Data & Statistics

Hong Kong Air Pollutant Emission Inventory

The Environmental Protection Department (EPD) compiles the Hong Kong Air Pollutant Emission Inventory annually to analyze the quantity of local air pollutant emissions and their major emission sources for supporting the formulation of effective air quality management strategies in Hong Kong. It also provides necessary data for carrying out air quality impact assessments. The emission inventory for Hong Kong was first published on EPD's website in March 2000.

The emission inventory comprises estimates of the emissions from seven source categories for six major air pollutants, namely: sulphur dioxide (SO_2), nitrogen oxides (NOx), respirable suspended particulates (RSP or PM_{10}), fine suspended particulates (FSP or $PM_{2.5}$), volatile organic compounds (VOC) and carbon monoxide (CO). The emission sources include public electricity generation, road transport, navigation, civil aviation, other combustion sources, non-combustion sources and hill fires.

Other combustion sources are defined as sources involving combustion, other than public electricity generation, road transport, navigation and civil aviation. Major contributing sources in this sector include non-road mobile machineries operating in construction sites and container terminals. Starting from 2016, emissions from cigarette smoking have been included under this category to improve the coverage of the emission inventory.

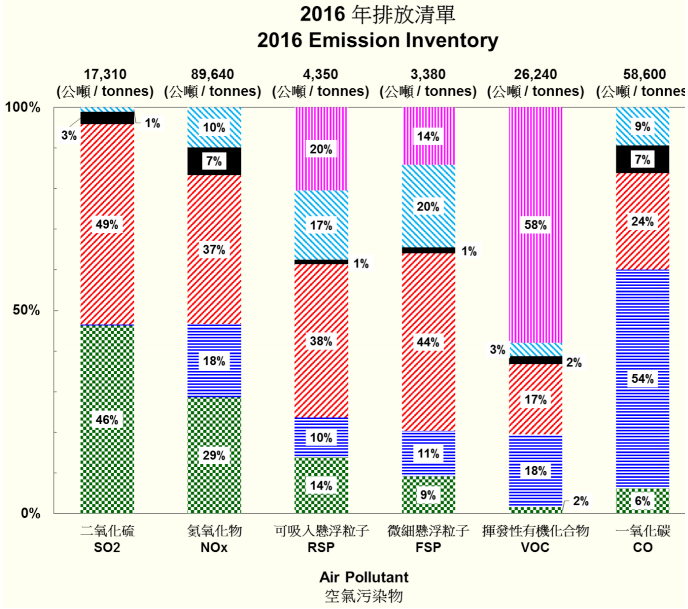
Non-combustion sources are defined as those remaining sources that do not involve combustion, from which only VOC, RSP and FSP emissions are significant. In this category, the major emission sources for VOC include paints and associated solvents, consumer products and printing, whereas those for RSP and FSP include paved road dust, cooking fumes, construction dust and quarry production.

In Hong Kong, hill fires can produce a large amount of particulates. As most of the hill fires in Hong Kong are caused by human negligence or accidents and are sporadic in nature, their emissions cannot be reduced through emission control measures like other pollution sources. In order to enable more meaningful comparison on the emission trends of controllable pollution sources and the effectiveness of local emission control measures, hill fires are reported separately in Sectoral Analysis.

2016 Emission Inventory

The diagram below shows the emission inventory for 2016 under different emission source categories including public electricity generation, road transport, navigation,

civil aviation, other combustion sources and non-combustion sources.



See Data

Topics of Interest

Emission Trends (1997-2016)

Sectoral Analysis (1997-2016)

Changes in Emissions Relative to Population, Energy Consumption and Economic Growth

Regional Emission Reduction Cooperation

Update of Emission Inventory

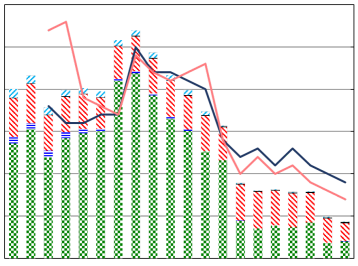
Emission Inventory Report

Useful References

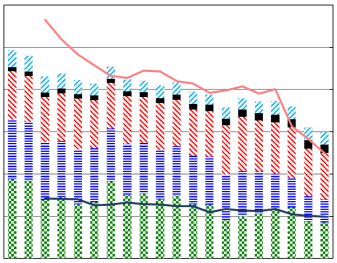
Emission Trends (1997-2016)

Trends of Emissions from Specific Source Categories

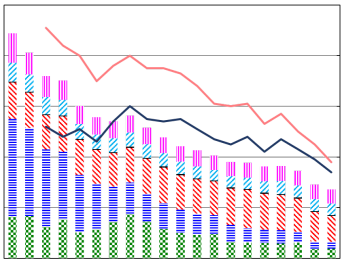
Legends:



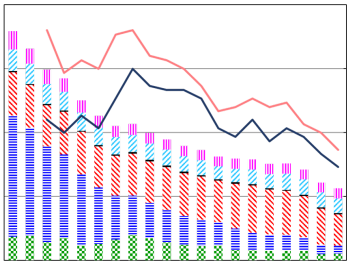
Sulphur Dioxide (SO_2)



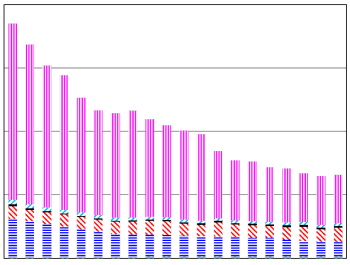
Nitrogen Oxides (NOx)



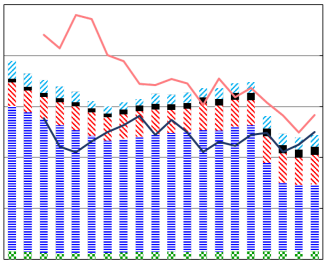
Respirable Suspended Particulates (RSP)



Fine Suspended Particulates (FSP)



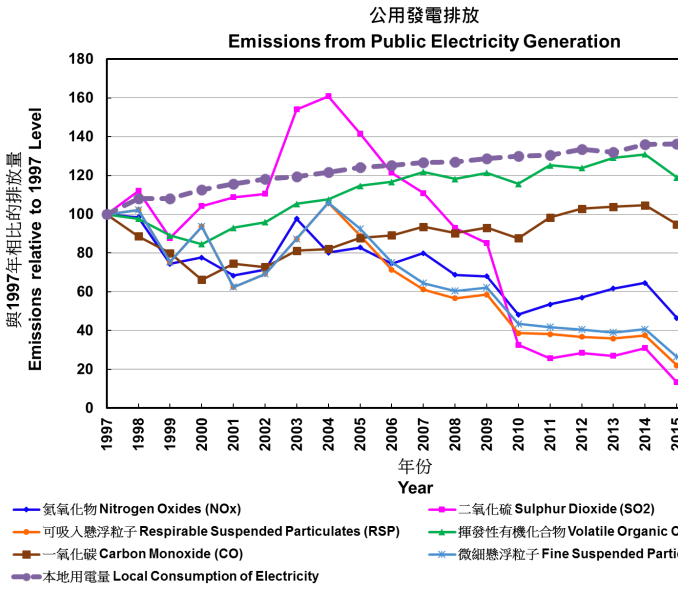
Volatile Organic Compounds (VOC)



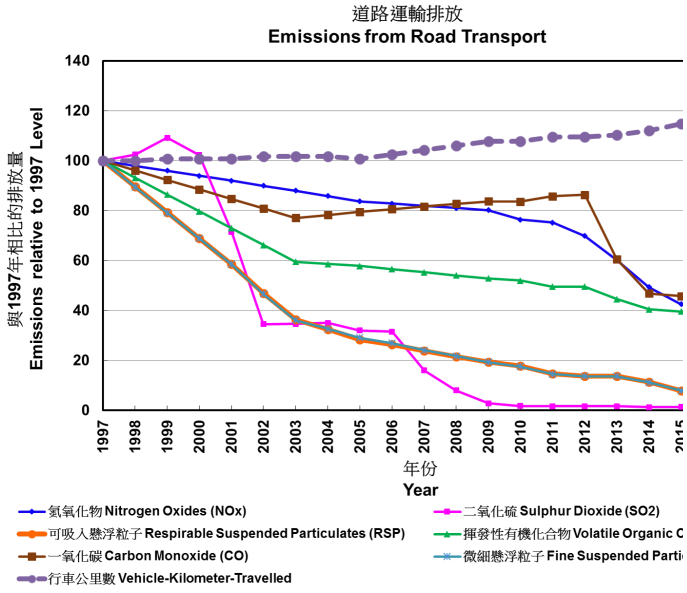
Carbon Monoxide (CO)

Sectoral Analysis (1997-2016)

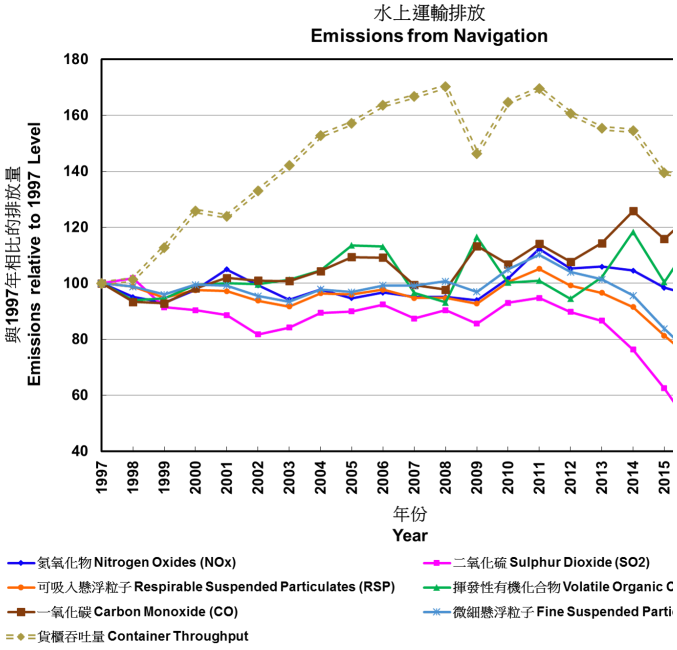
Sectoral Analysis for Specific Source Categories



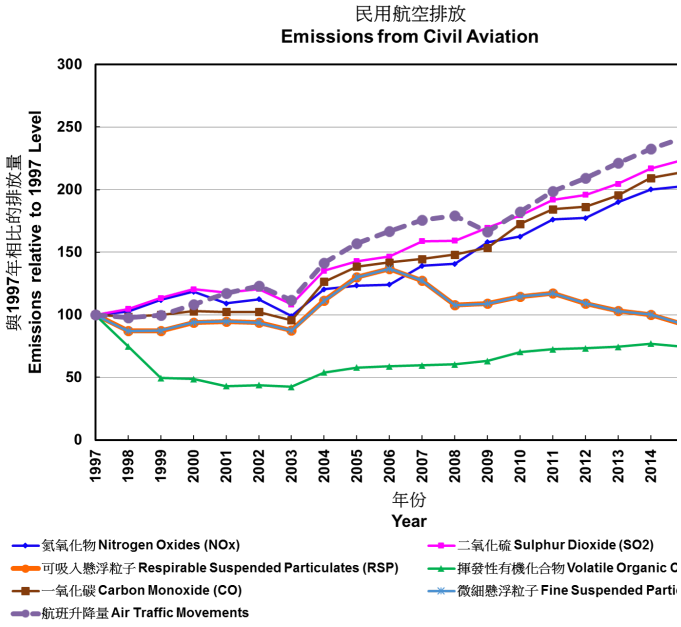
Sectoral Analysis for "Public Electricity Generation"



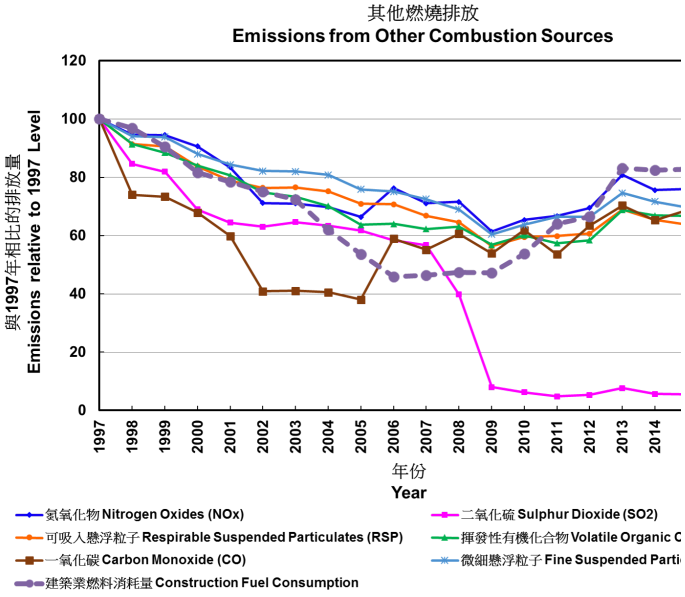
Sectoral Analysis for "Road Transport"



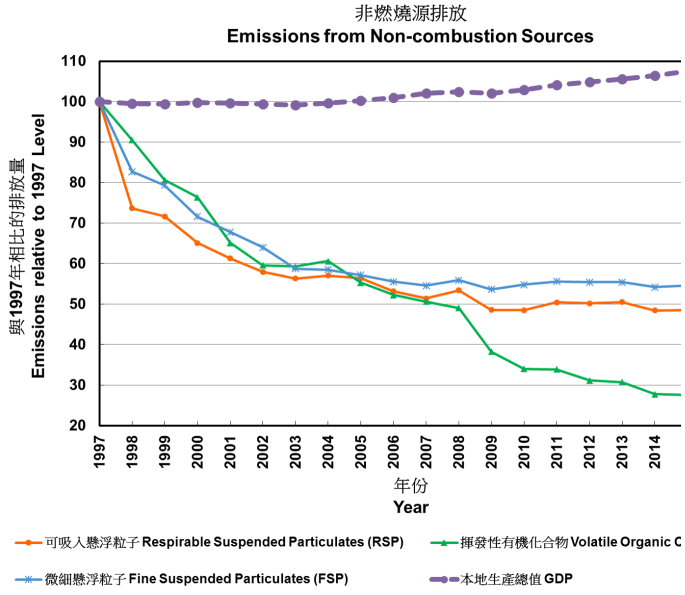
Sectoral Analysis for "Navigation"



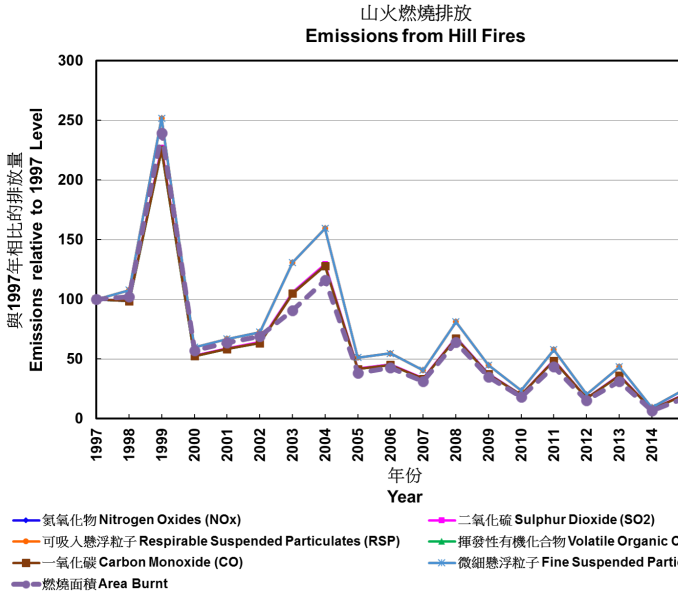
Sectoral Analysis for "Civil Aviation"



Sectoral Analysis for "Other Combustion Sources"



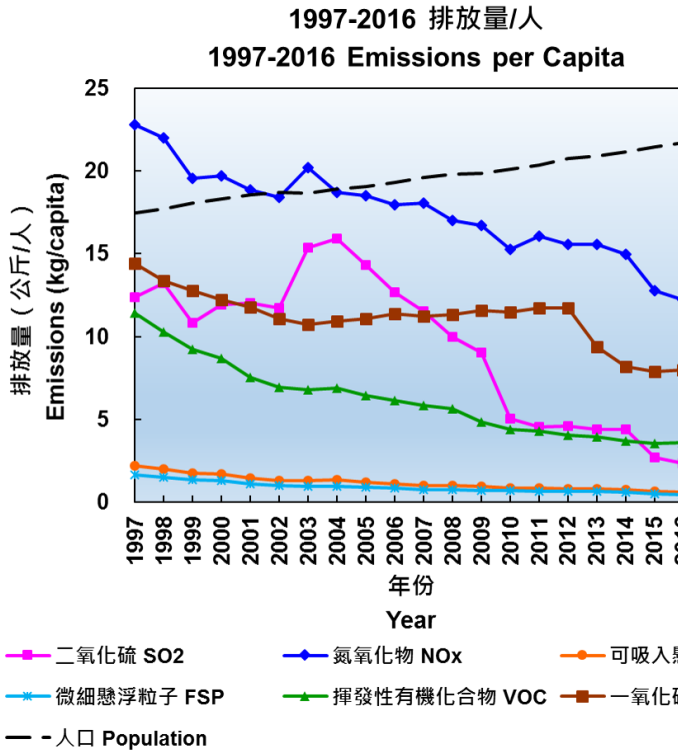
Sectoral Analysis for "Non-combustion Sources"



Sectoral Analysis for "Hill Fires"

Changes in Emissions Relative to Population, Energy Consumption and Economic Growth

Changes in Emissions Relative to Population



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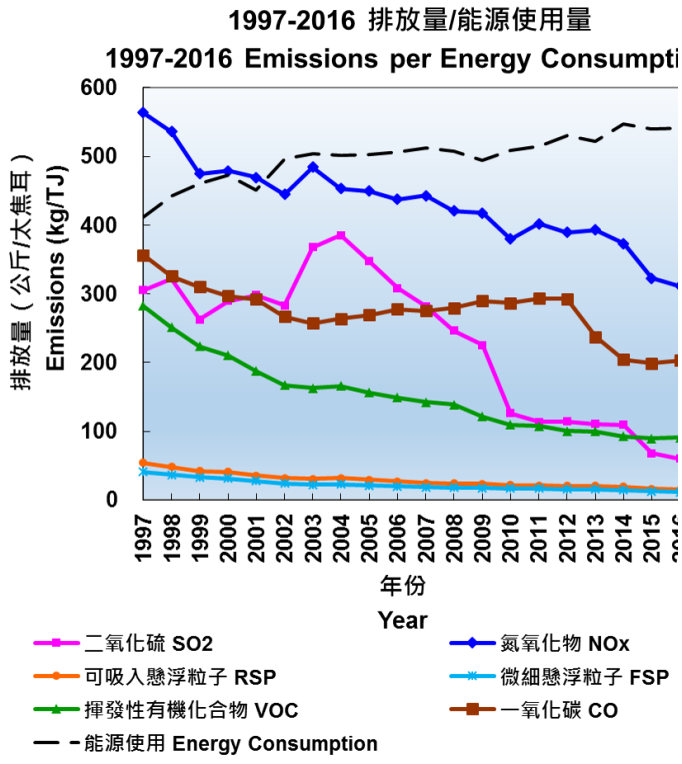
Changes in Emissions Relative to Energy Consumption



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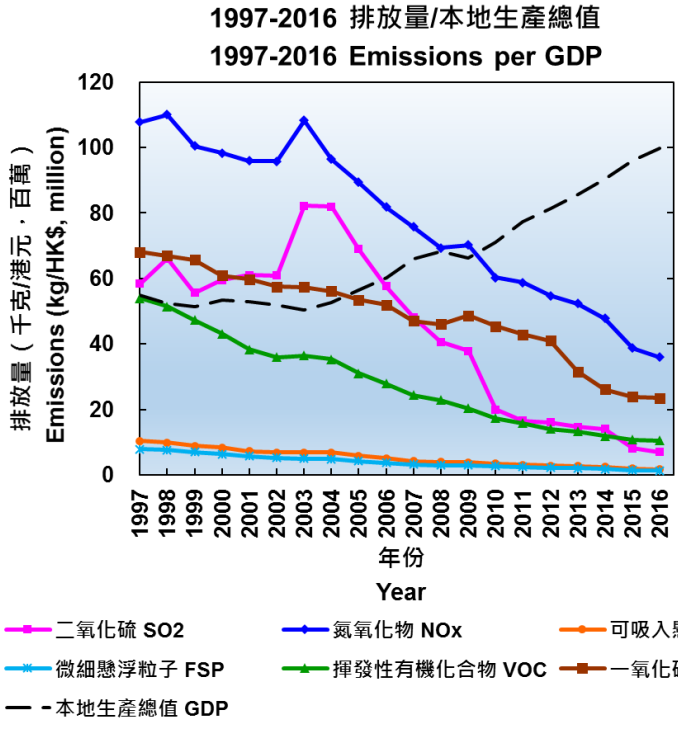
Changes in Emissions Relative to Economic Growth



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Regional Emission Reduction Cooperation

Over the past years, the Hong Kong and Guangdong governments have been working together to improve regional air quality in the Pearl River Delta (PRD) Region [Note 1]. Both parties have been collaborating since 2002 to reduce emissions from major sources such as power plants, vehicles and industries. In 2012, the Hong Kong and Guangdong governments endorsed a set of 2015 emission reduction targets and 2020 emission reduction ranges of four major air pollutants, namely sulphur dioxide (SO_2), nitrogen oxides (NOx), respirable suspended particulates (RSP) and volatile organic compounds (VOC), for Hong Kong and Pearl River Delta Economic Zone (PRDEZ) [Note 2], adopting 2010 as the base year. At the 17th meeting of Hong Kong-Guangdong Joint Working Group on Sustainable Development and Environmental Protection held in December 2017, the Hong Kong and Guangdong governments jointly announced the results of the mid-term review study which concluded the emission reduction results in 2015 and finalized the emission reduction targets for 2020.

Emission reduction results in 2015

Both Hong Kong and Guangdong have achieved their respective 2015 emission reduction targets for SO_2, NOx, RSP and VOC. According to 2015 Emission Inventory Report, the emission levels of major air pollutants in Hong Kong in 2015 decreased by 14% to 45% compared with 2010, while those in the PRDEZ dropped by 11% to 25% (as shown in Table 1). The emission reductions of SO_2, RSP and VOC in Hong Kong and that of SO_2 in the PRDEZ have far exceeded the targets.

Table 1: Emission reduction results for Pearl River Delta (PRD) Region in 20

Polluants	Region	2015 Emission Reduction Targets#	Actual Emission Reducti based on 2015 Emissior Report
SO_2	Hong Kong	-25%	-45%
	PRDEZ	-16%	-25%
NOx	Hong Kong	-10%	-14%
	PRDEZ	-18%	-22%
RSP	Hong Kong	-10%	-20%
	PRDEZ	-10%	-14%
VOC	Hong Kong	-5%	-14%
	PRDEZ	-10%	-11%

Reductions are relative to 2010 emission levels

Finalised emission reduction targets for 2020

Having taken into account the current and committed emission reduction measures, the mid-term review study finalised the emission reduction targets for 2020 for both sides (as shown in Table 2).

Table 2: 2020 Emission Reduction Targets for Pearl River Delta (PRD) F

Polluants	Region	2020 Emission Reduction Range released in 2012#	Establishe Reduc
SO_2	Hong Kong	-35% ~ -75%	
	PRDEZ	-20% ~ -35%	
NOx	Hong Kong	-20% ~ -30%	
	PRDEZ	-20% ~ -40%	
RSP	Hong Kong	-15% ~ -40%	
	PRDEZ	-15% ~ -25%	

VOC	Hong Kong	-15%	
	PRDEZ	-15% ~ -25%	

Reductions are relative to 2010 emission levels

Hong Kong will continue to co-operate with Guangdong Province to implement further control measures according to the Pearl River Delta Regional Air Quality Management Plan, in order to attain the emission reduction targets for 2020 and to meet broadly the existing Air Quality Objectives by 2020.

The key emission reduction measures implemented by Hong Kong include:

- requiring power plants to increase the use of natural gas in electricity generation;
- imposing and progressively tightening emission caps for power plants;
- tightening vehicle emission standards to Euro VI;
- continuing to phase out pre-Euro IV diesel commercial vehicles;
- collaborating with the Guangdong Provincial Government on the implementation of a domestic emission control area (DECA) in PRD waters as well as mandating vessels to use low-sulphur fuel in Hong Kong waters;
- controlling the VOC content of fountain solutions and printing machine cleaning agents; and
- aiming to tighten in phases the VOC content limits of architectural paints.

The key emission reduction measures implemented by Guangdong include:

- controlling the pollutant emissions of coal-fired thermal power plants and implementing ultra-low emission modifications of coal-fired generating units with power of 300 000 kilowatts or above;
- taking forward the comprehensive emission treatment of highly polluting boilers and strengthening emission monitoring of various industrial boilers and kilns to ensure stable and up-to-standard emissions;
- advancing the implementation of National VI emission standards for motor vehicles in the PRD;
- strongly promoting the use of new energy vehicles, which Shenzhen will use to fully electrify public transport by 2017, while Guangzhou and Foshan have already implemented electrification for newly acquired public vehicles from 2017 onwards. For newly acquired or replacement public vehicles in other regions of the PRD, the ratio of pure electric vehicles should not be less than 90 per cent;
- enhancing VOC control by regulating 13 major industries associated with sources of VOC including the petrochemical, furniture and printing industries;
- strengthening emission control at source including fugitive dust control for works and roads, enhancing the comprehensive utilisation of crop straw and forbidding straw burning in particular areas and at particular times, as well as stepping up cooking emission controls for the catering industry; and
- establishing a DECA in PRD waters and progressively implementing the use of low-sulphur fuel for vessels navigating, berthing and operating within the DECA in accordance with requirements.

As regards the next phase of the emission reduction plan, the two Governments will jointly form a scientific research team to discuss regional air pollution reduction co-operation beyond 2020, including the launch of a study on post-2020 air pollutant emission reduction targets and concentration levels for Hong Kong and Guangdong, in order to continuously improve regional air quality and protect public health.

Update of Emission Inventory

Making reference to international developments and technological advancement, we have been updating the methodologies to compile emission inventories including the collection of most updated data with an aim to provide a better support to the management of air quality. Whenever the compilation methodology is updated, new activity data are collated, or errors in the estimates are identified, we will follow international practice to update the emission inventory and to revise the emission inventories for past years as far as practicable based on the updated methods and data to enable consistent and reliable emission trend analysis to be made. Updates of the emission inventories are listed in the Summary of Updates to the Emission Inventory. Major updates to the emission inventories in recent years are highlighted below.

- EPD commissioned a comprehensive study on the marine emission inventory in 2008, which was completed in 2012. The study collected extensive local vessel activity data and reviewed the latest emission compilation methodologies of advanced places such as the Port of Los Angeles of the USA. The study concluded that these latest emission compilation methodologies can provide more realistic estimates of marine emissions. Based on the study findings, we updated the previous emission inventories for marine vessels. The updated emissions from vessels were higher than the previous ones.
- EPD have been conducting emission measurements for on-road vehicles by means of remote sensing equipment and advanced portable emission measurement systems (PEMS). The measurements have provided a more robust basis for us to estimate vehicle emissions. They have also found that vehicles with inadequate maintenance, e.g. LPG vehicles with worn-out catalytic converters, could emit considerably above their normal levels. We made use of the findings to update our vehicle emission estimation model and compile the vehicle emission inventory.
- Since the implementation of the Air Pollution Control (Volatile Organic Compounds) Regulation in April 2007, we have used the sales report data submitted by importers under the Regulation to compile VOC emissions of regulated products including six types of consumer products (air fresheners, hairsprays, multi-purpose lubricants, floor wax strippers, insecticides and insect repellents), printing inks and architectural paints. In October 2009, we amended the Regulation to further regulate the VOC contents of vehicle refinishing paints, marine paints (vessels and pleasure craft paints), adhesive and sealants and started to compile the VOC emissions from these paints based on their sales report data. Emissions from cleansing solvents during the application of paints have also been estimated. To compile VOC emissions for the regulated products, we also made reference to EPD's studies on printing industry, solvent usage for coatings and VOC-containing products, and survey data for marine paints to assess emissions from VOC-containing products.

Emission Inventory Report

2016 Hong Kong Air Pollutant Emission Inventory Report

Useful References

Intergovernmental Panel on Climate Change (IPCC)
U.S. Environmental Protection Agency (U.S. EPA - AP42)
European Environment Agency (EEA - EMEP/EEA Emission Inventory Guidebook)
Census and Statistics Department (C&SD - Hong Kong Statistics)
Electrical and Mechanical Services Department (EMSD - Hong Kong Energy End-use Data)

Note:

[1] *PRD Region refers to the whole territory of HKSAR and the Pearl River Delta Economic Zone (PRDEZ).*

[2] *PRDEZ includes Guangzhou, Shenzhen, Zhuhai, Dongguan, Zhongshan, Foshan, Jiangmen, Huizhou and Zhaoqing.*