



HK Electric's Response to the Long-term Decarbonisation Strategy Public Engagement

1. Introduction

HK Electric appreciates the global vision to minimise carbon emissions to effectively limit the temperature rise of not more than 2°C laid down in the Paris Agreement. As electricity generation is the largest carbon-emitting sector locally, we strive to facilitate the formulation of pragmatic decarbonisation strategies and pathways, which would be in line with the overall interest of Hong Kong.

2. HK Electric's Ongoing Decarbonisation Efforts

Under the long-established and administration-efficient regulatory regime of the Scheme of Control Agreement (SCA), HK Electric has been investing cost-effectively in green technologies and initiatives to decarbonise our operations progressively and has made substantial achievements.

2.1 Increase the Use of Natural Gas

We are currently pursuing a coal-to-gas transition towards a cleaner and more decarbonised Hong Kong by building three highly efficient combined-cycle gas turbines using the cleanest fossil fuel, natural gas, to replace our ageing coal-fired generating units. Upon the full project completion in 2023, our gas-fired generation will account for about 70% of our total electricity output, reducing our absolute carbon emissions by more than 40% compared with the 2005 level.

Year	2005 (Baseline)	2018	2020	2022	2023
Commissioning of New Gas-fired Generating Unit	-	-	First	Second	Third
Proportion of Gas Generation	0%	32%	~50%	~55%	~70%
Reduction in Absolute Carbon Emissions	Base	16%	>25%	>30%	>40%

2.2 Promote the Use of Renewable Energy (RE)

HK Electric has been harvesting emission-free RE through the incremental development of our own RE systems since 2006. Our 1-MW solar power system and 800-kW wind power station are among the largest RE installations in Hong Kong. In 2018, the two systems together generated about 1.8 million units of green electricity to reduce the carbon emissions from our overall production process and the reduction is more than that contributed by 60,000 trees in a year. Our customers are also keen to join the Feed-in Tariff (FiT) and Renewable Energy Certificate (REC) schemes, with over 100 and 70 applications received respectively since the scheme launch.

2.3 Community Efforts to Achieve Energy Saving

HK Electric educates our community the importance of energy efficient lifestyle through the Smart Power Services (SPS) schemes. The SPS schemes support the implementation of energy efficiency and conservation measures and promote local RE development, targeting all our customers, particularly the needy members of community. We also opened the Smart Power Gallery early this year to showcase new energy management solutions and advocate the importance of energy efficiency, and have received overwhelming interests.

2.4 Support Electrification of Transport

HK Electric introduced electric vehicles (EVs) to our operation fleet as early as the 1980s. As of 2018, EVs constituted 43% of our vehicle fleet continuing to make a difference in roadside air quality. We have installed 17 EV chargers in public charging stations across Hong Kong Island and offer technical advice on the installation of EV chargers to our customers to encourage higher penetration of EVs in Hong Kong. We endeavour to provide a reliable electricity supply to the existing and future railway lines as the backbone of Hong Kong's mass transport system.

3. Approaches for Decarbonising the Electricity Generation Sector

To meet the limit of 2°C or even 1.5°C temperature rise target laid down in the Paris Agreement, Hong Kong will need to pursue an aggressive carbon reduction target for the electricity generation sector up to 2050 as delineated in the public engagement document. The ultimate goal is to achieve net zero carbon emissions. As such, the possible approaches in this area should be seriously examined with due considerations of the relevant factors, in particular the effects on power supply reliability and the necessary time for different approaches, to deliver decarbonisation results.

3.1 Continue the Coal-to-gas Transition

Continuing the ongoing coal-to-gas transition for the local electricity generation sector is a pragmatic approach for Hong Kong to move forward in its decarbonisation journey. This approach will bring highly predictable and tangible benefits.

For HK Electric, we have gained first-hand and invaluable project experience from the current erection of the three new gas generating units and their plant buildings. The additional two to three new gas-fired generating units to replace the remaining coal-fired generating units can be built in the existing Lamma Power Station without the need for any new land. Hence further coal-to-gas transition projects can be executed efficiently and effectively, with low risk and high certainty.

If and when the replacement of the remaining coal-fired generating units by gas-fired generating units is decided in the coming few years with necessary approvals granted, a full gas-fired generation can be achieved in the early 2030s to complete the entire coal-to-gas transition. Upon this completion, HK Electric's absolute carbon emissions will be reduced by about 60% compared with the 2005 level. This will be a significant milestone for Hong Kong paving a robust foundation for migrating to the next stage of decarbonisation to meet the Paris Agreement target.

Meanwhile, HK Electric will continue to explore developments in all possible advanced technologies including hydrogen fuel, carbon capture and storage, energy storage and smart grid to determine if they can be commercially viable and introduced in Hong Kong for decarbonisation opportunities. However, these advanced technologies are still far from mature, and we are currently unable to see any prospects for their economical applications in the near future. That being the case, the full gas transition in the coming decade will be an effective interim step in substantially lowering Hong Kong's carbon emissions.

3.2 Develop Local Renewable Energy

Due to local geographical and urbanisation constraints, Hong Kong lacks the potential to develop mega-scale zero-carbon energy sources for meeting a significant portion, say over 20%, of its electricity demand. However, local RE projects have additional community and educational values by symbolising Hong Kong community commitments in decarbonisation and its desire for a low-carbon lifestyle. Solar and wind energy are the only locally available and practicable zero-carbon energy resources, and the promotion of distributed type solar and wind generation facilities in Hong Kong should still continue. As a key stakeholder of

the power sector, HK Electric will proactively explore practical local RE projects for cost-effective implementation.

3.3 Pursue Regional Cooperation

Large-scale development of zero-carbon electricity generation sources based on currently available technologies, namely RE and nuclear power, has gained momentum in Mainland China over the last two decades. In facing global climate risks, regional cooperation represents a pragmatic approach for Hong Kong that is worthy of serious consideration as even after all local solutions are exhausted it will still be unlikely to meet the Paris Agreement target. However, the following conditions must be met for any regional cooperation to bring in more zero-carbon energy:

- ***Clear community consensus.*** The public, in general, welcomes RE though costly backup power needs to be arranged due to the intermittency and relatively lower reliability of RE. In contrast, nuclear power is highly reliable, land-efficient and has high tariff stability against fuel price volatility. To address public concerns on nuclear radiation safety and waste disposal, governments and authorities across the boundary will have to promote civilian nuclear technology awareness, disseminate well-informed safety precautions adopted in modern nuclear power stations, and establish transparent and credible incident monitoring mechanism.
- ***Suitable supply sources are available.*** Zero-carbon energy sources should be geographically close to Hong Kong to avoid acquiring on-shore corridors through congested populated cities for building long-distance transmission infrastructure. That will be very challenging due to large land spaces required for RE farms, stringent limitations for nuclear power station siting, and the high degree of urbanisation in the Greater Bay Area. Besides, there will be keen competition for the similar zero-carbon energy sources to meet the national targets for the Mainland provinces/cities, especially along the south coastal regions.
- ***Dedicated transmission link to ensure reliability.*** Compared to the grid-to-grid configuration, a dedicated transmission link connecting the zero-carbon energy source with Hong Kong provides clear and robust benefits and is therefore essential. It will ensure that a discernable supply of zero-carbon electricity is in place and provides a clear reference of the supply costs. As the power grid in the Mainland spans across wide geographical areas, its operations are more susceptible to interference due to natural/climate events. A dedicated transmission link can

mitigate these adverse reliability impacts as well as facilitate Hong Kong to better manage and control the transmission process and performance in ways that meet our local needs.

- ***Necessary policy confirmation and social supports are available.*** There are considerable technical complications and significant uncertainties in importing RE and/or nuclear power. These challenges need to be resolved by long-term planning with overall project construction lead time of not less than 10 years after policy decisions are made. In addition, early commitments in investments have to be made well ahead of the day when zero-carbon electricity is available to Hong Kong. To take regional cooperation forward, the community and relevant authorities, both in the Mainland and Hong Kong, need to timely provide the necessary supports in all cross-boundary planning, investment decision making, statutory permissions and related engineering design and construction.

4. HK Electric Position

Having regard to the above considerations, HK Electric's position in response to the public engagement is as follows:

- 4.1 HK Electric has powered Hong Kong for over a century with highly reliable electricity supply and is committed to continue to do so whilst investing in the city's decarbonisation future.
- 4.2 Though very challenging, we support Hong Kong's move for further decarbonisation and its role to contribute to the vision of the Paris Agreement to effectively limit temperature rise.
- 4.3 As one of the key players in the local electricity sector, we have made meaningful contributions to Hong Kong's decarbonisation efforts as described in section 2 above, and are continuing to do so:
 - through our coal-to-gas transition, we expect gas-fired generation to account for 70% of our total output by 2023;
 - through the FiT and REC schemes, we facilitate the local RE development; and
 - through our SPS schemes, we drive energy efficiency and conservation initiatives in the community.

4.4 There is room to further increase our gas-fired generation proportion to beyond 70% after 2023 to achieve full coal-to-gas transition, as well as to further increase local RE capacity. While these are efforts worth pursuing, they alone will likely not be able to attain a sufficient level of carbon reduction for Hong Kong to meet the Paris Agreement vision.

4.5 We are constantly searching for technology advances which may allow more low or zero-carbon electricity to be generated locally, though currently we are unable to see any such technology advances materialising in the near future.

4.6 Regional cooperation can provide a potential source of zero-carbon energy to Hong Kong, but its viability depends on a number of factors, such as:

- the community's consensus to accept the chosen type of zero-carbon electricity, both its merits and demerits;
- the availability of suitable and affordable zero-carbon energy sources of supply from our neighbouring regions to Hong Kong, bearing in mind that such should not compromise on the carbon performance of our neighbouring regions;
- the feasibility of a cross-boundary transmission system in the form of a dedicated link to ensure supply security;
- the time it will take to commence supply of zero-carbon energy to Hong Kong, taking into consideration the long-term planning, long lead time and early commitments for investments required for the supporting infrastructure; and
- the necessary supports in all cross-boundary planning, investment decision making, statutory permissions and related engineering works from the community and relevant authorities both in the Mainland and Hong Kong.

There are at present uncertainties to these factors, and further exploration will be required for an informed assessment.

4.7 Overall, we believe decarbonisation is a joint effort and collective endeavours, and each and every of us living and working in Hong Kong has a role to play. Community

consensus and commitment is therefore critical in order for the city to be able to make real decarbonisation progress.

- 4.8 Detailed studies and careful considerations must be made for Hong Kong to formulate a responsible and practical decarbonisation strategy. Operating under the SCA regime and with our expertise and experience in the electricity sector, HK Electric is well placed to contribute to these efforts. We will continue to work closely with the relevant authorities and all stakeholders towards the city's further decarbonisation, and are committed to giving effect to the climate policy to be decided by the Hong Kong SAR Government.

The Hongkong Electric Co., Ltd.
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