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Legislative Council

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**Subcommittee on Seventh Technical Memorandum for
Allocation of Emission Allowances in Respect of Specified Licences**

Background brief

Purpose

This paper provides background information on the Seventh Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences ("Seventh TM"). It also gives a brief account of the views and concerns expressed by Members on related issues when the issuance and reviews of TMs were discussed at relevant committees of the Legislative Council ("LegCo") from 2015 to 2017.

Background

Emission caps for the power sector

2. The Air Pollution Control Ordinance (Cap. 311) ("APCO") empowers the Government to set emission caps for power plants for improving air quality in Hong Kong. Section 26G of APCO provides for the Secretary for the Environment ("SEN") to allocate emission allowances for three specified pollutants, i.e. sulphur dioxide ("SO₂"), nitrogen oxides ("NO_x") and respirable suspended particulates ("RSP"), for power plants by way of a TM.¹ Section 26G(2) stipulates that in making emission allocations, SEN should have regard to the following:

¹ Under section 37B of APCO, a TM is subject to the negative vetting procedure. Pursuant to section 30B(1) of APCO, non-compliance with the emission caps is an offence liable on a first conviction to a fine of \$30,000 in respect of each tonne in excess of the relevant allowed emission; and on a second or subsequent conviction to a fine of \$60,000 in respect of each tonne in excess of the relevant allowed emission plus imprisonment for six months.

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

Previous Technical Memoranda for Allocation of Emission Allowances in Respect of Specified Licences

3. Section 26G(4) of APCO stipulates that an allocation of emission allowances made by a TM in relation to an emission year can only take effect at least four years after the commencement of the TM. Six TMs were issued from 2008 to 2016 as follows:

- (a) the First TM, issued in 2008, set the emission allowances for the emission years between 2010 and 2014; and
- (b) the Second to Sixth TMs were issued in 2010, 2012, 2014, 2015 and 2016 to tighten the emission allowances. The emission allowances for the Second and Third TMs took effect from 1 January 2015 and 1 January 2017 respectively while the Fourth, Fifth and Sixth TMs will take effect from 1 January 2019, 1 January 2020 and 1 January 2021 respectively.²

Increasing electricity generation through the use of natural gas

4. The Administration announced during the public consultation on "Future Development of the Electricity Market" in 2015 that it had determined to increase the percentage of gas generation of the two local power companies to around 50% of the total fuel mix for electricity generation in 2020 ("fuel mix target"). It was envisaged that the two power companies would need to build a small number of additional gas-fired generating units ("gas-fired units") in order to increase the use of natural gas and achieve the fuel mix target.

5. In connection with the above, the Hongkong Electric Company, Limited ("HEC") has started the construction of two new gas-fired units (known as "L10" and "L11") at the Lamma Power Station Extension, which are expected

² Compared to the emission caps set out in the First TM for 2010, the emission allowances of SO₂, NO_x and RSP will be reduced by 72%, 52% and 56% respectively in 2021 under the Sixth TM.

to be commissioned in 2020 and 2022 respectively. It is estimated that HEC will be able to achieve a gas generation ratio of 50% in 2020 and 55% in 2022.³

6. In December 2016, the Executive Council approved the construction of a new gas-fired unit (known as "D1") at the Black Point Power Station by CLP Power Hong Kong Limited and Castle Peak Power Company Limited (collectively referred to as "CLP"). It is expected that D1 will commence operation in 2020 and CLP will be able to achieve a gas generating ratio of about 49% in 2020.⁴

7. According to the Administration, when determining the emission allowances for the two power companies under the Seventh TM, it has taken into account the following factors:

- (a) the progress of increasing local gas generation to meet the fuel mix target for 2020, including the construction of new gas-fired units and replacement of some old power generating units;
- (b) new technology to upgrade existing gas-fired units for improving their NO_x emission performance as well as thermal efficiency;
- (c) practicability to maintain the current import of 80% of nuclear output from Daya Bay Nuclear Power Station to CLP after 2018; and
- (d) projected local electricity consumption in the period from 2022 to 2023.

8. As mentioned in the LegCo brief on the Seventh TM, in ascertaining the emission allowances for HEC and CLP, the Administration will also follow the established mechanism in the Sixth TM by taking into account the actual intake of the electricity generated from renewable energy ("RE") facilities and the unit emission factors of coal-fired units.⁵ For RE, facilities covered in the Seventh TM include the Lamma Winds of HEC and its photovoltaic system at Lamma Power Station. The Sludge Treatment Facility (T · PARK) in Tuen Mun, Phase 1 of the new Organic Resources Recovery Centre in Siu Ho Wan, North

³ Currently, on a total electricity sent-out basis, the fuel mix for HEC is 66% coal and 34% gas.

⁴ Currently, on a total electricity sent-out basis, the fuel mix for CLP is 42% coal, 25% gas and 33% nuclear.

⁵ Unit emission factors of coal-fired units are the averaged emission of specified pollutants (i.e. SO₂, NO_x and RSP) owing to the generation of 1 GWh electricity from coal-fired units in the power plant, expressed in tonne/GWh.

Lantau, and the landfill gas electricity generation at West New Territories Landfill are taken into account in CLP's emission caps under the Seventh TM.

The Seventh Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences

9. The Seventh TM was published in the Gazette on 13 October 2017 and tabled before LegCo on 18 October 2017 for negative vetting. The Seventh TM seeks to allocate for each emission year from 1 January 2022 the quantity of emission allowances for each type of specified pollutant to each of the four existing power plants and possible new electricity works in Hong Kong.⁶

10. Compared with the emission allowances for 2021 set under the Sixth TM, the Seventh TM will see a further tightening of 25% for SO₂, 15% for NO_x, and 11% for RSP for the electricity sector.

Major views and concerns expressed by Members

11. The Panel on Environmental Affairs ("EA Panel") was consulted on the issuance of the Fifth, Sixth and Seventh TMs at the meetings on 29 September 2015, 24 October 2016 and 17 July 2017 respectively.⁷ A subcommittee was formed under the House Committee in October 2015 to study the Fifth TM. Related issues were also brought up during examination of the Estimates of Expenditure 2017-2018. Member's major views and concerns are summarized in the ensuing paragraphs.

Emission caps for fine particulates and carbon dioxide

12. Members enquired about the feasibility of setting emission caps for fine particulates ("PM2.5") and carbon dioxide ("CO₂"), and of using carbon sequestration technology to capture and store CO₂ produced during electricity generation. The Administration advised in November 2015 that local power plants adopted wet flue gas desulphurization systems to reduce SO₂ emission and the treated flue gas was wet. The water droplets could dissolve some of the PM2.5, rendering these particles not collected by the PM2.5 particle-sizing device for measurement. As there was not any reliable method to measure

⁶ The four existing power plants are the Lamma Power Station and Lamma Power Station Extension, Black Point Power Station, Castle Peak Power Station, and Penny's Bay Gas Turbine Power Station. New electricity works refers to any new entrant (i.e. in addition to HEC and CLP) to the electricity generation industry after the commencement of the Seventh TM.

⁷ EA Panel was also briefed on the review of the previous TM at each of these meetings.

PM2.5 in a stack where water droplets were present, the Administration considered it not yet practicable to set limits on PM2.5 emissions from local power plants.

13. As regards CO₂ emissions, the Administration advised in July 2017 that there was no proven practicable technology for controlling such emissions from power generation, and hence it was not feasible to set emission caps for CO₂ in a TM at this stage. Currently, CO₂ emissions from power plants were calculated with reference to the quantity and property of fuel used and in accordance with the guidelines issued by the United Nations' Intergovernmental Panel on Climate Change. The carbon intensity reduction target would be achieved mainly by increasing the use of natural gas for electricity generation.

14. The Administration also pointed out that the emerging carbon sequestration technology commonly involved the injection of CO₂ into the ground such as deep geological formations or declining oil fields. As there was a lack of deep underground caverns in Hong Kong for storing captured CO₂, it was questionable whether the said technology could be deployed in Hong Kong.

Monitoring of compliance

15. Members sought details on the mechanism to monitor the two power companies' compliance with the TM in force, and reduction of emissions from the electricity sector. The Administration responded that power plants had to install and use online continuous emission monitoring systems that complied with international standards, and transmit their real-time emission data to the Environmental Protection Department ("EPD") for monitoring air pollutant emissions from their generating units. In addition, power plants had to submit emission data regularly to EPD for scrutiny and verification by an independent and authorized checker to ensure data accuracy. EPD also conducted regular inspections of power plants to check the operation of their pollution control equipment and examine the emission data of their generating units on-site. The Administration also advised that, compared with the emission levels in 2005, SO₂, NO_x and RSP emissions of the electricity sector had decreased by 90%, 45% and 74% respectively in 2016.

Electricity demand forecasts

16. As the Administration had taken into account the electricity demand forecasts provided by the two power companies when it proposed the allocation of emission allowances under each TM, Members enquired how the Administration assessed the credibility of such forecasts. The Administration responded that it would make reference to various types of information, including independent electricity demand forecasts conducted by an independent energy consultant and the Government Economist, in order to

review the data provided by the power companies. Records showed that the power companies' forecasts in recent years were generally in line with the Administration's assessment, and there were no significant variations between the power companies' forecasts and actual sales volume of electricity.

Tariff implications

17. Members enquired about the potential impact on electricity tariffs arising from the construction of new gas-fired units and replacement of some old power generation units by the two power companies.

18. The Administration pointed out that electricity tariffs were determined having regard to a number of factors, such as the fuel mix plan for 2020, future fuel costs, the pace of capital investments, and the permitted rate of return ("RoR") of the two power companies. As the permitted RoR was reduced under the new Scheme of Control Agreements ("SCAs") signed between the Government and the two power companies on 25 April 2017,⁸ this would help alleviate the tariff impact to be brought by the provision of additional gas-fired units in future.

Latest development

19. At the House Committee meeting on 20 October 2017, Members agreed to form a subcommittee to study the Seventh TM.

Relevant papers

20. A list of relevant papers is set out in the **Appendix**.

Council Business Division 1
Legislative Council Secretariat
30 October 2017

⁸ The new SCAs will take effect from 1 October 2018 for CLP and 1 January 2019 for HEC, and will both expire on 31 December 2033.

**Subcommittee on Seventh Technical Memorandum for
Allocation of Emission Allowances in Respect of Specified Licences**

List of relevant papers

Date	Event	Paper
29 September 2015	Special meeting of Panel on Environmental Affairs	<p>Administration's paper on "Review of the Fourth Technical Memorandum for Allocation of Emission Allowances for Power Plants" (LC Paper No. CB(1)1260/14-15(01))</p> <p>Minutes of special meeting (LC Paper No. CB(1)55/15-16)</p>
28 October 2015	The Fifth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences ("TM") was tabled at the Legislative Council	<p>Fifth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences</p> <p>Legislative Council Brief</p> <p>Legal Service Division Report (LC Paper No. LS4/15-16)</p>
4 December 2015	House Committee	<p>Report of the Subcommittee on Fifth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences (LC Paper No. CB(1)238/15-16)</p>
24 October 2016	Meeting of Panel on Environmental Affairs	<p>Administration's paper on "Review of the Fifth Technical Memorandum for Allocation of Emission Allowances for Power Plants" (LC Paper No. CB(1)19/16-17(03))</p> <p>Administration's follow-up paper (LC Paper No. CB(1)236/16-17(02))</p> <p>Minutes of meeting (LC Paper No. CB(1)210/16-17)</p>

Date	Event	Paper
26 October 2016	The Sixth TM was tabled at the Legislative Council	<p>Sixth Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences</p> <p>Legislative Council Brief</p> <p>Legal Service Division Report (LC Paper No. LS6/16-17)</p>
5 April 2017	Special meeting of Finance Committee for examination of Estimates of Expenditure 2017-2018	Written questions raised by Members and Administration's replies (Reply serial numbers: ENB096 and 109)
17 July 2017	Meeting of Panel on Environmental Affairs	<p>Administration's paper on "Review of the Sixth Technical Memorandum for Allocation of Emission Allowances for Power Plants" (LC Paper No. CB(1)1286/16-17(03))</p> <p>Administration's follow-up paper (LC Paper No. CB(1)1355/16-17(02))</p> <p>Minutes of meeting (LC Paper No. CB(1)1419/16-17)</p>
18 October 2017	The Seventh TM was tabled at the Legislative Council	<p>Seventh Technical Memorandum for Allocation of Emission Allowances in Respect of Specified Licences</p> <p>Legislative Council Brief</p> <p>Legal Service Division Report (LC Paper No. LS3/17-18)</p>

Other relevant documents:

Government bureau	Document
Environment Bureau	Legislative Council Brief on "Proposal of constructing a new gas-fired generating unit by the Hongkong Electric Company, Limited to implement the 2020 Fuel Mix" issued on 23 September 2016 (File Ref : ENB CR 2/4576/08 (16) Pt.18)
Environment Bureau	Legislative Council Brief on "Proposal of constructing a new gas-fired generating unit by CLP Power Hong Kong Limited and Castle Peak Power Company Limited to implement the 2020 Fuel Mix" issued on 13 December 2016 (File Ref: ENB CR 1/4576/08 (16) Pt.19)