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**ACE Paper 13/2010**
***For discussion on 11 October 2010***

# Review of the Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences

## PURPOSE

Section 26G of the Air Pollution Control Ordinance (Cap. 311) (the APCO) provides that the Secretary for the Environment (the Secretary) shall by technical memorandum (TM) allocate emission allowances for each type of specified pollutants for electricity power plants for the emission years from 1 January 2010. This paper informs Members of the findings of our review of the "Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences" issued under section 26G of the APCO in 2008 (the First TM). It also seeks Members' views on our proposal to reduce the emission allowances for power plants for the emission years from 1 January 2015 by way of issuing a new TM (the Second TM).

## BACKGROUND

2. In 2008, Government introduced amendments to the APCO to cap the emission of specified pollutants by power plants. The Secretary may allocate the emission allowances in respect of the specified pollutants to individual power plants by stipulating in the TM specific quantity of emission allowances or an allocation method for ascertaining the quantity of emission allowances. In addition, pursuant to section 26G(4) of the APCO, an allocation of emission allowances made by the TM in relation to an emission year (other than an allocation made under the First TM) could only take effect at least four years after the commencement of the TM making the allocation.

3. The Secretary issued the First TM in 2008 having regard to the provisions in section 26G(2) of the APCO[1]. Specifically, the First TM –

(a) caps the power sector's emission of sulphur dioxide (SO2), nitrogen oxides (NOx) and respirable suspended particulates (RSP) at 25,120 tonnes, 42,600 tonnes and 1,260 tonnes respectively for emission years starting 2010. Comparing to the 2007 levels[2], the emission caps of SO2, NOx and RSP have been substantially curtailed by about 67%, 13% and 46% respectively;

(b) stipulates that the total emission allowances in (a) above are to be distributed among the power plants operated by the two power companies based on their respective share of the quantity of electricity generation for local consumption[3] starting 2010 and updated not less than once every three years; and

(c) allows the allocation of not more than one percent of the total emission allowances for the power sector in respect of each of the specified pollutants for new electricity works.

4. During the Legislative Council's scrutiny of the First TM in 2008, we undertook to review it within two years.

## REVIEW FINDINGS

### Methodology for Allocating Emission Allowances

5. The current methodology for allocating emission allowances, which is based on the respective share of the quantity of electricity generation for local consumption of individual power companies, essentially reflects the allocation method we adopted in 2005 for assigning the emission caps to the two power companies for

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[1] Section 26G(2) of the APCO provides that in making an allocation of emission allowances to power plants, the Secretary shall –

(a) have regard to the best practicable means for preventing the emission of that type of pollutant;
(b) have on 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.

[2] The emission caps of SO2, NOx and RSP imposed on the power sector in 2007 were 75,913 tonnes, 48,738 tonnes and 2,335 tonnes respectively. The caps had been tightened up progressively and were stipulated in the First TM.

[3] "Quantity of electricity generation for local consumption" means the quantity of gross electricity generation of the Electricity Works concerned minus the quantity of its 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.

delivering the 2010 emission reduction targets agreed with the Guangdong Provincial Government for the Pearl River Delta Region. It works well as a driver to require the power companies to retrofit their generation units with emission reduction devices and switch to cleaner fuels. To meet the 2010 emission reduction targets, the power companies have already embarked on major retrofitting works to install emission abatement devices to bring about substantial improvement to the emission performance of their generation plants. Following installation of these planned emission abatement facilities, however, the scope for further emission reduction in future is more restricted and varies amongst different power plants.

6. In addition, the current generation units operated by the two power companies, though designed and constructed to the best practicable requirements then, have different emission performance because of different technologies adopted and stages of development. In general, the younger units emit less than the older ones. This difference in emission performance will have to be accounted for until the older generation units have been phased out. Moreover, any further scope for retrofitting the existing generation units with emission reduction devices is subject to practical constraints such as availability of space for the retrofit and practicable emission control technologies.

7. In considering further tightening of the emission caps on the power plants after 2010, we will therefore have to take account of the make-up of the existing generation units of each of the power companies as well as the emission reduction devices that have already been or will be retrofitted to their generation units for meeting the 2010 emission caps. To realize the maximum emission reduction potential of the power sector, the distribution of the emission allowances can no longer be made based on the sole consideration of the respective share of local electricity generation of the two power companies. Instead, it is necessary to set specific emission allowances for each of the power plants operated by the two power companies taking account of –

(a) the practicability and extent of further emission reduction that can be achieved from the existing power generation units by adopting further emission abatement technologies, etc.; and

(b) the scope for maximizing the use of the existing gas-firing generation units.

**Scope for Tightening the Emission Caps**

8. The two power companies have been unable to fully utilize their gas burning capacity because of the inadequate supply of natural gas. The Memorandum of Understanding on Energy Co-operation signed between Hong Kong and the Mainland in 2008 will make available additional supply of natural gas to Hong Kong in the coming few years. We envisage that there will be sufficient supply of natural gas to enable both power companies to make the full use of their existing gas burning capacity towards 2015. By then, the CLP Power Hong Kong Limited (CLP[4]) will be able to increase the local electricity generation by natural gas from the current level of about 10,900 GWh to about 16,430 GWh and the Hongkong Electric Co. Ltd. (HEC) from about 3,680 GWh to about 4,060 GWh, thereby increasing the overall share of natural gas in the combined fuel mix of the two power companies for local electricity generation from the current 39% to about 52%.

9. Increasing the use of natural gas, coupled with the commissioning of the emission abatement equipment being retrofitted, will make it possible for us to reduce the emission allowances for SO2, NOx and RSP set out in the First TM by 50%, 35% and 34% respectively.

**Frequency of Review**

10. The First TM requires the update of the emission allowances at a frequency of no less than once every three years to cater for changes in the share of local electricity generation for local consumption. Although we do not consider it advisable to continue to allocate emission allowances based on the share of electricity generation for local consumption, we are of the view that the current review frequency should be retained to provide for a regular framework for updating the emission allowances.

**Emission Allowances for Possible New Electricity Works**

11. The current allocation method in the First TM for making an allocation of not more than one percent of the total emission allowances of the power sector in respect of each of the specified pollutants for possible new electricity works[5] should

[4] Including also the Castle Peak Power Company Limited (CAPCO), which is jointly owned by CLP Power Hong Kong and ExxonMobil Energy Limited. The principal activity of CAPCO is the generation of electricity for the sole supply to CLP Power Hong Kong.

[5] "New electricity works" refers to new entrant comes into the electricity generation industry after the commencement of the TM.

be retained in relation to the emission years from 1 January 2015, so as to ensure that new electricity works will not be debarred from starting their business even with the use of the most advanced emission reduction technology.

**PROPOSED NEW TM**

12. Having regard to the relevant provisions in the APCO, the practicability of fully utilizing the existing gas-fired electricity generation capacity of the two power companies as a result of the additional natural gas supply forecasted over the next few years and the commissioning of the emission abatement equipment that is being retrofitted to the existing power generation units, we propose to reduce the emission allowances for the two power companies to the following levels[6] in relation to the emission years from 1 January 2015 –

| | **Emission Allowances for Existing Electricity Works (Tonnes Per Year)** | | |
|---|---|---|---|
| | **Sulphur dioxide** | **Nitrogen oxides** [@] | **Respirable suspended particulates** |
| **HEC** | | | |
| Lamma Power Station (mixed fuel) | 6,780 | 10,020 | 300 |
| **Subtotal** | **6,780 [72%]** [*] | **10,020 [63%]** [*] | **300 [64%]** [*] |
| **CLP** | | | |
| Black Point Power Station (gas-fired) | 1,440 | 4,140 | 110 |
| Castle Peak Power Station (coal-fired) | 4,260 | 13,390 | 420 |
| Penny's Bay Gas Turbine Power Station (oil -fired) [#] | 2 | 2 | 1 |
| **Subtotal** | **5,702 [36%]** [*] | **17,532 [66%]** [*] | **531 [67%]** [*] |
| **Total** | **12,482 [50%]** [*] | **27,552 [65%]** [*] | **831 [66%]** [*] |

[@] Expressed as nitrogen dioxide

[*] The figures in square brackets compare the proposed emission allowances with the current emission allowances in percentage terms.

[#] As the Penny's Bay Gas Turbine Power Station is for emergency and peak-lopping purposes, the projected SO2, NOx and RSP emissions for the purposes are one to two tonnes.

[6] The proposed emission allowances have taken account of the latest forecasted electricity generation for local consumption for 2015 and average annual sulphur and ash contents of the coal to be consumed by the two power companies.

13. In line with the existing practice, we propose to set out the following maximum emission allowances equivalent to approximately one percent of the total emission allowances for the entire power sector in respect of each of the specified pollutants for possible new electricity works with a total installed capacity equal to or more than 300 MW in relation to the emission years from 1 January 2015 as follows –

| **Specified Pollutant** | **Maximum Emission Allowances for New Electricity Works (Tonnes Per Year)** |
|---|---|
| Sulphur dioxide | 120 |
| Nitrogen oxides [&] | 270 |
| Respirable suspended particulates | 8 |

[&] Expressed as nitrogen dioxide

For those possible new electricity works with a total installed capacity less than 300 MW, the existing practice of allocating the emission allowances by multiplying the respective maximum emission allowances set out in the above table with the ratio of the total installed capacity to 300 MW will be continued.

14. We also propose to review the Second TM at a frequency of no less than once every three years to enable timely revision of the emission allowances.

15. A copy of the draft new Second TM is at **Annex**. If the proposed new Second TM commences to have effect before the end of 2010, the new emission allowances in relation to the emission years from 1 January 2015 would take effect starting from 1 January 2015, having regard to the statutory requirement in section 26G(4) of the APCO that an allocation of emission allowances made by the TM in relation to an emission year (other than an allocation made under the First TM) could only take effect at least four years after the commencement of the TM making the allocation.

16. As a whole, the above proposed emission caps represent the maximum emission reduction with the use of best practicable means currently available to both power companies on the basis of their existing power plants. To further reduce emissions from the power sector, it would require a major change of the fuel mix for electricity generation as proposed in the "Hong Kong's Climate Change Strategy and Action Agenda – Consultation Document". For details of the proposal, Members

may refer to the ACE Paper 12/2010 on the "Public Consultation on Hong Kong's Climate Change Strategy and Action Agenda".

## ENVIRONMENTAL BENEFITS

17. As compared with the current emission allowances for 2010, the proposed set of allowances will see a tightening of 50% for SO2, 35% for NOx and 34% for RSP. The reduction will help improve local air quality given that emissions from the power sector account for 88%, 44% and 28% respectively of the territory-wide emissions of these pollutants in 2008.

18. The overall share of natural gas in the combined fuel mix of the two power companies for local electricity generation will be raised from the anticipated 39% in 2010 to about 52% in 2015, which incidentally would be broadly the same as the proposal in the Air Quality Objectives Review to raise the power sector's fuel mix ratio to 50% for natural gas.

## TARIFF IMPLICATIONS

19. Achieving the proposed emission caps does not involve any new capital investment and hence any implications for the tariff would arise from the increase of the use of natural gas. Given the volatile fuel market conditions and that the tightened emission caps will take effect only in 2015, it would not be possible to provide a reliable estimation of the tariff implications until the cost of natural gas to be imported is available. The power companies will present their tariff assessment to the Administration in accordance with the prevailing regulatory mechanism under the Scheme of Control Agreement.

## CONSULTATION

20. The two local power companies have been consulted on the proposal. CLP expresses support for efforts to improve local air quality. The proposed reductions in emission allowances for 2015 are significant, ranging between 33% to 64% of the 2010 levels and would be challenging to comply. The proposed emission allowances have been derived based on the assumptions of timely availability of replacement natural gas to be delivered under the Memorandum of Understanding on

Energy Co-operation, specific quality levels of power plant fuels and specific growth rates in local electricity demand with little room for operational variations. Compliance could be adversely affected should there be significant deviations from these assumptions. CLP is committed to working closely with the Government to ensure compliance while maintaining the excellent supply reliability to the customers. HEC considers that to meet the proposed significant decreased emission allowances from 2015 onwards is a very challenging exercise. It, however, is prepared to take on the challenge in support the Government's objective to continuously reduce emissions. It stresses the need for a long-term policy on increase of the use of natural gas for electricity generation as it cannot negotiate with gas suppliers for an ad hoc and minor increase of natural gas supply.

21. We consider that full compliance of the proposed emission caps, stringent as they should be, is feasible should sufficient supply of natural gas be available for full utilization of the existing gas-fired units and both power companies optimize the loading schedule to maximize the use of their generation units with better environmental performance, carry out proper maintenance of their plants and ensure appropriate sourcing of environment-friendly coals. In determining the emission caps for both companies, we have made reference to the best available demand load forecast and per MWh emission figures of the generation plants of both companies with due consideration of their actual emission performances in 2009. Should there be any special event which could not reasonably have been foreseen and is beyond the control of both power companies, additional emission allowances may be issued under section 26K of the APCO to cover any excess of emissions due to such special event if all due diligence to prevent the occurrence of the special event has been taken by the power companies[7]. In addition, a lead time of at least four years will be provided to the power companies in accordance with section 26G(4) of the APCO to gear themselves up before the proposed emission caps take effect. We are therefore of the view that both power companies should be able to fully comply with the proposed requirements.

[7] In addition, the power company is required to notify the occurrence of the event within 5 working days after the occurrence of the event, and, from promptly after the occurrence of the event, to exercise all due diligence to minimize the quantity of that type of pollutant being emitted in the emission year from the licensed premises as a result of the occurrence of the event. The power company may apply for the additional emission allowances during the period commencing on 1 January and ending on 1 March in the year immediately following the emission year in respect of the amount of excessive emissions caused by the special event.

## WAY FORWARD

22. We plan to submit the new Second TM to the Legislative Council under section 37B(1) of the APCO at the start of the next legislative session. Our target is that the new Second TM shall commence to have effect before the end of 2010, thus providing at least four years' lead time for the revised emission allowances in respect of the specified pollutants in relation to the emission years from 1 January 2015 to take effect.

**Environmental Protection Department**
**October 2010**

**Annex**

# DRAFT

## SECOND TECHNICAL MEMORANDUM FOR ALLOCATION OF EMISSION ALLOWANCES IN RESPECT OF SPECIFIED LICENCES

## 1. PRELIMINARY

### 1.1 *Citation and Commencement*

This Technical Memorandum is the second technical memorandum issued pursuant to Section 26G of the Ordinance and may be cited as the "Second 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 for each and every emission year from 1 January 2015. The allocation of emission allowances set out or determined under the First Technical Memorandum for each and every emission year from 1 January 2015 is superseded by this Technical Memorandum.

### 1.3 *Interpretation*

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

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

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

"First Technical Memorandum" （首份技術備忘錄）means the "Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences" published under Section 37B(1) of the Ordinance on 7 November 2008 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).

"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.

"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 2015 shall be as follows –

(a) Black Point Power Station

| | 2015 and thereafter |
|---|---|
| Sulphur dioxide | 1,440 |
| Nitrogen oxides [(i)] | 4,140 |
| Respirable suspended particulates | 110 |

(b) Castle Peak Power Station

| | 2015 and thereafter |
|---|---|
| Sulphur dioxide | 4,260 |
| Nitrogen oxides [(i)] | 13,390 |
| Respirable suspended particulates | 420 |

(c) Lamma Power Station and Lamma Power Station Extension

| | 2015 and thereafter |
|---|---|
| Sulphur dioxide | 6,780 |
| Nitrogen oxides [(i)] | 10,020 |
| Respirable suspended particulates | 300 |

(d) Penny's Bay Gas Turbine Power Station

| | 2015 and thereafter |
|---|---|
| Sulphur dioxide | 2 |
| Nitrogen oxides [(i)] | 2 |
| Respirable suspended particulates | 1 |

[(i)] Expressed as nitrogen dioxide

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 2015 shall be determined in accordance with the formulae set out in the Appendix.

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 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 2015.

2.5 The Secretary shall review 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 not less than once every three years after the commencement of this Technical Memorandum.

**Appendix**

## Quantity of Emission Allowances for a Specified Licence of New Electricity Works referred to in Section 2.2

A.1 The quantity of emission allowances for a specified licence of New Electricity Works for a full emission year shall be as follows -

| Total Installed Capacity of the New Electricity Works | Sulphur dioxide | Nitrogen oxides[(ii)] | Respirable suspended particulates |
|---|---|---|---|
| Less than 300 MW | 12/30 × Total installed capacity in MW | 27/30 × Total installed capacity in MW | 8/300 × Total installed capacity in MW |
| Equal or more than 300 MW | 120 | 270 | 8 |

(ii) Expressed as nitrogen dioxide

A.2 Where the specified licence of a New Electricity Works does not commence in January of an emission year, the quantity of emission allowances for that specified licence for the remaining months of that emission year shall be allocated on a pro-rata monthly basis and part of a month is taken as a full month in the determination.

A.3 The quantity of emission allowances determined in this Appendix for allocation to a specified licence of New Electricity Works shall be rounded up to the next whole number.