

**Implementation Framework of the  
Emission Trading Pilot Scheme for Thermal Power Plants  
in the Pearl River Delta Region (the Pilot Scheme)**

**1 Background**

- 1.1 In 2002, the Guangdong Provincial Government and the Hong Kong Special Administrative Region (the “HKSAR”) Government set up the Special Panel on Pearl River Delta Air Quality Management & Monitoring (the “Special Panel”) under the Hong Kong-Guangdong Joint Working Group on Sustainable Development and Environmental Protection to develop and implement jointly a series of control measures, to exchange management and monitoring techniques and to study the feasibility of introducing new technologies and measures in the Pearl River Delta (the “PRD”) Region.
  
- 1.2 Emission trading between thermal power plants in the PRD Region<sup>1</sup> is one of the measures studied by the Special Panel to facilitate emission reduction. The objective is, by making use of market forces, to provide greater flexibility for emission sources to meet the emission reduction requirements set down by the government in a cost effective manner. In December 2002, the State Environmental Protection Administration (the “SEPA”) expressed support to carry out Hong Kong – Guangdong emission trading pilot projects.
  
- 1.3 Having examined the current management approaches for power plants adopted by both sides, the legal regimes of the two places, experiences

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<sup>1</sup> The Pearl River Delta Region includes the Hong Kong Special Administrative Region and the Pearl River Delta Economic Zone in Guangdong Province.

gained from the national pilot programme on sulphur dioxide emission trading, the emission trading system currently being developed by the Central Government etc., the environmental protection authorities of the HKSAR Government and Guangdong Provincial Government jointly drew up this Implementation Framework to allow thermal power plants/power companies (hereafter referred to “power plants”) in the PRD Region to participate, on a voluntary basis, in emission trading and by making use of its flexibility to reduce air pollutant emissions in the whole PRD Region in a way meeting the interests of various parties.

## **2 Purposes of the Pilot Scheme**

- 2.1. To help both governments to develop the main details, management and implementation methods for an emission trading scheme, and to establish audit standards and emission guidelines system for the emission trading scheme.
- 2.2. To promote the use of emission trading as a tool to reduce pollutant emissions by major emission sources in the Region.
- 2.3. To lay the foundation for the development of a practicable and comprehensive emission trading system in the PRD Region in the future.
- 2.4. The Pilot Scheme is applicable to emission trading projects to be undertaken among power plants in the PRD Region. The Guangdong Provincial Government or the HKSAR Government may introduce adjustments to the Pilot Scheme to suit their specific situations for emission trading involving only power plants in their own jurisdiction.

### **3 Details of the Pilot Scheme**

- 3.1. The two governments will adopt the following framework in implementing the main elements of the Pilot Scheme.

#### Emission Caps and Allocation of Emission Credits

- 3.2. Power generation is the major source of emission of sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and respirable suspended particulates (RSP/PM<sub>10</sub>) in the PRD Region. Based on the control strategies for SO<sub>2</sub> emission adopted by the Central Government and the experience gained from SO<sub>2</sub> emission trading in the mainland and overseas, the Pilot Scheme is intended to support emissions trading of SO<sub>2</sub> whilst the trading of NO<sub>x</sub> and RSP have also been included taking into account the regional air quality situation in the PRD. Guided by their own emission reduction strategies, the HKSAR Government and the Guangdong Provincial Government will impose emission caps for each of these three types of pollutants on respective power plants in the Region and allocate emission credits to them.
- 3.3. Both governments will allow eligible power plants in the PRD Region to participate in emission trading on a project basis. Those interested eligible power plants may propose emission reduction plans to further reduce their total emissions (through installation of emission reduction facilities, use of cleaner fuels, enhancing energy efficiency, conversion to the use of renewable energy, etc.) for consideration by their respective local government environmental protection authorities<sup>2</sup>. Eligibility criteria for

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<sup>2</sup> Local government environmental protection authorities refer to the Environmental Protection Bureau of Guangdong Province in the PRD Economic Zone and the Environmental Protection Department of the Hong Kong Special Administrative Region

power plants in the PRD Region to participate in the Pilot Scheme are set out in Appendix 1.

- 3.4. The respective environmental protection authorities of the prospective trading partners will jointly examine the emission reduction plan under application in order to ascertain the base emission target of the power plant under lawful emission performance and its emission target after completion of the emission reduction plan. The difference between the two emission targets will be converted into the total amount of emission reduction on which the number of “project-based emission credits” and their validity period are determined in respect of the particular emission reduction plan. The principles for determining the base emission target are set out in Appendix 2.
- 3.5. During the implementation of the Pilot Scheme, in the event that the Environmental Protection Bureau of Guangdong Province (the “GDEPB”) has to introduce adjustments to the emission caps and the approach of allocating emission credits within its jurisdiction in accordance with the regulations and methodologies promulgated by the Central Government or the Provincial Government, such adjustments shall not affect the emission credits determined and/or already transacted under the Pilot Scheme.
- 3.6. The HKSAR Government will determine, in accordance with the prevailing policy, the emission cap for each power plant within its jurisdiction for use in each year and/or the following few years. The number of emission credits for each year (hereafter referred to as

“emission credits for total emissions”) will be stipulated in the respective power plant licence<sup>3</sup>.

### Management of Emission Credit Trading

- 3.7. Emission trading is a market activity. Participating power plants would negotiate on the price of transactions having regard to their own situations and trade emission credits on hand or as determined through contractual arrangements.
- 3.8. Under the Pilot Scheme, after the approved “project-based emission credits” are sold by a power plant eligible for selling its emission credits (the “seller”) to another power plant (the “buyer”) through contractual arrangements, both parties shall submit a copy of the contract to their respective local government environmental protection authorities for record. The contract should be prepared with reference to Appendix 3. Upon the close of each particular year, the seller shall prove its compliance with the operational conditions stipulated in the contract and confirm its actual total emissions in that year. After verification of the difference between the “confirmed total emissions” and the “base total emissions in line with the base emission target” by the environmental protection authorities of both governments, the seller may then formally transfer the actual “project-based emission credits” to the buyer in accordance with the terms and conditions of the contract.
- 3.9. Both governments will publish regularly the latest information on emission credits granted to eligible power plants in the PRD Region

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<sup>3</sup> “Power plant licence” refers to the Specified Process Licence issued to power plants under the Air Pollution Control Ordinance of Hong Kong.

(including “emission credits for total emissions”, “project-based emission credits” to be issued, actual “project-based emission credits”, etc.) to enhance transparency and facilitate identification of trading partners.

- 3.10. Power plants in the HKSAR shall submit detailed information to the Environmental Protection Department of the HKSAR Government (the “HKEPD”) upon close of a year to enable verification of total emissions of the power plants in that year and writing-off the valid emission credits on hand (including “emission credits for total emissions” and “project-based emission credits”). The amount of valid emission credits to be written off shall not be less than the actual total emissions.

#### Monitoring of Emissions

- 3.11. All participating power plants shall install suitable emission monitoring systems. The annual total emissions of a power plant shall be determined based on the data obtained from the monitoring system and the total emission calculation method approved by the government environmental protection authorities of both trading parties. Guidance on the monitoring systems to be installed by the seller and the total emission calculation method are set out in Appendix 4.

#### Handling of Emission Exceedance

- 3.12. The HKSAR Government and the Guangdong Provincial Government will handle cases of exceedance of emission caps by power plants in their own jurisdiction in accordance with their laws and regulations.
- 3.13. A seller who fails to operate in accordance with the requirements stipulated in the contract and/or to attain the total emission reduction and/or to

transfer the valid emission credits to the buyer within the time specified in the contract shall offer compensation to the buyer in accordance with the terms and conditions of the contract.

#### **4. Managing the Pilot Scheme**

- 4.1 Both governments will jointly set up an Emission Trading Management Panel (the “Management Panel”) to assist their government environmental protection authorities in matters relating to the management of emission trading among power plants in the PRD Region. The terms of reference and membership of the Management Panel are set out in Appendix 5.
  
- 4.2 The workflow of an emission trading transaction between power plants in the PRD Region is shown in Appendix 6.

**Eligibility Criteria for Power Plants in the PRD Region to Participate in the Pilot Scheme**

The Guangdong Provincial Government and the HKSAR Government will allow power plants/power companies meeting the following criteria to participate in the Pilot Scheme:

1. Power plants/power companies with generating units in the PRD Region\* using coal, oil or natural gas as the principal fuel may participate in the Pilot Scheme.
2. The power plants/power companies should have at least one single generating unit with capacity at or above 100 MW and are already in compliance with the environmental requirements stipulated in local laws and regulations (including the emission permit, emission performance stipulated in the power plant licence<sup>#</sup> under the local environmental laws and regulations, and the statutory environmental assessment process). The generating units concerned should also have a plan to install or have already installed emission reduction facilities committed before the end of 2005.
3. Generating units involved should have met or will meet the emission monitoring requirements set down in the Pilot Scheme.

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**Participation of PRD Power Plants in the Pilot Scheme –  
Principles for Determining the Base Emission Target**

In examining the application of a PRD power plant submitted under the Pilot Scheme, the respective governments of the trading parties would determine the base emission target of the power plant by considering factors in the following order of priority:

1. The annual emission cap allocated by the local government under the principle of total emissions control.
2. The annual emission cap specified in the power plant licence<sup>#</sup> or emission permit.
3. Where the annual emission cap for a power plant in the PRD Economic Zone of the Guangdong Province is estimated by means of the Generation Performance Standard (the “GPS”), the calculation will be as follows:
  - a. Select the appropriate GPS set out in Tables 1 to 3 according to the specific condition of the respective generating unit:
    - i. For generating units completed for operation before 1 January 1997 or projects involving newly-built thermal power plants, extension or alteration of the thermal power plants with the environmental impact assessment report (EIA report) approved before 1 January 1997, Phase I Target will be adopted.

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- ii. For projects involving newly-built thermal power plants, extension or alteration of the thermal power plant with the EIA report approved between 1 January 1997 and 31 December 2003, if construction work has not yet commenced on 1 January 2004 and one year has elapsed after the date of approval, Phase III Target will be adopted. For other projects, Phase II Target will be adopted.
  - iii. For projects involving newly-built thermal power plants, extension or alteration of thermal power plants with the EIA report approved after 1 January 2004, Phase III Target will be adopted.
- b. To obtain the air pollutant emission target of a generating unit, multiply the installation capacity of the unit by the actual operating hours and further by the GPS. The RSP emission target is determined by converting the emission target for particulate matters using the “total emission calculation method”.
- c. The sum of emission targets of all generating units included in the emission reduction plan will give the base emission target of the power plant under that particular emission reduction plan.

Table 1: The GPS for Calculating Total SO<sub>2</sub> Emission of a Thermal Power Generating Unit

Phase	Principal Fuel	Generation Performance Standard G (g/kWh)			
		Year 2008-2009	Year 2010-2014	Year 2015-2019	Year 2020 and after
Phase I	Coal	5.5	4.5	3.5	2.0
	Fuel Oil	4.7	3.8	3.0	1.7
Phase II	Coal	4.0	1.6	1.6	1.6

	Fuel Oil	3.4	1.4	1.4	1.4
Phase III	Coal	0.7			
	Fuel Oil	0.6			

Table 2: The GPS for Calculating Total NO<sub>x</sub> Emission of a Thermal Power Generating Unit

Phase	Principal Fuel		Generation Performance Standard G (g/kWh)	
			Year 2008 -2019	Year 2020 and after
			Phase I	Coal
	$V_{daf} \geq 10\%$	2.9	1.8	
	Fuel Oil		1.5	0.9
Phase II	Coal	$V_{daf} < 10\%$	2.5	
		$V_{daf} \geq 10\%$	1.2	
	Fuel Oil		0.6	
Phase III	Coal	$V_{daf} < 10\%$	1.9	
		$10\% \leq V_{daf} \leq 20\%$	1.1	
		$V_{daf} > 20\%$	0.8	
	Fuel Oil		0.3	

Note:  $V_{daf}$  – Volatile Matter (dry ash-free basis)

Table 3: The GPS for Calculating Particulate Matters Emission of a Thermal Power Generating Unit

Phase	Principal Fuel	Generation Performance Standard G (g/kWh)			
		Year 2008-2009	Year 2010-2014	Year 2015-2019	Year 2020 and after
Phase I	Coal	0.79	0.75	0.58	0.33

	Fuel Oil	0.45	0.32	0.25	0.14
Phase II	Coal	0.38	0.20	0.20	0.20
	Fuel Oil	0.16	0.16	0.16	0.14
Phase III	Coal	0.09			
	Fuel Oil	0.08			

4. The annual emission cap or total emission control levels specified in the statutory EIA report.

**Participation of PRD Power Plants in the Pilot Scheme –**

**Main Items to be Included in an Emission Credit Trading Contract**

Details of the contract will be drawn up by both trading parties and should include at least the following:-

1. The names, addresses and legal representatives of both buyer and seller
2. The emission reduction plan for credit trading and the results of approval made jointly by environmental protection authorities of the respective governments of the trading partners
3. The number of emission credits for transaction, validity periods of credits, the time and price of transaction and the currency to be used
4. The place for signing of contract and the jurisdiction applicable
5. Liability in breach of contract and resolution for settling disputes

**The Emission Monitoring System and Methods for Calculating the Total Emissions of Seller under the Pilot Scheme**

1. The seller in the PRD Region should have installed suitable emission monitoring systems for generating units to be included in the emission reduction plan before the emission credits become effective in order to allow monitoring of the emission performance of the power plant.
2. The emission monitoring system should perform continuous monitoring of the following pollutants in the flue gas:
  - sulphur dioxide
  - nitrogen oxides
  - particulate matters
3. The emission monitoring system should, at the same time, make continuous measurements of other flue gas parameters such as moisture content and flow rate, etc. in order to meet the requirements of the “total emission calculation method”.
4. The emission monitoring system should be installed, operated, calibrated and have performance assessment conducted according to the predetermined standards. Standards adopted should not be lower than those adopted below:
  - Technical Norm for Continuous Emissions Monitoring of Flue Gas Emitted from Thermal Power Plants (《火電廠煙氣排放連續監測技術規範》), HJ/T75-2001; and

- Specifications and Test Procedures for Continuous Emission Monitoring Systems of Flue Gas Emitted from Stationary Sources (《固定污染源排放煙氣連續監測系統技術要求及檢測方法》), HJ/T76-2001; and
- Relevant standards determined by government authorities at provincial level in Guangdong or above;

OR

- Performance Standard and Testing for the Continuous Emission Monitoring of Flue Gas from Power Plants in Hong Kong (《香港發電廠煙氣排放連續監測工藝標準及檢測方法》) (see Appendix 7)

Environmental protection authorities of the respective governments of the trading partners will, after taking into account the technical advice given by the Emission Trading Management Panel (the “Management Panel”), update the standards to be adopted for the emission monitoring system from time to time based on prevailing developments.

5. Environmental protection authorities of the respective governments of trading partners will, after taking into account the technical advice given by the Management Panel, establish the total emission calculation method for power plants. The method may be adjusted to suit the specific situations as required.

**Emission Trading Management Panel (the “Management Panel”)**

Terms of Reference:

1. To assist the environmental protection authorities of the two governments in the management of emission trading matters under the Emission Trading Pilot Scheme for Thermal Power Plants in the PRD Region (the “Pilot Scheme”), including management of the transfer and write-off of emission credits, announcement of the distribution of emission credits, recommendation on the operational rules of emission trading as well as training of personnel, etc.;
2. To provide technical advice on the Pilot Scheme, including technical requirements for participating in the Pilot Scheme, approaches for allocating emission credits, setting of emission targets, emission monitoring systems, total emission calculation method as well as approval and implementation of emission reduction plans;
3. To report on the implementation of the Pilot Scheme and the experiences gained;
4. To recommend the way forward for the future development of emission trading in Guangdong and Hong Kong; and
5. To coordinate the management of emission trading matters by government authorities in Guangdong and Hong Kong.



Membership List (the two governments may add/reduce the number of members according to actual need)

HKSAR

Representative of the Environment,  
Transport and Works Bureau /  
Environmental Protection Department  
(The Convener)

Guangdong Province

(To be provided by the Environmental  
Protection Bureau of Guangdong  
Province)

**The Workflow of a Transaction of “Project-based Emission Credits”  
between Power Plants under the Pilot Scheme**

**1. The Workflow for the Seller to Form its “Project-based Emission Credits”**

1.1 The seller seeks verification of its eligibility to participate in the Pilot Scheme by the local government environmental protection authority.

1.2 The seller submits to the local government environmental protection authority a report on the emission reduction plan (the “plan”) prepared by a professional consultant serving as an independent third party. The report should include the following information:

- the generating units under operation before and after implementation of the plan
- the pollutants involved
- the base emission target of the existing generating units
- the specific details, technologies, amount of investment and implementation schedule of the plan
- the emission target to be achieved after completion of the plan
- the anticipated reduction in total emissions, the year of achievement and the corresponding operating conditions
- the technical specifications of the emission monitoring system and the total emission calculation method applicable to the plan
- other relevant information

The government environmental protection authorities of the trading partners will jointly examine the plan and determine the number and validity period of “project-based emission credits” expected to be achieved,

technical specifications of the emission monitoring system and the total emission calculation method applicable to the plan, the effective period of the approval, etc.

- 1.3 After completing other applicable approval procedures (including environmental impact assessment) of the construction project, the seller shall implement the approved plan. Should there be any major amendment to the approved plan, the number of project-based emission credits expected to be achieved shall be re-determined in accordance with the procedures stated in paragraph 1.2 of this appendix. The seller shall inform the buyer of the outcome once it is available.
- 1.4 After completion of the plan, the seller shall submit an acceptance report to the local government environmental protection authority. If necessary, the authority concerned may, together with the Management Panel, conduct an independent acceptance test on the plan by itself and/or through its agent. The authority concerned shall, after taking into account the technical advice from the Management Panel, approve the acceptance test results on the plan.
- 1.5 During every trading year after completion of the acceptance test, the seller shall submit to the local government environmental protection authority an annual report on the total emission reduction prepared by a professional consultant serving as an independent third party. The report will validate the actual operating conditions of the plan, the actual annual emission of the concerned pollutants and the total number of project-based emission credits actually achieved. The report shall be jointly examined by the environmental protection authorities of respective governments of the trading partners to affirm the total number of project-based emission

credits actually achieved, and to determine the validity period of the emission credits in accordance with the approval result mentioned in Paragraph 1.2 above and the acceptance result mentioned in Paragraph 1.4, etc.

## **2. Workflow for Transfer of Emission Credits**

- 2.1 Under the Pilot Scheme, both the buyer and seller are free to choose their trading partners and decide for themselves details of the emission trading contract as well as the time of entering into the contract.
- 2.2 Both the buyer and seller shall, within 5 working days after signing the contract, submit a copy of the contract to the environmental protection authorities of respective governments for record, who shall then inform the Management Panel.
- 2.3 The seller shall transfer the project-based emission credits actually achieved to the buyer in accordance with the approval made by respective environmental protection authorities on the actual amount of emission reduction as well as terms and conditions of the contract.
- 2.4 Both the buyer and seller shall, within 5 working days after transferring the emission credits, inform the respective environmental protection authority which will then inform the Management Panel for a formal record to be made on the transfer of emission credits.

**Performance Standards and Testing for the Continuous Emission Monitoring of Flue Gas from Power Plants in Hong Kong**

Performance Standards of Continuous Emission Monitoring System (“CEMS”) of Power Plants

The measurement uncertainties of CEMS should not exceed the following percentages of the emission limit values:

NO <sub>x</sub> CEMS	:	20%
SO <sub>2</sub> CEMS	:	20%
Particulates CEMS	:	30%

Such requirement has been stipulated in paragraph 6, Annex VIII (A) of the EC Directive titled “Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants”.

Testing and Quality Assurance/Quality Control (QA/QC) of CEMS

The testing, quality assurance and quality control of the CEMS are conducted mainly with reference to the European Standard EN 14181 “Stationary Source Emissions – Quality Assurance of Automated Measuring Systems”, particularly the QAL2, QAL3 and the procedures of the Annual Surveillance Test (AST).