

LEGISLATIVE COUNCIL BRIEF

Air Pollution Control Ordinance (Cap. 311)

Fifth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences

INTRODUCTION

Pursuant to Section 26G of the Air Pollution Control Ordinance (Cap. 311) (the Ordinance), the Secretary for the Environment (the Secretary) has made the "Fifth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences" (the Fifth TM) at **Annex** to tighten the emission allowances for the two power companies with a view to improving air quality. The emission allowances will apply to three types of air pollutants, i.e., sulphur dioxide (SO₂), nitrogen oxides (NO_x) and respirable suspended particulates (RSP), to be allocated in respect of each specified licence to conduct electricity works for each emission year from 1 January 2020.

JUSTIFICATIONS

2. Section 26G(2) of the Ordinance provides for the Secretary to allocate the emission allowances for each type of specified pollutant allocated in respect of each specified licence to conduct electricity works by a technical memorandum (TM). The Secretary, in making the emission allocations, shall:

- (a) have regard to the best practicable means (BPM) for preventing the emission of that type of pollutant;
- (b) have as his purpose the attainment and maintenance of any relevant air quality objective ; and
- (c) have regard to whether the emission of that type of pollutant would be, or be likely to be, prejudicial to health.

3. In 2014, the Secretary issued the "Fourth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences" (the Fourth TM) to allocate emission allowances in relation to each emission year commencing on 1 January 2019 for each of the electricity works of the two power companies. To meet

the emission allowances set under the TM for 2015 and beyond, the power companies should continue to use low emission coal and uphold the performance of their emission control devices while maximising the use of existing gas-fired electricity generation units (gas-fired units) and prioritizing the use of coal-fired electricity generation units (coal-fired units) equipped with advanced emission control devices.

4. The extensive retrofits that the power companies have undertaken to reduce their emissions have made further retrofits impracticable. Revamping the fuel mix for power generation is the only practicable way to significantly reduce their emissions. Following a public consultation conducted in the first half of 2014 on two fuel mix options to meet the environmental targets in 2020, the Government set out its plan to implement the future fuel mix in March 2015. Having regard to public views and comments received at the public consultation on fuel mix, the Government intends to increase the proportion of natural gas generation to around 50% in 2020, and, subject to a reasonable import price, to maintain the current interim measure of importing 80% of nuclear output¹ from the Daya Bay Nuclear Power Station (DBNPS) so that nuclear import would account for around 25% of the total fuel mix. Furthermore, subject to public views on the tariff implications, the Government is prepared to consider developing more renewable energy (RE), and will also enhance efforts to promote energy saving. The remaining demand will be met by coal-fired generation.

5. When reviewing the Fourth TM, the Administration have taken note of the following ó

- (a) the progress of implementing the fuel mix plan for 2020, including the construction of new gas-fired units and replacement of some old power generation units, which are scheduled for retirement after reaching the end of their service life in the coming years;
- (b) the practicability to maintain the current import of 80% of nuclear output from the DBNPS after 2018;
- (c) new technology to control NOx emissions from new gas-fired units²; and

¹ In addition to the original agreement to import 70% of the electricity output of Daya Bay Nuclear Power Station (DBNPS), CLP had made arrangement with DBNPS to import an additional 10% of nuclear power for a period of 4 years from 2015 to 2018 as an interim measure.

² Natural gas (NG)-fired units have negligible emissions of SO₂ and RSP. To reduce their NO_x emissions, new NG-fired units shall be equipped with a Dry Low-NO_x (DLN) combustion system and a Selective Catalytic Reduction (SCR) system, which in combination can have an NO_x

(d) the projected local electricity consumption for 2020.

6. Based on the above parameters, our assessment for the Hongkong Electric Company, Limited (HEC) is as follows ó

(a) the electricity demand for Hong Kong Island is forecasted to reduce by around 4% in 2020 as compared to the demand projection for 2019 when setting the Fourth TM. This is because there will be no major growth in demand arising from infrastructure development during the period while the energy efficiency and conservation initiatives introduced by the Government, such as the Buildings Energy Efficiency Ordinance will help reduce electricity consumption. The operation of its coal-fired units will be reduced;

(b) a new gas-fired unit of around 335 MW would be required by the end of 2019 to meet electricity demand resulting from the scheduled retirement of old generating units. This new gas-fired unit has obtained the provisional approval from the Executive Council for installation and an environmental permit (EP) under the Environmental Impact Assessment Ordinance (Cap. 499) for its construction and operation;

(c) the service life of an existing gas-fired unit due for retirement in early 2020 would be extended for a few years having regard to its operational conditions with proper refurbishment; and

(d) the reduced electricity demand in 2020 and the availability of more gas-fired generation capacity could reduce its reliance on coal-fired units for power generation. It is estimated that HEC's emission allowances could be reduced by 26% for SO₂, 29% for NO_x and 28% for RSP in 2020 as compared to the levels in the Fourth TM.

7. As for CLP Power Hong Kong Limited (CLP), the assessment is as follows ó

(a) there will be around 1% increase in its local electricity demand in 2020 as compared to that of 2019;

reduction efficiency of 90% to meet a new NO_x emission standard of 5 mg/m³.

- (b) it made an application in April 2015 to carry out an Environmental Impact Assessment (EIA) for installing additional gas-fired units at its Black Point Power Station. At this stage, there are uncertainties as to whether additional generation unit could be ready for operation in 2020;
- (c) DBNPS would continue supplying 80% nuclear power beyond 2018; and
- (d) the relatively stable electricity demand in 2020 coupled with the continuation of the additional nuclear power import will help reduce CLP's local generation. It is estimated that its emission allowances could be reduced by 9% for SO₂, 10 % for NO_x and 12% for RSP in 2020 as compared to the levels in the Fourth TM.

8. The proposed emission allowances for the electricity works of the two power companies in 2020 and beyond are presented in Table 1 below, together with the reductions relative to the respective Fourth TM levels.

Table 1: Projected Emissions for Electricity Works in 2020 and beyond (tonnes per year)

		Sulphur dioxide	Nitrogen oxides^[@]	Respirable suspended particulates
HEC	Lamma Power Station and Lamma Power Station Extension (mixed fuel)	3 130 [-26%]	6 350 [-29%]	145 [-28%]
CLP	Black Point Power Station (gas-fired)	279 [-4%]	4 074 [-2%]	108 [-2%]
	Castle Peak Power Station (coal-fired)	4 259 [-9%]	10 844 [-12%]	331 [-15%]
	Penny's Bay Gas Turbine Power Station (oil -fired)	2 [-0%]	2 [-0%]	1 [-0%]
	Total of CLP's Stations	4 540 [-9%]	14 920 [-10%]	440 [-12%]
Electricity sector		7 670 [-17%]	21 270 [-17%]	585 [-16%]

[@] Expressed as nitrogen dioxide

Note: The figures in square brackets are the percent reduction comparing with the emission allowances stipulated in the Fourth TM.

9. For renewable energy facilities, the Lamma Winds of HEC and its thin film photovoltaic solar system at Lamma Power Station will continue to supply RE of about 2 GWh per year in total to HEC's power grid. CLP will have additional RE power from Phase 1 of Environmental Protection Department's (EPD) new Organic Waste Treatment Facilities in Siu Ho Wan, North Lantau, which will be commissioned in 2017, apart from EPD's Sludge Treatment Facility in Tuen Mun, which started operation in 2015. These two facilities will supply about 32 GWh of surplus electricity to CLP's power grid per year. As for the landfill gas from EPD's South East New Territories Landfill, which was covered in the last review, it will be used by a gas company for local use instead of generating surplus electricity to the power grid. Besides, EPD's Integrated Waste Management Facility in Shek Kwu Chau is also a potential RE facility and is expected to start operation by 2022. That will be assessed in our next review of TM when more details are available. We will also follow the established mechanism in the Fourth TM for ascertaining the emission allowances according to the actual intake of the electricity generated from RE based on the unit emission factors of coal-fired units.

THE FIFTH TECHNICAL MEMORANDUM

10. Based on the above review, we propose to promulgate a new TM to allocate the emission allowances from 2020 onwards to each of the existing power plants by the following method, which was also adopted in the Fourth TM:

	Emission allowances to be allocated and ascertained
=	Emission allowances that are required with the use of BPM (i.e., those presented in Table 1 above)
<i>plus/minus</i>	Emission allowances to be added / deducted due to deviation of the actual intake of RE from the anticipated intake (i.e., 2 GWh and 32 GWh for HEC and CLP respectively) in accordance with the unit emission factors of coal-fired units

11. The formulae for allocating the emission allowances to the four electricity works are presented in the tables below:

Table 2(a): Lamma Power Station and Lamma Power Station Extension

	Quantity of Emission Allowance for 2020 and thereafter
SO ₂	$3\,130 + (2 \text{ ó A}) \times 0.563$
NO _x ^[@]	$6\,350 + (2 \text{ ó A}) \times 0.928$
RSP	$145 + (2 \text{ ó A}) \times 0.019$

Table 2(b): Black Point Power Station

	Quantity of Emission Allowance for 2020 and thereafter
SO ₂	279
NO _x ^[@]	4 074
RSP	108

Table 2(c): Castle Peak Power Station

	Quantity of Emission Allowance for 2020 and thereafter
SO ₂	$4\,259 + (32 \text{ ó B}) \times 0.422$
NO _x ^[@]	$10\,844 + (32 \text{ ó B}) \times 1.073$
RSP	$331 + (32 \text{ ó B}) \times 0.033$

Table 2(d): Penny Bay's Gas Turbine Power Station

	Quantity of Emission Allowance for 2020 and thereafter
SO ₂	2
NO _x ^[@]	2
RSP	1

^[@] Expressed as nitrogen dioxide

where -

- A is the aggregate of total net sent-out electricity output (in GWh) from individual RE to the electricity grid of Lamma Power Station and Lamma Power Station Extension in the emission year; and
- B is the aggregate of total net sent-out electricity output (in GWh) from

individual RE to the electricity grid of Castle Peak Power Station in the emission year.

12. For any possible new electricity works³, we will allocate emission allowances based on the emission performance of a new gas-fired unit adopting BPM for emission reduction. We also propose to retain the mechanism in the Fourth TM to cater for the possible intake of RE by new electricity works. Accordingly, the formulae for allocating and ascertaining the emission allowances in respect of each of the specified pollutants for possible new electricity works, with respect to the same reference installed capacity adopted in the previous TM, i.e., 300 MW, for emission years starting from 1 January 2020 would be as presented in the table below.

Table 3: New Electricity Works

	Quantity of Emission Allowance for 2020 and thereafter
SO ₂	$36 \times (C/300) \times (D/12) \text{ ó } E \times 0.018$
NO _x ^[@]	$55 \times (C/300) \times (D/12) \text{ ó } E \times 0.028$
RSP	$14 \times (C/300) \times (D/12) \text{ ó } E \times 0.007$

[@] Expressed as nitrogen dioxide

where ó

- C is the total installed capacity (in MW) of the New Electricity Works; or 300 (i.e., reference installed capacity), whichever is smaller;
- D 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
- E is the aggregate of total net sent-out electricity output (in GWh) from individual RE to the electricity grid of the New Electricity Works in the emission year.

LEGISLATIVE TIMETABLE

13. The Fifth TM will be published in the Gazette on 23 October 2015 and tabled at the Legislative Council for negative vetting on 28 October 2015. Subject to the negative vetting by the Legislative Council, the new set of emission allowances

³ "New electricity works" refers to new entrant coming into the electricity generation industry after the commencement of the proposed TM.

will take effect at least four years after the commencement of the Fifth TM, i.e., starting from the emission year of 2020 in accordance with Section 26G(4) of the Ordinance.

BASIC LAW AND HUMAN RIGHTS IMPLICATIONS

14. The Fifth TM is in conformity with the Basic Law, including the provisions concerning human rights.

ENVIRONMENTAL AND SUSTAINABILITY IMPLICATIONS

15. As compared with the emission allowances for 2019 set under the Fourth TM, the proposed Fifth TM will see a further tightening of 17% for both SO₂ and NO_x as well as 16% for RSP for the electricity sector. The reduction will help improve air quality given that emissions from the electricity sector account for 47%, 31% and 16% respectively of the territory-wide emissions of these pollutants in 2013.

16. CLP is undertaking an EIA study for installing additional gas-fired units with a view to increasing the use of natural gas for generation in response to government's fuel mix plan for 2020. As such, we have not taken into consideration its new units in setting the emission allowances under the proposed Fifth TM because of uncertainty on their readiness for operation by 2020. Due to this uncertainty, there might be a shortfall for meeting the 2020 emission reduction targets as agreed with Guangdong in 2012. We will keep in view closely CLP's preparation for installing the additional gas-fired units and the progress of other air quality improvement measures in the run up to 2020. If the development plan for CLP's new gas-fired units is firmed up in 2016, we shall prepare another TM next year to tighten the emission allowances.

17. Achieving better air quality for Hong Kong through statutory control on power plants' emissions is in line with the sustainability principles of seeking opportunities to enhance the quality of our living environment that promotes and protects the physical health of the people of Hong Kong.

TARIFF IMPLICATIONS

18. Meeting the proposed emission allowances for 2020 will involve new capital investment in the new gas-fired unit by HEC as well as a change on its fuel mix. As HEC's new gas-fired unit proposal is still being assessed by the government and CLP still needs to discuss with parties concerned on the intake price of additional nuclear import, it is premature to provide a meaningful assessment of the tariff implications for 2020 and beyond.

19. The power companies will present their tariff assessment to the Administration annually in accordance with the prevailing regulatory mechanism under the Scheme of Control Agreement.

FINANCIAL AND CIVIL SERVICE IMPLICATIONS

20. The Fifth TM will not incur additional financial implications for the Administration. Enforcement of the emission caps for power companies will be carried out by existing staff of EPD.

CONSULTATION

21. We have consulted the two power companies about the proposal. Both companies consider the proposed new emission allowances extremely challenging. They are however supportive of Hong Kong's new fuel mix plan for 2020 and are committed to working closely with the Administration to ensure compliance while maintaining a reliable supply of electricity to the customers. HEC considers it important to have the Government's early approval for its new gas-fired unit for meeting a very tight work schedule as well as the extension of the service life of an existing gas-fired unit. While currently undertaking an EIA study and other development work for building additional gas-fired generation capacity, CLP considers assuming its readiness for setting the emission allowances in the proposed TM to be premature. However, it believes that importing additional nuclear energy on top of its existing supply contract of 70% of the annual output of the DBNPS before the start of 2020 a more realistic scenario.

22. Both power companies also see the compliance of the emission allowances

contingent upon having the supply of fuels of the right quality. They have further explained that with the natural deterioration in the performance of its coal-fired units and pollution control equipment, any forced outages of the units or equipment will jeopardize their compliance with the new emission allowances. Should their operation encounter events that are beyond their control and with significant emission implications, e.g., cessation or insufficient supply of low emission coal, unexpected increase in power demand, increase in sulphur content of the natural gas supplied, less than expected additional nuclear energy made available to CLP for 2020, delay in the operation of HEC's new gas-fired unit to meet its schedule by the end of 2019 and/or other related issues outside their control, they will have to resort to the special event provision under Section 26K of the APCO to adjust their emission allowances accordingly. When necessary, we will handle these special events in accordance with the APCO.

23. The Panel on Environmental Affairs of the Legislative Council was consulted on the new set of emission allowances on 29 September 2015. The Panel supported the proposal. Some Members suggested that the Government should ask the power companies to help develop more RE and reduce the overall electricity consumption. We explained that the Administration invited public views on these issues in the public consultation on the Future Development of the Electricity Market which ended on 30 June 2015, and would take into account the public feedback received in considering how to further promote energy efficiency and RE.

24. The Advisory Council on the Environment was consulted on the Fifth TM on 12 October 2015. The Council supported the proposal and some Members suggested that the Government should enhance its efforts in promoting the use of RE despite its higher costs.

PUBLICITY

25. A press release will be issued on the date of gazette of the Fifth TM. A spokesman will be made available for media enquiries.

ENQUIRY

26. For any enquiry relating to this brief, please contact Mr. W C Mok, Assistant Director of Environmental Protection (Air Policy), at 2594 6309.

Environmental Protection Department
October 2015

**FIFTH TECHNICAL MEMORANDUM
FOR ALLOCATION OF EMISSION ALLOWANCES
IN RESPECT OF SPECIFIED LICENCES**

**WONG Kam-sing
SECRETARY FOR THE ENVIRONMENT**

This Technical Memorandum is published under Section 37B(1) of the Air Pollution Control Ordinance (Cap. 311) and shall commence to have effect in accordance with Section 37C of that Ordinance.

TABLE OF CONTENTS

	Page
1. PRELIMINARY	1
1.1 Citation and Commencement	1
1.2 Application and Scope	1
1.3 Interpretation	1
2. ALLOCATION OF EMISSION ALLOWANCES	3

FIFTH TECHNICAL MEMORANDUM FOR ALLOCATION OF EMISSION ALLOWANCES IN RESPECT OF SPECIFIED LICENCES

1. PRELIMINARY

1.1 Citation and Commencement

This Technical Memorandum is the fifth technical memorandum issued pursuant to Section 26G of the Ordinance and may be cited as the "Fifth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences". This Technical Memorandum shall come into operation in accordance with Section 37C of the Ordinance.

1.2 Application and Scope

This Technical Memorandum sets out the quantity of emission allowances for each type of specified pollutant allocated in respect of each specified licence and the allocation principles and determination method of the quantity of emission allowances to be allocated for each and every emission year from 1 January 2020. The allocation of emission allowances set out or determined under the Fourth Technical Memorandum for each and every emission year from 1 January 2020 is superseded by this Technical Memorandum.

1.3 Interpretation

In this Technical Memorandum, unless the context otherwise requires, the following definitions apply ó

"Authority" (監督) has the same meaning as in the Ordinance.

"Electricity generation for local consumption" (供本港使用電力) means the gross electricity generation of the Electricity Works concerned minus the electricity sales for export outside the Hong Kong Special Administrative Region irrespective of whether the export sales are directly conducted by the subject specified licence holder or indirectly dealt with by other dealers.

"Electricity Works" (電力工程) means the process of Electricity Works

specified in item 7 of Schedule 1 to the Ordinance.

"emission allowance" (排放限額) has the same meaning as in the Ordinance.

"emission year" (排放年度) has the same meaning as in the Ordinance.

"Existing Electricity Works" (現有電力工程) means the Electricity Works conducted in any of the following power stations in respect of which a valid specified licence is in force on the commencement date of this Technical Memorandum

- (a) Lamma Power Station and Lamma Power Station Extension at Lot 1934 and Lot 2200, DD 3, Po Lo Tsui, Lamma Island;
- (b) Black Point Power Station at Yung Long Road, Lung Kwu Tan, Tuen Mun, New Territories;
- (c) Castle Peak Power Station at Lung Yiu Street, Tuen Mun, New Territories; and
- (d) Penny's Bay Gas Turbine Power Station at Lot 23, DD 256, Penny's Bay, Lantau Island, New Territories.

"Fourth Technical Memorandum" (第四份技術備忘錄) means the "Fourth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences" published in the Gazette under Section 37B(1) of the Ordinance on 17 October 2014 which came into operation in accordance with Section 37C of the Ordinance.

"New Electricity Works" (新電力工程) means any Electricity Works, other than the Existing Electricity Works, which comes into existence after the commencement of this Technical Memorandum.

"Ordinance" (條例) means the Air Pollution Control Ordinance (Cap. 311).

"Renewable Energy System" (可再生能源系統) means an electricity generation system employing solar, wind, biomass, hydro, tidal, wave, geothermal or energy from waste (including landfill gas or sewage gas) that provides electricity to the grid.

"Secretary" (局長) has the same meaning as in the Ordinance.

"specified licence" (指明牌照) has the same meaning as in the

Ordinance.

"specified licence holder" (指明牌照持有人) has the same meaning as in the Ordinance.

"specified pollutant" (指明污染物) has the same meaning as in the Ordinance.

2. ALLOCATION OF EMISSION ALLOWANCES

2.1 The quantity of emission allowances for each type of specified pollutant allocated to each specified licence of Existing Electricity Works for each and every emission year from 1 January 2020 shall be determined by the formulae in the respective tables as follows

(a) Lamma Power Station and Lamma Power Station Extension

	2020 and thereafter
Sulphur dioxide	$3\,130 + (2 \text{ ó A}) \times 0.563$
Nitrogen oxides ⁽ⁱ⁾	$6\,350 + (2 \text{ ó A}) \times 0.928$
Respirable suspended particulates	$145 + (2 \text{ ó A}) \times 0.019$

(b) Black Point Power Station

	2020 and thereafter
Sulphur dioxide	279
Nitrogen oxides ⁽ⁱ⁾	4 074
Respirable suspended particulates	108

(c) Castle Peak Power Station

	2020 and thereafter
Sulphur dioxide	$4\,259 + (32 \text{ ó B}) \times 0.422$
Nitrogen oxides ⁽ⁱ⁾	$10\,844 + (32 \text{ ó B}) \times 1.073$
Respirable suspended particulates	$331 + (32 \text{ ó B}) \times 0.033$

(d) Penny's Bay Gas Turbine Power Station

	2020 and thereafter
Sulphur dioxide	2
Nitrogen oxides ⁽ⁱ⁾	2
Respirable suspended particulates	1

⁽ⁱ⁾ Expressed as nitrogen dioxide

where δ

- A is the aggregate of total net sent-out electricity output (in GWh) from the Renewable Energy Systems to the electricity grid of Lamma Power Station and Lamma Power Station Extension in the emission year; and
- B is the aggregate of total net sent-out electricity output (in GWh) from the Renewable Energy Systems to the electricity grid of Castle Peak Power Station in the emission year.

2.2 The quantity of emission allowances for each type of specified pollutant allocated to each specified licence of New Electricity Works for each and every emission year from 1 January 2020 shall be determined by the formulae as follows-

	2020 and thereafter
Sulphur dioxide	$36 \times (C/300) \times (D/12) \delta E \times 0.018$
Nitrogen oxides ⁽ⁱⁱ⁾	$55 \times (C/300) \times (D/12) \delta E \times 0.028$
Respirable suspended particulates	$14 \times (C/300) \times (D/12) \delta E \times 0.007$

⁽ⁱⁱ⁾ Expressed as nitrogen dioxide

where δ

- C is the total installed capacity (in MW) of the New Electricity Works; or 300, whichever is smaller;
- D 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
- E is the aggregate of total net sent-out electricity output (in GWh) from the Renewable Energy Systems to the electricity grid of the New Electricity Works in the emission year.

2.3 The Authority shall make the allocation of emission allowances for

each type of specified pollutant in relation to each specified licence in respect of electricity generation for local consumption.

2.4 For the purposes of determination of the quantity of emission allowances referred in Sections 2.1 and 2.2, the aggregate of the total net sent-out electricity output from the Renewable Energy Systems in the emission year is to be rounded up to the next whole number.

2.5 The quantity of emission allowances determined in this Technical Memorandum for allocation to a specified licence shall be rounded up to the next whole number.

2.6 Unless otherwise provided or required in the Ordinance or its subsidiary legislation, the Authority shall allocate to each specified licence the respective quantity of emission allowances set out or determined in accordance with this Technical Memorandum for each and every emission year from 1 January 2020.

2.7 The Secretary shall review in 2016 the quantity of emission allowances for each type of specified pollutant for each specified licence set out or determined in accordance with this Technical Memorandum after the commencement of this Technical Memorandum.