





Running a Sustainable Business

Sharing our Planet

Serving Hong Kong

Working with Partners

Sharing our Planet

KEEP GREENING





Management Approach

As one of Hong Kong's two electricity utilities, we recognise our responsibility to minimise the impact of our operations on the environment, particularly in order to help combat climate change and improve local air quality.

HK Electric's commitment to safeguarding the environment is articulated in our Environmental Policy, which focuses on low-carbon power generation and promoting smart, renewable energy technology in line with the Government's long-term decarbonisation strategy.

Environmental considerations are fully integrated into our business planning and operations across all areas of our business with coordination from HK Electric's Environment Committee. We have robust environmental management and energy management systems in place that are certified to international standards ISO 14001 and ISO 50001 respectively, and we strive for continuous improvement against measurable targets. In 2020, we formulated 50 environmental management programmes under our environmental management systems.

We also work to prevent and mitigate adverse environmental impact from our operations in a systematic way through early environmental impact assessments, appropriate mitigation measures and regular environmental monitoring and audits.

Environmental stewardship cannot succeed in isolation. We align closely with our stakeholders such as the Government, business partners and NGOs to achieve shared aims. In addition to helping our customers conserve energy and make responsible choices, we actively reach out to the public to enhance environmental awareness through education campaigns.

Inspiration from *Nature's Resilience*

Lemmaphyllum microphyllum

Winding its way around rocks and trees, this epiphytic fern is sometimes known as an "air plant" because it does not root in soil. Thick and fleshy leaves absorb moisture from the air and fall off to conserve water during the dry season.



Climate Action and Clean Air

The global community has been working together to combat climate change under the Paris Agreement. In support of this, the HKSAR Government has announced that Hong Kong will strive to achieve carbon neutrality before 2050 and the city's Climate Action Plan will be updated to set out more proactive strategies and measures for reducing carbon emissions.

HK Electric supports Hong Kong's decarbonisation targets and related initiatives such as the Low Carbon Charter led by the Business Environment Council and Hong Kong Green Building Council's Advancing Net Zero programme. In addition to decarbonising our power generation, we are actively promoting EE&C, RE and EVs, and bolstering our network's resilience to climate change through robust planning and precautionary measures.

Full disclosure about our carbon reduction strategies and performance can be found in our annual response to CDP's Climate Change survey. CDP is an international initiative helping companies and cities worldwide disclose their climate impact responsibly.



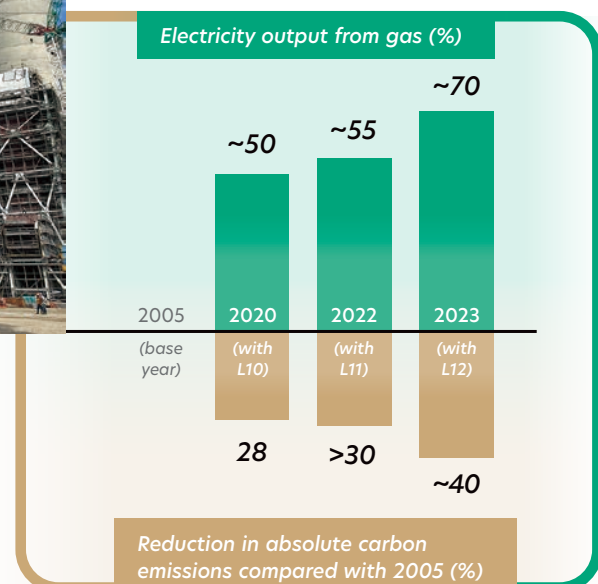
From Coal to Gas

Decarbonising Power Generation

Switching from coal to natural gas provides a clean, reliable and cost-effective way to reduce carbon emissions. We are progressively phasing out coal-fired generation at LPS in favour of highly efficient gas-fired combined-cycle technology.

In February 2020, we commissioned L10, which is the first new gas-fired unit to be completed as part of our 2019-2023 Development Plan. Over the year, power generated from natural gas comprised approximately 50% of total output from LPS; increasing from around 30% in 2019. As a result, the carbon intensity of our power supply declined to 0.71 kg of CO₂e per kWh, compared with 0.81 kg/kWh in 2019.

Increasing Gas-fired Generation Ratio



By 2023, when the other two new gas-fired units L11 and L12 are in operation, gas-fired power will account for around 70% of the total output from LPS, resulting in a reduction of absolute carbon emissions by approximately 40% compared with 2005. Beyond 2023, we have capacity to develop additional gas-fired units within the existing site at LPS. It is possible for us to achieve 100% gas-fired electricity output in the next decade subject to the development of Hong Kong's decarbonisation strategy.

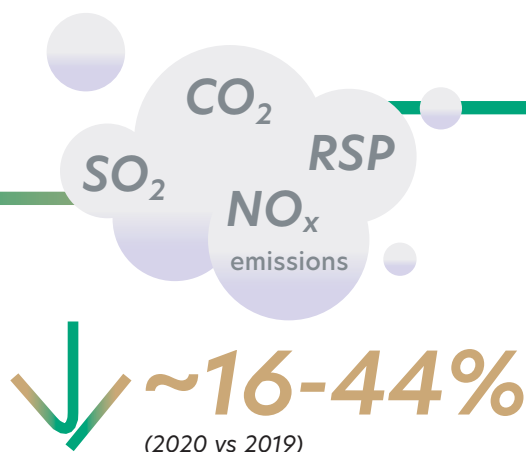
To ensure the commercial and operational viability of coal-to-gas transition, we are building an offshore LNG terminal using "Floating Storage and Regasification Unit" technology in partnership with CLP Power. The terminal will enhance the security of our fuel supply at LPS by creating a new channel to receive natural gas from around the world. Project construction began in November 2020, and is on schedule for completion in 2022.

Moving forward, we are working closely with the Government to introduce low-carbon energy sources and carbon reduction technologies in line with the long-term interests of our customers and all stakeholders. We will take heed of the further development of Hong Kong's Climate Action Plan. Clear direction on the city's long-term decarbonisation strategy is important for our strategic planning and to ensure commitment of necessary resources.

Improving Local Air Quality

In 2020, LPS complied with all emissions allowances specified by the Government. To reduce emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x) and respirable suspended particulates (RSP) as much as practically possible from our operations, we consume low-sulphur coal and implement advanced emission reduction systems, such as flue gas desulphurisation and low-nitrogen-oxide combustion for our remaining coal-fired units.

The new gas-fired units at LPS feature advanced emissions control technology known as Selective Catalytic Reduction. Combined with other efficiency enhancements, this technology will contribute to sustaining the declining trend in emissions of greenhouse gases and other air pollutants.



More Gas-fired Units in the Pipeline



Due to some challenges arising from disruptions in the supply chain and onsite social-distancing restrictions due to the COVID-19 pandemic, we are experiencing some delay in the construction of L11 and L12—the other two new gas-fired units under our 2019-2023 Development Plan. Yet we still expect to commission these units in 2022 and 2023 respectively.

Construction of the L11 main station building was substantially completed in 2020. Power-train equipment for the unit, comprising the gas turbine, generator and steam turbine, were successfully put on base in September. All critical pressure parts and steam drums of the Heat Recovery Steam Generator were fully installed in November.

For L12, engineering design and shop fabrication of major equipment progressed as scheduled. Construction of the main station building commenced in December.



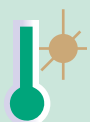


Green electricity from RE sources of HK Electric and its customers

~3.5 GWh

↑ >50%
(2020 vs 2019)

Adapting to Climate Change



**Longer periods
of higher
ambient
temperature**

- ▶ Stringent requirements on reliability for new generation, transmission and distribution facilities and equipment in high ambient temperature
- ▶ Conversion of 11-kV open-ring distribution feeders to 22-kV closed ring feeders that have more margin and greater resilience against high ambient temperature



**Stronger
typhoons;
more powerful
thunderstorms**

- ▶ Underground and submarine cables for nearly our entire transmission network
- ▶ Typhoon emergency teams on standby to undertake operations and repairs for different severity levels
- ▶ Dedicated IT reporting platform with mobile applications for effective coordination of emergency response
- ▶ Decentralised storage of critical spares



**Rising sea
levels; more
erratic rainfall**

- ▶ Anti-flooding systems at LPS and higher ground-level design standards for new generating units
- ▶ Flooding alarms, bund walls and sump pumps at substations subject to flooding risk from storm surge
- ▶ Stringent anti-flooding requirements for new substations vulnerable to storm surge
- ▶ Advice for property managers in commercial and residential buildings on installing anti-flooding systems in their switch rooms with high flooding risk

Supporting EE&C, RE and EVs

We believe that EE&C, RE and EVs will continue to play an integral role in reducing our city's emissions and improving local air quality.

HK Electric introduced wind power in 2006 and solar power in 2010 to its power generation profile. We operate an 800-kW "Lamma Winds" turbine, as well as an 1-MW solar panel system on Lamma Island. In 2020, these systems generated more than 0.8 and 1.1 GWh of green electricity respectively. We are currently exploring other large-scale local RE projects, such as an offshore wind farm off Lamma Island.

At the same time, we recognise there are many important opportunities to work closely with customers to promote RE technologies, EE&C and EVs. Please refer to the chapter on [Serving Hong Kong](#) for more information about our Smart Power Services on these aspects.

Strengthening Climate Resilience

Climate change poses acute and chronic physical risks for Hong Kong. We are helping bolster the climate resilience of our operations and our city's power supply by conducting regular operational reviews, assessing short and long-term climate risks, adopting flexible and resilient systems and designs, and implementing timely enhancement measures.

We constantly evaluate and enhance our contingency plans and emergency procedures through frequent practice drills and regular reviews. Our ongoing campaign to deploy smart meters throughout our network will help us map electricity supply outages and improve data collection for restoring services in adverse weather conditions.



Responsible Resource Management

At HK Electric, we recognise that the planet's natural resources are limited and must be conserved. In addition to implementing energy saving strategies, we cultivate a culture of environmental stewardship among our employees based on the principles of 4Rs: Reduce, Reuse, Recover and Recycle.

In 2020, we worked to minimise environmental impact and reduce consumption of natural resources while balancing environmental considerations with the need to enhance hygiene practices during the COVID-19 pandemic.

Energy Saving

- ▶ EnergywiSe Certificate
- ▶ Energy Saving and 4T Charter
- ▶ Charter on External Lighting

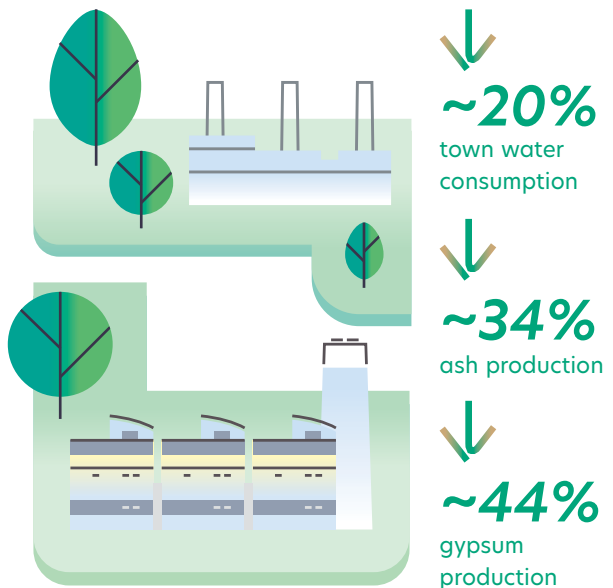


HK Electric participates in the "Hong Kong Energy Evolution Exhibition" organised by the Construction Industry Council to help showcase the development of Hong Kong's energy industry and educate the public about climate change mitigation by reducing emissions.

Water Resources

- ▶ Let's Save 10L Water Campaign

Gas-fired generation ratio at LPS (2020 vs 2019)



Energy Saving Opportunities

It is well recognised that the vast majority of energy saving opportunities for Hong Kong arise in our built environment. HK Electric leads by example with energy saving targets for its main office buildings. In 2020, we continued to implement energy saving measures, including upgrade of mechanical ventilation and air-conditioning systems at LPS to further improve thermal insulation and increase efficiency. We also installed additional energy meters in our buildings to enhance energy monitoring and fine-tune our energy saving plans.

Conserving our Water Resources

At LPS, smart water meters help us monitor water use in real time so we can identify areas for saving water. In 2020, we collected more than 123,000 m³ of rainwater and plant processing water for reuse. This helps reduce our consumption of fresh water while reducing wastewater discharge. We also have wastewater storage and treatment facilities to recycle and reuse wastewater from bore piling work during ongoing development of our new gas-fired units.



Waste Management

- ▶ *WastewiSe Certificate*
- ▶ *Food Wise Charter*
- ▶ *FoodWaste Lean & Green Label Scheme*
- ▶ *Green Event Pledge*

Managing our Waste Responsibly

We produce various types of waste in our operations, and dispose of all waste responsibly in line with relevant laws and regulations. Hazardous waste such as waste oil is handled by licensed contractors under a trip-ticket system.

Ash and gypsum are two non-hazardous by-products of coal-fired power generation. In 2020, we supplied 154 kT of ash and 39 kT of gypsum to third parties as inputs for industrial production. Of the 45 kT of construction waste generated from our major construction projects, about 98% was recycled for use as public filling. At LPS, we also convert woody garden waste into nutrient-releasing mulch for use as fertiliser onsite.

Wherever possible, we seek out opportunities to reduce, reuse and recycle. In our staff canteens, for example, we have eliminated disposable tableware, plastic straws and utensils, as well as plastic beverage containers from vending machines.

As a signatory of the Food Wise Charter, we work continuously to reduce food waste. In our staff canteen, colleagues order their meals in advance and make use of self-service stations for rice and soup to reduce wastage. During the pandemic, self-service stations were manned by designated helpers to reduce the risk of infection. We also separate out food waste from general waste for proper processing. Regretfully, in the latter half of 2020, our daily donations of surplus food to Food Angel, a local NGO, were suspended due to the pandemic. We will resume this practice once conditions allow.

In our offices, we are reducing paper consumption by digitalising our work processes and purchasing thinner paper, wherever possible. We encourage our customers to switch to e-bills and autopay services by offering a one-off \$50 incentive. Customers can choose to offset the value of this incentive against their electricity charges or donate it to one of our designated green groups.



Biodiversity

- ▶ *Greening Partner Charter*

Rethinking Retired EV Batteries



In June 2020, we turned our award-winning pilot project from 2017 into practical reality at the Ap Lei Chau Industrial Estate Zone Substation. We are utilising retired EV batteries to provide

back-up energy storage in the substation switch room, thereby helping protect sensitive equipment and enhance the reliability of our power supply.

During the year, we also completed a trial of a portable energy storage device made from retired EV battery banks. This portable energy supply can be utilised for operating tools and equipment during cable jointing work.

Protecting and Promoting Biodiversity

We have a proud legacy of conserving the ecological habitat of LPS by controlling air and noise emissions, excessive illumination and human disturbance on plants and animals. We cultivate native tree and shrub species to promote biodiversity and create carbon sinks for combating climate change.

In order to avoid harmful impact on the local ecosystem, we treat all wastewater by removing oil, grease, suspended solids and heavy metals, and our fish deterrent system generates low-frequency sounds to avoid the problem of fish caught up in seawater inlet culverts.

In 2020, we continued monitoring water quality conditions to ensure that marine habitats are not adversely affected by construction work on the LPS Navigation Channel Improvement project. As part of the offshore LNG terminal project, a Marine Conservation Enhancement Fund and Fisheries Enhancement Fund have been set up to support marine ecology conservation and sustainable development of local fishing industries.

Case Story

Setting the Benchmark for Energy Savings

In Hong Kong, our built environment offers many opportunities for energy saving. At HK Electric, we make it a priority to lead by example in our own facilities as well as promoting EE&C to our customers through Smart Power Services.

In 2020, we received the prestigious "Hanson Grand Retro-commissioning (RCx) (Implementation) Award" from the Environment Bureau and the Electrical and Mechanical Services Department (EMSD) for excellent energy conservation performance at Electric Tower. This success demonstrates that with a can-do attitude, the energy performance of every building can be improved.

Replacement of ageing conventional air-cooled chillers with new and more environmentally friendly water-cooled chillers

Replacement of belt-driven air handling units with variable-speed electronically commutated fans with energy-efficient motors

Installation of manually operated "overtime buttons" in individual zones to regulate air-conditioning supply after office hours based on actual need

Adoption of an AI-based analysing system with smart temperature sensors in the new data centre to optimise the operation of dedicated air-conditioning units round-the-clock in order to meet cooling loads while minimising energy wastage

~30%

Total Energy Consumption (2013-2019)

Replacement of ageing light fittings in carparks, stairwells and warehouses with smart, energy-efficient fixtures such as T5 LED tubes with photocell and occupancy sensors



This is the first time that we have adopted water-cooled chillers in HK Electric's buildings. Although these chillers are more energy-efficient than air-cooled alternatives, we explored practicable ways of making our chiller plant even more environmentally friendly. As a result, we adopted magnetic bearing (oil-free) compressors and utilised variable-speed-drive controls in all water-side equipment. In addition, we installed a computerised chiller plant control and monitoring system for better implementation of RCx in the future.

Wu Ka-kin

Project Engineer



HK Electric's Environmental Policy emphasises integrating environmental considerations into all aspects of our business operation. The incorporation of RCx elements into the new data centre project demonstrates this principle in action and that it is possible for every one of us to contribute to protecting the environment in our daily work.

Chan Chi-wai

Data Centre Specialist

Retro-commissioning at Electric Tower

Retro-commissioning (RCx) is a process to improve the energy efficiency of an existing building's equipment and systems. Located in Ap Lei Chau, Electric Tower is the "nerve centre" of HK Electric's power network. It is from here that we dispatch electricity generated at LPS and monitor real-time performance of our transmission and distribution network, which spans over 583,000 customers.

In recent years, we have set up a new data centre at Electric Tower. Our engineering team seized this opportunity to upgrade other ageing equipment in the building. New ways of saving energy and appropriate technologies such as AI were adopted, resulting in significant energy savings.



Promoting RCx through Experience Sharing

We take every opportunity to share our experiences in identifying and implementing energy saving opportunities during RCx works in order to encourage others to do the same. Recently, our experts have addressed over 600 audience members on two webinars hosted by the Green Council. We also participated in the "Green Schools 2.0 for Retro-commissioning Professional Talk" sponsored by the Hong Kong Green Building Council as well as two webinars organised by the EMSD to promote RCx and building energy efficiency.

The RCx project for Electric Tower was a new and valuable experience for us. We are keen to share our RCx journey with others and hope to see more RCx projects being implemented in Hong Kong.

Thomas Yeung

Manager (Building Maintenance & Services)

Education and Awareness

Enhancing public awareness and participation through education is essential if Hong Kong is to realise a sustainable future by and for all.

Happy Green Campaign

For many years, we have been promoting EE&C, RE and low-carbon lifestyles through our Happy Green Campaign, a major initiative under the Smart Power Education Fund.

In 2020, the campaign continued with the theme "Smart Power for Smart City," however the COVID-19 pandemic challenged us to rethink our approach by focusing on web-based experiences and social media interactions:

- ▶ An animation series "Smart City Takes Action" was launched to introduce the various aspects of a smart city and encourage actions in daily life.
- ▶ The campaign's mini-site was enhanced for school students' online learning at home.
- ▶ Posts promoting green messages and actions were published every week on the campaign's Facebook page.
- ▶ An interactive drama "Smart Power Alliance" was produced in partnership with a professional production house, iStage, with both online and onsite versions.



[Smart City
Takes Action](#)



[Smart Power
Alliance](#)



Timely Support for Schools

Our support and engagement with schools continued despite disruption to school operations due to the pandemic.

Happy Green Schools

- ▶ Over 480 primary and secondary schools in Happy Green Schools Network
- ▶ Up to \$10,000 each for 27 schools to carry out projects promoting EE&C, RE and low-carbon lifestyle
- ▶ 13 sessions of interactive drama for around 2,800 participants
- ▶ 3 sessions of STEAM workshop in partnership with Hong Kong Federation of Youth Groups' (HKFYG) for around 100 students

Happy Green Ambassadors

- ▶ Online training in partnership with the University of Hong Kong (Faculty of Engineering) and HKFYG for 40 Ambassadors
- ▶ A two-day virtual "Smart City Online" workshop with sharing by representatives from HK Electric, Cyberport and local start-up companies, as well as hands-on learning of using geographic information systems

Green Energy Dreams Come True

- ▶ Up to \$20,000 each for 15 shortlisted projects from previous years to sustain or enrich their dreams



Green Hong Kong Green

Our Green Hong Kong Green (GHKG) programme—now in its 16th year—is co-organised by HK Electric and the Conservancy Association to foster public appreciation of Hong Kong's eco-heritage resources through guided tours on designated routes.

Before the introduction of social-distancing restrictions in February 2020, five eco-tours were organised in January for about 60 participants.

As most physical eco-tours were suspended under the pandemic, we continued to promote our eco-heritage routes and spots through weekly Facebook posts with topics ranging from ecology to local history. Various videos, including one taken with a drone to capture the beautiful scenery of our Tai Tam Country Park route from above, were produced to encourage the public to appreciate eco-heritage treasures online. A set of WhatsApp stickers were designed to further promote the best spots on our 10 eco-heritage trails.

New Eco-heritage Route Reminiscing the Lights and Sounds of North Point



In 2020, we developed a new eco-heritage route in the Eastern District called "The Eastern Sparkle" to share with the public the unique entertainment history, culture and ecology of North Point.

Following the official launch of this new route in March 2021, we have achieved complete coverage of all districts on Hong Kong and Lamma Islands. Eleven eco-heritage routes showcase a host of eco-heritage treasures to Hong Kong citizens.

About 50 participants attended an online eco-leaders training to learn about the ecology and history of North Point, including the unique story of North Point Power Station. They will help conduct eco-tours on the route when physical tours can resume. The GHKG mobile app was also enhanced to cover the new route and a series of videos were produced to introduce the eco-heritage spots enroute.

Environmental Campaigns

We strive to raise awareness of environmental concerns by encouraging our employees to support a range of green campaigns organised by the Government and NGOs.

In support of the United Nations' World Environment Day in June 2020, more than 800 employees and their families made green pledges around the four basic necessities of life: apparel, diet, living and transport. Many donated used mobile phones, digital cameras and books to benefit people in need. The campaign also featured a quiz and a photo competition on biodiversity.

In 2020, we launched a Waste Management Campaign at our Head Office to raise awareness of waste reduction and recycling in collaboration with the Hong Kong Productivity Council and funded by the Environment



and Conservation Fund. The campaign included a waste charging trial that took place between May and September with the objective of preparing for the expected introduction of a new municipal solid waste charging scheme.