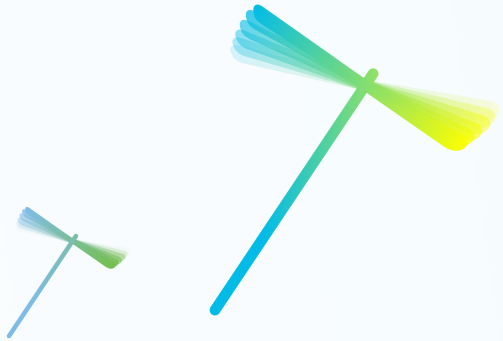
CLP 中電

CLP's Climate Vision 2050

A more sustainable world

Contents



CEO's Message

There can be no serious doubt that greenhouse gas levels in the atmosphere are increasing due to human activity and that significant and damaging changes to our climate are occurring as a direct result. Time is ticking, with the risks and impacts of climate change becoming more evident as witnessed in the intensity and frequency of extreme weather events. The Intergovernmental Panel on Climate Change (IPCC) special report – *Global Warming of 1.5°C* – underscores the urgency with which we must act.

CLP has long been a staunch supporter of climate action. In 2007 we were the first Asian-headquartered power company to set carbon intensity reduction targets for our generation portfolio. A decade on, we are transforming into a Utility of the Future. We are progressively decarbonising our portfolio of generation assets and evolving our business model to support our customers to improve energy efficiency. We are also leveraging advanced technologies and exploring opportunities in transmission and distribution, electric vehicle charging, decentralised generation and smart energy services.

In our Climate Vision 2050 we have taken the strategic decision to add no additional coal-fired power generation assets to our portfolio. We also aim to phase out all remaining coal-based assets from our generation portfolio by 2050 at the latest.

In 2018 we announced our tightened carbon intensity targets which require a reduction of 80% from the 2007 baseline-level by the middle of this century. We have also established new renewable energy and non-carbon emitting capacity targets for 2030, reflecting both the scale of the changes needed and the improved economic viability of renewable energy. These new commitments help us focus on opportunities stemming from low-carbon solutions inherent in a Utility of the Future business model.

We are committed to strengthening our targets at least every five years. We set our targets conservatively based on currently available technology and the existing regulatory context in our key markets. These targets are in line with our long-term decarbonisation strategy. We understand that the pledges made under the Paris Agreement will not be enough to achieve the ambition of limiting global temperature increases to 1.5°C. But we anticipate that our markets will deepen their decarbonisation capabilities over time; hence we will start tracking our progress in climate action against the Sectoral Decarbonisation Approach (SDA) trajectory of the Science Based Targets initiative (SBTi). This transparent comparison will help us stay on course to accelerate our transition to a science-based target.

Addressing the challenges of climate change requires a collective effort from communities, governments and businesses. CLP is committed to working across sectors to support the development of stable policies and regulations that will speed up the transition to a low-carbon and affordable power supply for all.

Our updated Climate Vision 2050 demonstrates CLP's ambition to make decarbonisation a reality and to be an important player in the world's journey towards a sustainable, low-carbon future.

Richard Lancaster
Chief Executive Officer
December 2019

About CLP Group

CLP's Vision

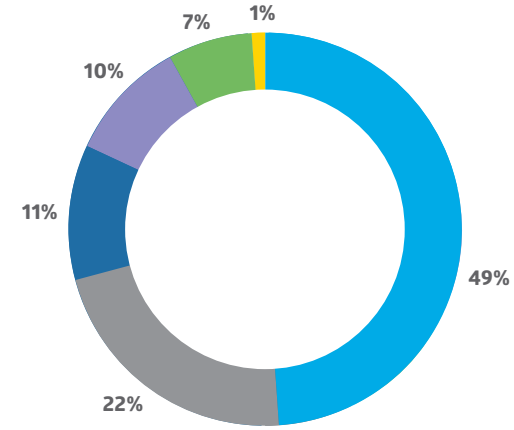
Our vision is to be the leading responsible energy provider in the Asia-Pacific region, from one generation to the next.

Founded in Hong Kong in 1901 and listed on the Stock Exchange of Hong Kong, CLP is currently one of the largest investor-operators of power assets in the Asia-Pacific region. We operate in Hong Kong, Mainland China, India, Southeast Asia, Taiwan and Australia, with business activities ranging from generation, transmission and distribution to retail and energy services. As of 31 December 2018, we employed over 7,600 people and served over five million customer accounts.

In 2018, half of CLP's operating earnings came from transmission, distribution, retail and other non-generation related activity. Generation from non-carbon emitting sources contributed 18% of the operating earnings, up from 11% in 2017.

Operating earnings

(Before unallocated expenses) by asset type



Read more about our company profile and our portfolio.

Our Context

Setting targets for the power sector

We first published our Climate Vision 2050 in 2007, and in 2017 undertook a comprehensive review of the existing targets. Having set ourselves the target of progressive decarbonisation, we modelled various outcomes based on different projected approaches, taking into account likely trends in technology, regulatory context in our markets, and how the business would perform. This work was based on global and regional energy development scenarios that align with the International Energy Agency's (IEA) *World Energy Outlook 2016* Current Policies Scenario, New Policies Scenario and 450 Scenario (also called the 2°C Scenario), as well as forecasts outlined in Bloomberg New Energy Finance's *New Energy Outlook 2017*.

Moving forward we will use scenario analysis in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) to assess the ongoing impact of climate change on our business. Moreover, as we are committed to strengthening our decarbonisation targets at least every five years, we will chart our targets and our progress towards them against the SBTi.

CLP Holdings Limited Chief Executive Officer Richard Lancaster speaks on climate change in Paris on the side of the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21).

Our Context

Changes in technology and business models

Wind and solar technology continues to improve and renewable energy is becoming increasingly more efficient and affordable. Battery and other energy-storage solutions combined with flexible forms of generation like natural gas and renewables are evolving fast and starting to contribute to grid stability.

Onshore wind turbines have substantially increased in size in addition to improvements in generator technology. Wind technology is now viable at lower wind speeds, increasing the number of sites suitable for wind farms. This is particularly significant in CLP's focus markets, many of which see lower average wind speeds.

Even more dramatic improvements have been observed in the size of offshore wind turbines. The increase in size has pushed down the cost of offshore wind projects and made this area an increasingly attractive and viable option for investment across the Asia-Pacific region.

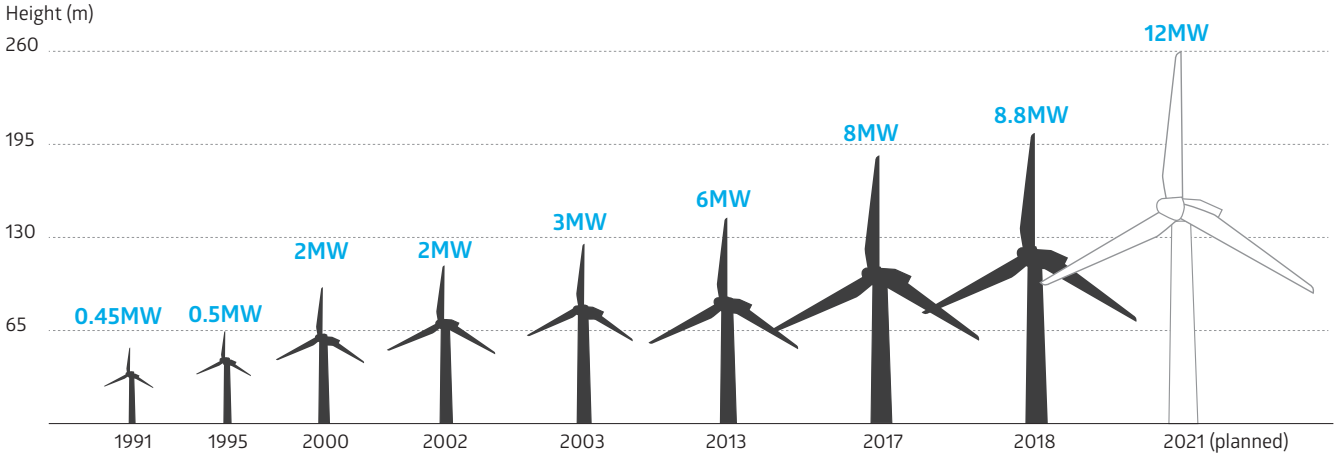
The capabilities of solar energy have also grown significantly in recent years, driven by dramatic reductions in equipment costs, primarily photovoltaic (PV) solar modules. Further price reductions are expected, and these will lead to continued growth of PV solar, both in large-scale solar farms and small-scale installations.

As the costs of both renewable energy and battery storage continue to fall, renewable generation combined with storage systems will offer an increasingly economical and flexible source of electricity. The intermittent nature of renewable energy means that flexible, dispatchable forms of generation along with battery and other storage technologies will play a critical role in enabling the continued expansion of renewable energy.

Millions of new players, in the form of homes, businesses and communities, are entering the energy economy as renewable energy creates more of a decentralised power generation business model. Increased environmental awareness among consumers has encouraged us to place extra focus on retail services related to energy efficiency and electric vehicle charging. Commercial opportunities have arisen for the provision of low-carbon energy as well as for more collaboration, particularly between information and communications technology equipment suppliers and utilities.

In response to these changes, we are going beyond low-carbon generation to include broader investments in innovative projects and propagating new technologies within the energy economy in fields including transmission and distribution, electric vehicle charging and smart energy services.

Evolution of offshore wind turbine heights and output



Note: The data on the largest offshore wind turbines installed or to be installed for commercial deployment at that time are from various sources, including energy consultancies and releases from turbine manufacturers and wind farm developers.

Our Context

Regional context and energy security

According to the *IEA's World Energy Outlook 2018*, the number of people worldwide without electricity fell below 1 billion in 2017, with over 120 million people obtaining a power supply for the first time. India announced in 2018 the connection of every village in the country to the grid.

Electricity has been fundamental for lifting millions out of poverty in the Asia-Pacific region, and will continue to play a pivotal role in economic growth and human development. Access to electricity has enabled children to study at home, families to refrigerate food, industries to increase productivity and governments to deliver health care and education.

As economies continue to develop and populations continue to grow in many parts of the region, ensuring reliable and safe access to electricity at affordable rates remains the key to our growth.

In our more developed markets of Hong Kong and Australia, demand growth is generally slower or flat. Decarbonising the generation fleet requires a gradual and carefully-planned transition away from old fossil fuel power plants, ensuring the power supply continues to meet both communities' needs and the expectations of a reliable and affordable electricity supply.

As a provider of an essential service, we must meet the needs of all the communities we serve. As a result, we have calibrated our rate of change and our energy transition ambitions to the needs and aspirations of the key markets where we do business.

Our Climate Action

Aligning with the policies in our markets

Our decarbonisation targets have been set based on local, regional and national government policies in each region where we do business, and also factor in existing technology and anticipated technical developments. These targets seek to guide the development of our business so that we can:

- shoulder our share of the responsibility to mitigate climate change;
- manage the key risks posed to our business by transforming away from carbon-emitting generation; and
- focus on business opportunities and deliver value from low-carbon solutions.

Technology will continue to drive the needed transitions and new policies should emerge to support the objectives of the Paris Agreement. The higher the levels of certainty in policy in any one region, the greater the likelihood of more investment in low-carbon energy infrastructure. Policies that encourage and facilitate investment in high efficiency and state-of-the-art technologies for fossil fuel power plants, new capacity in lower-emitting fuels such as gas, nuclear and renewables, and decentralised generation and storage, would help facilitate the transition in particular.

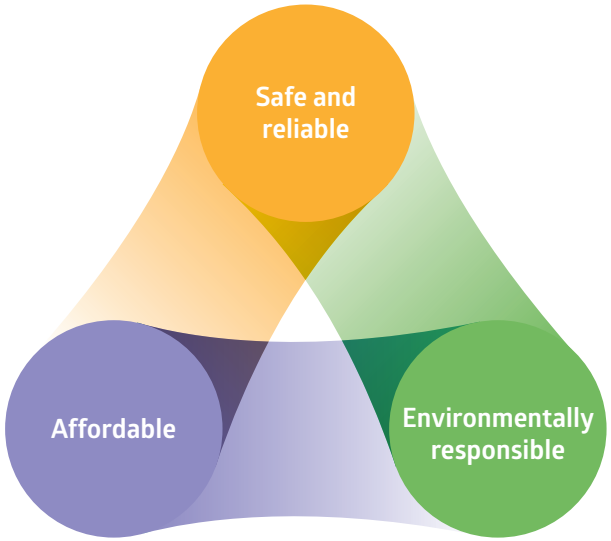
Given the potential for policy changes, our targets are not static. While our 2020 decarbonisation target aligns with the 2°C scenario, our remaining targets for 2030 and beyond do not. We intend to strengthen these targets at least every five years, responding to changes in climate science, technology, and energy policy in relevant territories. We expect the countries where we operate to strengthen their pledges under the Paris Agreement over time. We will continue to calibrate our pace of change with our key markets and we will measure our progress in line with the SDA outlined by the SBTi.

The 2017 review of our climate action targets was based on conservative optimism, and anchored in the reality of the energy market development in the Asia-Pacific region and the technologies available at the time. Reliability, safety, affordability and environmental responsibility are our key consideration factors:

- In Hong Kong, where very high reliability is critical, we need long-term lower-carbon electricity supplies to support smart city economic development and environmental needs;
- In Australia, an orderly transition to lower emissions electricity generation will require stable national and regional policies, and a flexible, well-coordinated energy system to enable and react to a higher penetration of variable supply from renewables;
- In Mainland China, the ongoing reform of the power sector requires continued policy support that enables the growth of renewables and microgrid solutions, and supports better utilisation of the least emission-intensive facilities;
- In India, we must meet the need for new clean energy capacity and a strengthened grid that facilitates the integration of more renewable energy;
- In Southeast Asia, we need new generation capacity to support strong population and economic growth and, over time, a higher penetration of low- or zero-carbon generation assets.

The updated Climate Vision 2050 remains true to our purpose – to provide a reliable and safe electricity supply, in an environmentally responsible way, at a reasonable cost.

Managing our energy supply



Our Climate Action

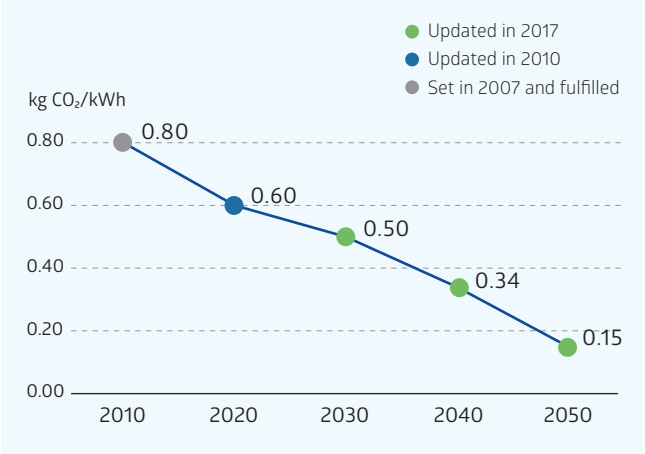
Our updated targets

We revised our targets in 2017 and strengthened our 2050 carbon intensity target in particular to reflect the increasing pace of transition in our key markets and globally. We also created 2030 targets for renewable energy and non-carbon emitting generation in line with the United Nations' Sustainable Development Goals (SDGs) timeframe.

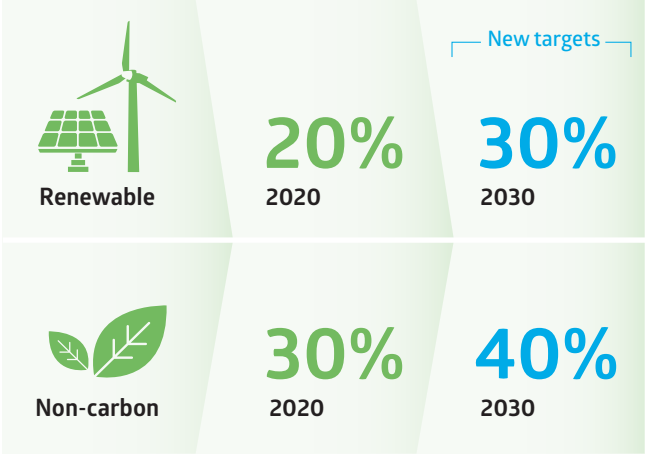
These new targets are ahead of most of our key markets' Nationally Determined Contributions (NDCs) submitted by the relevant governments under the Paris Agreement. They also form part of our commitment towards SDGs, particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

Strengthening CLP's decarbonisation and clean energy targets over time

Decarbonisation Targets
(in terms of carbon intensity)



Clean Energy Targets
(in terms of renewable and non-carbon emitting energy share of CLP's generation portfolio)



Note: The targets are on an equity plus long-term capacity and energy purchase basis.

Decarbonisation Targets

We are keeping our 2020 carbon intensity target of 0.60kg CO_2/kWh. We also introduced new carbon intensity reduction targets for 2030 and 2040 to replace the previous target set for 2035. Furthermore, we tightened our 2050 target to reduce the carbon intensity of our portfolio by 80% from 2007 levels, to 0.15kg CO_2/kWh.

The rate at which we are committed to decarbonising our portfolio is expected to be ahead of the pace of the markets where we operate while being in line with our business plan projections. However, it still falls short of the rate of change required for the beyond 2°C trajectory outlined by SBTi.

Clear government directions and policy certainty are important so that businesses can align their decarbonisation efforts with the developments in individual countries. By strengthening our targets at least every five years, we can take into account the changes in technologies, policies, regulations and market structures, and conditions over time.

Clean Energy Targets

As part of the updated Climate Vision 2050, we established a new renewable energy capacity target of 30% and a new non-carbon emitting capacity target of 40% by 2030. The 2020 targets that were set by CLP in 2010 will remain challenging for us to meet due to lower than expected growth in our renewable portfolio in recent years and our new partnership with *Caisse de dépôt et placement du Québec* (CDPQ) with CLP India.

Our Climate Action

Our current generation capacity

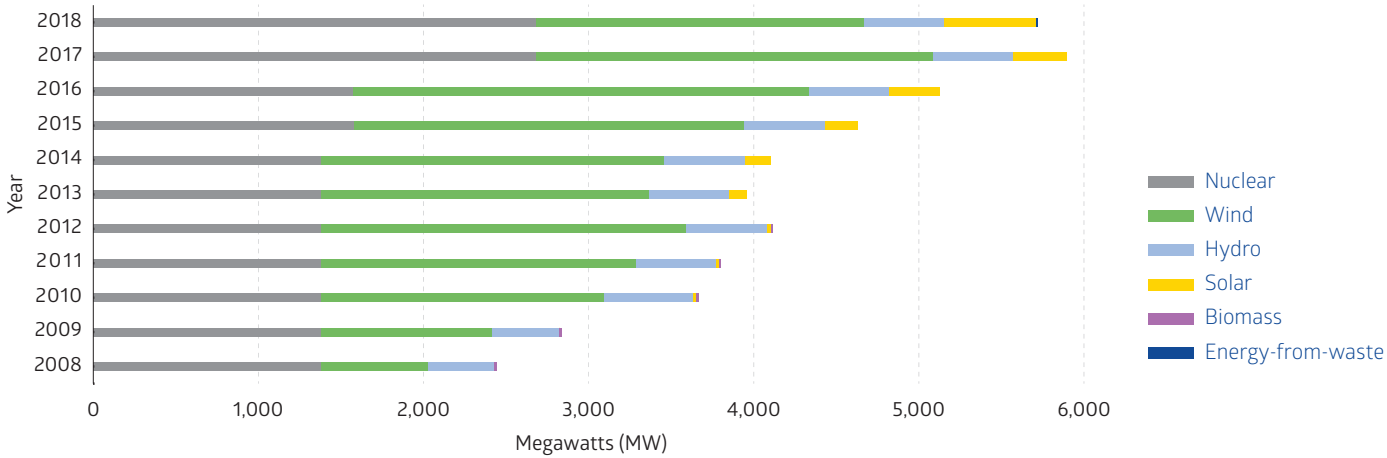
In the past, we grew our renewable portfolio by investing in, and directly constructing, new projects primarily in Mainland China, India and Australia. We have now begun to make capacity purchases of renewable energy and will continue to explore such opportunities where appropriate.

We started building our renewable energy portfolio back in 2004 and, as of 31 December 2018, we had 2,387MW of equity generation capacity and 652MW of long-term capacity and energy purchase in renewable energy. CLP is currently one of the largest foreign direct investors in renewable energy in Mainland China and India.

We also have a long history of developing and operating non-carbon emitting generation capacity which began with our investment in Guangdong Daya Bay Nuclear Power Station in the 1990s. In 2017, we expanded our nuclear portfolio with a 17% equity investment in Yangjiang Nuclear Power Station in Guangdong, China.

The overall share of non-carbon generation capacity decreased in 2018 as compared to 2017, due to CDPQ having taken a 40% equity share in our CLP India business and a recent slowdown in our growth in renewable energy as markets move from being predominantly subsidy driven to experiencing market pricing at large. This may present a challenge in terms of meeting our clean energy targets by 2020, but we are on track to meet our decarbonisation targets.

CLP Group's non-carbon emitting generation capacity



Note: The capacity is on an equity plus long-term capacity and energy purchase basis as of the end of each year.

CLP's progress towards our 2020 targets

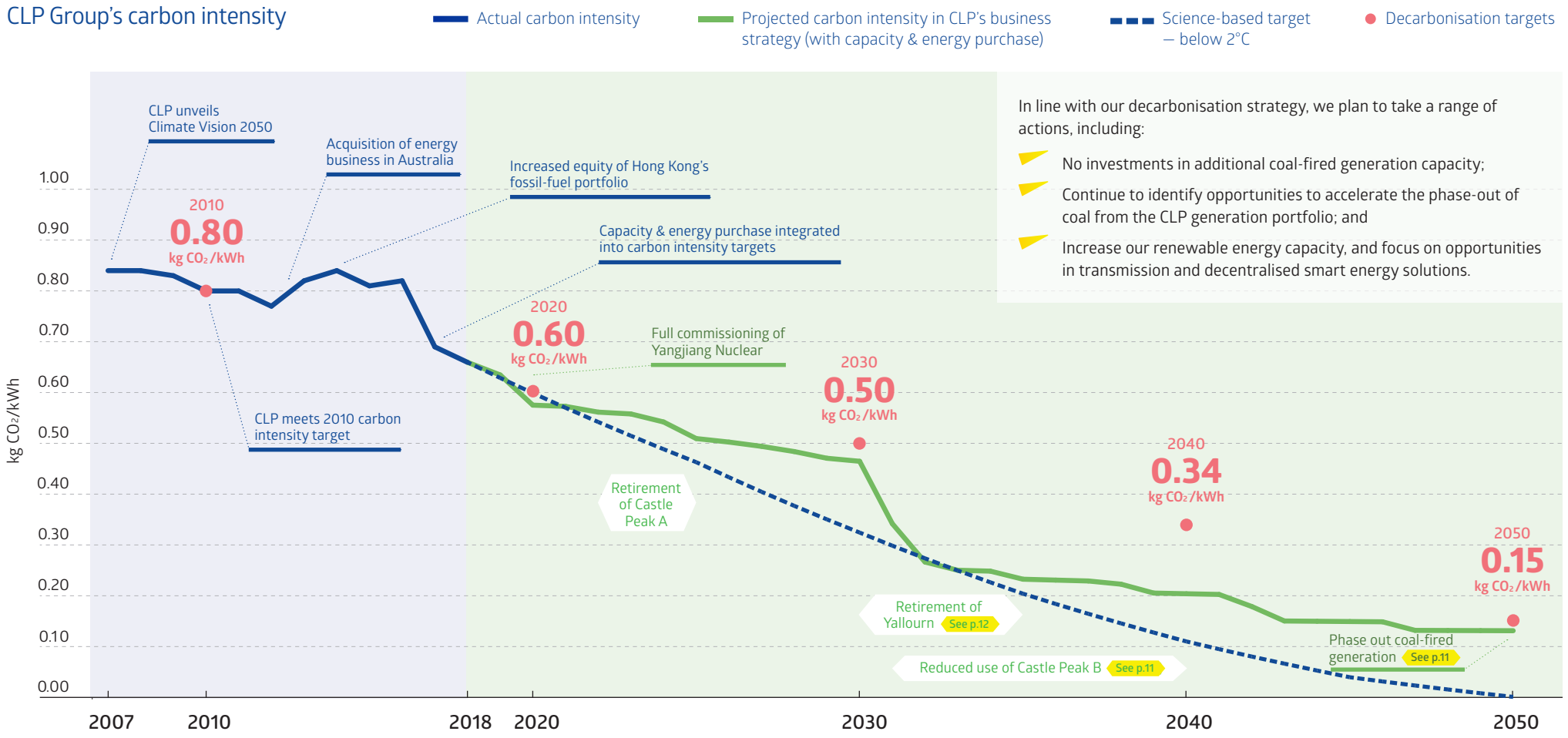
	On an equity plus long-term capacity and energy purchase basis		
	Carbon Intensity	**Renewable Energy Capacity**	**Non-carbon Emitting Energy Capacity**
2018 Performance	0.66kg CO_2/kWh	12.8%	24.1%
2020 Target	**0.60kg CO_2/kWh**	**20%**	**30%**

Our Climate Action

Our past and projected carbon intensity

The trajectory of the CLP Group's projected carbon intensity is in line with our 2018 business plan and long-term decarbonisation strategy.

CLP Group's carbon intensity



Note: The plant retirement timeframes are indicative only.

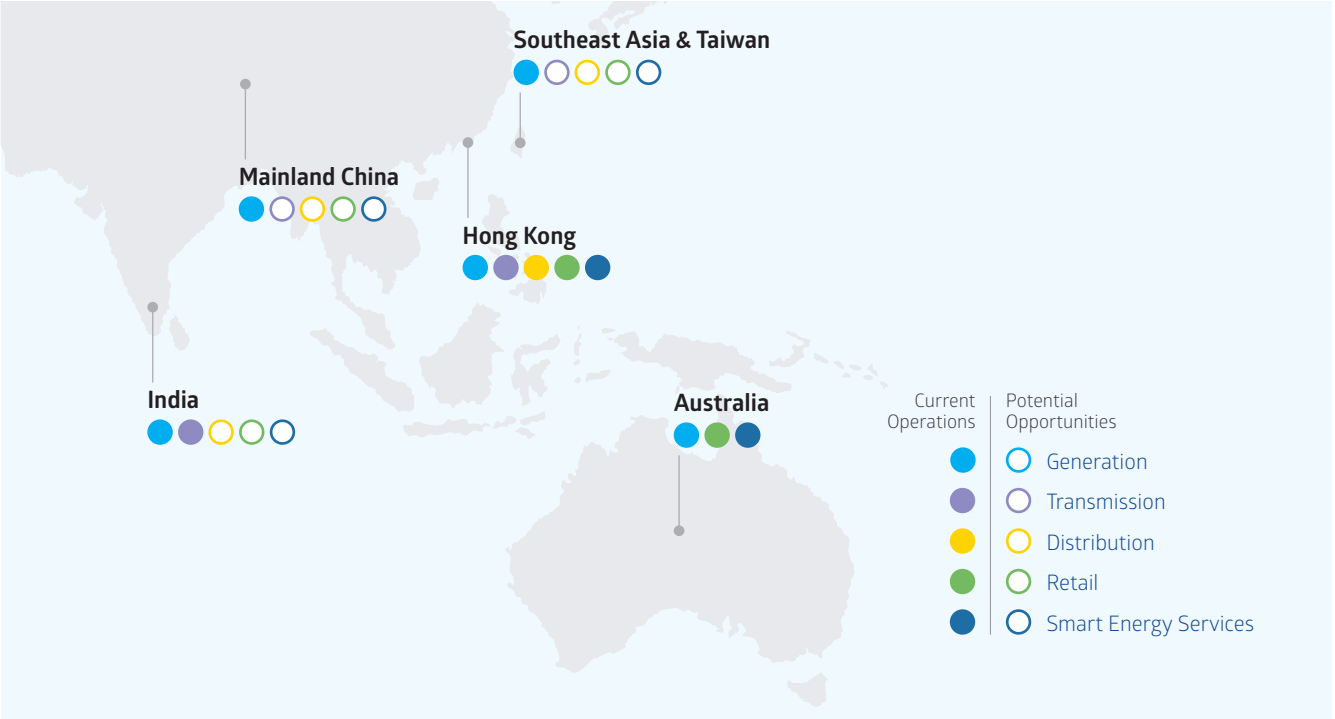
Discover CLP's latest performance in our Sustainability Report.

Moving Forward

We expect new technologies will offer opportunities to accelerate decarbonisation and we will therefore continue with our investment in innovation that has the potential to support our Climate Vision.

As a Group, our products span the entire value chain, from power generation, transmission and distribution, to gas and electricity retail services. Increasingly, this value chain is supported by smart energy services including system balancing, energy storage, and efficient energy solutions. We play different roles across the electricity value chain in different geographies, depending on local constraints and market characteristics. The nature of our business requires that we devise customised strategies and solutions for each of the markets in which we operate.

Around 20% of our revenue comes from coal-based generation. This revenue stream is the focus of our decarbonisation and will be replaced over time by a combination of non-coal-based electricity generation, more transmission and distribution business, as well as earnings from new energy services and opportunities arising from the development of smart energy efficient cities in the region. Given our knowledge and experience, we are confident that we will be able to capitalise on the new energy business opportunities in our region.



Our value chain

Generation
Design, build, operate and invest in power assets; procure adequate and appropriate fuel and energy resources

Transmission
Design, build, operate and enhance transmission networks; facilitate the integration of more clean energy into the grid

Distribution
Design, build and operate distribution networks; integrate distributed energy resources into the grid

Retail
Develop and deploy customer-oriented, technology-enabled energy services

Smart Energy Services
Provide energy efficiency services and promote smart energy use; our services cover the whole value chain

Moving Forward

Our integrated energy retail businesses in Hong Kong and Australia

Hong Kong

Centralised electricity generation will remain necessary for dense and highly populated cities. Gas and nuclear power are currently the only commercially viable and proven lower- or zero-carbon solutions available today that can meet baseload demand and provide security of supply; we will therefore continue to deploy these technologies in Hong Kong as we move away from coal power.

The Government has set a target to increase the amount of gas-generated electricity in Hong Kong's fuel mix to 50% gas by 2020, facilitating a further reduction in the use of electricity generated by coal. Hong Kong is on track to achieve this target. Once additional gas-fired generation is in place, we will have greater flexibility to retire coal-fired units. We have already announced plans to close our coal-fired generation units at Castle Peak A Power Station progressively in the mid-2020s. The electricity produced by our final remaining coal-based generation asset in Hong Kong, Castle Peak B, will need to be replaced from the mid-2030s onwards.

In consultation with the Hong Kong Government, we are committed to facilitating the decarbonisation of the power system in Hong Kong. The Hong Kong Government is undertaking a review of its Long-term Decarbonisation Strategy, which will ultimately lead to the setting of carbon reduction targets through to 2050. A key aspect of this strategy will be the approach to decarbonisation of electricity generation. We are working closely with the Government on this important initiative. Our Climate Vision 2050 targets are based on the Government's current policies for carbon reduction. We may therefore be able to further strengthen our decarbonisation targets depending on the outcome of the review and any new policies that are implemented.

Reduced use of Castle Peak B

Powering Hong Kong's growth

When Hong Kong grew rapidly as a manufacturing hub and developed a financial centre in the 1980s, Castle Peak Power Station was built in response to the increase in the city's electricity demand, shifting the city's primary fuel from oil to coal.

The station currently has four 350MW coal-fired units, grouped together as Castle Peak A, and another four 677MW units, making up Castle Peak B. It has been a key generating asset for the Hong Kong economy for over 30 years, providing reasonably priced electricity. With emissions control measures in place, the stations' overall environmental performance has improved over time. The Group's carbon intensity is expected to reduce further when the plant is gradually retired and alternative lower carbon supply is confirmed for Hong Kong.

Phase out coal-fired generation

Lower-carbon gas generation provides energy security

As CLP moves away from coal in Hong Kong, natural gas is expected to take up an increasingly important role in maintaining the city's energy security.

At Black Point Power Station, CLP will have two new gas-fired power generation units operating. As well as these units, which are more energy and carbon efficient than coal-fired units, we are also constructing an offshore liquefied natural gas terminal that will improve Hong Kong's energy security by securing access to international sources of natural gas.

As part of our business planning to 2050, natural gas continues to be a key part of our fuel mix for Hong Kong, considering the energy security and supply reliability it can offer, the intermittency of renewable energy and the limited availability of natural resources and land required for decentralised generation in a dense and highly populated city. As such, we project that our carbon intensity will be at a low level in 2050 and will remain so until such a time that alternative options for Hong Kong are identified.

Moving Forward

Our integrated energy retail businesses in Hong Kong and Australia

Australia

Our coal-based generation assets in Australia are expected to be gradually phased out over a timeframe that provides for carefully managed transition. Yallourn Power Station will reach the end of its technical life in 2032 and our Mount Piper station in New South Wales is scheduled to be retired around 2043.

In recent years several end of life major coal-fired power stations were progressively retired, without replacement by equivalent new dispatchable capacity. Consequently, Australia's ability to generate reliable power has declined, causing the market to tighten. Today Australia's national energy market is characterised by a fine balance between supply and demand during times of peak electricity consumption. The system's diminished resilience was highlighted in early 2019 by blackouts in southern regions during extreme summer heat. This means, practically, that for now retirement of coal-fired plants should only occur once they are no longer needed to support a reliable and affordable electricity supply.

Our coal-fired power stations in Australia (particularly Yallourn) have a significant impact on the Group's carbon intensity. We will continue to work closely with customers, communities, governments and partners to support the development of stable policies and regulations that assists the transition to a low-carbon, reliable and affordable power supply. Depending on the energy policy landscape in Australia, and the overall development of the generation market, the retirement schedule of our coal-based assets in Australia may accelerate. This would support the decarbonisation of the CLP Group portfolio at a significantly faster pace than currently projected, bringing us closer to our science-based target ambition.

More broadly, EnergyAustralia will continue to invest in measures and projects to support development of a new, modern energy system and help customers as we make the transition to cleaner forms of power. In 2014 we shut Wallerawang coal-fired power station in New South Wales, reducing our annual carbon emissions by around five mega tonnes of CO_2 equivalent. In 2018 we completed a programme to underpin development of 500 megawatts of new wind and solar power across eastern Australia. We have invested in commercial-scale battery projects to help provide stability to the grid and we are participating in a major demand-response programme with our customers. One of our key priorities today is assessing a portfolio of opportunities, including new gas and pumped hydro generation projects, with the potential to provide customers with firm, reliable and flexible capacity when they need it. We think solar and wind energy, demand response, pumped hydro, battery storage and intelligent energy management systems – supported by flexible gas-fired generation – will underpin a new, modern energy system in Australia. The challenge is integrating all those technologies so we get the right balance and mix for a modern energy system – at the least cost to the customer.

Retirement of Yallourn

Powering Victoria and beyond 24/7

Yallourn Power Station in Victoria's Latrobe Valley has the capacity to generate enough electricity every day to supply two million Australian homes. More than 500 people work at the plant and it spends millions of dollars every year with local businesses on goods and services. Closing the plant has the potential to reduce the CLP Group's carbon intensity by around 20% based on current business projections.

Closing Yallourn without careful planning would impact the local community and exacerbate the pressure on an already finely balanced wholesale electricity market.

To support an orderly transition, we plan to run Yallourn to 2032 or as long as policy and regulation permit, and so long as there is not a substantial change in the market. We have promised our workers and the local community that, should things change, and circumstances remain within our control, we will give at least five years' notice before closing Yallourn.

Moving Forward

Our businesses in Mainland China, India, Southeast Asia and Taiwan

Mainland China

As one of Mainland China's largest external independent power producers, we have a diversified generation portfolio based on geography and fuel type. We will continue to grow our renewables and non-carbon emitting energy portfolio. The role of coal will continue to decline over the coming years, as we commit to not building any additional coal-fired generation facilities in Mainland China. Several of our legacy coal minority joint venture investments will come to a natural end.

Digitalisation is playing a key role in the transformation of the power sector, improving the efficiency and reliability of power generation. We are collaborating with, and investing in, the latest innovation as part of our drive to digitalisation across the region and we are exploring further partnerships in integrated energy systems and independent decentralised generation and distribution to deliver more technology-enabled energy solutions in Mainland China. The Guangdong-Hong Kong-Macao Greater Bay Area will be one of the focus regions.

We will continue to grow our renewables and non-carbon emitting portfolio

CLP completed the acquisition of a 17% equity interest in Yangjiang Nuclear Power Co., Ltd. in December 2017 to strengthen its low-carbon investment in Mainland China.

Moving Forward

Our businesses in Mainland China, India, Southeast Asia and Taiwan

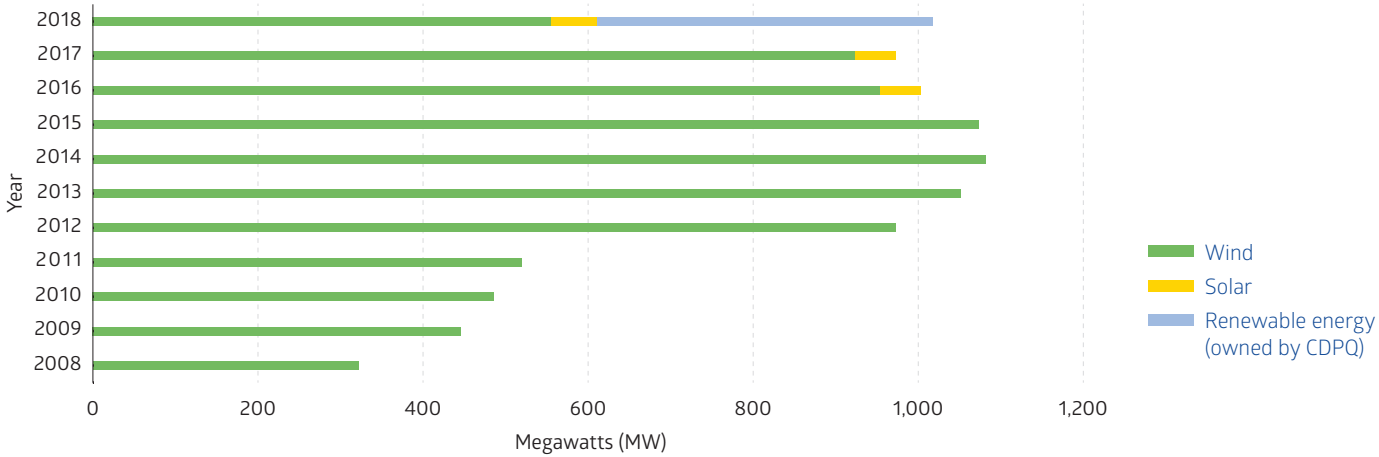
India

We have been investing in renewable energy in India for over a decade and will continue to grow our renewable energy portfolio in the country, particularly in solar and wind energy. We have traditionally been a developer of greenfield utility-scale renewable energy but in order to continue growing our renewable energy portfolio at a fast rate, we have expanded our approach beyond greenfield development to include the acquisition of high-quality renewable energy projects.

In 2018, we announced a strategic partnership with CDPQ, a leading global institutional investor. As part of the partnership agreement, CLP India is committed to expanding investments in low-carbon growth areas including renewable energy investments as well as non-generation business opportunities in transmission, distribution and other customer-focused businesses.

In July 2019, CLP India signed agreements to acquire three transmission projects in India. The successful completion of this transaction will open up a new line of business for CLP India which supports the continued growth of renewable energy into the system in India. The stable earnings that we expect to receive from these investments should also allow us to accelerate efforts to further reduce the carbon intensity of CLP India's business.

CLP India's renewable generation capacity



Note: Caisse de dépôt et placement du Québec (CDPQ) acquired a 40% stake in CLP India in 2018. The generation capacity is on an equity plus long-term capacity and energy purchase basis as of the end of each year.

Moving Forward

Our businesses in Mainland China, India, Southeast Asia and Taiwan

Southeast Asia and Taiwan

The Ho-Ping coal-fired plant in Taiwan, in which CLP owns a 20% shareholding, continues to deliver a stable supply of electricity to the local market. The power purchase agreement is due to expire in 2027. In accordance with the country's Electricity Act of 2017, Ho-Ping will invest in renewables in the coming years.

In Thailand, the Natural Energy Development's solar plant delivers a steady supply of renewable energy to the community in Lopburi province. We will continue to explore options to expand our renewable footprint in the country.

As part of our strategic decision not to add any additional coal-fired generation assets, CLP will focus its efforts in Vietnam on exploring new investment opportunities in renewable generation.

The 63MW Lopburi Solar Farm supplies renewable energy in Thailand.

Moving Forward

Investment in innovation

We are focussed on investing in best-in-class technologies to further decarbonise and digitalise our operations, as well as developing new products and services for our customers. For instance, new technologies to further develop smart grids and energy storage are needed to maintain a reliable electricity supply. Since CLP's innovation team was set up in 2016, we have selected a number of core areas of focus: next-generation renewables, distributed energy, energy management systems, energy storage, microgrids, electric vehicle infrastructure, and insights from data science tools.

In recent years, we have combined our own investments with a number of venture capital funds that invest in new technology and early-stage digital energy companies.

We have also teamed up with start-ups, universities, businesses and organisations on a number of innovative projects. CLP has recently introduced Smart Energy Connect - the combination of an energy app store, a data platform, and a commercial channel - that accelerates the adoption of energy management solutions (EMS), combining localised energy generation and storage, smart devices that can be monitored and controlled remotely, and a suite of computer-aided tools that optimise the performance of the generation and transmission system.

As we build the capabilities needed to transform into a Utility of the Future, we will continue to make targeted investments in innovation.

Utility-scale battery storage in Australia

EnergyAustralia has the largest battery storage portfolio of any retailer in Australia's National Electricity Market as a result of underpinning two first-of-their-kind battery storage projects which reached commercial operation over the 2018-2019 summer. The 30MW/30MWh Ballarat stand-alone Battery Storage System is located at a critical part of the transmission network and provides grid stability services. It can power more than 20,000 homes for an hour of peak demand before being recharged from the grid at night when prices are low. The 25MW/50MWh Gannawarra Battery Storage System is the largest integrated solar farm in Australia, and amongst the largest in the world.

Moving Forward

Collaboration and partnership

To move forward at a faster pace, there is a need to make sure that governments, societies and companies are aligned in their commitments and are collaborating to achieve a low-carbon energy transition.

Changes in our industry are expected to go beyond the traditional boundaries of the utility sector and link with those in other fields such as transportation and real estate. The pace of change and the nature of optimal solutions will vary depending on the socio-political and economic circumstances in different parts of the world. This makes it all the more important for the international momentum on climate change to continue to ensure we move together towards a more sustainable future for the planet and future generations.

Attracting like-minded investors through disclosure

Capital providers are key players in ensuring that climate action is properly funded; it is therefore important that a reliable and consistent climate financial risk assessment is available to investors, lenders, insurers and other stakeholders to support informed decision making.

CLP has therefore been providing information through CDP and is supporting the Financial Stability Board's TCFD recommendations. We have also supported the World Business Council for Sustainable Development (WBCSD) to develop a guidance document for electric utilities on how to respond to TCFD. Such disclosure and transparency demonstrate that we run our business with a long-term view, and are managing both our physical and transition risks in relation to climate change. We are committed to being part of Asia-Pacific's decarbonisation journey, and want to attract and engage with like-minded investors to address one of the world's most pressing challenges.

Our Path to 2050

With the daunting IPCC projections of what it will take to shift to a 1.5°C world, there is much work that needs to be done. We are prepared to address the threats climate change poses both to our business and to the communities that we serve.

As we showcase in this updated Climate Vision 2050, CLP has laid out a transparent trajectory of our own performance against the trajectory required to meet a science-based target. We are committed to no longer investing in any additional coal-fired assets and accelerating our plans to phase out coal-fired generation capacity by 2050 at the latest. We are determined to deliver on our purpose to provide safe, reliable and affordable electricity for customers, and we are fully aware that our environmental responsibility has never been greater. CLP is ready to face this challenge and we will continually raise our ambitions by renewing and, wherever possible, strengthening our targets at least every five years.

All of us need to play our part. Energy efficiency starts at home, and we are proud to provide solutions and services to allow our customers to do just that. Together we can speed up the pace of the energy transition and make a low-carbon world our new future.

Glossary

Baseload	The minimum level of demand on the electrical grid over a span of time.
CDP	CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their climate and environmental impacts. Find out more on https://www.cdp.net/en.
Clean energy	Clean energy generally refers to power sources that add no extra carbon to the atmosphere. Non-carbon emitting energy, including renewable energy, is considered clean energy in CLP's context.
Climate Vision 2050	CLP's Climate Vision 2050 sets out a series of 10-year targets from 2010 to 2050 compared to 2007 levels. These targets are based on the company's generation capacity on an equity plus long-term capacity and energy purchase basis. They consist of decarbonisation targets, measured in terms of the Group's carbon intensity, and clean energy targets, based on the renewable and non-carbon emitting energy share of CLP's generation portfolio.
Decarbonisation	The decarbonisation of the power sector means reducing its carbon emissions from generation. At CLP it is measured by the reduction in the carbon intensity, which is expressed in kilograms of carbon dioxide per kWh of electricity sent out.
Decentralised generation / Distributed generation	Decentralised generation or distributed generation refers to electrical generation and storage performed by a variety of technologies of a smaller scale located close to the load they serve. In contrast, centralised generation is the large-scale generation of electricity serving multi-loads connected to the transmission network.
Dispatchable energy	Dispatchable energy refers to power sources that can be used on demand and dispatched at the request of power grid operators according to market needs.
Generation capacity	Generation capacity is the maximum amount of power that a generator can produce. For the generation capacity on an equity plus long-term capacity and energy purchase basis at CLP, it includes the equity share of capacity of the company's power generation assets or projects and the capacity and energy purchased by CLP to meet customer demand where: (a) the purchase agreement duration is at least five years; and (b) the capacity or energy purchased is no less than 10MW.
Guangdong-Hong Kong-Macao Greater Bay Area	The Guangdong-Hong Kong-Macao Greater Bay Area (Greater Bay Area) comprises the two Special Administrative Regions of Hong Kong and Macao, and the nine municipalities of Guangzhou, Shenzhen, Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen and Zhaoqing in Guangdong Province. The total area is 56 000 km^2 and the total population is over 70 million (as of the end of 2018). Find out more on https://www.bayarea.gov.hk/en/home/index.html.
Intergovernmental Panel on Climate Change (IPCC)	The Intergovernmental Panel on Climate Change is the United Nations body for assessing science related to climate change. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they underpin negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC). Find out more on https://www.ipcc.ch.
International Energy Agency (IEA)	The International Energy Agency is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 30 member countries and beyond. Find out more on https://www.iea.org.
Liquefied natural gas (LNG)	Liquefied natural gas is natural gas that has been cooled to its liquid state for storage or transport. It is then regasified for use including power generation through combined cycle, open cycle or gas-fired steam generators.
National Electricity Market (NEM)	Australia's National Electricity Market commenced operation as a wholesale spot market in December 1998. It interconnects five regional market jurisdictions – Queensland, New South Wales (including the Australian Capital Territory), Victoria, South Australia, and Tasmania. The NEM involves wholesale generation that is transported via high voltage transmission lines from generators to large industrial energy users and to local electricity distributors in each region for delivery to homes and businesses.
Non-carbon emitting energy	Non-carbon emitting energy includes renewable and nuclear energy.

Glossary

Phase out coal-fired generation capacity	In CLP's context, phasing out coal-fired generation capacity refers to (a) the retirement and closure of a coal-fired power asset; (b) the move away from a build-operate-transfer coal-fired project before the end of the contract term or according to the terms of the project; or (c) the divestment from a coal-fired asset.
Photovoltaic (PV) solar technology	Photovoltaic solar technology converts the sun's energy into direct current electricity.
Renewable energy	Renewable energy is energy that is generated from renewable resources, which are naturally replenished on a human timescale, including sunlight, geothermal heat, wind, tides, water, and various forms of biomass.
Science Based Targets initiative (SBTi)	The Science Based Targets initiative is a collaboration between CDP, World Resources Institute (WRI), the World Wide Fund for Nature (WWF), and the United Nations Global Compact (UN Global Compact) and is one of the We Mean Business Coalition commitments. The initiative defines and promotes best practice in science-based target setting, offers resources and guidance to reduce barriers to adoption, and independently assesses and approves companies' targets. Find out more on https://sciencebasedtargets.org.
Sectoral Decarbonisation Approach (SDA)	The Sectoral Decarbonisation Approach of the Science Based Targets initiative allocates a 2°C carbon budget to different sectors. This method takes into account inherent differences among sectors, such as mitigation potential and how fast each sector can grow relative to economic and population growth. Within each sector, companies can derive their science-based emission reduction targets based on their relative contribution to the total sector activity and their carbon intensity relative to the sector's intensity in the base year.
Sustainable Development Goals (SDGs)	The 17 Sustainable Development Goals, adopted by all United Nations Member States in 2015, are the blueprint to achieve a better and more sustainable future for all. Find out more on https://sustainabledevelopment.un.org.
Task Force on Climate-related Financial Disclosures (TCFD)	The Task Force on Climate-Related Financial Disclosures seeks to develop recommendations for voluntary climate-related financial disclosures that are consistent, comparable, reliable, clear, and efficient, and provide decision-useful information to lenders, insurers, and investors. The TCFD's members were chosen by the Financial Stability Board to include both corporates and users of disclosures from across the G20's constituency covering a broad range of economic sectors and financial markets. Find out more on https://www.fsb-tcfd.org.
World Business Council for Sustainable Development (WBCSD)	The World Business Council for Sustainable Development is a CEO-led organisation of over 200 leading businesses and partners working together to accelerate the transition to a sustainable world. Find out more on https://www.wbcsd.org.

Contact Us

We welcome your views on *CLP's Climate Vision 2050: A more sustainable world*.
Should you have any comments or questions, please contact us at groupsustainability@clp.com.hk.

For further information on CLP's energy transition work, check out clpgroup.com/en/sustainability.

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