IMPLEMENTATION OF AIR-QUALITY IMPROVEMENT MEASURES

Executive Summary

1. Air pollution is one of the major problems in Hong Kong. The Environment Bureau (ENB) and the Environmental Protection Department (EPD) are responsible for formulating and implementing environmental policies, including those on air quality. In 2012-13, the EPD's estimated expenditure on managing air quality is $627 million.

2. The existing air quality objectives (AQOs) in Hong Kong were set in 1987, some 25 years ago. The AQOs stipulate the concentration levels for seven major air pollutants, of which sulphur dioxide (SO_2), nitrogen dioxide, and particulate matters with a diameter of 10 micrometres or less (PM_{10}) are the most relevant and significant ones in Hong Kong. The major sources of air pollution in Hong Kong are motor vehicles, marine vessels and power plants as well as emissions from the Pearl River Delta (PRD) region.

3. Under the Air Pollution Control Ordinance, the EPD, as the Air Pollution Control Authority, is tasked to aim to achieve the AQOs as soon as is reasonably practicable and thereafter to maintain the quality so achieved. In the past decade, through the EPD's efforts, concentrations of SO_2, PM_{10} and carbon monoxide have been reduced in Hong Kong. In January 2012, the Government announced that, based on the Air Quality Guidelines issued in 2006 by the World Health Organisation, the AQOs in Hong Kong would be revised to more stringent levels with effect from 2014 (2014 AQOs). To meet the 2014 AQOs, the Government would, subject to resource availability, implement 22 air-quality improvement measures.

Emission control of vehicles

4. In 2010, emissions from vehicles accounted for 30% of nitrogen oxides (NOx) and 21% of PM_{10} of the total emissions in Hong Kong. In 2011, five of the 13 roadside AQO measurements had exceeded the AQO limits and there were 172 days with the roadside air pollution index exceeding the very high air pollution level of 100, ranging from 101 to 192. According to the EPD, diesel commercial vehicles were the main source of roadside pollution.

5. ***A significant number of high-polluting vehicles still in service.*** As of March 2012, there were 131,490 diesel vehicles, including 120,990 commercial vehicles (e.g. goods vehicles, non-franchised buses and light buses) and 5,800 franchised buses. Diesel vehicles registered before October 2001 (known as pre-Euro, Euro I and Euro II vehicles) are far more polluting than those registered since October 2006 (known as Euro IV and Euro V vehicles). To replace the high-polluting diesel vehicles, the EPD has launched since 2000 four one-off grant schemes. Whilst the 2000 Taxi Grant Scheme and the 2002 Public Light Bus Grant Scheme had replaced 99.8% and 54% respectively of the diesel taxis and diesel public light buses, the 2007 Grant Scheme for replacing the pre-Euro and Euro I diesel commercial vehicles was less than effective as it had only replaced 29% of the pertinent vehicles. Similarly, as of March 2012, the 2010 Grant Scheme (which will take place until June 2013) had only replaced 11% of the Euro II diesel commercial vehicles. As a result, 44% of the 120,990 diesel commercial vehicles running on the street were high-polluting ones (pre-Euro, Euro I and Euro II vehicles). Audit considers that the EPD needs to formulate better strategies for reducing the number of high-polluting vehicles running on the street.

6. ***Slow progress in implementing bus-route rationalisation.*** According to the EPD, franchised buses could account for up to 40% of the total vehicular emissions at busy traffic locations, causing health risks. The EPD consultant also estimated that a 10% reduction of bus trips could help reduce 156 tonnes of roadside NOx emissions, and the rationalisation of bus services was the most cost-effective air-quality improvement measure as it did not involve significant additional costs for implementation. However, Audit has found that from 2009 to 2011, only 1.1% of bus trips had been reduced in three busy locations.

Emission control of marine vessels

7. In 2010, emissions from marine vessels accounted for 48% of SO_2, 36% of PM_{10}, and 32% of NOx of the total emissions in Hong Kong. According to the International Maritime Organisation (IMO), air pollution from vessels is substantial and growing, causing serious and increasing public health and environmental impacts. Due to increased maritime activities in Hong Kong and the PRD region, emissions from vessels have substantially increased and become a significant source of air pollution in Hong Kong.

8. ***Delay in adopting the IMO 2010 standards.*** Legislative amendments were effected in June 2008 to adopt the IMO 2005 Standards which governed the sulphur content of vessel fuel and NOx emissions by vessel engines, but up to September 2012, similar amendments had not been made to adopt the more stringent IMO 2010 Standards which should have been adopted by consenting members of the IMO (including Hong Kong) with effect from July 2010. Owing to the lack of legal backing, the Marine Department cannot refrain ocean-going vessels from using high sulphur-content fuel and engines with high NOx emissions in Hong Kong waters.

9. ***Slow progress in requiring local and river-trade vessels to use ultra-low-sulphur diesel.*** Local and river-trade vessels in Hong Kong are normally fuelled by diesel with a sulphur limit of 0.5%. Although the EPD had once completed a trial scheme for local ferries to use ultra-low-sulphur diesel (with a sulphur limit of 0.005%), up to September 2012, local and river-trade vessels had still not been required to use ultra-low-sulphur diesel. Audit research has shown that some overseas countries have adopted more stringent standards for local vessels to use diesel with a sulphur content of 0.001% to 0.0015% and the Mainland will also adopt from July 2013 onwards a sulphur content of 0.035% for the purpose.

10. ***Slow progress in controlling dark-smoke emissions from vessels***. Vehicles suspected of emitting dark smoke are required under the Road Traffic Ordinance to undergo a smoke test to ascertain whether their dark-smoke emissions exceed the statutory limits. However, vessels will only be prosecuted under the Shipping and Port Control Ordinance and the Merchant Shipping (Local Vessels) Ordinance if they emit smoke in such a quantity as to cause a nuisance. Although legislative amendments for adopting the Ringelmann Chart had been proposed for measuring dark-smoke emissions, up to September 2012, the amendments had not been introduced. As a result, from 2007 to 2011, only five prosecutions relating to smoky vessels had been successful.

Emission control of power plants

11. In 2010, emissions from local power plants accounted for 50% of SO_2, 25% of NOx and 16% of PM_{10} of the total emissions in Hong Kong. Two electricity companies are operating a total of four power plants which together supply 77% of electricity for local consumption. In 2011, these four power plants used coal or natural gas as fuel, with coal accounting for 71% of local electricity generation and natural gas 29%.

12. ***Room for reducing NOx emissions from local power plants.*** Audit has found that emissions of SO_2, NOx and PM_{10} per unit of electricity generated from local power plants by using natural gas are far lower than those generated by using coal. However, it is more costly to generate electricity using gas than coal. Audit has further found that the NOx emission allowances set for local power plants, to be effective from 2015 and 2017, would significantly exceed those proposed by the EPD consultant. This may affect the achievement of the 2014 AQOs.

Regional emission control

13. In April 2002, the Hong Kong Special Administrative Region Government and the Guangdong Provincial Government issued a joint statement setting targets for reducing emissions of various pollutants in the PRD region by 2010. In October 2012, the EPD announced that Hong Kong had met the targets set under the joint statement. However, Audit notes that, as of September 2012, the post-2010 emission-reduction targets and the arrangements for implementation had not yet been formulated.

Audit recommendations

14. **Audit recommendations are made in the respective sections in this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Administration should take on board the audit observations and recommendations in this Audit Report for implementing measures to improve the air quality of Hong Kong. Specifically, the Administration should:**

Emission control of vehicles

(a) **formulate better strategies for reducing the number of pre-Euro, Euro I and Euro II diesel commercial vehicles running on the street;**

(b) **step up efforts and formulate a better strategy for reducing franchised bus trips;**

Emission control of marine vessels

(c) **seek legislative support for adopting the IMO 2010 Standards in Hong Kong as early as possible;**

(d) **require local and river-trade vessels to use ultra-low-sulphur diesel in Hong Kong waters as early as possible;**

(e) **seek legislative support to give effect to adopting the Ringelmann Chart as a reference to measure dark-smoke emissions from vessels;**

Emission control of power plants

(f) **take further measures to reduce NOx emissions from local power plants and review the long-term fuel mix for local electricity generation; and**

Regional emission control

(g) **work closely with the Guangdong Provincial Government with a view to setting the post-2010 emission-reduction targets and related implementation arrangements at an early time.**

Response from the Administration

15. The Administration agrees with the audit recommendations. The Secretary for the Environment and the Director of Environmental Protection have said that both the ENB and the EPD will seriously take on board the audit observations and recommendations in this Audit Report, and will promote public understanding of the health, economic and social implications of introducing various air-quality improvement measures.