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ACE Paper 6/2025 For discussion on 12 May 2025

## **Review of the Ninth Technical Memorandum for Allocation of Emission Allowances for Power Plants**

## PURPOSE

This paper seeks Members' views on the Government's proposal to further tighten emission allowances (EAs) for power plants starting from 1 January 2030 by way of issuing a new Technical Memorandum (TM) (i.e. the Tenth TM) under Section 26G of the Air Pollution Control Ordinance (Cap. 311) (APCO).

## BACKGROUND

2. Hong Kong's air quality has been improving continuously. In 2024, the ambient concentrations of major air pollutants such as sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide and respirable suspended particulates (RSP) had reduced by 45% to 88% from 2004. The number of hours of reduced visibility observed had also greatly reduced by 82% from its peak in 2004. The significant improvement is partly attributed to the vigorous measures to reduce emissions from electricity generation. As compared with 2004, the emissions of SO<sub>2</sub>, nitrogen oxides (NO<sub>x</sub>)<sup>1</sup> and RSP from the power plants in 2024 reduced substantially by 98%, 76% and 88% respectively, despite an increase in electricity consumption of 18% during the same period.

3. Since 2008, the Secretary for Environment and Ecology (the Secretary) has been empowered to issue TMs under Section 26G of the APCO to allocate EAs for each type of specified pollutants, i.e.  $SO_2$ ,  $NO_x$  and RSP, in respect of the specified licences of the power plants. Under Section 26G(2) of the APCO, the Secretary, in allocating the EAs for a type of specified pollutant, shall:

- (a) have regard to the best practicable means for preventing the emission of that type of pollutant;
- (b) have as his purpose the attainment and maintenance of any relevant air quality objective (AQO); and

<sup>&</sup>lt;sup>1</sup> All quantities of NO<sub>x</sub> emissions are expressed as nitrogen dioxide.

(c) have regard to whether the emission of that type of pollutant would be, or be likely to be, prejudicial to health.

4. So far, we have issued nine TMs to set out the emission caps of power plants for each emission year starting from 2010. The EAs set out in these nine TMs, actual emissions from power plants and electricity consumption involved are shown in **Annex A**. The latest TM, i.e. the Ninth TM, was passed by the Legislative Council (LegCo) in 2021, setting the EAs for power plants from 2026 onwards. Compared with the First TM, the EAs for SO<sub>2</sub>, NO<sub>x</sub> and RSP under the Ninth TM have been significantly reduced by 89%, 74% and 71%, respectively. When issuing the Ninth TM, we also undertook to review the EAs not less than once every two years, which is in line with past practice.

5. For the Ninth TM, the first review was conducted in 2023, and the results indicated no room for tightening the EAs. Hence, no change was proposed in the last review.

## THE LATEST REVIEW

6. A second review has been conducted earlier this year, covering projections and assessments up to 2030. The factors taken into account, as well as the relevant assessment or projection, are set out as follows:

Factors	Projection/Assessment	
	CLP Power Hong Kong Limited (CLP)	The Hongkong Electric Company, Limited (HEC)
Projected local electricity demand	CLP's electricity demand in 2030-2031 is forecast to increase by 9% as compared to that of 2026-2027 when setting the Ninth TM, mainly driven by major infrastructure, commercial and housing developments including those in the Northern Metropolis.	Electricity demand in 2030- 2031 is forecast to be roughly the same as that of 2026-2027 when setting the Ninth TM.
Projected local gas	Currently, CLP operates ten	Currently, HEC operates
generation,	gas-fired units in the Black	four gas-fired units in the
including the	Point Power Station <sup>2</sup> .	Lamma Power Station and
construction of new		its Extension. It is also

<sup>&</sup>lt;sup>2</sup> The Penny's Bay Gas Turbine Power Station is an oil-fired power generation plant primarily for emergency and peak-lopping purposes. The Ninth TM has maintained the practice of allocating a fixed amount of EA to this plant, i.e. two tonnes of SO<sub>2</sub>, two tonnes of NOx and one tonne of RSP.

gas-fired units and replacement of coal-fired units	Increase in the electricity demand will partly be met by additional output from CLP's existing gas-fired units. CLP's gas generation ratio <sup>3</sup> will increase from 48% in 2026-2027 to 53% in 2030- 2031. All coal-fired units at the	constructing a new gas-fired unit (Unit L13) with an installed capacity of 380 megawatt (MW) planned for commissioning in 2029. With the commissioning of Unit L13, an old coal-fired unit (Unit L6) will retire. HEC's gas generation ratio
	Castle Peak A Station will be retired by 2026, while the remaining four coal-fired units at the Castle Peak B Station will be operated to meet peak electricity demand in 2030-2031. CLP's coal generation ratio will decrease from 16% in 2026-2027 to 9% in 2030-2031.	will increase from 70% in 2026-2027 to 77% in 2030-2031. Coal generation ratio will decrease from 30% to 23% accordingly. The operation of the two coal-fired units (Units L7 and L8) will still be required in 2030-2031 for meeting peak electricity demand as well as providing backup capacity.
Quantity of low- emission coal to be acquired by the power companies	Both power companies continue of low-emission coal for elect 2031 as far as possible, and ma emission control devices of co are mainly to meet peak electro back).	te to acquire adequate quantity cricity generation in 2030 and aintain the performance of the al-fired units (whose purposes icity demand and serve as fall
Projected nuclear power and clean energy to be imported into Hong Kong	The Daya Bay Nuclear Power Station (DBNPS) to continue to supply 80% of its annual nuclear power output to CLP in 2030-2031. CLP plans to additionally import about 1 500 GWh zero carbon energy from the Mainland each year via the enhanced Clean Energy Transmission System (CETS).	Not applicable
Projected electricity intake from various local renewable energy (RE) sources	Slight increase in the projecte RE sources (see <b>Annex B</b> ).	d electricity intake from local

<sup>&</sup>lt;sup>3</sup> All generation ratios are on sent-out basis.

7. Similar to other advanced economies such as the European Union, we have been requiring the two power companies to adopt the best practicable measures (BPM) in their plants' design and operational management, to minimise the emission of air pollutants. Examples include retrofitting coal-fired units with flue gas desulphurisation and denitrification systems, maximising the use of existing gas-fired units, prioritising the use of coal-fired units equipped with better emission control devices, using low-emission coal and upholding the performance of emission control devices.

8. With the on-going adoption of BPM and given the projections set out in paragraph 6 above, we see room to further tighten the EAs in 2030 and beyond and issue the Tenth TM. The proposed new EAs for the two power companies after tightening, together with the reductions relative to the respective levels set out in the existing Ninth TM, are presented in **Table 1** -

		SO <sub>2</sub>	NOx	RSP
HEC	Lamma Power Station and Lamma Power Station Extension (mixed fuel)	1 056 [-32%]	1 931 [-34%]	85 [-25%]
	Black Point Power Station (gas-fired)	97 [-27%]	2 327 [14%]	131 [14%]
CLP	Castle Peak Power Station (coal-fired)	1 147 [-1%]	4 090 [-34%]	100 [-28%]
	Penny's Bay Gas Turbine Power Station (oil-fired)	2 [0%]	2 [0%]	1 [0%]
	Total of CLP's Stations	1 246 [-3%]	6 419 [-22%]	232 [-9%]
	Electricity sector	2 302 [-19%]	8 350 [-25%]	317 [-14%]

 Table 1: Projected EAs in 2030 and beyond (tonnes per year)

Note: The figures in square brackets are the change in percentage when compared with the EAs stipulated in the Ninth TM.

As shown in Table 1, the EAs for the entire electricity sector will be tightened by 19% for SO<sub>2</sub>, 25% for NO<sub>x</sub> and 14% for RSP. The tightening will help further improving air quality, given that emissions from the electricity sector account for 61%, 27% and 13% of the territory-wide emissions of the respective pollutants in 2022.

9. The allocation method and the formulae for allocating the EAs in the Tenth TM are presented at **Annexes C** and **D** respectively. In the event of new electricity

works<sup>4</sup>, we will, as in the past, allocate EAs based on the emission performance of a new gas-fired unit having adopted BPM. Details are at **Annex E**. We also propose to retain the mechanism in the Ninth TM to cater for the possible intake of RE by new electricity works.

## CONSULTATION

10. We have consulted the two power companies on the proposed tightening. Both of them accepted the proposal and acknowledged the objective of progressively reducing emissions while ensuring a reliable electricity supply. They also indicated that should the operation of the power plants encounter events that are beyond their control and with significant emission implications<sup>5</sup>, they may have to seek to resort to the special event provision within Section 26K of the APCO<sup>6</sup> to apply for an adjustment to their allocated EAs.

11. We consulted the Panel on Environmental Affairs of the LegCo on the proposed tightening of EAs on 28 April 2025. The Panel supported the proposal.

## WAY FORWARD

12. Subject to Members' views, we plan to submit the Tenth TM to LegCo for negative vetting under Section 37B(1) of the APCO in the second quarter of 2025. Section 26G(4) of the APCO requires a TM to be issued at least four years before the commencement of the emission year (to start on 1 January) that it takes effect. Hence, the tightened EAs are proposed to take effect from 1 January 2030. We will maintain the practice to review the EAs every two years.

#### **ADVICE SOUGHT**

13. Members' views on the proposed tightening are welcome.

#### Environment and Ecology Bureau May 2025

<sup>&</sup>lt;sup>4</sup> "New electricity works" refers to new entrant (i.e. operators in addition to HEC and CLP) coming into the electricity generation industry after the commencement of the proposed TM.

<sup>&</sup>lt;sup>5</sup> For instance, cessation or insufficient supply of low-emission coal, unexpected increase in power demand, difficult to secure low-sulphur natural gas, less than expected nuclear power and clean energy made available, unexpected delay in the commissioning test of the new gas-fired unit, etc.

<sup>&</sup>lt;sup>6</sup> Under Section 26K of the APCO, the Director of Environmental Protection may adjust the emission caps when the power companies invoke the special event provision to account for any uncontrollable factors that affect the additional nuclear power supply or the commissioning schedule of the new gas-fired unit which are the prime considerations in setting the EAs in the Tenth TM. This special event mechanism to adjust the emission cap may be resorted to only when the incident involved is outside the control of the power companies and they have made their best endeavour to avoid such happenings and minimise the resulting pollutants emissions.

# $SO_2$ and $NO_x$ (Tonnes) RSP (Tonnes) Electricity Demand (GWh) 50,000 6,000 - -×

**Emission Caps, Actual Emissions and Electricity Demand since 2010** 



#### Annex A

## Electricity intake from local RE

For HEC, a total of about 22 GWh electricity intake from RE per year is estimated to be obtained in 2030 and 2031. For CLP, a total of about 1 043 GWh electricity intake from RE per year are estimated to be obtained in 2030 and 2031. The projected total electricity intake from local RE sources in 2030 and 2031 will be around 2% of the projected electricity demand. Breakdown of electricity intake from RE sources in 2030 and 2031 is presented in the table below.

	<b>RE Facilities</b>	RE intake under the Ninth TM	Estimated RE intake in 2030 and 2031
HFC	Lamma Winds and solar energy generation systems	3	2 [Note 1]
IIIC	Distributed RE systems [Note 2]	4	20
	Total of HEC's RE	7	22
CLP	<ul> <li>Waste-to-energy Facilities:</li> <li>Sludge Treatment Facility, (T·PARK)</li> <li>Organic Resources Recovery Centre Phase 1 (Siu Ho Wan) (O·PARK1)</li> <li>Organic Resources Recovery Centre Phase 2 (Sha Ling) (O·PARK2)</li> <li>Integrated Waste Management Facility Phase 1 (Shek Kwu Chau) (I·PARK1)</li> </ul>	526	535
	WENT Landfill Gas Generation & Distributed RE systems [Note 2]	268	508
	Total of CLP's RE	794	1 043
	Electricity sector	801	1 065

#### Breakdown of electricity intake from RE in 2030 and 2031 (GWh)

- Note 1: The decrease of the estimated RE intake from HEC's RE facilities in 2030-2031 is due to the scheduled retirement of HEC's wind turbine, "Lamma Wind" in 2026.
- Note 2: This refers to the Government's collaboration with the power companies in promoting the development of distributed RE systems in the communities, such as solar energy through the Feed-in Tariff (FiT) Scheme.

#### Annex C

## Allocation Method for Emission Allowances for Existing Electricity Works under the Tenth TM

We will continue to keep the allocation method adopted in the Ninth TM -

EAs to be allocated		
=	EAs that are required with the use of best practicable means (i.e. those presented in Table 1 in paragraph 8)	
plus/minus	<ul> <li>EAs to be added/deducted owing to deviation of the actual intake of electricity from the anticipated RE and clean energy sources<sup>7</sup></li> <li>HEC: intake about 22 GWh from local RE sources in 2030-2031</li> <li>CLP: intake about 2 543 GWh in 2030-2031, comprising 1 043 GWh from local RE facilities and additional import of 1 500 GWh from zero-carbon energy via the enhanced CETS</li> </ul>	

Anticipated RE and clean energy sources include solar energy generation systems (including the distributed RE systems), waste to energy facilities and the enhancement of the CETS for the supply of clean energy to Hong Kong. The current mechanism is used to calculate the deviation between the actual renewable energy intake of power plants and the original projection, thereby determining the emission allowances the power plants can receive. Given that power plants may import additional zero-carbon energy from Mainland China at the time. Thus, the aforementioned mechanism is also applicable for determining the emission allowances the power plants can receive under such circumstances.

## Annex D

## **Emission Allowances for Existing Electricity Works under the Ninth and Tenth TMs (tonnes per year)**

## (a) Lamma Power Station and Lamma Power Station Extension

	Ninth TM (2026 – 2029) <sup>@</sup>	Tenth TM (2030 and thereafter)
SO <sub>2</sub>	$1.564 + (7 - A) \times 0.151$	$1\ 056 + (22 - A) \times 0.114*$
NO <sub>x</sub>	$2906 + (7 - A) \times 0.282$	$1 931 + (22 - A) \times 0.203*$
RSP	$113 + (7 - A) \times 0.011$	$85 + (22 - A) \times 0.009*$

## (b) Black Point Power Station

	Ninth TM	Tenth TM
	( <b>2026</b> – <b>2029</b> ) <sup>@</sup>	(2030 and thereafter)
$SO_2$	$133 + (603 - B) \times 0.008$	$97 + (2162^{\&} - B) \times 0.005^{\land}$
NO <sub>x</sub>	$2\ 050 + (603 - B) \times 0.118$	$2 327 + (2162^{\&} - B) \times 0.111^{\land}$
RSP	$115 + (603 - B) \times 0.007$	$131 + (2162^{\&} - B) \times 0.006^{\land}$

## (c) <u>Castle Peak Power Station</u>

	Ninth TM	Tenth TM
	$(2026 - 2029)^{\odot}$	(2030 and thereafter)
$SO_2$	$1\ 153 + (191 - C) \times 0.203$	$1 147 + (381^{\&} - C) \times 0.315^{\#}$
NO <sub>x</sub>	$6\ 186 + (191 - C) \times 1.087$	$4\ 090 + (381^{\&} - C) \times 1.124^{\#}$
RSP	$138 + (191 - C) \times 0.024$	$100 + (381^{\&} - C) \times 0.027^{\#}$

#### (d) Penny's Bay Gas Turbine Power Station

	Ninth TM (2026 – 2029) <sup>@</sup>	Tenth TM (2030 and thereafter)
SO <sub>2</sub>	2	2
NO <sub>x</sub>	2	2
RSP	1	1

- @ When the Tenth TM is issued, the EAs specified in the Ninth Technical Memorandum for each emission year starting from 1 January 2030 will no longer be applicable.
- \* Composite unit emission factors of coal-fired and gas-fired units in Lamma Power Station based on the projected electricity generation ratio (around 77% gas and 23% coal) in 2030/2031
- ^ Unit emission factors of gas-fired units in Black Point Power Station in 2030/2031
- # Unit emission factors of coal-fired units in Castle Peak Power Station in 2030/2031
- & Electricity intake by CLP from the RE systems and other clean energy systems regarded as relevant by the Secretary will displace both gas and coal generation broadly according to their ratio of CLP. It is projected that in the period 2030 to 2031, (i) the electricity generation from CLP's gas-fired and coal-fired units are around 85% to 15% respectively, and (ii) gas generation at Black Point Power Station and coal generation at Castle Peak Power Station to be offset by the RE electricity and clean energy intake are 2 162 GWh (i.e. 85% of the total anticipated RE electricity and clean energy intake of 2 543 GWh) and 381 GWh (i.e. 15% of the total anticipated RE electricity and clean energy intake) respectively.

#### where -

- A is the aggregate of total net sent-out electricity output (in GWh) from the RE Systems and other clean energy systems regarded as relevant by the Secretary to the electricity grid connected to Lamma Power Station and Lamma Power Station Extension in the emission year;
- B is the aggregate of total net sent-out electricity output (in GWh) from the RE Systems and other clean energy systems regarded as relevant by the Secretary to the electricity grid connected to Black Point Power Station in the emission year; and
- C is the aggregate of total net sent-out electricity output (in GWh) from the RE Systems and other clean energy systems regarded as relevant by the Secretary to the electricity grid connected to Castle Peak Power Station in the emission year.

#### Annex E

## Proposed Emission Allowances for <u>New</u> Electricity Works under the Tenth TM (tonnes per year)

	2030 and thereafter
$SO_2$	$10 \times (D/300) \times (E/12) - F \times 0.005^{-1}$
NO <sub>x</sub>	$56 \times (D/300) \times (E/12) - F \times 0.028^{-1}$
RSP	$12 \times (D/300) \times (E/12) - F \times 0.006^{-1}$
^ Un	it emission factors of gas-fired units equipped with latest

^ Unit emission factors of gas-fired units equipped with latest emission control device

#### where -

- D is the total installed capacity (in MW) of the New Electricity Works; or 300 (i.e. reference installed capacity), whichever is smaller;
- E is the total number of months in the emission year after the commencement of operation of the New Electricity Works and part of a month is taken as a full month in the determination; and
- F is the aggregate of total net sent-out electricity output (in GWh) from the RE Systems and other clean energy systems regarded as relevant by the Secretary to the electricity grid connected to the New Electricity Works in the emission year.