

2021

Climate-related Disclosures Report

Stock Code: 00002





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1 Executive Summary

With the conclusion of the 26th United Nations Conference of the Parties (COP26) in November 2021, achieving net-zero emission has become a top priority for both the public and private sector alike. Many regions, including markets in which CLP operates, have set targets for carbon neutrality, and have emphasised the pressing need to develop adaptation measures that help mitigate the physical consequences of climate change. Under the Glasgow Climate Pact, developed countries agreed to double their 2019 levels of adaptation finance by 2025¹. The potential for the establishment of a global carbon market, building on the Clean Development Mechanism (CDM), in the near future has fuelled further investment in green finance.

In the energy utility sector, the transition to low carbon generation has accelerated along with the pressure to phase out coal. Transitioning from coal generation to renewable and nuclear assets poses investment risks to electric utilities with legacy assets but failing to do so will be even costlier for the sector in the long-term. Furthermore, the risks posed by extreme weather events on existing infrastructure have resulted in mounting pressure for utilities to set up safeguards to protect critical assets. Recent energy shortages in many countries caused by rising fuel prices have also highlighted the importance of an energy transition that does not compromise the reliability and stability of the electricity grid.

This report is CLP's first standalone Climate-related Disclosures Report. Previous reporting years saw CLP's climate-related financial disclosures integrated as part of CLP's Sustainability Report. With the rising interest in this topic, CLP believes it is timely to outline in one document how the Company is responding to climate change and the impact on its business.

This report adopts the four pillars as recommended by the Task Force for Climate-related Financial Disclosures (TCFD) to provide a consistent structure to facilitate analysis and comparison with disclosures from other companies:

- The **Governance** section describes how climate change issues are integrated into CLP's Corporate Governance system, with oversight from the Board, through senior management to different functional and regional units.
- **Climate-related risks** discusses how climate issues are managed through an integrated enterprise risk management framework. It includes a detailed discussion on the analysis and disclosure of the physical and transition climate risks currently faced by the Company. It also identifies the most material issues and their relevance to different asset types and geographies.
- The **Strategy** section describes CLP's decarbonisation commitment and roadmap – Climate Vision 2050. It includes CLP's commitment to achieving net-zero emissions throughout its value chain by 2050 and other interim targets. It also provides an assessment of different climate-related opportunities, and how CLP mobilises resources to deliver its strategy. The section further describes the Company's progress in using scenario analysis to evaluate the resilience of CLP's decarbonisation strategy under Climate Vision 2050. Three scenarios – business-as-usual, a well-below 2°C aligned with the Paris Agreement, and a scenario bespoke to CLP's markets – were developed for the purpose.
- The **Metrics and Targets** section includes quantitative targets and metrics that demonstrates CLP's progress in its transition to net-zero.

This report draws on references from the Annual Report and Sustainability Report, and aligns with the TCFD recommendations to facilitate the provision of information for investors and other stakeholders who focus specifically on understanding climate change in the context of CLP's business. The Climate-related Disclosures Prototype developed by the Technical Readiness Working Group, chaired by the IFRS foundation, to provide recommendations to the International Sustainability Standards Board was also considered as part of the preparation of this report.

¹ Glasgow Climate Pact (Advanced unedited version) (13 Nov 2021): https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf



2 Background

GRI reference: 201-2

Increasing demand for climate-related information

Focus and attention on climate change continues to rise and COP26 provided further impetus for action. The climate summit was described as the “Business and Finance COP”² due to significant interest shown and attendance by business leaders taking a more proactive stance in leading climate action beyond regulatory requirements. An array of business initiatives were planned for launch before or during COP26. These included the establishment of the [Glasgow Finance Alliance for Net Zero \(GFANZ\)](#), the [Science-Based Targets initiative’s \(SBTi\)](#) net-zero corporate standard, and a new [International Sustainability Standards Board \(ISSB\)](#) that will develop global reporting standards focused on climate-related risks and opportunities.

Under the Glasgow Climate Pact, developed countries agreed to double their 2019 levels of adaptation finance by 2025³. The potential for the establishment of a global carbon market in the near future, building on the Clean Development Mechanism (CDM), has fuelled further investment in green finance and resulting in increasing demand for climate-related disclosures from the finance community. Prominent investor groups including the [Asia Investor Group on Climate Change \(AIGCC\)](#) and key asset managers including BlackRock and Fidelity are expecting investee companies to apply the TCFD recommendations in their annual accounts.

A number of regulators across the G7 and G20 are mandating the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). Jurisdictions that have announced TCFD-aligned reporting requirements include Brazil, the European Union, Japan, Singapore and the United Kingdom. The Hong Kong Security and Futures Commission has [published](#) its plans to do so in August 2021.

CLP’s disclosure

CLP was an early supporter of the TCFD, committing to communicate with its investors on its decarbonisation progress, as well as general disclosures on how the Company manages carbon risks and opportunities.

Through its annual Sustainability Report, CLP has over the years provided transparent, reliable and consistent climate-related information to its stakeholders, including capital providers. In the last few years, CLP has enhanced its disclosure by following TCFD recommendations. With a strong governance and risk management framework already in place, the focus has been on enhancing climate-related risk assessment and developing bespoke climate scenarios for the markets where the Group is present.

In 2021, CLP has several notable achievements that illustrate its commitment to climate action:

- Committed to achieve net-zero emission by 2050 across the Group. This is supported by interim targets, including a science-based target for 2030, and a solid decarbonisation plan;
- Continual investments in non-carbon generation assets and other transition enablers, including large scale energy storage and transmission and distribution systems;
- Undertaken a thorough assessment across the Group on the resilience of its assets against extreme weather events; and
- Continued to make progress in using scenario analysis to understand its strategy’s resilience.

This year, CLP has produced a standalone Climate-related Disclosures Report to facilitate stakeholders in obtaining climate-related information. The report aligns with the recommendations from the Task Force, and follows the ISSB Climate-related Disclosures Prototype published in November 2021. Links to other CLP publications, in particular the Annual Report, the Sustainability Report and *Climate Vision 2050 (2021 edition): A Net-Zero Future*, are provided where relevant.

When preparing this report, reference was also drawn from the Task Force’s latest publications, including the [Guidance on Scenario Analysis for Non-Financial Companies \(October 2020\)](#), [Annex: Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures \(October 2021\)](#), and [Guidance on Metrics, Targets, and Transition Plans \(October 2021\)](#).

Building on the previous engagement in 2019 at the World Business Council for Sustainable Development (WBCSD) [TCFD Electric Utilities Preparer Forum](#), CLP continues to work with industry peers to advance the sectors’ and its own TCFD disclosure. In 2021, CLP focused on improving its climate risk assessment and reporting, as well as scenario analysis, through the WBCSD Sustainable Energy Supply Project, including the publication of [Evaluating climate-related financial impacts on power utilities \(November 2021\)](#), and the Reference Scenarios Energy Forum.

² Article by KPMG on COP26 reflections: <https://home.kpmg/xx/en/home/insights/2020/06/kpmg-impact/cop26-reflections-implications-for-business.html>

³ Glasgow Climate Pact (Advanced unedited version) (13 Nov 2021): https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf

3 Governance

Sustainability is well integrated into CLP's business strategy and the [CLP Board](#) has overall responsibility for CLP's ESG reporting and sustainability. Climate change issues are a key focus, considering their central role to the Company's strategy. Strong governance ensures that climate change, along with other sustainability issues, is always incorporated into the corporate agenda. Executive remuneration considers a balanced scorecard of measures,

including climate-related performance, as detailed in the [Human Resources & Remuneration Committee Report](#) in the 2021 Annual Report.

The diagram below shows how governance of sustainability is integrated into CLP's corporate governance structure throughout the Group.



As part of overall sustainability management, the Sustainability Committee and the Audit & Risk Committee have separate but complementary roles in climate change management:

The **Sustainability Committee** is chaired by the CEO, who is also a member of the Board. The Committee's responsibilities are to review, endorse and report to the Board on CLP's sustainability frameworks, standards, priorities and goals. It also oversees CLP group-level strategies, policies and practices on sustainability matters to attain those standards and goals. In 2021, the Committee considered climate-related risks and opportunities, developments and outcomes related to COP26, as well as external expectations, when reviewing the Group's updated decarbonisation targets. The revised targets as detailed in Climate Vision 2050 were endorsed by the Committee before approval by the Board.

In 2021, a key focus of the Sustainability Committee's work was overseeing the work on climate change and its impact on the Group's strategy. The Committee held an additional meeting during the year to consider the proposed climate-related targets for CLP. It also spent considerable time in reviewing the draft CLP's Climate Vision 2050 with the

objective of delivering a firm commitment to climate action in a clear and succinct manner.

The Committee had the benefit of a briefing from a leading external expert on the key outcomes of COP26; this covered the international efforts in reducing GHG emissions and the potential opportunities associated with the commitments and pledges at the COP26 and the implications for the corporate sector.

The **Audit and Risk Committee (ARC)** ensures adequate risk management and internal control systems are in place and followed and where deficiencies are found, appropriate remedial actions are taken in a timely manner. The ARC receives and reviews management's periodic internal control reports and the Group's quarterly risk management reports, which includes climate-related risks. The [Risk Management Report in the 2021 Annual Report](#) outlines this process in detail. The ARC also reviews and makes sure the assurance of the sustainability data in the Sustainability Report is appropriate. This includes CLP's GHG profiles and the carbon intensities of its portfolio, which tracks progress towards decarbonisation targets. Read more in the ["Metrics and Targets"](#) section below.



The **Sustainability Executive Committee (SEC)** has the strategic responsibility to assess and manage sustainability issues at the Group level, and convened on six occasions in 2021. The discussion items directly related to climate are listed below. For a full discussion of the work of the SEC in 2021, please refer to the [Sustainability Governance](#) section of the 2021 Sustainability Report.

- Reviewed carbon reduction targets under Climate Vision 2050, and determined the ambition level for the Group;
- Provided direction on climate scenario analysis and development of the financial model in quantifying climate-related risks and opportunities;
- Maintained oversight of the Company's public disclosures on sustainability issues and submission to ESG surveys, including the Annual and Sustainability Reports and CDP – Climate Change and CDP – Water Risks;

- Monitored the implications of local, regional and international climate policy changes to CLP; and
- Reviewed and endorsed CLP's support of carbon reduction initiatives, including the WBCSD Hydrogen Pledge.

The SEC is supported by the Director-led Group Sustainability Department. Amongst other commitments, the department manages the Group's climate change strategy, including managing the Group's GHG inventory, reviewing and reporting on progress on CLP's Climate Vision 2050, TCFD implementation, climate scenario analysis, monitoring changes in climate change regulatory landscapes and assessing the implications of evolving stakeholder expectations related to climate change.



CASE STUDY

CLP's working group on scenario analysis

To help implement TCFD recommendations, CLP established a cross-functional working group to analyse and manage climate risks and opportunities of the Group's key markets under different scenarios.

This working group is coordinated by the Group Sustainability Department with participation from Fleet Management, Renewable Energy, Financial Planning, Risk Management and Investor Relations departments. Other business functions also engaged in the process, including business development and planning, legal and policy, innovation, health, safety and environment (HSE), human resources, and representatives from each business unit.

In 2021, after key scenarios were defined, the working group focused on developing an appropriate methodology to assess the financial impact of the prioritised risks

and opportunities. Extensive engagement with different business units was conducted to incorporate findings from local climate assessments, and to collect baseline data as well as references from past events to help deepen the analysis.

The SEC and the Sustainability Committee were continually engaged in the course of the project, providing critical input for scenario development. They also reviewed and confirmed the materiality of the prioritised risks and opportunities and provided guidance on the financial assessment.

Further engagement will ensure the analysis is consistent with other corporate management processes, especially financial planning and enterprise risk management across different business units. In particular, further financial analysis will optimise between data collection, complexity and utility of the results.

4 Climate-related risks

Risk management

In an ever-changing operating environment, risk management is an integral part of all of CLP's processes, and critical to the Company's long-term growth and sustainability. Risk management is therefore integrated into all CLP business and decision-making processes including strategy formulation, business development, business planning, capital allocation, investment decisions, internal control, and day-to-day operations.

As climate change is one of the most impactful issues for electric utilities, management of the risks it presents is embedded in CLP's risk management process and risk register. CLP identifies, assesses, and manages climate change risks alongside all other types of risk as an integral part of its group-wide Risk Management Framework. The risk management framework at CLP comprises four key elements: Risk Management Philosophy, Risk Appetite, Risk Governance Structure and Risk Management Process.

Recognising the wide-ranging implications of climate change, CLP considers climate change risks a combination of cross-cutting risk drivers of other Group top-tier risks as well as standalone risks. This approach supports the Company's risk management objectives:

- At a **strategic level**, CLP focuses on the identification and management of material risks inherently associated with the pursuit of the Group's strategic and business objectives. In pursuing growth opportunities, CLP aims to optimise risk and return decisions as defined and

quantified through diligent and independent review and challenge processes.

- At an **operational level**, CLP aims to identify, analyse, evaluate, and mitigate operational hazards and risks. Doing so creates a safe, healthy, efficient, and environmentally-friendly workplace for employees and contractors while ensuring public safety and health, minimising environmental impact, and securing asset integrity and adequate insurance.

As with other material risks of the Group, CLP adopts the same set of risk profiling criteria in assessing the climate change risks. They are managed according to CLP's risk governance structure and risk management process, with management oversight and assurance provided to the Board.

[Read more from the 2021 Risk Management Report](#)

Through the risk management process, and supported by deep-dive discussions with representatives from each business unit, CLP has identified the tailored climate-related risks and opportunities relevant to its assets and services across key markets summarised in the table below. This exercise referenced third party energy and climate models to understand the scenarios under which these risks and opportunities may be most significant.

	Risks	Opportunities
Short term (0-1 year)	<ul style="list-style-type: none"> Extreme weather events compromising the integrity of CLP's assets or that of the power system 	<ul style="list-style-type: none"> Developing new business model including energy-as-a-service, or provision of customer-facing solutions Increased demand for transition enablers, including energy storage, and transmission and distribution systems
Medium term (1-5 years)	<ul style="list-style-type: none"> Implementation of low-carbon policies for the power sector, including carbon pricing, or tightened emission standards 	<ul style="list-style-type: none"> Creating new earning streams as other sectors electrify, for example, the development of electric vehicles infrastructure
Medium to long term (5+ years)	<ul style="list-style-type: none"> Potential stranded fossil fuel assets Changes in climate pattern affecting the performance of renewable assets 	<ul style="list-style-type: none"> Growing the non-carbon portfolio to meet increased demand for low carbon electricity



Physical risks

Understanding physical risks

Physical climate risks have the potential to compromise the integrity of CLP's assets or disrupt service delivery. In the last few years, CLP has experienced multiple large-scale extreme weather events, including super typhoons, forest fires, flooding and landslides across different geographies. Such events are expected to occur more frequently because of climate change, with impacts increasing over time.

Weather pattern changes will not be experienced uniformly around the world. Even within the same country, considerable variance is present especially for geographically large countries such as Mainland China, India and Australia. The relevance of different extreme weather events also differs. It is therefore important to assess physical climate risk asset-by-asset.

Evidence suggests that, under the rise in average global temperature of 1.2°C recorded to date, significant climate-related risks are already emerging. In a business-as-usual scenario with a projected average global temperature rise of around 3 to 4°C, physical risks will become more impactful and predominant when compared to other scenarios. Some extreme weather event risks such as super typhoons could have an acute impact, directly damaging physical assets. Meanwhile, the risk of chronic changes in climate patterns may increase the risks of other natural disasters including forest fires, which have broader impacts upon the communities where CLP operates.

The table below summarises the physical risks prioritised for CLP, considering its assets and geographical presence. They are closely linked to the material topic, *Building resilience in a changing climate*, which is discussed in further detail in the Annual and Sustainability Reports.

Risk	Impact	Implications for CLP	Relevance	
			Asset types	CLP's markets
Flooding	Acute; Short-term	<p>Fluvial (river) flooding can result from heavy rainfall on an already waterlogged catchment; coastal flooding occurs under tidal surges, resulting from a combination of high tides and stormy conditions.</p> <p>Coal and gas generation plants requiring water for cooling are most susceptible to flooding as they are located on the coast or near rivers. They are exposed to:</p> <ul style="list-style-type: none"> Health and safety risks to personnel Increased <i>CAPEX</i> as a result of site flooding and water damage to equipment and infrastructure (including turbines, cooling towers, pipelines or buildings) Increased <i>OPEX</i> as a result of additional fuel, labour liability and insurance cost Disruptions to commodity supply due to flooding of access routes Potential reduction in <i>revenue</i> caused by site downtime 	Coal Gas	Hong Kong Mainland China Australia India
Tropical storms	Acute; Short-term	<p>Tropical storms, including cyclones and typhoons, occur across a significant area of CLP's operating regions and drive some of the most impactful climate hazards. This hazard is measured by maximum windspeed.</p> <p>Due to its degree of coverage, transmission and distribution assets are most prone to tropical storms, with the following potential effects:</p> <ul style="list-style-type: none"> Safety risks to personnel Direct damage to infrastructure, or indirectly through falling trees, towers and poles, resulting in possible increased <i>CAPEX</i> associated with severe damage to power lines, transformers and substations <i>OPEX</i> caused by repair works, additional labour and insurance costs 	T&D	Hong Kong Mainland China India



Risk	Impact	Implications for CLP	Relevance	
			Asset types	CLP's markets
Landslides	Acute; Short-term	Landslides can result from heavy rainfall, earthquakes, volcanic activity, or human activity. Only those resulting from heavy rainfall are considered to be climate-related. Areas with landslide hazards are avoided when selecting sites for solar and wind farms. However, landslide risks are at times unavoidable at hydropower sites. These risks include: <ul style="list-style-type: none"> · Health and safety risks to personnel · Damaged infrastructure including dams, reservoirs, water turbines and buildings, resulting in possible <i>CAPEX</i> · <i>OPEX</i> caused by additional labour, liability and insurance costs · Reduction in <i>revenue</i> caused by site down time 	Hydropower sites	Mainland China
Changes in wind speeds impacting wind assets	Chronic; Medium- to long-term	Different changes in wind speed will affect the performance of wind turbines: reduced wind speeds, an ongoing trend in some territories over recent years, may result in reduced load factors, generation sent out and lowered associated revenue. On the other hand, increased wind speed could improve their performance and increase revenue. The changing wind pattern is introducing uncertainty when planning for future investments	Wind	Mainland China India

Managing physical risks to build resilience

Over the years, a range of measures have been implemented in CLP's value chain to help the Company prepare for climate events. Tailored to different geographies, they consider the asset type and location. CLP incorporates climate adaptation measures into its plant design for new build projects, and ensures its systems are resilient to withstand extreme conditions, thereby minimising disruption and facilitating faster recovery for affected communities.

Some of these measures are summarised in the table below:

Relevant part of the value chain	Protection measures
Supply chain	Diversify fuel supply. For instance, Hong Kong's offshore liquefied natural gas terminal would assist CLP Power in diversifying the natural gas supply. Read more in this case study .
Generation	<p>To address extreme heat and increased temperature:</p> <ul style="list-style-type: none"> · Maintain cooling equipment in good condition · Refurbish cooling towers to improve efficiency <p>To address water shortage and drought for thermal plants:</p> <ul style="list-style-type: none"> · Use sea water or recycled water for cooling to mitigate risks from freshwater shortage · Where possible, work with local authorities to construct water transfer pipelines from nearby sources and water treatment facilities to secure water supply <p>To address flooding:</p> <ul style="list-style-type: none"> · Protection walls for coal yards and run-off water storage are in place · Deploy asset-specific anti-flooding measures, including water pumps and piping for water discharge, ground-level drainage systems, sea walls along power station shorelines, flood gates and flood barriers · Implement additional coverage via tarps, grass and tree planting and drainage works to avoid soil erosion · For assets downstream of dams, continually control and monitor river rate flow. Maintain regular communications with local authorities on flood discharge schedule and flowrate <p>To address changing weather patterns:</p> <ul style="list-style-type: none"> · To support investment decisions, a climate model has been commissioned to estimate future performance of wind farm projects · For CLP-operated wind farms, conduct regular wind resources forecast based on latest wind plant performance data · Maintenance of a Bushfire Mitigation Plan in Australia



Relevant part of the value chain	Protection measures
Transmission and distribution	<p>To address extreme heat and increased temperature:</p> <ul style="list-style-type: none"> Have operational guidelines in place that consider operations under high temperatures (of up to 45°C) <p>To address flooding:</p> <ul style="list-style-type: none"> Continue flooding assessment and mitigation measures for new and existing substations. <p>To address tropical storms:</p> <ul style="list-style-type: none"> Continue reinforcement of overhead line structures Strengthen foundations of transmission towers, and stabilisation of nearby slopes Enhance automatic detection and isolation of faulty sections of overhead line circuits and expedite deployment of smart meters in villages. Use smart meter supply interruption data to proactively contact customers and prioritise recovery Enhance vegetation management to minimise risk from overgrown vegetation
Retail	<ul style="list-style-type: none"> Business continuity planning to provide necessary supports to customers directly impacted by extreme weather events Through engagement events, inform customers of initiatives already undertaken to increase system resilience
Condition monitoring and service recovery	<ul style="list-style-type: none"> Install online condition monitoring systems for switchgear and transformers to allow real-time monitoring and detection of incipient fault conditions Enact emergency management procedures and response plans across all operations, and conduct regular drills Establish a typhoon response protocol and coordination system. Conduct regular drills and post-typhoon reviews to ensure smooth execution of contingency plans Utilise the CLP System Control Centre, providing round the clock surveillance of network status, enabling prompt mobilisation during power outages Utilise the emergency restoration system, enabling rapid construction of temporary masts to expedite restoration of power supply Enhance the communication capacity of customer services. In particular, post-incident customer communication for energy transmission outage Establish in-house unmanned aerial vehicle (UAV) teams for post-typhoon surveillance inspection



CASE STUDY

Case Study: Climate Risks and Adaptation Assessments

Assessing and understand risks is the first step in managing them. The uncertainty of changing climate patterns and the long design life of electric utility assets makes management more challenging.

CLP has developed tools to help assess physical climate risks and updated its assessment to better understand asset resilience. In late-2021, a physical climate risk tool was applied during the investment due diligence process of new projects. Using bespoke characteristics related to CLP's asset types and data specific to its operating regions, this tool assesses trends in physical climate from present day to 2080. The screening style assessment will identify possible risks and recommend areas that warrant detailed assessment. Such early identification of physical climate risks to assets promotes effective resilience of those assets.

Across the Group, detailed studies have been conducted to identify actionable adaptation measures. For instance, in 2021 CLP Power updated previously conducted assessments with a comprehensive climate change risk assessment of all its generation, transmission and distribution assets in Hong Kong. The study makes use of updated climate science and industry-leading datasets specific to Hong Kong, including downscaled climate projections throughout the 21st century from the Hong Kong Observatory. A purpose-designed methodology was prepared for the assessment, engaging technical input from across CLP. The generation and network business now has a fully aligned assessment methodology, with a set of focused adaptation measures for effective deployment across assets.



Transition risks

GRI reference: EU5

Understanding transition risks

Policy and regulatory changes and technology are amongst the strongest drivers – and enablers – for decarbonisation. Given the long asset life of electric utilities, it is critical for CLP to continuously engage with stakeholders and understand their expectations. Doing so will ensure transition plans keep up with, or even surpass, the pace of markets where CLP operates, be it related to regulatory changes, market structures, technological developments or public sentiment. Failure to do so would present significant transition risks to the Company.

The table below summarises some of the most material transition risks to CLP. They are closely aligned with the material topic *Responding to evolving regulatory landscapes* detailed in the Annual and Sustainability Reports.

Risk	Impact	Implications for CLP	Relevance	
			Asset types	CLP's markets
Carbon pricing	Short- to medium-term	Carbon pricing is a government tool designed to curb GHG emissions. Of CLP's markets, Mainland China has in place a national Carbon Emissions Trading Scheme, which commenced in July 2021. Carbon allowance allocation is expected to phase-down over time. Implementation of carbon pricing will directly increase the <i>OPEX</i> of thermal assets.	Coal Gas	Mainland China
Decrease in generation output for fossil fuel generation	Short- to medium-term	In 2021, global electricity generation from all renewable sources reached an all-time high of 30% of total electricity. Combined with nuclear power, low-carbon sources of generation have exceeded 2021 output from the world's coal plants ¹ . Coupled with other policies such as carbon pricing and utility-scale energy storage assets, overall output – and <i>revenue</i> – from either coal or gas plants is likely to reduce, especially when renewable energy growth can fill part of the supply gap.	Coal Gas	Hong Kong Mainland China Australia India
Emissions standards for generation assets with emissions intensities above a certain threshold	Medium- to long-term	In some markets, thermal plants continue to serve as base load. In such cases, shifting to gas and/or hydrogen is one potential pathway to reduce carbon intensity. Coal plants, or aged gas plants that cannot be economically retrofitted with hydrogen-compatible equipment, may be forced to be decommissioned earlier, with <i>CAPEX</i> implications. Although hydrogen prices are reducing, it is unlikely to be commercially viable in the short- to medium-term. Unless price parity is reached compared with gas generation, there would be implications on <i>OPEX</i> .	Coal Gas	Hong Kong
Disruption from new market entrants leading to barriers to maintaining market share for generation and electricity retail	Medium- to long-term	The increasing demand for clean energy presents opportunities for investment. The entry barrier for distributed renewable generation and virtual power plants is lower than traditional asset intensive utility investments, encouraging many new market entrants. There is a risk that CLP will be unable to capture these opportunities amidst keen competition. The results could include <i>revenue</i> loss due to an inability to capture opportunities for additional renewable generation, and a loss of customers.	Renewable assets	Mainland China Australia India
Potential stranded fossil fuel assets	Long-term	More governments are accelerating the retirement of fossil fuel assets, and many investors are divesting from fossil fuel assets. The declining demand for electricity generated from these assets may see some become "stranded assets" that will not be fully utilised. Over time, this will result in lowered asset value. Compared to gas, coal is subject to more rapid loss of market value.	Coal Gas	Hong Kong Mainland China Australia India

1 Global Energy Review 2021 – Renewables (<https://www.iea.org/reports/global-energy-review-2021/renewables>)



Monitoring regulatory developments in different markets

CLP is closely monitoring the global climate change policy landscape across markets where it operates. The government policy updates listed below are expected to impact on the operating environment in the near term.

<p>Hong Kong</p>	<p>In Hong Kong, electricity generation, transport and waste together account for 90% of the city's GHG emissions according to the latest publicly available data (2019). The four documents released by the HKSAR government in 2021 – Waste Blueprint for Hong Kong 2035, Hong Kong Roadmap on Popularisation of Electric Vehicles, Clean Air Plan for Hong Kong 2035 and Hong Kong's Climate Action Plan 2050 – together define the roadmap for the city to reach a cleaner environment and carbon neutrality by 2050.</p> <p>Some targets will have a direct implication on CLP Power, including:</p> <ul style="list-style-type: none"> • Cessation of coal use for daily electricity generation by 2035; • Trial of new energy and closer cooperation with neighbouring areas to increase the supply of zero-carbon electricity to 60-70% by 2035; • Public and private sectors to develop RE proactively to increase its share to a target of 7.5-10% by 2035, and an increase to 15% in subsequent years; • Reach net-zero carbon emissions in electricity generation before 2050. <p>Projects are underway to enable CLP Power to decarbonise its electricity supply in Hong Kong, including the Feed-in Tariff Scheme, waste-to-energy generation in West New Territories Landfill, and new gas-fired generation units in Black Point coming into service. CLP Power will apply its expertise in working with the Government and community to deliver a stable and reliable electricity supply solution for the city. Read CLP Power's response here.</p>
<p>Mainland China</p>	<p>During the UN General Assembly in September 2020, China's President Xi Jinping announced that China will aim to peak carbon emissions before 2030 and reach carbon neutrality before 2060. To meet this target, China will accelerate electrification, enlarge the scale of renewable energy, implement major enhancements on abatement technologies, and establish a well-functioning national carbon market.</p> <p>After extensive preparation and trials, trading through the national Carbon Emissions Trading Scheme (ETS) began in July 2021. Power generation is the first sector covered by the Scheme. In its inaugural year, over 2,000 thermal plants totalling more than four billion tons of CO₂ were included, making it the largest carbon market in the world by emissions volume. The covered entities follow an annual procedure of monitoring, reporting, verification and compliance to fulfil their GHG control obligations.</p> <p>CLP's Fangchenggang Power Station successfully completed the first compliance cycle and has fulfilled its requirements and obligations.</p>
<p>Australia</p>	<p>In October 2021, the Federal Government formally committed Australia to a 2050 net-zero target, signalling that development of new technologies will drive this outcome. It also confirmed that its 2030 target under the Paris Accord will remain at 26% to 28% emissions reduction on 2005 levels, as committed in 2015. The government has ruled out introducing a price on carbon.</p> <p>State Governments have continued to advance with ambitious policies and support structures for decarbonisation. All States have separately confirmed targets for reaching net zero GHG emissions by 2050.</p> <p>Notably, New South Wales announced during the first quarter of 2021 its Electricity Infrastructure Investment Roadmap to drive investment in up to 12GW of renewable energy and 2GW of long-duration energy storage over the next decade. The plan will accelerate the design and formation of large-scale renewable energy zones. Also, NSW plans to cut 50% of emissions by 2030 against 2005 levels.</p> <p>In May 2021, the Victorian State Government announced interim GHG emissions reduction targets for 2025 and 2030, as part of its Climate Change Strategy. It is planning further support for new renewable energy assets, has brought forward the construction of a major utility-scale battery, and has announced mechanisms to drive reduced electricity usage reduction through energy efficiency.</p> <p>EnergyAustralia announced its updated Climate Change Statement in September 2021 to highlight its targets and steps to reduce emissions. Download EnergyAustralia's Climate Change Statement here.</p>
<p>India</p>	<p>During COP26, new decarbonisation targets were set by the Prime Minister of India. These targets are:</p> <ul style="list-style-type: none"> • By 2030, non-fossil electricity generation capacity to reach 500GW, and 50% of India's energy requirements to be fulfilled by renewable energy sources; • Reducing 1 billion tonnes of projected emissions from 2021 till 2030; • Lower carbon emissions per GDP by 45% by 2030; and • Achieving net-zero emission by 2070. <p>In line with these commitments, India has initiated stakeholder consultations for the development of a national carbon market. In October 2021, Apraava Energy committed to SBTi's Business Ambition of a well-below 2°C scenario. Apraava Energy is developing a science-based, measurable emissions reduction target that will be validated by SBTi. To set the target, Apraava Energy joined CDP India's SBTi Incubator Programme.</p>

5 Strategy

CLP's Climate Vision 2050

SASB reference: IF-EU-110a.3

Commitment to reach net-zero emissions by 2050

Decarbonisation is one of CLP's main priorities in transitioning to a Utility of the Future. Globally, the collective approach to decarbonisation needs bolder action; CLP acknowledges its responsibility to play a leading role in these efforts. CLP's Climate Vision 2050 sets out the blueprint of the Group's transition to net-zero GHG emissions leading up to mid-century, and firmly embeds climate change mitigation into CLP's business strategy.

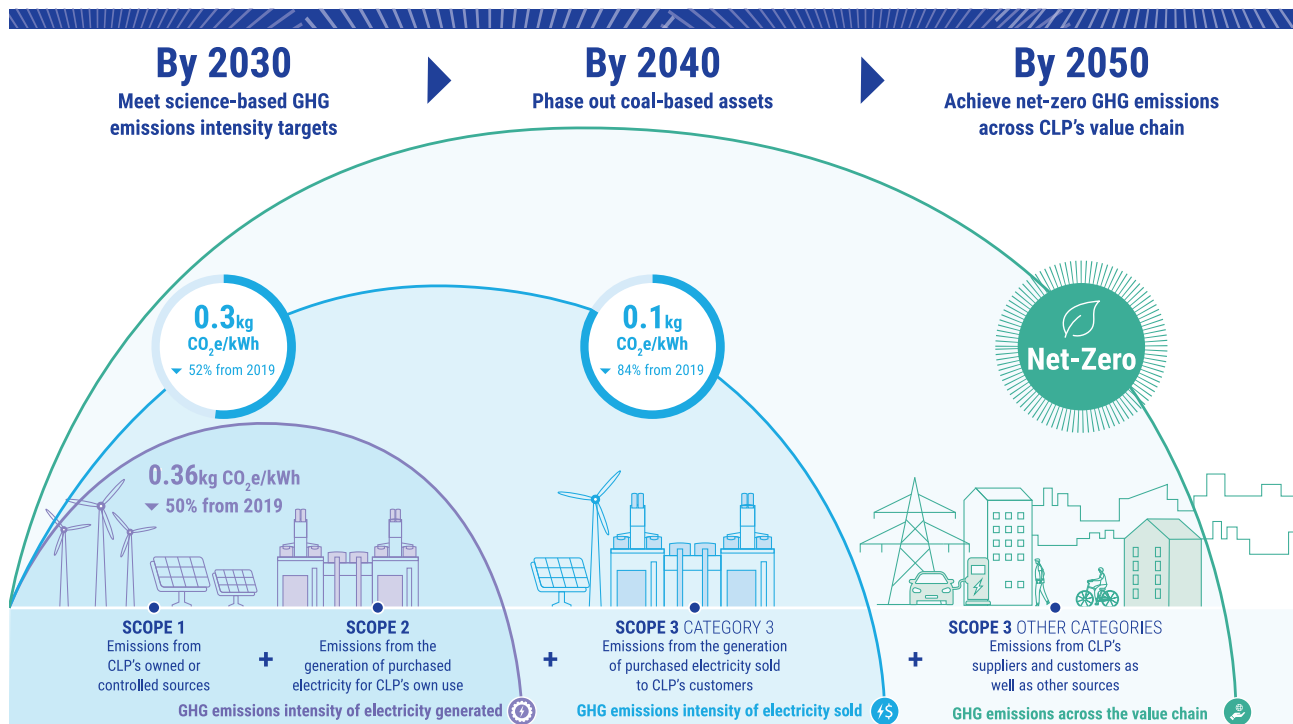
Launched in 2007, Climate Vision 2050 is an integral component of CLP's broader climate strategy, which covers

key considerations around climate adaptation and scenario analysis, among others. It is integrated into CLP's strategies on asset portfolio management, guiding the Group in managing climate-related risks as well as opportunities. CLP's commitments have continually realigned to meet current climate science and industry best practice, as well as growing expectations from stakeholders. The latest version of CLP's Climate Vision 2050 was released in 2021.

[Download CLP's Climate Vision 2050: A Net-Zero Future](#)



CLP's key targets and commitments under the Climate Vision 2050



The commitments under the latest Climate Vision 2050 are:

- **Setting science-based targets for 2030** – CLP has set new interim targets for 2030 to align with the Paris Agreement goal of limiting global warming to well-below 2°C above pre-industrial levels. Using 2019 emissions as a base line, CLP is committed to:

- 52% reduction in the Group's Scope 1, 2 and 3 GHG emissions intensity of electricity sold. The new target of 0.3kg CO₂e/kWh has been considerably strengthened relative to the previous 0.5kg CO₂/kWh.

- 50% reduction in Scope 1 and 2 GHG emissions intensity of electricity generated to 0.36kg CO₂e/kWh.



CLP's Climate Vision 2050

Pursuing opportunities

Allocating resources to support decarbonisation

Assessing the resilience of Climate Vision 2050 using scenario analysis

– 28% reduction in absolute Scope 3 GHG emissions from the combustion of natural gas supplied to customers in line with the SBTi's requirements.

- **Strengthening interim targets for 2040** – CLP has also strengthened its 2040 interim target to lower its Scope 1, 2 and 3 GHG emissions intensity of electricity sold to 0.1kg CO₂e/kWh, greatly reduced from the previous 0.34kg CO₂/kWh.
- CLP will also progressively phase out its coal-based assets by 2040 – a decade earlier than previously pledged. The transition will be accelerated where market conditions allow, acting responsibly and taking a considered approach that limits adverse effects on our communities and on power supply reliability, system security and affordability. At the same time, the

Company's position on ceasing the development of new coal-fired power generation assets within its portfolio is maintained.

- **Reaching net-zero emissions by 2050 across the CLP value chain** – Where unable to reduce emissions by the year 2050, any residual GHG emissions attributable to the CLP Group, covering Scope 1, 2 and 3 emissions, will be addressed through the purchase of accredited offset units. The Company will also follow international standards and industry practices to continually realign its net-zero target with norms of best practice.

CLP will continue to review its targets at least every five years. Reviews will include the latest climate science, policy drivers, technological advancement, industry trends and community expectations.

CLP's decarbonisation trajectory

The foundation of these targets is the trajectory of the Group's carbon intensity, which is in line with its current business plan and long-term decarbonisation strategy. It is demonstrative of CLP's credible approach in target-setting, which is accompanied by a clear roadmap and action plan. Following are the key actions that will help CLP achieve its targets:

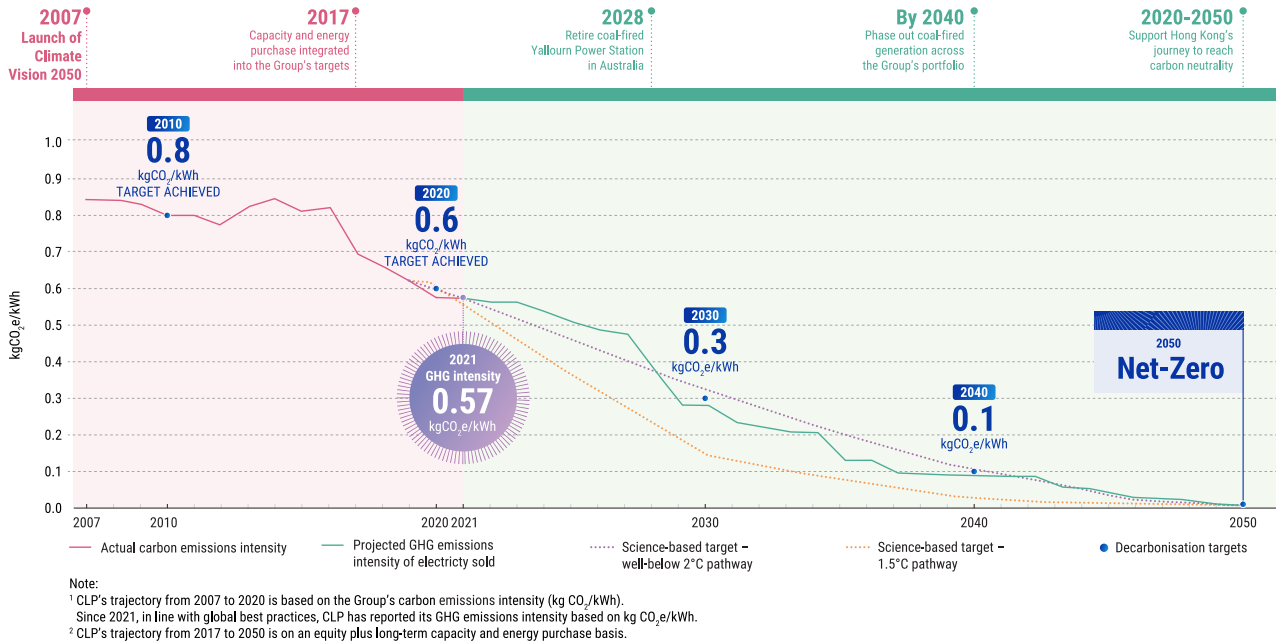
- Phase out of coal power generation at Castle Peak A Power Station in Hong Kong over the next few years, and at Castle Peak B Power Station from the mid-2030s onwards.
- Retirement of the coal-fired Yallourn Power Station in Australia in mid-2028, with the 350 MW Wooreen utility-scale battery to be operational within the region in 2026, and the 300+ MW Tallawarra B power station further north to be operational in 2023. Tallawarra B will be capable of using a blend of green hydrogen and natural gas, with all its direct GHG emissions offset over its operational life.

- New gas-fired generation units in Hong Kong and Australia will shift electricity generation from coal to gas. These facilities are ready to blend in green hydrogen as the technology grows more viable and mature. To accelerate the use and production of hydrogen, in November 2021, CLP became one of the 28 global companies supporting [H2Zero](#), a new global initiative launched by the WBCSD and The Sustainable Markets Initiative.
- In May 2021, construction commenced on the 250 MW Kidston pumped hydroelectricity storage project, which will help bring more renewable electricity to market in Australia's north. EnergyAustralia will be the market operator of the plant under a long-term contract.

CLP's decarbonisation trajectory is mapped alongside the Sectoral Decarbonisation Approach (SDA) trajectory of the Science Based Targets initiative (SBTi). This transparent comparison ensures CLP remains on course to meet its decarbonisation target.



CLP's past and projected GHG emissions intensities



To support the review of CLP's commitments under Climate Vision 2050, the Company has undertaken the following:

- Benchmarked CLP's approach against industry standards. For instance, the trajectory of the GHG intensity of the Group's electricity sold is compared with the SBT's well-below 2°C and 1.5°C pathways, to understand the expected extent of reductions;
- Reviewed business planning assumptions, including an asset retirement plan and electricity sent-out from each generation asset, in updating Climate Vision 2050;

- Conducted a climate change scenario analysis in consideration of climate-related physical and transition risks and opportunities; and
- Identified strengths and opportunities in its efforts to reduce GHG emissions.

A major focus at CLP is to manage the pace of change to strike a balance between financial sustainability, environmental best practice and social responsibility while taking market needs and regulatory changes into account. Careful planning and engagement with authorities, communities and relevant stakeholders will ensure an orderly and just transition.

Pursuing opportunities

Climate change is a key risk driver to businesses, especially to those in the electric utility sector. However, it also presents opportunities in the transition to a low-carbon economy. Development in renewable energy is decentralising electricity generation, whilst deployment of digital technologies opens up previously unavailable opportunities in system management. As energy industry changes continue to accelerate, CLP recognises that the once traditionally linear electricity sector value chain is now an interconnected and multidirectional mesh of opportunities within which the Company needs to evolve.

CLP's strategy in becoming a Utility of the Future is set against such a backdrop: on the one hand, Climate Vision 2050 sets a roadmap for decarbonisation of CLP's generation business; on the other hand, CLP pursues opportunities presented by electrification and digitalisation. Opportunities arise from: increased electricity demand; investment in low-carbon electricity to meet growing demand; and other infrastructures required for grid balancing.

The following table presents a summary of these opportunities. Further discussion on the material topic [Creating new earning streams as other sectors electrify](#) can be found in the Annual Report.



Opportunities	Impact	Implications for CLP	Relevant CLP's markets
Demand for low carbon electricity	Short- to medium-term	<p>Low carbon electricity generation is in demand to meet the growing electricity needs from electrification, and replace carbon-intensive sources of power generation. The short- to medium-term focus will be to expand existing technologies including wind and solar energy, and to bring more renewable energy to market through the use of energy storage (discussed further below).</p> <p>Opportunities arise from increased corporate customer demand for renewable power purchase agreements. Gas-fired generation – and later using hydrogen – as well as nuclear power remain as core options to deliver low carbon electricity and shape the energy transition. While new investments would require <i>CAPEX</i>, the transition will also create new <i>revenue</i> sources.</p>	Hong Kong Mainland China Australia India
Demand for energy storage	Short- to medium-term	<p>Storage solutions are key to addressing the intermittent nature of renewable energy, by catering for peak demand. Utility-scale battery storage in particular – whether standalone or integrated with renewable generation – offers material opportunities to incumbents such as CLP.</p> <p>There will be implications on <i>CAPEX</i> for initial investments, but assets provide <i>revenue</i> throughout design life of the equipment.</p>	Mainland China Australia India
Demand for transmission and distribution infrastructures	Short- to medium-term	<p>Leveraging its current transmission and distribution system presence in the Hong Kong and India market offers growth opportunities for CLP. Additionally, CLP can diversify and grow in the non-generation business.</p> <p>There will be implications on <i>CAPEX</i> for initial investments but <i>revenue</i> will be generated in the long-term.</p>	Hong Kong India
Demand for electric vehicle infrastructures	Short- to medium-term	<p>Technology developments in electric vehicles (EV) is driving down costs and increasing their competitiveness against incumbent, fossil fuel-based technologies. In Hong Kong, the number of registered EVs has more than doubled since 2017, with over 12% of newly registered vehicles being electric in 2021.</p> <p>Infrastructure that supports EV developments is in high demand, including EV chargers, energy services, and other facilities for conversion of commercial fleets to EVs.</p> <p>To capture this opportunity, there will be implications on <i>CAPEX</i>, as well as ongoing <i>OPEX</i> and <i>revenue</i>.</p>	Hong Kong Mainland China (Greater Bay Area)
Higher demand for cooling due to increased summer temperature	Medium- to long-term	<p>Extreme heat events and gradual increases in average annual temperature may increase the demand for electric cooling in spring and summer, particularly in tropical climates. In more temperate climates, cooling demand could increase in warm months, but heating demand may also decrease in winter. Such changes may result in higher peak demand for electricity to power cooling. If an electricity service provider is able to increase its power supply from generation or storage solutions flexibly while prices spike, overall <i>revenue</i> can increase.</p> <p>Conversely, as discussed under physical risks, extreme heat events could also lead to heatwaves and increased risks of wildfire, which can have a broad range of effects on the community and the economy.</p>	Hong Kong Mainland China Australia India



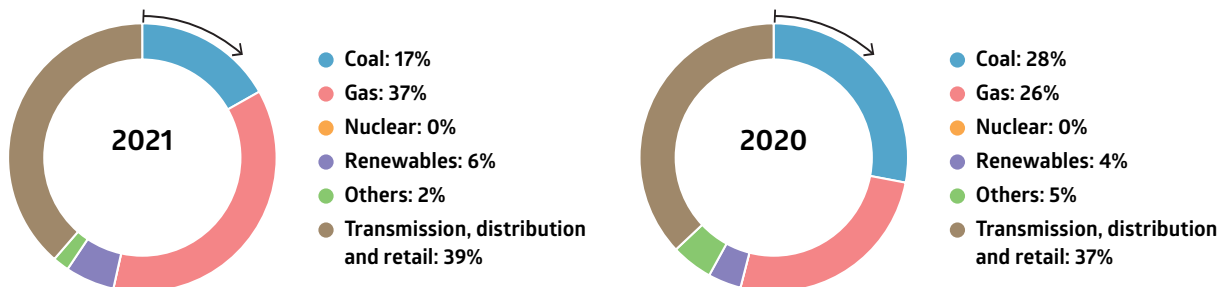
Allocating resources to support decarbonisation

Climate Vision 2050 has been instrumental in informing CLP's business strategy and guiding its investment decision-making. Decarbonising and diversification of CLP's asset portfolio are key approaches to lowering the Group's GHG emissions and reducing reliance on revenue from fossil fuel-based generation. Investing in smart energy systems also presents new opportunities.

The following charts demonstrate how CLP allocates resources to invest in different asset types, and how its generation portfolio has diversified. As a result, its operating earnings are now derived from a broad range of fuel types and non-generation business activities.

Capital investment (on accrual basis) incurred by asset type

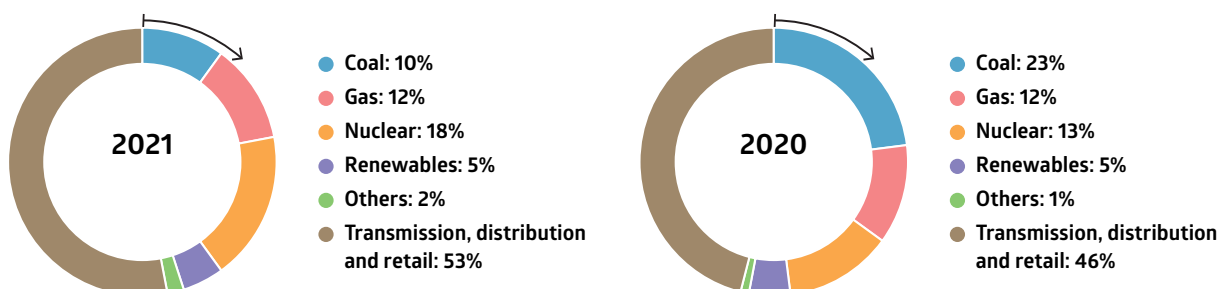
i In 2021, a significant amount of investment has shifted to gas assets, supporting the low-carbon energy transition in Hong Kong and Australia. CLP's portion of capital investment in transmission, distribution and retail remains stable as compared to 2020.



¹ Numbers have been subject to rounding. Any discrepancies between the total shown and the sum of the amounts listed are due to rounding.

Operating earnings (before unallocated expenses) by asset type

i The portion of operating earnings from coal assets decreased significantly in 2021 vs. 2020. At the same time, the portion of operating earnings from non-carbon generation assets increased to 23% and from transmission, distribution and retail-related activity increased to 53%.





CASE STUDY

Climate Action Finance Framework

Adequate resources are required to support CLP's strategy, in particular in decarbonising its portfolio, which often involve capital-intensive infrastructure projects.

CLP's Climate Action Finance Framework (CAFF) was first published in 2017 and further enhanced in 2020. It lays out the Company's methodology in raising Climate Action finance, including bonds, loans and other forms of finance, and detailed proceeds usage of those finance transactions that are consistent with its Climate Vision 2050.

There are two types of Climate Action Finance Transactions under the CAFF:

- **New Energy Finance Transactions** whose use of proceeds is to develop renewable energy, energy efficiency and low emissions transportation infrastructure projects; and
- **Energy Transition Finance Transactions** whose use of proceeds is to fund projects that are supported by the government to deliver valid and significant emission reductions.

Governance of the CAFF aligns with the Green Bond Principles, a set of voluntary guidelines that recommend transparency and disclosure, and promote integrity in the development of the international green bond market. The

four pillars under the CAFF include the use of proceeds, process for project evaluation and selection, management of proceeds and reporting.

Castle Peak Power Company Limited (CAPCO), a key subsidiary of CLP engaging in the electricity generation business in Hong Kong, has entered into a series of Climate Action Finance Transactions since the establishment of CAFF in 2017. These include a total of HK\$17.5 billion of Energy Transition Finance Transactions to fund the construction of the two additional new combined-cycle gas turbine (CCGT) generation units at Black Point Power Station, and the construction of an offshore liquefied natural gas (LNG) receiving terminal in Hong Kong waters and its associated subsea pipeline and gas receiving station, and a HK\$170 million New Energy Bond to fund the construction of a landfill gas renewable energy generation project at West New Territories Landfill. In 2021, CLP Power Hong Kong Limited (CLP Power) also issued a US\$100 million New Energy Bond to finance the rollout of smart meters for its customers in Hong Kong.

[Read more on the CAFF and download the 2021 report](#)





Assessing the resilience of Climate Vision 2050 using scenario analysis

Developing scenarios for analysis

In 2020, the TCFD published the *Guidance on Scenario Analysis for Non-Financial Companies*, which guides CLP's approach. The TCFD recommendations call for businesses to consider their strategic plans against two or more climate scenarios. These scenarios offer differing views of the future

over a typical time horizon of 20 to 30 years. Transition and physical risks impact a company differently, especially over the course of time. CLP has taken steps to consider the resilience of its Climate Vision 2050 against transition and physical risks using the different climate-related scenarios, outlined below.

Scenario 1	Slow, weak transition – Warming of 3-4°C by 2100
Reference	Based on IEA 'Stated Policies Scenario' (STEPS) (2020), and AEMO ISP 2020 Central Scenario for Australia
Description	This scenario assumes implementation of climate-related policies already announced by key governments, which do not pursue decarbonisation with enough speed and force to align with the objectives of the Paris Agreement. Whilst the development and deployment of low carbon technologies is maintained, unabated fossil fuels continue to play a significant role in the power sector across Asia. Physical risks intensify as atmospheric CO ₂ and global temperatures rise.
Example trends¹	<ul style="list-style-type: none"> Emissions continue to rise, peaking after 2040. In Australia, the highest monthly rainfall over a 10-year period decreases by 0.7mm by 2050 compared to historic averages.² In India, the number of extreme hot days with temperatures above 40°C increases by 23 days per year by 2050 compared to historic averages. Renewables have a 47% share of global electricity generation by 2040. Carbon pricing reaches US\$35 per tCO₂ by 2040.³
Transition risks	Slower transition to a low-carbon economy. As a result, transition risks are lower and opportunities are fewer.
Physical risks	Physical risks are highest under this scenario and increase over time.

1 Physical climate event figures averaged across CLP Markets of Hong Kong, Mainland China, Australia and India.

2 Historical average references years 1986 to 2005.

3 Mainland China only.

Scenario 2	Immediate, strong transition – Warming of 1.5-2°C by 2100
Reference	Based on IEA Sustainable Development Scenario (SDS) (2020)
Description	This scenario assumes significant changes in government policy begin immediately, aligned with the objectives of the Paris Agreement. The resulting surge in clean energy policies and investment leads to significant, early deviation from the 2020 base case and a rapid but planned transition towards net zero emission economies across Asia by 2070.
Example trends¹	<ul style="list-style-type: none"> Emissions decline from 33 gigatonnes (Gt) in 2020 to less than 10 Gt by 2050. In Australia, the highest monthly rainfall over a 10-year period increases by 10mm by 2050 compared to historic averages. In India, the number of extreme hot days with temperatures above 40°C increases by 16 days per year by 2050 compared to historic averages. Renewables have a 72% share of global electricity generation by 2040. Carbon pricing reaches US\$125-140 per tCO₂ by 2040.²
Transition risks	Significant transition risks and opportunities arise from rapid electrification of energy consumption, stronger low-carbon policies, and changing markets.
Physical risks	Physical risks are lower, but likely still significant, under this scenario.

1 Physical climate event figures averaged across CLP Markets of Hong Kong, Mainland China, Australia and India.

2 Mainland China only.



Scenario 3	Deferred, disruptive transition – a late or deferred transition from the 3-4°C pathway to the 1.5-2°C pathway occurs, resulting in a warming of 2°C by 2100
Reference	Bespoke for each of CLP's markets, drawing on references used by institutional investors (e.g. UNPRI's Inevitable Policy Response) and central banks (e.g. NGFS climate scenarios 2020).
Description	<p>This scenario assumes deferral of the most significant policy changes until the effects of climate change become more disruptive, forcing governments to urgently revise their climate policies and mandate adoption of low-carbon technologies. This leads to a much more sudden and disruptive transition toward the goals of the Paris Agreement during the 2030s and a greater need for negative emissions technologies after 2050.</p> <p>The GHG emissions trajectory follows the "slow, weak transition", but with a much deeper and sharper reduction as abrupt policy changes come into place.</p> <p>Each of CLP's business units were consulted during the development of this scenario, each providing a plausible decarbonisation pathway based on the most relevant and credible local sources.</p>
Example trends¹	<ul style="list-style-type: none"> • Governments are forced to urgently revise their climate policies. Changes are expected to be more abrupt. • Technology advances in areas such as battery storage and EVs plays an important role in managing the energy system as intermittent supply from renewable sources is more widely adopted. • Government policies may hasten the update of technologies known to accelerate decarbonisation, potentially disrupting the energy system. • Such a scenario could be expected to have disruptive impacts on the operational landscape, making it particularly important to include business resilience testing.
Transition risks	In the short-term, transition risks and opportunities are similar to Scenario 1. Main risks are associated with policy uncertainty and the unpredictable actions of other participants in the market. In the late 2020s to early 2030s, rapid policy changes to mandate sharper emissions reductions leads to far higher transition risks.
Physical risks	Similar physical risk profile to Scenario 1 until 2050, moderating towards the risk profile of Scenario 2 after mid-century.

¹ Physical climate event figures averaged across CLP Markets of Hong Kong, Mainland China, Australia and India.

Assessing risk exposures under different climate scenarios

Focusing on the identified physical and transition risks, CLP has developed a financial model to help understand the financial impacts of these risks on the Company in different time horizons until 2050. The assessment will take into

account different climate patterns, speeds of policy changes, as well as the Company's decarbonisation plan.

The tool needs to be further enhanced using information from past events, and to engage each business unit for trialling and fine-tuning, before further utilising the results for strategic scenario planning.



CASE STUDY

EnergyAustralia's scenario analysis

EnergyAustralia continued to mature its use of risk scenario analysis focused on the specifics of its market.

Within the CLP Group Risk Management governance framework, EnergyAustralia has a robust risk management process in place. Since 2020, that process has explicitly engaged with climate risks including transitional risks relevant to the clean energy transition and the risks arising from operating in the physically changing climate. Climate risks are evaluated, documented, and regularly viewed as top tier business risks, with Executive participation and Board stewardship.

Risk scenarios include higher incidence of bushfire and other major events, consistent with increased incidence

of low frequency, high consequence climate events, and where the transition in electricity generation asset mix occurs faster or slower than the Company plans for, contemplating different levels of policy and regulatory changes and plausible market reactions to such changes.

EnergyAustralia has set a goal to be carbon neutral by 2050.

[Read their statement here.](#)



6 Metrics and Targets

Performance against the Climate Vision 2050 targets

SASB reference: IF-EU-000.D; GRI reference: 305-4, 305-5, EU2, EU10

CLP tracks progress against its Climate Vision 2050 commitments using the carbon intensity of electricity sold – representative of the Company's efforts in decarbonising electricity sold to its customers.

CLP has grown its renewable portfolio by investing in, and directly constructing, new projects primarily in Mainland China, Australia and India. It has significant capacity purchases of renewable energy and will continue to explore such opportunities to provide a low carbon option to customers. Inclusion of purchased electricity, by using an equity plus long-term capacity and energy purchase basis, serves to better represent the Company's investments and decarbonisation efforts.

This approach follows the SBTi guidance for electric utilities, [Setting 1.5°C-aligned science-based targets: Quick start guide for Electric Utilities \(p.12-15\)](#). The guidance outlines how to calculate emissions intensity targets covering all sold

electricity by using the sum of emissions from both electricity generation in the organisational boundary and electricity purchased and sold to customers. This means that in addition to its own direct emissions from generation (on an equity basis), CLP's targets also include emissions from electricity purchased and sold to its customers (Scope 3 Category 3). Performance on an equity basis continues to be disclosed for comparison.

In 2021, the Group's GHG intensity was 0.57 kgCO₂e/kWh, maintained at similar level as 2020. Over the course of the year, CLP's total Scope 1, 2 and 3 GHG emissions increased to 65,017 ktCO₂e on an equity basis. While the generation mix remained stable, higher sent out amid the recovery from the COVID-19 pandemic in part led to an increase in CLP's absolute emissions from 2020, although markedly lower than the 2019 levels.

[Find out more on CLP's portfolio online](#)



Climate Vision 2050	2021	2020	2019	2018	2017
CLP Group – GHG emissions intensity of generation and energy storage portfolio^{1,2,3,4}					
On an equity plus long-term capacity and energy purchase basis (kg CO ₂ e/kWh) ^{5,6}	0.57	0.57	0.63	0.66	0.69 ⁷
On an equity basis (kg CO ₂ e/kWh) ⁸	0.65	0.66	0.71	0.74	0.80 ⁷

1 The 2019-2021 numbers refer to the GHG emissions intensity (kg CO₂e/kWh), in line with the updated Climate Vision 2050 targets. Numbers prior to 2019 refer to carbon emissions intensity (kg CO₂/kWh), as reported in the past.

2 Starting from 2020, the portfolio includes energy storage assets and generation assets. Energy storage assets include pumped storage and battery storage. In previous years, the portfolio included generation assets only.

3 Paguthan Power Station, the power purchase agreements of which expired in December 2018, was not included in the 2019-2021 numbers.

4 In accordance with the Greenhouse Gas Protocol, WE Station, which makes use of landfill gas from waste for power generation, is not included in CLP's Scope 1 CO₂ emissions and is reported separately in the Asset Performance Statistics. Its non-CO₂ GHG emissions (i.e. CH₄ and N₂O) are included in CLP's Scope 1 CO₂e emissions.

5 Numbers include assets with majority and minority shareholdings, and those under "long-term capacity and energy purchase" arrangements with CLP. Starting from 2018, "long-term capacity and energy purchase" has been defined as a purchase agreement with a duration of at least five years, and capacity or energy purchased being no less than 10MW.

6 Numbers include Scope 1, Scope 2 and Scope 3 Category 3 emissions (direct emissions from generation of purchased electricity that is sold to CLP's customers).

7 CO₂e emissions of Yallourn and Hallet Power Stations were used to calculate CO₂e emissions metrics in 2017 due to limited data availability.

8 Numbers include Scope 1 and Scope 2 emissions.



In CLP's home market in Hong Kong, CLP Power's carbon intensity in 2021 also remained stable with a slight increase to 0.39kg CO₂/kWh compared to 0.37kg CO₂/kWh in 2020. The emissions intensity level was affected by a host of

factors, including CLP customers' electricity consumption, the fuel mix for electricity generation and the operational requirements such as regular inspection and maintenance arrangements for the generation units.

CLP Power Hong Kong – GHG emissions intensity of electricity sold ^{1,2}	2021	2020	2019	2018	2017
CO ₂ e emissions intensity of electricity sold by CLP Power Hong Kong (kg CO ₂ e/kWh)	0.39	0.37	0.50	0.51	0.51
CO ₂ emissions intensity of electricity sold by CLP Power Hong Kong (kg CO ₂ /kWh)	0.39	0.37	0.49	0.51	0.50

1 In accordance with the Greenhouse Gas Protocol, WE Station, which makes use of landfill gas from waste for power generation, is not included in CLP's Scope 1 CO₂ emissions and is reported separately in the Asset Performance Statistics. Its non-CO₂ GHG emissions (i.e. CH₄ and N₂O) are included in CLP's Scope 1 CO₂e emissions.

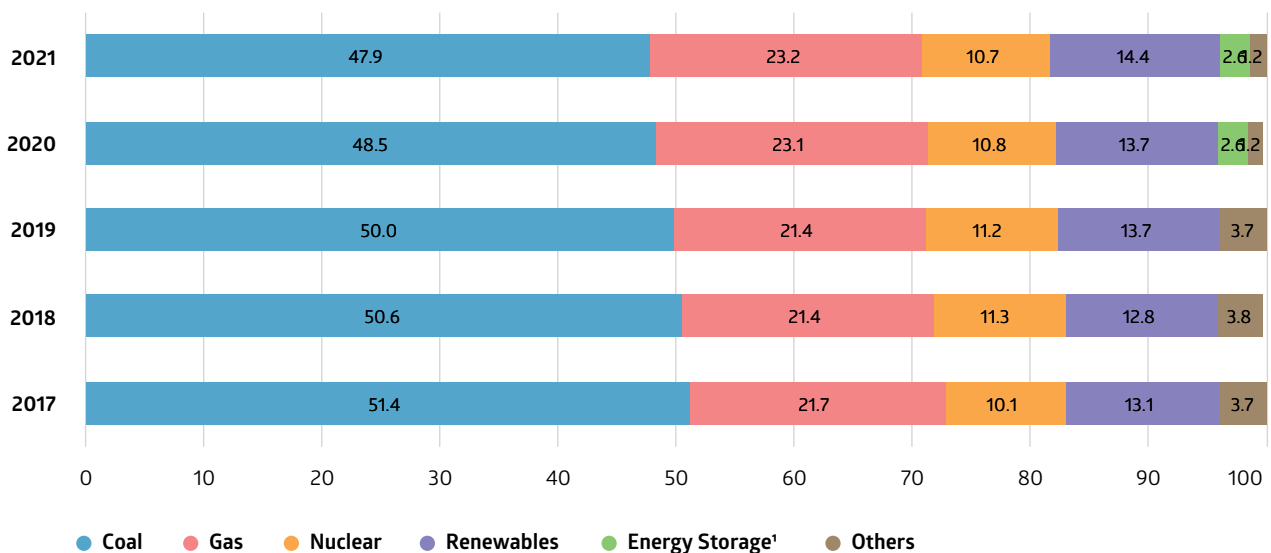
2 "Electricity sold" is the total electricity energy sold to CLP Power Hong Kong's customers before the adjustment of Renewable Energy Certificates.

The following charts demonstrate how CLP diversifies its portfolio, and hence the asset types from which energy is sent out, in the past five years. In the coming years, CLP will continue to focus efforts on progressively phasing out coal for power generation, including honouring its commitment to the early closure of Yalourn Power Station in 2028, to bring itself in line with its decarbonisation targets. It will also seek to widen deployment of renewable energy and keep assessing new energy technologies such as green hydrogen and energy storage solutions in its transition underway.

Generation capacity (on an equity plus long-term capacity and energy purchase basis) by asset type

i The renewable generation capacity in operation and under construction continued to grow in 2021. Renewable generation capacity increased to 2,743MW, supplemented by an additional 881MW of long-term capacity and energy purchase. Together they account for 14.4% of the portfolio.

The portfolio percentages are shown in the graph below.



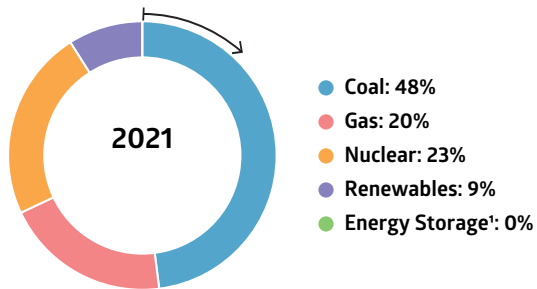
1 Energy storage was categorised under Others prior to 2020.



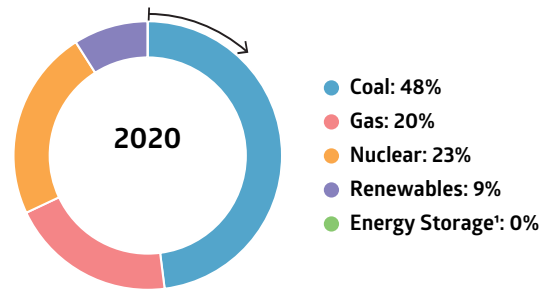
Energy sent out (on an equity plus long-term capacity and energy purchase basis) by asset type



CLP's energy sent out from all asset-type increased in 2021 to meet the increased energy demand. The proportion of generation from different asset types remains relatively stable as compared to 2020.



¹ Energy storage was categorised under Others prior to 2020.



¹ Energy storage was categorised under Others prior to 2020.

Energy sent out (GWh)	2021	2020
Coal	43,995	41,118
Gas	18,461	17,157
Nuclear	20,962	19,923
Renewable	7,841	7,868
Energy Storage	-75	-118
Total	91,183	85,949



CLP's GHG profile

SASB reference: IF-EU-110a.1; GRI reference: 305-1, 305-2, 305-3

Scope 1 and Scope 2 emissions

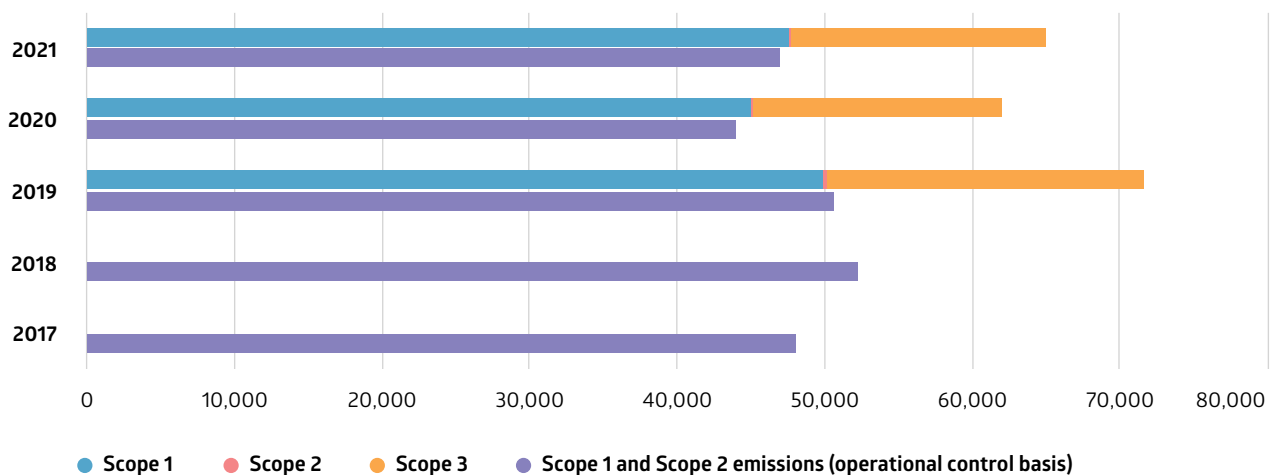
CLP's Scope 1 and Scope 2 GHG emissions are reported on two bases – operational control, and equity plus long-term capacity and energy purchases – to provide a transparent overview of its decarbonisation efforts and progress.

[Find out how CLP's GHG profile is compiled](#)



GHG emissions (equity and operational control bases)

i In 2021, CLP's total Scope 1 and Scope 2 GHG emissions rebounded to 47,926 ktCO₂e on an equity basis, and to 47,090 ktCO₂e on an operational control basis.

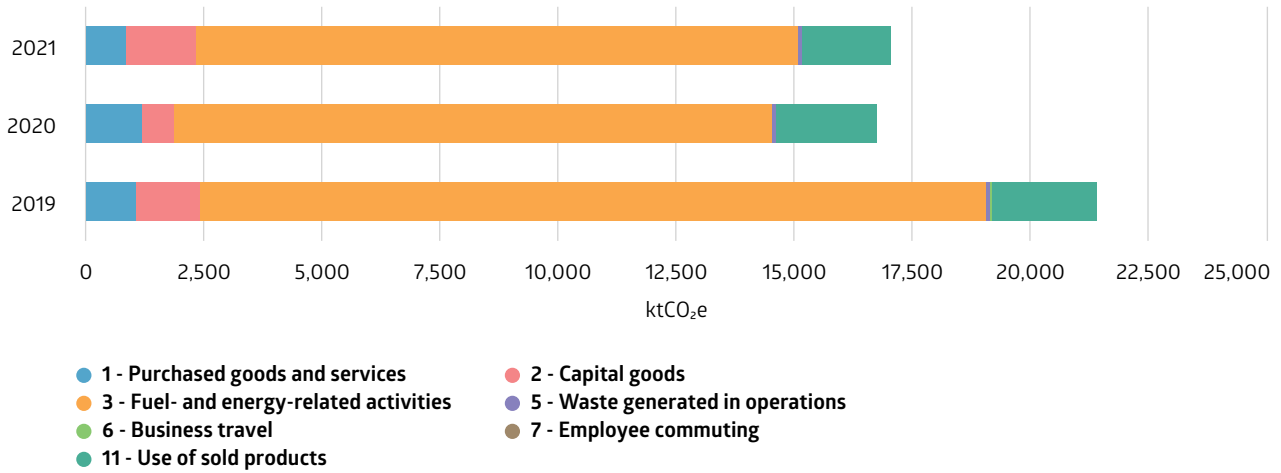


GHG emissions (ktCO ₂ e)	2021	2020	2019	2018	2017
Total emissions (equity basis)	65,017	62,138	71,720	N/A	N/A
· Scope 1	47,690	45,105	50,047	N/A	N/A
· Scope 2	236	244	250	N/A	N/A
· Scope 3	17,091	16,790	21,424	N/A	N/A
Scope 1 and Scope 2 emissions (operational control basis)	47,090	44,023	50,676	52,306	48,082

Scope 3 GHG emissions by category



CLP's Scope 3 GHG emissions in 2021 increased slightly compared to 2020. The increase in total emissions is mainly from Category 2 – Capital goods, due to more construction activities across Hong Kong, Mainland China and India.



Scope 3 GHG emissions by category (kt CO ₂ e)	2021	2020	2019
1 - Purchased goods and services	901	1,210	1,093
2 - Capital goods	1,488	685	1,347
3 - Fuel- and energy-related activities	12,733	12,690	16,671
5 - Waste generated in operations	80	63	101
6 - Business travel	1	1	8
7 - Employee commuting	4	2	4
11 - Use of sold products	1,884	2,138	2,200
Total	17,091	16,790	21,424



Transition enablers

Investment in a broad range of transition enablers is required to transform the energy system. CLP invests in innovative projects, seeding new technologies within the energy economy.

Decarbonisation of the generation portfolio cannot be achieved by replacement of fossil fuel use with non-carbon sources alone. A range of transition enablers is required to transform the energy system. For instance, renewable energy sources must be complemented with energy storage and other technologies to ensure power reliability and accessibility, and development of zero-carbon fuels such as green hydrogen need to be continued. Other examples

include decentralised generation and smart energy services, transmission and distribution systems, battery or alternative energy storage solutions and EV charging facilities. Digital technologies also provide new tools for customers to interface with the energy system.

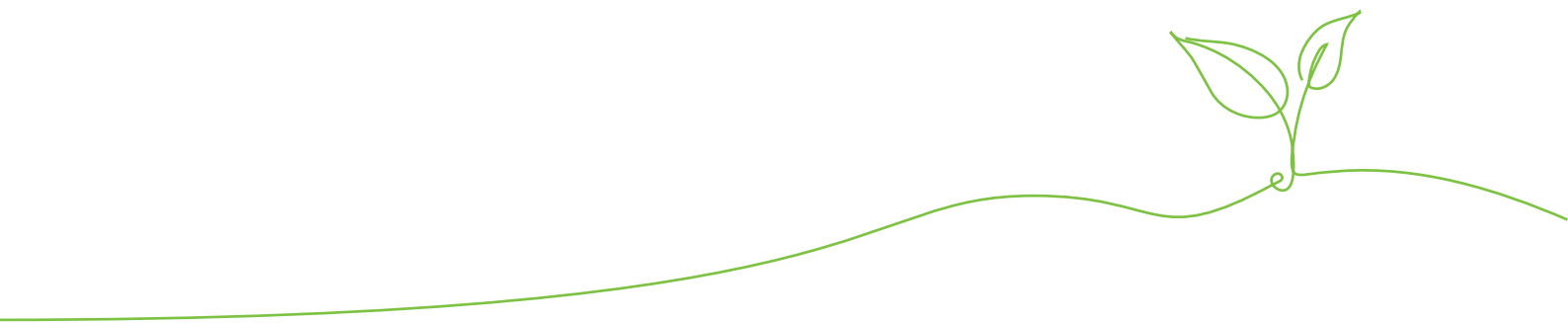
The table below summarises CLP's progress in expanding its investment in these enablers. To leverage the opportunities presented by energy transition, the Company is also providing a range of energy services and solutions to its customers, as detailed in the [Customer section](#) in the Sustainability Report.

Smart meters	<ul style="list-style-type: none"> In Hong Kong, under the seven-year rollout plan approved by the government in 2018, over 1.2 million smart meters have been connected to date, equivalent to a 30% coverage of CLP Power's service area. More details on the mass rollout plan are available here. In the Australian States where CLP operates, over 900,000 EnergyAustralia customers now have smart meters installed.
Decentralised generation	<ul style="list-style-type: none"> The Feed-in Tariff Scheme in Hong Kong has seen a significant increase in interest. By the end of 2021, more than 18,600 applications had been received, of which around 90% (representing a combined capacity of 265MW) have been approved or connected to the grid. EnergyAustralia has over 250,000 business and residential customer accounts with solar panels installed. The Solar Plus Plan is being trialed in New South Wales in Australia, where EnergyAustralia helps customers install solar panel and battery storage at their homes for free, and customers can enjoy a lowered electricity rate during the seven-year commitment period.
Electric vehicle (EV) development	<ul style="list-style-type: none"> In 2019, to demonstrate CLP's commitment to EV development, CLP was the first Hong Kong company to join the global EV100 initiative run by the international non-profit organisation, The Climate Group. Since its launch in November 2021, CLP Power's EcoCharge 2.0 service in Hong Kong has completed preliminary assessment for around 94% of the 451 applications received, covering around 119,000 parking bays. Additionally, more than 360 charging points have been installed at Company premises to support greater EV adoption across CLP operations in Hong Kong. EnergyAustralia EV charging facilities have been expanded to include the Newport Power Station in addition to head office, and the Yallourn and Mount Piper Power Stations.
Demand response programmes	<ul style="list-style-type: none"> In Hong Kong, around 1,900 commercial and industrial customers signed up for the <i>CLP Demand Response Programme</i>. Together with residential customers, the total demand reduction reached approximately 105MW. EnergyAustralia's demand response contracted capacity now stands at over 157MW. This includes more than 360,000 household customers in the EnergyAustralia PowerResponse Programme. These demand response programmes help smooth the transition by lowering peak demand across the energy system, reducing the need to construct additional generation assets.
Customer solution sales	<ul style="list-style-type: none"> EnergyAustralia has over 250,000 business and residential customer accounts with solar panels installed. CLP expanded its range of smart technologies and helped more businesses achieve energy efficiency improvements through the Smart Energy Connect (SEC) digital platform, where sales of smart energy technologies increased by 92% year-on-year, enabling more businesses and organisations to achieve impressive energy efficiency improvements.
Transmission and distribution infrastructure	<ul style="list-style-type: none"> In December 2021, Apraava Energy successfully received 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. This is Apraava Energy's second transmission asset, following acquisition of Satpura Transco Private Limited in 2019. Enhancement to the Clean Energy Transmission System connecting the CLP grid to Guangdong is planned by 2025. The system will improve accessibility to zero carbon energy resources and help further reduce fossil fuel use in Hong Kong.



Large scale storage

- In 2020, EnergyAustralia executed a binding long-term storage agreement with Genex Power to underpin the 250MW Kidston pumped hydro energy storage facility. Under this 30-year agreement, EnergyAustralia controls the market operations of the facility, and holds a right to acquire equity in the project. This facility will be the first of its kind in the National Electricity Market in almost 40 years. With 7.5 hours of storage, this will be a key project for EnergyAustralia to lead the integration of renewable energy into the grid. Construction commenced in May 2021.
 - EnergyAustralia continues to operate the Ballarat and Gannawarra battery storage facilities in Victoria. These facilities have a combined capacity of 55MW and have been operating since the summer of 2018/19, providing peak energy demand and ancillary services.
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