



Sharing
our Planet



Sustainability at HKEI

Sharing our Planet

Serving Hong Kong
Working with Partners





Management Approach

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 Hong Kong's international commitments to reducing carbon emissions and the Government's long-term decarbonisation strategy.

Environmental considerations are fully integrated across all aspects of our business under the co-ordination by HK Electric's Environment Committee. We strive for continuous improvement against measurable

targets in accordance with environmental management and energy management systems that are certified to international standards ISO 14001 and ISO 50001, respectively.

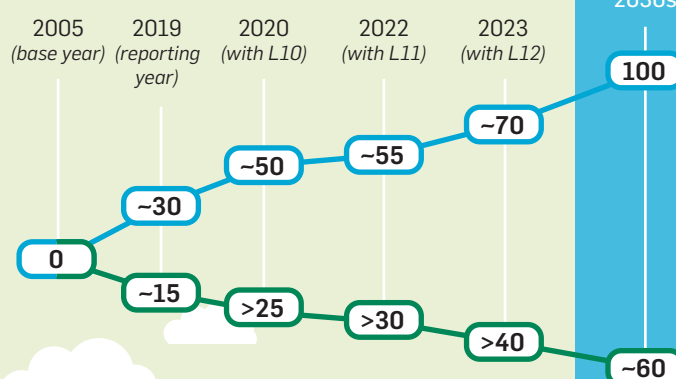
We know that environmental stewardship does not work in isolation, so we align closely with our stakeholders, such as the Government, business partners and non-governmental organisations (NGOs), to achieve shared aims. In addition to helping our customers conserve energy and make environmentally responsible choices, we actively reach out to the public at large through environmental awareness and education campaigns.

Continuous Improvement

In 2019, we conducted a company-wide Environmental Climate Index (ECI) survey as part of our ongoing performance monitoring and improvement programme. Compared with the last one conducted in 2016, a higher overall ECI score was obtained in 2019 demonstrating improvement in environmental awareness among our employees.

Pathway to 100% Gas-fired Generation

- Electricity output from gas (%)
- Reduction in absolute carbon emissions compared with 2005 (%)



Note: L10, L11, L12 are gas-fired generating units.

LNG



Taking Action on Climate Change

HK Electric is committed to working towards decarbonisation targets consistent with the direction of the Paris Agreement. We are taking action on climate change by reducing the carbon emissions from our power generation and promoting energy efficiency and conservation (EE&C) and renewable energy (RE), while bolstering our network's resilience to extreme weather events through robust planning and precautionary measures.

We also share information about relevant strategies and actions through the annual CDP survey, and support the Business Environment Council's Low Carbon Charter initiatives to contribute towards Hong Kong's long-term decarbonisation.

Transitioning from Coal to Gas

Switching from coal to natural gas provides a clean, reliable and cost-effective way to reduce carbon emissions. In 2019, power generated from natural gas comprised about 30% of total electricity output and the carbon intensity of our power supply was approximately 0.81 kg of CO₂e per kWh.

As part of our 2019-2023 Development Plan, we are developing three more highly efficient combined-cycle gas-fired generating units known as L10, L11 and L12. Following successful synchronisation in October 2019, L10 was commissioned in February 2020, bringing our gas-fired generation to about half of our total output. We are also making good progress with L11 and L12, which we expect to be commissioned in 2022 and 2023, respectively. By 2023, gas-fired power will rise further to about 70% of our total output.

Moving forward, we have capacity to develop additional gas-fired generating units at our existing site in LPS to achieve full transition to gas-fired generation by the early 2030s. For more information about HK Electric's position on long-term decarbonisation strategy for Hong Kong, please refer to our [Response to the Long-term Decarbonisation Strategy Public Engagement](#) on our website.

To ensure the commercial and operational viability of coal-to-gas transition, we are working with CLP Power to develop an offshore liquefied natural gas (LNG) terminal using "Floating Storage and Regasification Unit" (FSRU) technology. The project comprises an FSRU vessel, a jetty and a network of submarine pipelines that will be connected to the concerned power stations, including LPS. Scheduled for commissioning in 2022, the project will provide a new channel for LPS to receive cost-competitive LNG supplies from different markets across the globe, thereby enhancing the security of our fuel supply.

In June 2019, a joint venture was established for the project and two third-party agreements pertaining to long-term LNG supply and leasing of an FSRU vessel were also signed.



Coal-to-gas transition is taking place at LPS.

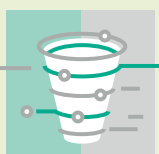


[An Era of Gas Generation](#)





Building Resilience: Adapting to Change



Stronger typhoons and more powerful thunderstorms

- Underground and submarine cables for almost our entire transmission network to minimise risks due to strong winds
- Standby typhoon emergency teams, equipped with action plans for different storm severity levels, to undertake operations and repairs
- Dedicated IT reporting platform with mobile apps for effective coordination of emergency response
- Decentralised storage of critical spares

Building Climate Resilience

Climate change poses both acute and chronic physical risks to our business. Building resilience into our infrastructure to mitigate climate-related threats is of paramount importance for assuring supply reliability. In addition to implementing precautionary measures at our power station and throughout our network, we continuously enhance our contingency plans and emergency procedures through frequent drills and regular reviews.

As part of our ongoing efforts, we are rolling out smart metering technologies to help identify and restore electricity supply outages during adverse weather conditions. The smart meter roll-out campaign will prioritise customers residing in remote areas.

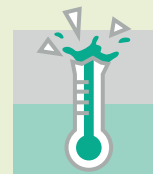
Roles for RE and EE&C

HK Electric supports utilising RE resources for local power generation. We operate a wind turbine named "Lamma Winds" and a solar power system on Lamma Island, both on commercial scale. In 2019, these systems generated more than 1.7 GWh of green electricity.

We also extended our commitment to our customers by promoting RE technologies and EE&C through a package of "Smart Power Services". Please refer to the chapter on [Serving Hong Kong](#) for more information.

Longer periods of higher ambient temperature

- Requiring new generation, transmission and distribution equipment to be able to withstand higher ambient temperatures
- Progressively converting 11-kV open-ring distribution feeders to 22-kV closed ring feeders that have more margin and greater resiliency against higher ambient temperature



Rising sea levels and more erratic rainfall

- Anti-flooding systems at LPS and a higher ground-level design for new generating units
- Progressively installing flooding alarms, bund walls and sump pumps at all substations subject to flooding risk from storm surge
- Higher anti-flooding requirements for new substations vulnerable to storm surge
- Working closely with property managers in commercial and residential buildings to provide advice on installing anti-flooding systems in their switch rooms with high flooding risk

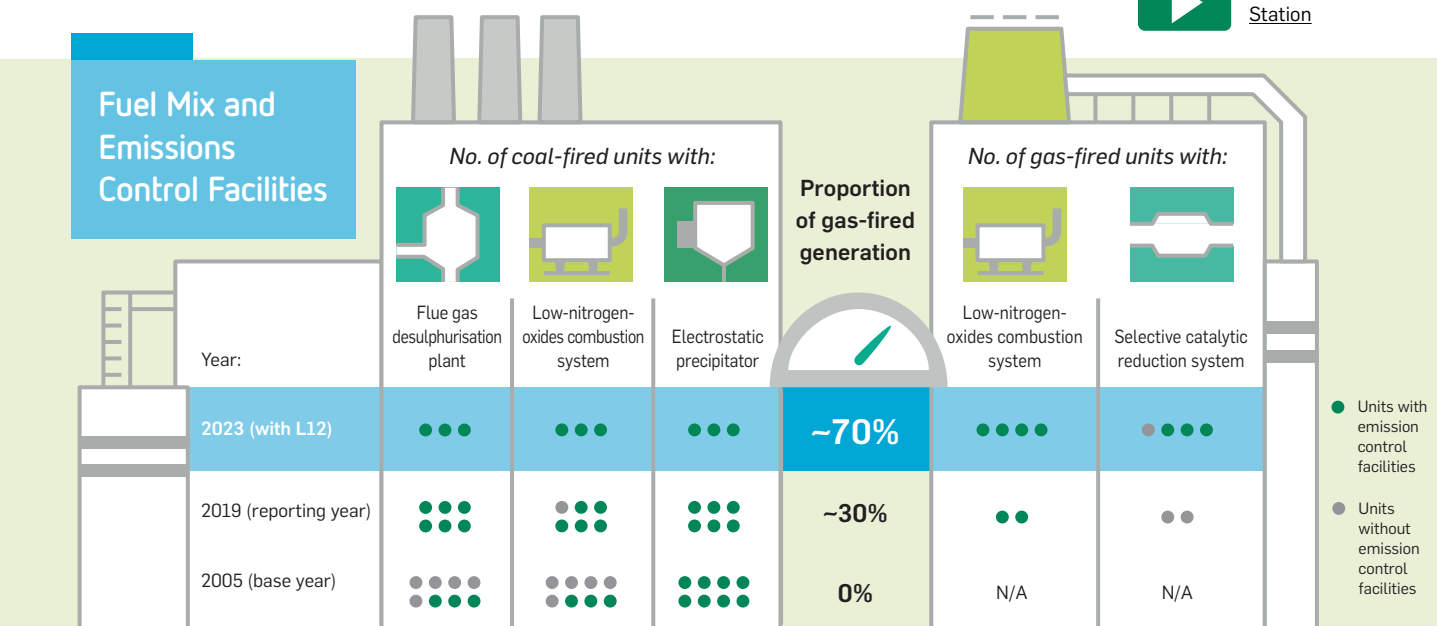


Improving Air Quality

Air pollution is one of the most important issues impacting the health and wellbeing of our community. Air emissions produced locally in Hong Kong arise largely from shipping, coal-fired power generation and road traffic.



Lamma Power
Station



Emissions from LPS

In 2019, we continued to implement a range of emissions control measures for our coal-fired and gas-fired units to ensure full compliance with statutory emissions targets. Moving forward, we are increasing the proportion of natural gas – a cleaner and more efficient fuel than coal – in our fuel mix. Heat recovery steam generators in our new gas-fired units will also feature advanced active emissions control technology known as Selective Catalytic Reduction. We expect that when L12 is operational in 2023, emissions of sulphur dioxide, nitrogen oxides and respirable suspended particulates from LPS will decrease by approximately 75-90% compared with 2005 levels.

In anticipation of generating even cleaner power in the future, in 2019 we completed a review with the Government and agreed on a new regime of tighter emissions allowances from 2024 onwards as set out in the Eighth Technical Memorandum.

Drive EVs • Charge Easy

We support widespread adoption of electric vehicles (EVs) because they produce zero emissions at source and could play an important role in helping improve roadside air quality in Hong Kong.

In 2019, 17 EV chargers were available for public use at 12 HK Electric charging stations covering every district on Hong Kong Island. EV drivers can continue to enjoy free charging services until the end of 2020.

We also offer a comprehensive range of EV charging support services to help both residential and commercial customers set up EV chargers. In 2019, our EV service team handled 280 enquiries and received 237 applications from our customers for installation of new EV risers and EV chargers in their buildings.

There have been some encouraging developments towards greater electrification of public transportation in Hong Kong. In 2019, for example, we provided technical support to Citybus and First Bus on proposed installation of charging facilities at Hong Kong Station Bus Terminus and Central Ferry Bus Terminus. We are also working with the Government and four inner harbour ferry companies to explore the feasibility of installing new charging facilities at specific ferry piers.

We have been greening our own vehicle fleet by replacing conventional vehicles with EVs for many years. As at the end of 2019, we owned and operated 149 EVs, which represent 47% of our total fleet. Year-on-year comparison of fuel consumption declined by about 16,000 litres or 12% compared with 2018.



Responsible Resource Management

Natural resources are finite and we must not take their consumption for granted. In addition to implementing various energy saving strategies, we cultivate a culture of environmental stewardship among our employees based on the principle of 4Rs – Reduce, Reuse, Recover and Recycle.

Partnerships to Protect the Environment

Energy Saving

- Energy Saving Charter
- 4Ts Charter
- Energywise Certificate
- Charter on External Lighting



Water Resources

At LPS, we strive to reduce fresh water consumption through collection and reuse of rainwater and plant processing water. In 2019, approximately 121,000 m³ of water was collected for reuse. Smart water meters also enable us to monitor water use in real time and identify areas for improvement.

In order to avoid harmful impacts on the local ecosystem, wastewater from LPS is properly treated by removing oil, grease, suspended solids and heavy metals. We also have wastewater storage and treatment facilities in place to recycle and reuse wastewater produced during bore piling for the construction of our new gas-fired units.

Energy Saving

Hong Kong's built environment presents significant energy saving opportunities for our customers. We enjoy the benefits of energy savings in our own office buildings by conducting energy audits and setting annual reduction targets. In 2019, we continued to implement measures that were identified in recent audits, including installation of additional energy meters to enhance monitoring of energy consumption patterns and retrofitting of LED lamps at appropriate locations.

During the year, we upgraded more mechanical ventilation and air-conditioning systems at LPS to improve their thermal insulations and efficiencies. To help reduce distribution losses in our power system, we also continued to optimise the arrangement of normal open points across our network.



Water Resources

- Let's Save 10L Water Campaign

Intelligent Savings

In 2019, we introduced artificial intelligence based-dynamic control technology to optimise airflow and cooling capacity in our Data Centre Infrastructure Management systems at Electric Centre and Electric Tower. This innovative technology has allowed us to realise 70% energy savings from the cooling systems in our data centres.





Waste Management

We ensure that waste produced throughout our operations is disposed of responsibly in accordance with relevant laws and regulations. Hazardous waste such as waste oil, for example, is handled by licensed contractors under a trip-ticket system.

Ash and gypsum are two by-products from coal-fired power generation at LPS that constitute our main types of non-hazardous waste generated. In 2019, we supplied 230 kT of ash and 70 kT of gypsum to third parties as inputs for industrial production. Our major construction projects generated 99 kT of construction waste, of which 99% was recycled as public fill.

To promote a waste-free culture, we work with the Government and NGOs to implement various waste reduction and recycling initiatives. In our staff canteens for example, we have eliminated disposable tableware and plastic straws. We also no longer stock beverages in plastic bottles in the vending machines on our sites.



Waste Management

- Wastewi\$e Certificate
- Food Wise Charter
- Green Event Pledge

To reduce food waste from our staff canteens, colleagues are incentivised to order their lunches in advance. Self-service stations for rice and soup encourage colleagues to take only what they need. After the meal, colleagues are asked to help separate food waste for processing. All surplus food is donated on a daily basis to a local NGO Food Angel for redistribution to people-in-need.

In our offices, we reduce paper consumption by digitalising our work processes and using thinner paper for printing whenever possible. In 2019, we also launched a campaign to encourage our customers to switch to e-bill and autopay services by offering a one-off \$50 incentive. Customers can choose to use the incentive either to offset their electricity charges or to make a donation to one of our designated green groups.

Vessel-based marine mammal monitoring for the offshore LNG terminal project.



Biodiversity

- Greening Partner Charter



Biodiversity

We have a proud legacy of conserving the ecological habitat of LPS and our surrounding environment. In addition to controlling the impacts of air and noise emissions, excessive illumination and human disturbance on plants and animals, we have a planting programme in place to promote biodiversity through cultivation of native tree and shrub species.

In 2019, we undertook monitoring to determine baseline water quality conditions and limits before commencement of dredging work for the LPS Navigation Channel Improvement project. We will monitor water quality regularly throughout the construction period to ensure that marine habitats are not adversely impacted.

During the year, we completed a 6-month programme of vessel-based marine mammal monitoring for the LNG terminal project. In December, we commenced monitoring for baseline water quality and a plankton survey.



Education and Awareness

We believe that enhancing public education, awareness and participation 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 lifestyle through our Happy Green Campaign (formerly known as Smart Power Campaign) which is supported by our Smart Power Education Fund. An advisory committee comprising representatives from the Government, academia, the engineering industry and green group provides guidance on how green messages can be spread among different sectors of the community.

In 2019, the Happy Green Campaign adopted the theme of "Smart Power for Smart City" in support of the Government's drive of developing Hong Kong into a smart city. Starring local actor Steven Ma, the Campaign's first mini-movie was launched during the year to remind us of the importance and urgency of living green to save our planet for future generations.

We also organised an exhibition with interactive displays, information kiosks and virtual reality games to showcase the six facets of a smart city – Smart Mobility, Smart Living, Smart Environment, Smart People, Smart Government and Smart Economy – and to illustrate how everyone can live smarter and greener by making changes in their daily lives.

An interactive roving exhibition to promote a greener, smarter city.



Key Outcomes in 2019

First

mini-movie "Happy Green Today for Tomorrow" was launched



"Happy Green Today for Tomorrow"



~70

students became Happy Green Ambassadors to promote green messages

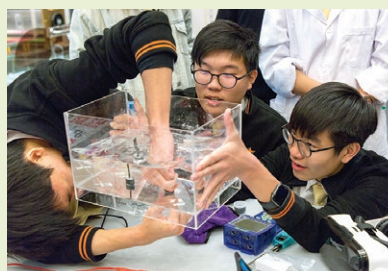
450+

primary and secondary schools participated in Happy Green Schools network



15

school teams were sponsored to make their Green Energy Dreams Come True



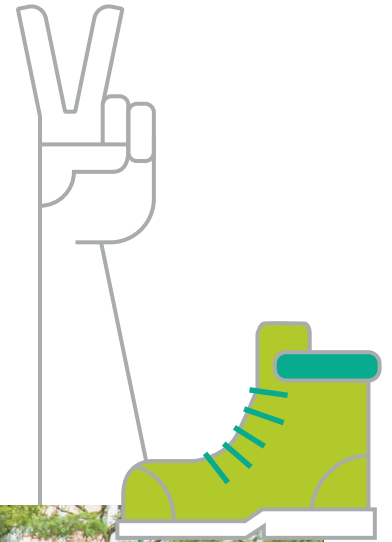


Green Hong Kong Green

Green Hong Kong Green (GHKG), which has been running for over 14 years, is a programme co-organised by HK Electric and the Conservancy Association to foster public appreciation of Hong Kong's eco-heritage resources through guided tours. Currently, 10 eco-heritage routes are available on Hong Kong and Lamma Islands.

In 2019, more than 700 participants took part in 57 eco-tours across Hong Kong and Lamma Islands. We introduced several new thematic tours that proved to be very popular, such as digital photography in Western District, Forest Bathing in the Aberdeen Country Park and "Somewhere in Time@Lamma". To enhance the educational value of these tours, we provided our volunteer eco-leaders with additional training, including field trips, refresher courses and sharing sessions.

We are currently developing a new eco-heritage route in the Eastern District of Hong Kong Island, which we plan to introduce by the end of 2020.



GHKG Night Safari

Highly popular GHKG eco-heritage tours.



Environmental Campaigns

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

In support of the United Nations' World Environment Day in June 2019, for example, more than 600 employees and their families made green pledges in their daily lives. Many also donated used mobile phones, digital cameras and books to benefit people-in-need.



HK Electric management team "walks the talk"; helping reduce carbon emissions from road transport.

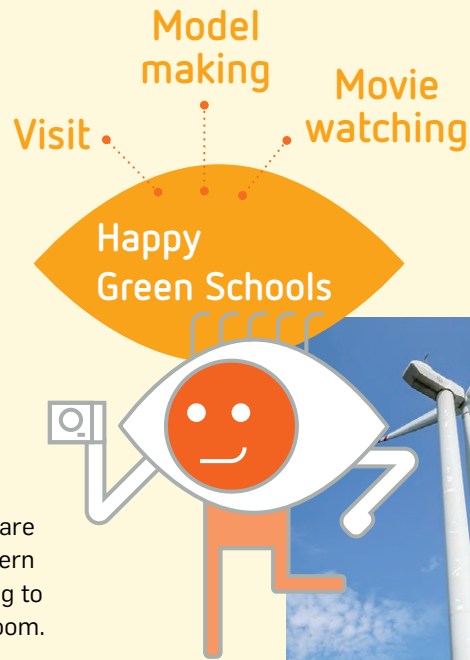


Case Story 3

Beyond the classroom



Traditional learning methods through textbooks and lectures are no longer the only ways to acquire knowledge. In today's modern and smart society, young people and their teachers are turning to new technologies and approaches to learn beyond the classroom.



"We strongly believe that Other Learning Experience activities, such as visits to power plants, are great and effective ways to enhance our students' knowledge and broaden their horizons."

Principal Yu Chi-yin

Seeing is believing

On a clear day, students from Hong Kong Southern District Government Primary School in Ap Lei Chau – a member of the Happy Green Schools network – can look out of their classrooms to see the huge wind turbine and power station chimneys on Lamma Island. The facilities look impressive to the students, who are always curious to find out more.

Under HK Electric's Happy Green Campaign, students from the school visited LPS to gain first-hand knowledge of what HK Electric and power generation are all about. After the visit, they worked with wind power models to reinforce what they observed during their outing.



[Launching of the Mini-movie](#)

To further strengthen their learning, students also had the opportunity to preview the Campaign's first mini-movie "Happy Green Today for Tomorrow" during school talks. The movie and related interactive games tell a tale of time travel to promote green messages and sustainable lifestyle. Younger generations are encouraged to make green choices and to share knowledge about sustainability with their families in order to realise a greener future.

Through hands-on activities, students not only gain valuable knowledge, but also develop a personal connection to important environmental issues, such as global warming. Experiences such as these create powerful, long-lasting impacts that cannot be replicated by reading books or attending lectures alone.

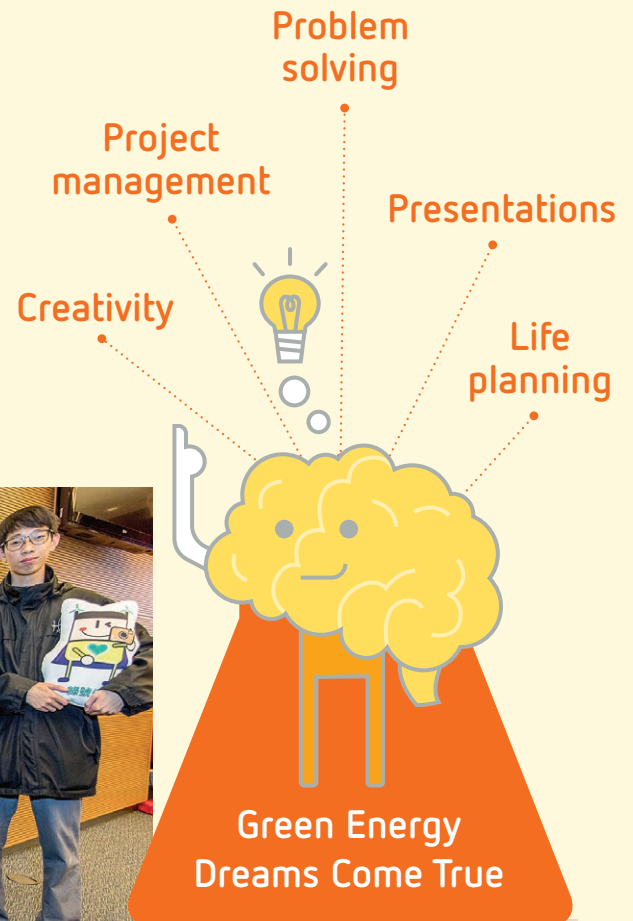


STEAM

is part of life

Science, Technology, Engineering, Arts and Mathematics = STEAM. Schools throughout Hong Kong are exploring new ways to incorporate and develop these essential topics into the curriculum for their students.

HK Electric's "Green Energy Dreams Come True" competition offers an exciting opportunity for local secondary students to explore their own ideas and gain hands-on experience, while strengthening their project management, problem-solving and presentation skills, as part of the life-planning education advocated by the Government.



"We had to overcome technical problems and build up the confidence to promote our ideas in a shopping centre! This competition is not only about STEAM, it's also about facing up to and overcoming real life challenges."

Students from the winning team

School teams that enrol in this competition receive support in the form of seed money and technical advice from our engineers.

In 2019, a team of students from Helen Liang Memorial Secondary School (Shatin) won the competition with their kinetic-powered gym machine. The experience of preparing their proposal, turning their ideas into action and presenting their final product to the judges was educational and truly unforgettable.



[Green Energy Dreams Come True 2019](#)