. The operational performances of both the KMTL and STPL projects have been in line with forecasts, with close to 100% availability.

## **Power Station Sets New Standards**

Apraava Energy's only coal-fired project in India – Jhajjar Power Station in Haryana state – recorded its highest utilisation rate to date following the successful completion of a major planned outage on one of the generation units in the first quarter. Despite low coal supplies because of a national shortage, the power station managed to increase output in response to rising electricity demand. Jhajjar Power Station is one of the few plants with flue gas desulphurisation equipment installed in the northern National Capital Region, which enabled the plant to meet the new and more stringent sulphur dioxide ( $\mathrm{SO}_2$ ) emission limit introduced in February 2019. It had four minor licence limit exceedances for  $\mathrm{SO}_2$  during the year due to equipment failure or malfunction. However, the units remained operational as requested by

local authorities because of high electricity demand. The issues were rectified at the earliest opportunity and none of the exceedances resulted in any action by local authorities.

The power station's operator Jhajjar Power Limited received the Apex India HSE Gold Award and the RoSPA Silver Award for its health and safety performance, as well as recognition from the Confederation of Indian Industry's ITC Sustainability Award and Business Excellence Maturity Assessment programmes.

As Jhajjar's current power purchase agreements are not expected to be renewed once they expire in 2037, an impairment of HK\$330 million was booked.

Apraava Energy continued to explore uses for the Paguthan plant in Gujarat, which ceased operations in 2018, but progress has been hampered by the pandemic.

The table below shows the performance of Jhajjar Power Station:

	Installed Capacity Equity MW	Electricity Sent Out Equity GWh		Availa %	•	Utilisation %	
		2021	2020	2021	2020	2021	2020
Coal							
Jhajjar	792	4,419	2,629	88.0 <sup>1</sup>	97.8 <sup>1</sup>	68.2	40.6

## Note:

1 Technical availability. Jhajjar's commercial availability was 83.9% in 2021 and 97.3% in 2020.



Output from Apraava Energy's renewable energy portfolio was higher in 2021 with both wind and solar projects performing well.

## Outlook

CLP India was renamed Apraava Energy in 2021, signifying the company's ambition to accelerate growth under a new corporate identity and its commitment to support the development of a green India. The rebranded company aims to double the size of its energy portfolio over the next two to three years, driven by greenfield renewable energy investments and acquisitions. As a strong support to reach this goal, in December Apraava Energy received

its registration under India's new foreign investment rules, which enables it to participate in all public auctions in the fields of generation, transmission and distribution in the years ahead.

Apraava Energy will continue to expand its non-generation business such as transmission amid the ongoing privatisation of India's power sector, explore diversification into power distribution and other customer-focused business and encourage greater participation from local shareholders.



## How will Apraava Energy help India meet its people's growing energy needs and its net-zero commitments?

A 2020 research by the International Energy Agency shows that India's population is continuing to grow, and its economic development is accelerating. As a result, energy demand is expected to double by 2040. On the other hand, according to information published by the Ministry of Power of the Government of India, the country's energy mix is dominated by fossil fuels which had an installed capacity of about 235GW in December 2021, or about 60% of the total. The installed capacity of renewables, meanwhile, stood at about 151GW. Currently, solar and wind contribute just 10% of India's electricity generation, while coal accounts for about 70%. This energy mix is undergoing a rapid transition driven by government policy including a target to install 500GW of renewables by 2030.

Keeping pace with this transition and the climate strategy of our investors, the CLP Group and CDPQ, we at Apraava Energy have been steadily decarbonising our energy portfolio for more than a decade with the current balance at 37% wind, 10% solar and 53% coal. Our rebranding in 2021 also heralded a new strategy under which we plan to double our existing business by 2024 through the addition of only low-carbon activities. Marching down this path of low carbon growth, we have committed to a business ambition which supports the well-below 2°C climate change scenario. We are developing an emissions reduction target aiming towards net zero that will be validated by the Science Based Targets initiative (SBTi).

Along with the shift to a low-carbon portfolio, we are taking additional small steps to reduce our carbon footprint. For example, during COP26, we signed the WBCSD's India's Electric Vehicle Ambition Statement, which aims to enable the energy transition in mobility. In this direction, we have added two electric cars to our office fleet, and I am currently driving an electric vehicle myself.

Apraava Energy is a budding, clean energy company that aims to produce more clean and affordable energy and has a vision of a low-carbon business. We aim to play a part not only in meeting India's growing energy demand but also in contributing to the country's net zero commitment.



## Southeast Asia and **Taiwan**

Managing investments in the region to deliver reliable and safe operations.

Lopburi Solar Farm

## **Southeast Asia and Taiwan**

## **Overview**

Ho-Ping Power Station in Taiwan operated reliably and safely during the year. But the plant's contributions to the Group were impacted by high fuel costs which were most acute in the later part of the year. A major overhaul of one of the generating units commenced in the fourth quarter to enhance reliability and reduce emissions.

Lopburi Solar Farm in Thailand also performed steadily.

During the year, operating earnings in Southeast Asia and Taiwan decreased 55.2% to HK\$173 million. CLP's performance in the market is summarised below:

Ope	rating Earnin	gs				2021 HK\$M	2020 HK\$M	Change %
	ewable Energ rmal Energy ers <sup>1</sup>	y <sup>1</sup>				61 126 (14)	63 366 (43)	(3.2) (65.6) 67.4
Tota	al					173	386	(55.2)
1 Cc	omparative figu	res for the im	pairment pro	ovision at Lo 386	pburi have been reclassified to conform w  2020 Operating Earnings  Lopburi: Stable performance	vith current year's	presentation.	
	-240	+29	_	-	Ho-Ping: Higher coal costs and lower eneron Others: Mainly lower development expensions 2021 Operating Earnings			
0	100	200 HK\$M	300	400	2021 Operating Lannings			

## Outlook

CLP will continue to manage its investments in Ho-Ping and Lopburi for them to deliver reliable and safe operations.