CLP 中電

Together for Sustainability, Powering Tomorrow



2024

Sustainability Report

Stock Code: 00002

How we manage impacts and performance

Our approach

To effectively manage nature-related impacts, risks and performance, CLP utilises various environmental management tools and processes from a life cycle perspective to ensure that nature-related issues are considered at each stage of every project.

The following sections provide details of how CLP manages individual nature-related matters that are deemed material. CLP has developed goals and targets that go beyond regulatory compliance to drive continual improvement, and performance indicators that are monitoring the progress and effectiveness of its nature-related strategies, plans and programmes.

Biodiversity and ecosystem

CLP plays an active role in nature preservation and habitat restoration activities while seeking to mitigate its impacts on nature, including biodiversity and ecosystem services in the vicinity of its operations, contributing to "no net loss of biodiversity". CLP's efforts are based on regulatory biodiversity controls, but it also implements site-specific initiatives and initiates ecological compensation programmes where necessary.

There is no one-size-fits-all approach to managing nature and biodiversity impacts. CLP considers varying factors (such as the location and the level of development in the vicinity of a project) as part of its ongoing efforts in nature and biodiversity conservation and land remediation.

Biodiversity and nature-related enhancement programmes in 2024 included:

- **Aquaculture and fisheries conservation**
  CLP Power supports marine conservation and fisheries enhancement projects through the Marine Conservation Enhancement Fund (MCEF) and the Fisheries Enhancement Fund (FEF) set up by the Hong Kong Offshore LNG Terminal Project in Hong Kong in 2020. By 2024, total funding of HK$100 million had been allocated to support 44 projects under the MCEF and 28 projects under the FEF. Projects funded by the MCEF focus on marine conservation, habitat restoration, rehabilitation, education and ecotourism, while the initiatives supported by the FEF include fisheries education and tourism, enhancement of fisheries resources and sustainable fishery development. A series of project highlights will be published on CLP's social media channel to showcase the achievements of these funded projects, with the aim of raising public awareness and knowledge of marine and fisheries conservation-related issues.
- **Nature-based solution at the Yuen Long Industrial Estate Substation in Hong Kong**
  In Hong Kong, the new Yuen Long Industrial Estate Substation features urban greenery as a nature-based solution to help address climate change. Over 20% of the building area is covered by greenery, with plant species such as Sapium discolor and Millettia pinnata specifically selected for their climate resilience and aesthetic appeal. Situated between the renowned wetland area of Nam Sang Wai and Yuen Long Industrial Estate, the substation was designed with Building Information Modelling (BIM) technologies to provide better integration with the natural landscape. This project was awarded a Provisional Platinum Rating in BEAM Plus New Buildings Version 2.0 certification, and was a winner at the Autodesk Hong Kong BIM Awards 2024.
- **Local vegetation management in Hong Kong**
  CLP Power continues to monitor the growth and condition of trees and other vegetation that may affect overhead line operations using the Predictive Vegetation Management System (PVMS) developed in 2022. At around 210 locations, the PVMS and CLP Power's existing tree inventory have helped CLP Power identify tall trees near its transmission and distribution overhead lines for replacement with native short trees as part of its Tree Replacement Programme. This approach aligns with the Hong Kong Government's 'Right Tree & Right Place' Policy and its Nature Conservation Policy. In 2024, about 85 tonnes of timber logs were delivered to Hong Kong Y-Park for recycling under the Tree Replacement Programme.
- **Habitat restoration programme in Australia**
  EnergyAustralia is committed to nature preservation and habitat restoration in its operation. All its large-scale projects will include a Flora and Fauna Management Plan to maintain local species populations and enhance biodiversity. The Tallawarra B gas-fired Power Station, which began commercial operations in June, developed a detailed Fauna and Flora Management Plan with local ecologists and indigenous community groups. This plan includes an offset programme for minor clearing, serving as an example of no net loss of biodiversity. In preparation for the retirement of Yallourn Power Station and its coal mine, a transformation project was initiated involving rehabilitation and remediation. In 2024, the focus was on assessing potential remediation sites within the boundary to identify associated nature-related risks and opportunities.
- **Biodiversity conservation in the Jiangbian Hydro Power Station**
  At the Jiangbian Hydro Power Station, various fish species are released annually to maintain the ecological balance of the river. The fish release activity for 2024 was completed in November. Furthermore, CLP China restricts ecological discharges at its hydro power stations during both construction and operation phases, adhering to local environmental protection authority requirements and the mitigation measures stipulated in the EIA report. This practice supports the healthy growth and reproduction of aquatic organisms downstream of the dams.
- **Promotion of awareness of nature and biodiversity**
  CLP is dedicated to promoting environmental protection and nature conservation across its locations of operation. CLP China engages with communities and local governments in different regions during World

Environment Day and other national environmental events. In 2024, a series of planting activities were organised across different CLP China sub-regions, in which thousands of diversified trees and flowering plants, such as fruit trees, willows and bamboos, were planted. Planting within the power stations is also encouraged.

In Hong Kong, eco-tours are arranged annually to enhance the awareness of nature and biodiversity conservation of local staff. For example, a guided tour of the Fung Yuen Butterfly Reserve is held each year to increase staff's understanding of butterfly ecology and the related conservation efforts in Hong Kong. CLP also sponsors a forest restoration programme conducted by Kadoorie Farm and Botanic Garden (KFBG), and supported staff to participate in the KFBG "Nature Walk & Treasure Hunt" 2024 event, where they learned about nature and biodiversity conservation.

In Australia, EnergyAustralia created a video on the natural aspects of the Lake Lyell project, including the protection of the platypus and its habitat, to raise awareness of nature conservation.

Case Study

Nature conservation and improvement initiatives at CLP China's Xicun Solar Power Station

CLP China is diligently promoting nature conservation, and its teams are working hard to enhance the natural surroundings of their plants.

Located in CLP China's west sub-region, the Xicun Solar Power Station integrates advanced solar technology with smart farming systems, in a unique model where solar panels generate power above while honeysuckle and rose bushes grow below. While generating 160 million kWh annually, the facility also runs a nature conservation programme that improves wild animal habitats, reduces soil erosion and increases farmers' income. The planting programme has been successfully in increasing the number of bird species, such as Lady Amherst's Pheasant, visiting the site over the past three years.



Lady Amherst's Pheasant at Xicun Solar Farm



Honeysuckle and rose bushes grow under the photovoltaic panels

Air emissions

CLP is striving to reduce the air pollutants emitted from its operations while expanding its renewable and nuclear energy portfolio. Achieving further emission reductions from existing fossil fuel power stations remains a high priority.

SASB reference: If-EU-120a.1; GRI reference: 305-7

CLP strives to manage its fuel mix and to apply various mitigation measures to combat climate change and improve the air quality of the regions where it operates.

Coal-fired power plants, such as Yallourn, Mount Piper and Castle Peak Power Stations, are the main contributors to the Group's air emissions and the emissions metrics are largely influenced by these plants' performance. CLP uses a combination of a managed fuel mix and advanced technologies to limit its air emissions.

CLP had set Group-wide medium- and long-term emissions targets for the years 2025 and 2030 to guide further improvements in reducing air emissions of NO_x, SO_2 and PM. The emission targets scope covers all power plants under its operational control.

The 2024 results related to the emission targets and progress are presented in the following table:

Nature metrics	Pollution Reduction	2024 Results	2024 Progress	Target Range by end 2025	Target by end 2030
Emissions (Impact driver)	NO_x emissions	-26%	In line	-20% to -30%	-50%
	SO_2 emissions	-18%	In line	-15% to -20%	-55%
	PM emissions	-16%	In line	-10% to -15%	-90%

In 2024, CLP cut emissions of NO_x, SO_2 and PM by 26%, 18% and 16% respectively compared with the baseline year of 2021, in line with its emission targets and is slightly ahead of the PM emissions target set for 2025.

Following the divestment of a majority stake in the Fangchenggeng coal-fired Power Station in Mainland China, and excluding assets in India, particularly the coal-fired Jhajjar Power Station, overall emissions were significantly reduced. By implementing a strategy of fuel diversification and consistently maintaining the effectiveness of emission control facilities, emissions can be further reduced.

Key initiatives and programmes in 2024 included:

- **Advanced air emission control systems**
  In Hong Kong, the new 600MW Unit D2 combined-cycle gas turbine generation unit went into service at Black Point Power Station in April, further lowering air emissions and providing a lower-carbon electricity supply. This follows the retirement of three of the four coal-fired units at Castle Peak A Power Station, which had a combined capacity of 1,050MW, in 2024.

  In Australia, the new 320MW Tallawarra B gas turbine generation unit went into service at Tallawarra Power Station in June. This plant is designed to run on a mixture of natural gas and hydrogen, thereby lowering emissions and providing a lower-carbon electricity supply. It is also a fast-start peaking generator that provides dispatchable capacity and can respond quickly to changes in power demand, bolstering supply reliability as more renewable energy enters the grid.

- **Upgrade of emissions monitoring systems**
  EnergyAustralia has installed an ambient air monitoring network consisting of three real-time dust monitors placed near the sensitive receivers around the Yallourn Power Station and its mine. The data provided by these monitors enables early detection and proactive management of the point source ambient emissions from both the power station and the mine, thereby improving overall air quality. Besides, installation of the Particulate Matter Continuous Emissions Monitoring System (PM-CEMS) at Mount Piper Power Station is delivering accurate real-time data for better management of the filter bag-house and a reduction in stack dust emissions.

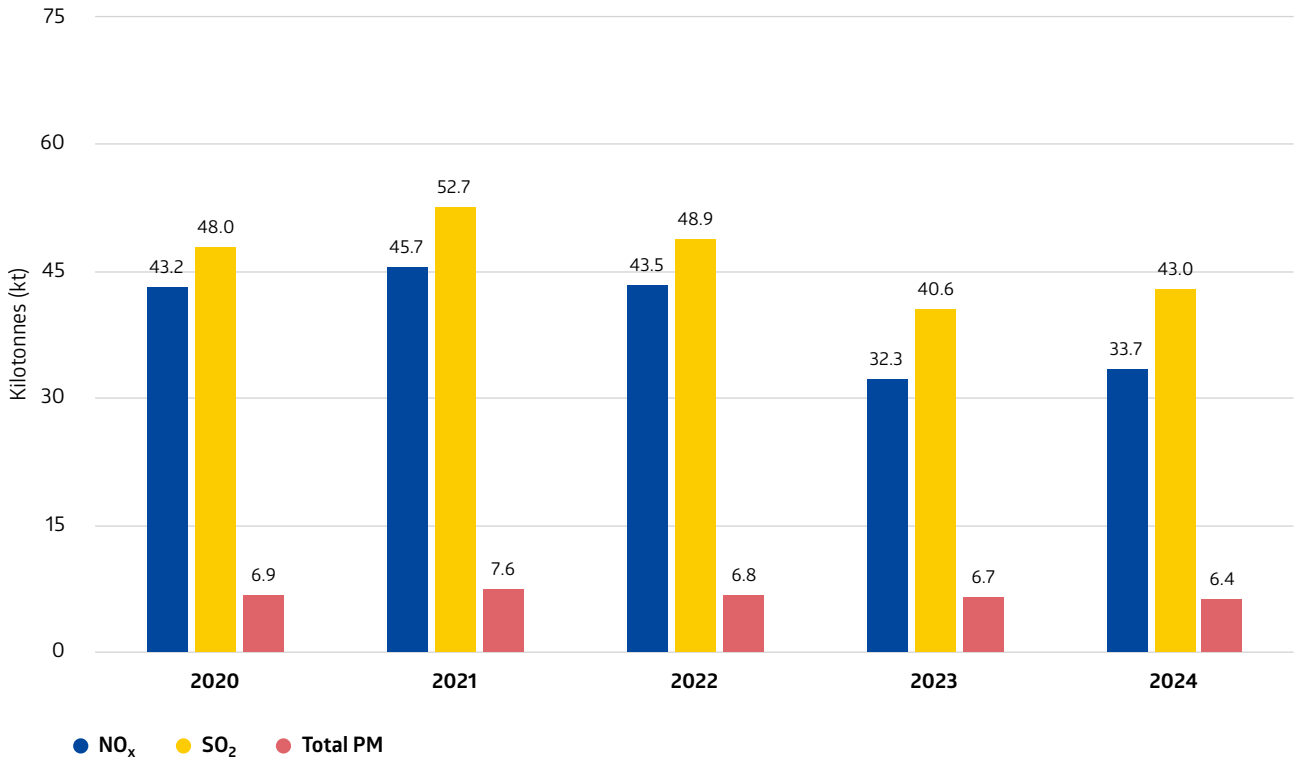
- **Optimisation of Castle Peak Power Station's Selective Catalytic Reduction (SCR) and minimisation of unreacted ammonia slip**
  In 2024, CLP Power conducted a review of Selective Catalytic Reduction (SCR) optimisation at Castle Peak B Station. Based on the review and NO_x removal efficiency test results, ammonia injection was optimised to maximise NO_x reduction efficiency. Following this review, SCR operations were further optimised to maximise NO_x reduction while minimising unreacted ammonia slip. The optimised usage of the SCR catalyst is extending its life and reducing the chemical usage of urea, as well as the generation and disposal of chemical waste.

- **Educating and empowering operators on emissions monitoring and control**
  In 2024, EnergyAustralia introduced a new mandatory environmental awareness training programme for all its employees and major contractors. Customised for each EnergyAustralia site, the training highlights key environmental risks and control measures for staff and contractors. Given air emissions is a key matter for EnergyAustralia's operations, the training aims to enhance the awareness and capabilities of staff and relevant contractors in emissions control, prevent emission exceedances and improve ambient air quality.

- **Control of fugitive GHG emissions from electrical equipment**
  CLP is striving to reduce its SF_6 emissions from high voltage equipment by enhancing operational efficiency, performing maintenance on SF_6 equipment and taking immediate corrective actions against SF_6 leakage due to equipment defects. Following a trial of non-SF_6 gas switchgears at the distribution level in 2023, the first non-SF_6 132kV transmission transformer with bio-degradable insulation fluid was commissioned at a Hong Kong substation in October 2024. The performance of non-SF_6 gas switchgears at both distribution and transmission levels will be reviewed, and CLP will continue to explore measures to reduce SF_6 emissions from electrical equipment and introduce sustainable alternatives.

Group-level air emissions

NO_x and SO_2 emissions increased slightly in 2024 compared to 2023, primarily due to increased generation at Mount Piper Power Station to meet power demand. Particulate matter (PM) emissions decreased slightly due to improved management of PM emission control facilities, supported by the newly installed PM Continuous Emissions Monitoring System (PM-CEMS) at Mount Piper Power Station.



Waste management and material use

CLP is striving to integrate circular economy (CE) principles across its project lifecycles and explore opportunities for minimising materials use and waste disposal. In addition to following a waste management hierarchy (i.e. prevent, reduce, reuse, replace, recycle, treat and dispose) which prioritises preferred actions for minimising waste generation in its daily operations, CLP has continued to promote the implementation of CE concepts in its operations to address waste and pollution matters.

SASB reference: IF-EU-150a.1; GRI reference: 301-2, 306-3, 306-4, 306-5

Guided by its CE strategy, CLP encourages any CE improvement opportunities and promotes the increase of circularity in its operations.

CLP has implemented various measures and initiatives to reduce waste and increase reuse and recycling during electricity generation and other operations.

It recycles its hazardous and non-hazardous solid and liquid waste where feasible and sells by-products such as ash and gypsum for reuse in other industries.

Different assets generate varying types of waste. Fossil fuel plants are the main contributors of waste generated. The amount of waste produced and recycled is not directly related to the amount of electricity sent out, but can be affected by maintenance and construction activities as well as local waste facilities and treatment practices.

CLP set Group-wide medium- and long-term waste targets for the years 2025 and 2030 in terms of a percentage reduction of total waste produced, including by-products produced by the coal-fired power plants, against the base year of 2021. In addition, waste targets for the year 2025 of 100% were set for the recycling of Waste Electrical & Electronic Equipment (WEEE), scrap rechargeable batteries, scrap metals and inert construction waste and for the removal of single-use plastics in catering facilities.

In 2024, total waste products from the Group's operations were reduced by 68% compared with the target-setting baseline year of 2021, slightly ahead of the waste target set for 2025.

The decrease was mainly contributed by the divestment of a majority stake in Fangchenggeng coal-fired power station in Mainland China, the exclusion of India's assets, particularly the coal-fired Jhajjar Power Station, and various waste management initiatives at certain assets.

Coal ash from coal combustion and gypsum from the flue gas desulphurisation process remain CLP's main waste products.

All Waste Electrical and Electronic Equipment (WEEE), scrap rechargeable batteries, scrap metal and inert construction waste were fully recycled in 2024 and single-use plastics in catering facilities were also removed in 2024, based on local regulatory policies and infrastructure available for recycling. Looking ahead, CLP will continue to refine the waste management process and promote the implementation of CE principles as well as explore CE improvement opportunities throughout the project cycle.

The waste target scope covers all operating assets under CLP's operational control. The 2024 results relating to the waste targets and their progress are shown in the following table:

Nature metrics	Pollution Reduction	2024 Results	2024 Progress	Target by end 2025	Target by end 2030
Waste (Impact driver)	Waste products[1]	-68%	In line	-65%	-70%
	Recycling of Waste Electrical & Electronic Equipment (WEEE)	100%	In line	100%	--
	Recycling of rechargeable batteries	100%	In line	100%	--
	Recycling of scrap metal	100%	In line	100%	--
	Recycling of inert construction waste	100%	In line	100%	--
	Removal of single-use plastics in catering facilities	100%	In line	100%	--

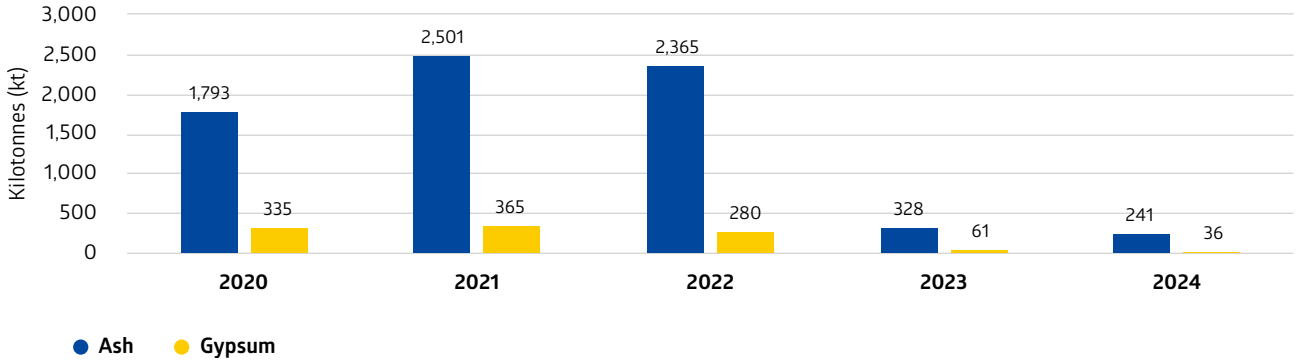
1 Waste products include total waste produced from operation and maintenance activities and by-products produced by the coal-fired power plants

Key programmes and initiatives in 2024 included:

- **Circular use of bottom ash from Mount Piper Power Station**
  Ash is typically the largest waste stream from coal-fired power stations. EnergyAustralia's Mount Piper Power Station is collaborating with an Australian building products company by utilising its bottom ashes to make bricks.
- **Extending the useful life of equipment in solar and wind farms in Mainland China**
  CLP China is embracing circular economy principles in several initiatives aimed at prolonging the lifespan of assets at its solar and wind farms. At Lingyuan and Xicun Solar Farms, spent photovoltaic modules are repurposed for second-life applications, such as power supplies for lighting. At Sihong and Huai'an Solar Farms, enhanced repair approaches are used to maintain existing equipment for extended use, including replacing quick plugs and sockets for solar plant equipment repairs. At Laiwu Wind Farm, information supplied by the Original Equipment Manufacturer (OEM) is being used to identify repairable waste components, such as heaters, pitch electromagnetic brakes and relays, that can extend the equipment's useful life.
- **Providing new uses for end-of-life assets in Mainland China's solar and wind farms**
  CLP China is using circular economy concepts in the recycling of solar panel waste. In 2024, Jinchang, Sihong and Huai'an Solar Farms recycled over 2,500 solar panels. For wind farms, CLP China is collaborating with a leading wind turbine manufacturer and a certified materials company to recover and repurpose retired wind turbine blades in Shandong Region. The resulting fragments are being recycled into new products, including water pipes, manhole covers, park benches, railings, signage and other construction materials, as well as household items.
- **Enhancement of waste management in offices**
  In Hong Kong, a series of awareness campaigns, including promotion booths, green tours, DIY workshops, quizzes and seminars, were held throughout the year to educate staff about circular economy concepts and the importance of source reduction and recycling in Hong Kong. CLP Power also increased the recycling facilities at its offices and rolled out a web-based platform of recycling information for staff. In Australia, a training programme for all corporate office users was run to facilitate better waste management in corporate offices.
- **Local recycling of Waste Lead-Acid Battery (WLAB) in Hong Kong**
  The implementation of circular economy concepts for local Waste Lead-Acid Battery (WLAB) recycling marks a significant environmental advance for CLP Power. Lead-acid batteries are used extensively in vehicles and backup power systems. Previously, these batteries were exported overseas for recycling, generating substantial carbon emissions per tonne of shipped batteries. Collaboration with a local WLAB recycling supplier enabled local recycling in 2024, significantly reducing the related carbon footprint.
- **Adoption of sustainable development principles with circular economy concepts for substation projects**
  CLP Power is adopting circular economy concepts for the construction of transmission substations, to minimise materials use and waste disposal. During the substation construction period, several initiatives are implemented to eliminate, minimise, or reduce waste arising from construction activities. For example, used water is collected and treated for site cleaning, and waste generated at the construction site is sorted for recycling as far as practicable. The steel beams used for excavation and lateral support are also reused or recycled.

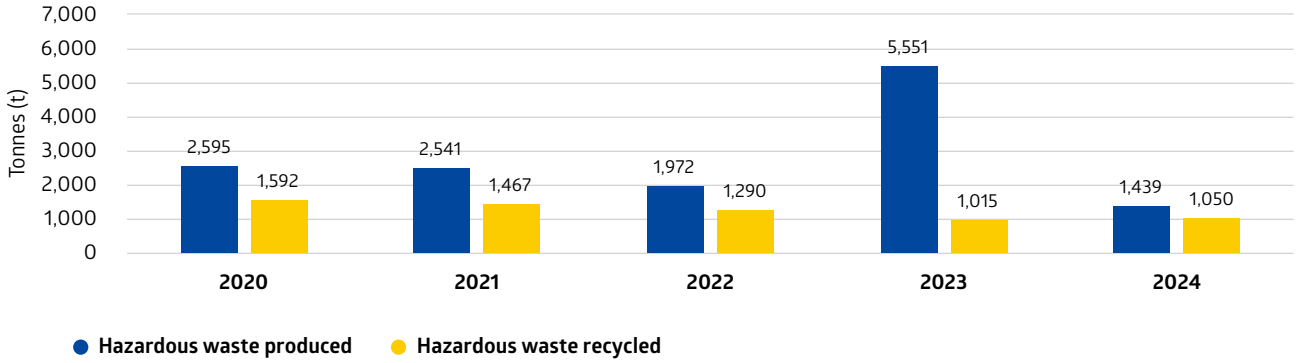
Ash and gypsum by-products recycled or sold

The total amount of ash and gypsum by-products recycled or sold in 2024 decreased compared to 2023. This decrease was due to reduced generation from the coal-fired Castle Peak Power Station, and some gypsum remained in site storage, pending sale for recycling.



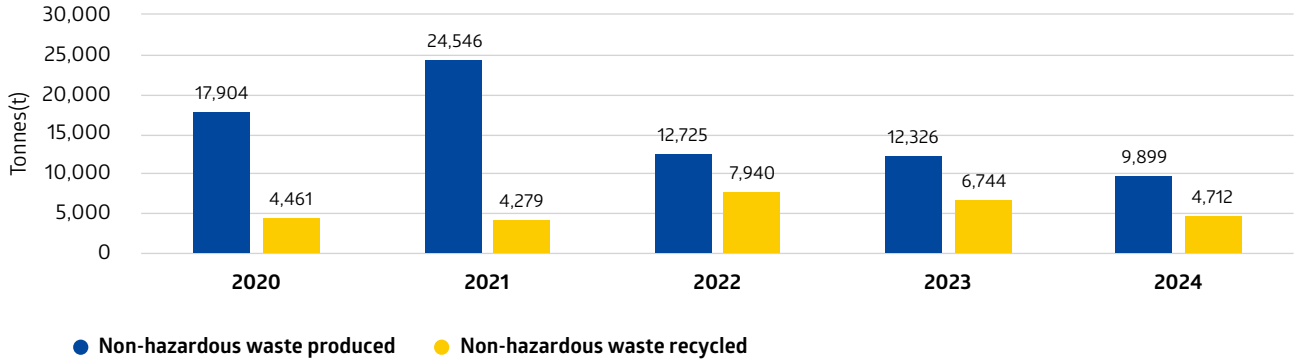
Hazardous waste produced and recycled

The total amount of hazardous waste produced in 2024 decreased compared to 2023, mainly due to a remediation project at Yallourn Power Station in 2023. The recycling amounts between 2023 and 2024 remained comparable.



Non-hazardous waste produced and recycled

The total amount of non-hazardous waste produced and recycled in 2024 decreased compared to 2023, primarily due to reduced waste from Hong Kong's transmission and distribution operations.



Case Study

Adoption of CE principles in Mainland China Wind Farms

CLP China is diligently championing the circular economy and nature conservation through various initiatives.

Reuse and recycling of replaced parts
At Laiwu Wind Farm, knowledge and skills acquired from the Original Equipment Manufacturer (OEM) are being used to identify repairable waste components such as heaters, pitch electromagnetic brakes and relays, extending the equipment's useful life.

Looking ahead, the team will continue to develop a strong technical foundation for unit maintenance to prolong the lifespan of equipment and components, while expanding recycling efforts and increasing the reuse of additional unit components.

Recovery and reuse of retired blades
Laiwu Wind Farm is collaborating with a leading wind turbine manufacturer and a certified materials company to recover and repurpose retired wind turbine blades. The decommissioned blades, along with components such as the blade root and body, will be processed through cutting or shredding and recycled into new products, including water pipes, manhole covers, park benches, railings, signage and other construction materials, as well as household items.

This initiative aligns with CLP's Environmental Policy and CE Strategy. Some research indicates that repurposing a single 24-meter blade can save the equivalent of six trees while simultaneously generating additional employment opportunities in the recycling and manufacturing sectors.





Process of cutting and shredding to recover and repurpose retired wind turbine blades

Water

Recognising the importance of addressing water matters, CLP has been strengthening its water management practices to reduce water usage and wastewater discharge, for example, by employing seawater cooling or water recirculation processes in its generation plants.

HKFRS S2/SASB reference: IF-EU-140a.1; GRI reference: 303-3, 303-4, 303-5

CLP has taken further steps to improve its water management and reduce water discharge-related impacts in its daily operations.

In 2023, CLP reviewed its environmental target-setting process and refined its water targets to reflect the upcoming retirement of CLP's fossil fuel plants. CLP has set Group-wide medium- and long-term freshwater consumption targets for the years 2025 and 2030 in terms of a percentage reduction of freshwater consumption quantities against the base year of 2021. It has set an ambitious freshwater consumption target comprising an absolute reduction of 45% to 55% by 2025, and a reduction of 85% by 2030, using 2021 as the baseline. The freshwater consumption target covers all CLP's operationally controlled assets.

The 2024 results against the Group-wide medium- and long-term freshwater consumption targets are shown in the following table:

Nature metrics	Pollution Reduction	2024 Results	2024 Progress	Target Range by end 2025	Target by end 2030
Water (Dependencies)	Freshwater consumption	-51%	In line	-45 to -55%	-85%

Against the group-wide targets in compared with the baseline year of 2021, CLP reduced the freshwater consumption by 51% in 2024 which was in line with the freshwater consumption target.

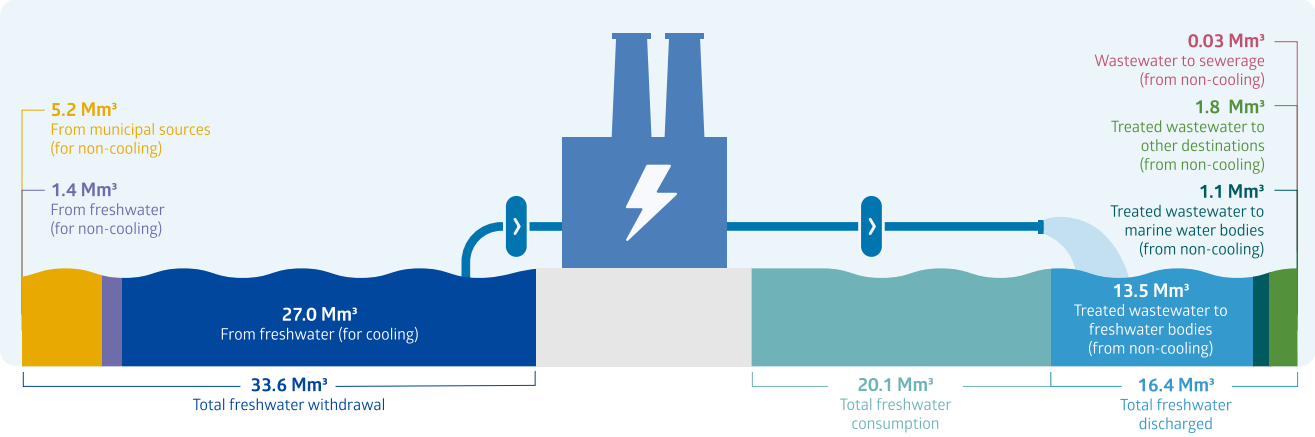
The decrease was mainly contributed by the divestment of a majority stake in Fangchenggeng coal-fired Power Station in Mainland China, the exclusion of India's assets, particularly the coal-fired Jhajjar Power Station and various water conservation initiatives at certain assets.

CLP will continue to track the volume of water recycling in its power stations for continual improvement and share good practices across the Group to maximise the benefit of individual power stations' efforts.

Examples of CLP's water management are summarised below:

- **Enhanced monitoring of process water discharge utilising innovative technology at Castle Peak Power Station**
  Castle Peak Power Station is a coal-fired power plant using once-through seawater cooling. During the cooling process, seawater is returned to the sea, often resulting in floating scum at the cooling water outfall. To control scum formation, the station doses anti-foaming agents, as required by regulation. To effectively monitor the cooling water outfall conditions, an Artificial Intelligence (AI) camera monitoring system has been installed at the station. This system delivers real-time monitoring with video analytics of environmental issues such as scum and floating and sends alerts to operators. This enables timely mitigation measures to be taken, ensuring regulatory compliance, and reduces nuisance for nearby residents.
- **Initiatives for minimising freshwater consumption in CLP's Mainland China renewable energy assets**
  To reduce freshwater use, CLP China has implemented robotic systems in its solar farms for the automatic cleaning of photovoltaic panels. In addition, robotic cleaning systems are also deployed for some wind farms for cleaning of wind turbine towers and blades. The freshwater at the solar and wind power stations is mainly for domestic use and in minimal quantities. Sewage treatment facilities have been set up at the sites, and the treated sewage used for irrigation or gardening. Additionally, water-saving awareness training has been conducted for site staff.
- **Reduction of freshwater consumption at Mount Piper Power Station**
  To avoid the flooding of the coal mine during heavy rains, Mount Piper Power Station receives significant volumes of mine water from the Springvale Mine for treatment. Besides managing the challenges posed by the increased intake of mine water, the Springvale Water Treatment Plant meets about 80% of the station's daily water needs, significantly reducing the need for freshwater intake.

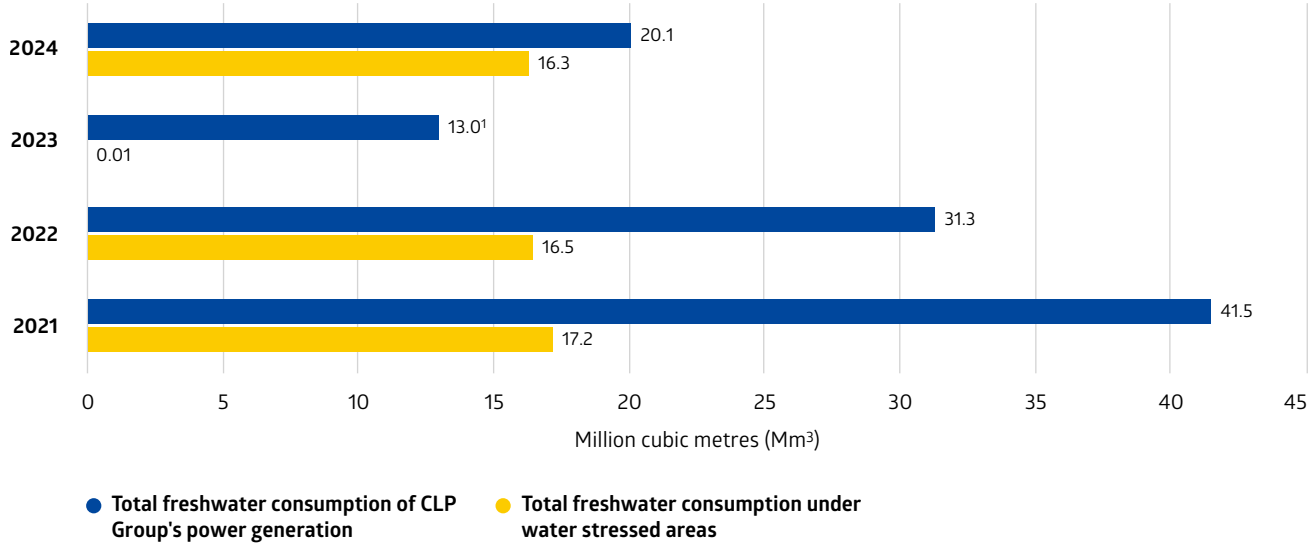
Freshwater balance



1. Freshwater discharged includes rainwater across the plants.

Freshwater consumption and consumption in water-stressed areas

Freshwater consumption increased in 2024 compared to 2023, mainly due to reduced rainfall at the Yallourn coal mine. Freshwater consumption in water-stressed areas increased in 2024 after five EnergyAustralia fossil fuel plants, including the coal-fired Yallourn and Mount Piper Power Stations in Australia, were identified as being in water-stressed areas year-round by updated WRI Aqueduct modeling.



1 Revised as per the updated water consumption data of December 2023 for Yallourn Power Station and Coal Mine.

Serving Our Stakeholders

Customers	70
Our people	95
Partners	110
Community	124

