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Panel on Environmental Affairs

Meeting on 23 May 2016

**Background brief on "Pollutants in the Atmosphere and
their Transport over Hong Kong" modelling system
prepared by the Legislative Council Secretariat**

Purpose

This paper provides background information on the "Pollutants in the Atmosphere and their Transport over Hong Kong" ("PATH") modelling system. It also gives a brief account of the major views and concerns expressed by Members when related issues were discussed by the relevant committees of the Legislative Council in the 2012-2013 to 2015-2016 legislative sessions.

Background

Air quality modelling in Hong Kong

2. Air quality modelling makes use of air quality models to estimate how a certain air pollutant emission will affect the air quality at a certain location, taking account of the characteristics of the relevant air pollutant emissions, meteorological information, chemical reactions, topography and the background air quality.

3. In line with international practices, the air quality impact assessment in Hong Kong usually adopts a three-tier approach that focuses on the following emission sources:

- (a) Tier 1: emissions from a proposed project under the assessment;

- (b) Tier 2: sources that have a significant contribution on the receptors identified in the project, usually within 500m of the project boundary; and
- (c) Tier 3: sources that are not covered by the first two tiers (i.e. the background sources). These include emissions in the Pearl River Delta ("PRD") region and beyond.¹

"Pollutants in the Atmosphere and their Transport over Hong Kong" model

4. PATH is an air quality model specifically designed to simulate air quality over the whole PRD region including Hong Kong (i.e. to calculate the background air pollutant concentrations in Hong Kong and the PRD region), and is extensively used in environmental impact assessment ("EIA") studies.² The PATH model was constructed by a consultant engaged by the Environmental Protection Department ("EPD") in 2001 from modules commonly accepted in the international modelling community to cater for Tier 3 emission sources or macro-scale air quality modelling. The model comprises meteorological, chemical and transport modules, and each module involves sophisticated scientific theories and calculation.

Review of the air quality modelling system

5. To facilitate the updating of the PATH model, EPD invited in August 2013 academics in the modelling field to study the various modules of the model, validate the system, enhance its performance as well as verify the results. Based on the study, EPD made certain enhancements to the PATH model, such as upgrading of its key modules and enhancement of spatial resolution.³ In August 2014, a working group comprising academics from local universities and representatives from EPD ("the Working Group") was set up to provide further input on the updating of the PATH model.

¹ The three tiers of emission sources call for different air quality models to estimate their air quality impacts. The air quality impacts of the emission sources of all the three tiers will be added up to give rise to the overall air quality impacts.

² The Environmental Protection Department has issued a number of guidelines to guide project proponents in their air quality modelling for assessing the air quality impacts of development projects.

³ For detailed information on the key enhancements made to the PATH model, see the paper provided by EPD in September 2013 to the Subcommittee on Issues Relating to Air, Noise and Light Pollution in response to issues arising from the discussion at the Subcommittee's meeting on 28 June 2013 (LC Paper [CB\(1\)1768/12-13\(03\)](#)).

6. EPD completed the updating of the PATH model (the updated model version was subsequently named as "PATH-2016") and its land use data in October 2015. The Working Group concluded that PATH-2016 was adequate for simulating the background air quality for the PRD region and recommended its use in EIA over the old version in consideration of its incorporation of the latest developments in the field of air quality science, refined calculation algorithm and validation with more recent air quality measurement results. PATH-2016 was then rolled out in January 2016 with the relevant program, data, results and tools as well as modelling guidelines published on EPD's webpage. EPD also accepted the recommendation of the Working Group to update PATH-2016 every five years.

7. For EIA studies commenced before the release of PATH-2016, a 6-month period with effect from 4 January 2016 will be allowed for project proponents and their study teams to adapt to the updated model version so as to reduce abortive work. During this transitional period, EIA reports submitted under the Environmental Impact Assessment Ordinance (Cap. 499) ("EIAO") may continue to use the previous model version for air quality assessment. After the 6-month transitional period, all EIA reports must use the PATH-2016 version.

Major views and concerns expressed by Members

8. The Subcommittee on Issues Relating to Air, Noise and Light Pollution ("the Subcommittee"), which was formed under the Panel on Environmental Affairs ("the Panel"), was briefed about the air quality modelling practices adopted in Hong Kong and the PATH model at the meeting on 28 June 2013. Issues relating to the PATH model were brought up at the Panel meeting on 17 July 2014 when the Administration briefed the Panel on the progress of the Administration in taking forward the recommendations of the Subcommittee, and during examination of the Estimates of Expenditure 2016-2017. At the Council meeting on 26 November 2014, Mr Dennis KWOK raised an oral question to follow up on, among others, the progress of updating the PATH model. The major views and concerns expressed by Members are summarized in the ensuing paragraphs.

Transparency of air quality modelling systems

9. Members stressed the importance to enhance the transparency of the air quality modelling systems including the PATH model, and provide more information on the relevant data and assumptions used in EIA reports.

10. The Administration advised that in vetting EIA reports, EPD would ensure that the assumptions on the air quality control policies and improvement measures used for estimating emissions for future years were consistent with the relevant government policies. A summary of the key assessment assumptions and related supporting documents were included in the EIA reports. In response to the recommendations made by the Subcommittee, the Administration had enhanced transparency of the air quality modelling systems by placing the relevant data and assumptions on EPD's website for public access.⁴

Approaches for estimating different emission sources

11. Members noted that section 4.3.1(b)(v) of the Technical Memorandum issued under EIAO required the assessment methodologies adopted in an EIA study to be capable of describing and predicting the reasonable case scenario and/or the worst case scenario, etc. Members were concerned whether the PATH model was adequate for simulating the background air quality for the PRD region, compared to other approaches such as the observation-based approach which collected data from one or more air quality monitoring stations in different locations.

12. The Administration explained that using the PATH model to estimate the background air quality level of a proposed project had advantage over other approaches since PATH was capable of accounting for the changes to future air quality due to technological changes or government policies to improve air quality, and hence could achieve a higher degree of certainty on the projections to be made. The PATH model also included and adequately represented different emission sources in the general environment, and had taken into account the various measures being implemented by the Administration to reduce local air pollutant emissions to meet the new Air Quality Objectives by 2020.

13. The Administration further advised that the assumptions for estimating emissions used in the PATH model for prediction of future background pollutant concentrations varied with the year of simulation and were case-specific. In the EIA study of any designated project, the emission assumptions were worked out by the project proponent to suit the year of assessment.

⁴ Previously, EPD provided upon request local emission data to members of the public including the air modelling experts, academics and environmental consultants for air quality modelling purposes.

Latest development

14. At the meeting on 23 May 2016, the Administration will brief the Panel on the updating of the PATH model.

Relevant papers

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

Council Business Division 1
Legislative Council Secretariat
17 May 2016

**"Pollutants in the Atmosphere and their Transport over Hong Kong"
modelling system**

List of relevant papers

Date of meeting	Event	Papers
28 June 2013	Meeting of the Subcommittee on Issues Relating to Air, Noise and Light Pollution	<p>Administration's paper on "Air quality modelling in Hong Kong" (LC Paper No. CB(1)1366/12-13(04))</p> <p>Administration's response to questions raised at the meeting (LC Paper No. CB(1)1768/12-13(03))</p> <p>Minutes of meeting (LC Paper No. CB(1)146/13-14)</p>
27 February 2014*	Report of the Subcommittee on Issues Relating to Air, Noise and Light Pollution to the Panel on Environmental Affairs	Report of the Subcommittee (LC Paper No. CB(1)1003/13-14(01))
17 July 2014	Special meeting of the Panel on Environmental Affairs	<p>Administration's response to the Report of the Subcommittee on Issues Relating to Air, Noise and Light Pollution (LC Paper No. CB(1)1785/13-14(05))</p> <p>Minutes of special meeting (LC Paper No. CB(1)179/14-15)</p>

Date of meeting	Event	Papers
30 March 2016	Meeting of the Panel on Environmental Affairs	Administration's paper on "Updating the 'Pollutants in the Atmosphere and their Transport over Hong Kong' ('PATH') air quality modelling system" (LC Paper No. CB(1)735/15-16(01))
6 April 2016	Special meeting of Finance Committee for examination of Estimates of Expenditure 2016-2017	Written question raised by Member and Administration's reply (Reply serial number: ENB084)

* Issuance date

Letter from a Member of the Legislative Council addressed to the Chairman of the Panel on Environmental Affairs ("the Panel") on the subject

Date of letter	Letter
20 October 2015	Letter from Mr Dennis KWOK requesting the Panel to discuss the subject of "'Pollutants in the Atmosphere and their Transport over Hong Kong' modelling system (LC Paper No. CB(1)43/15-16(01))

Hyperlink to relevant Council Question:

Date	Council Question
26 November 2014	Press release on Council question (oral) raised by Mr Dennis KWOK