## For information

## LEGISLATIVE COUNCIL PANEL ON ENVIRONMENTAL AFFAIRS

### **Report on the Cleaner Production Partnership Programme**

This paper summarises the key activities and achievements of the Cleaner Production Partnership Programme (the Programme) upon the completion of its five-year extension period from June 2015 to March 2020.

## BACKGROUND

2. The Environmental Protection Department (EPD) launched the Programme in April 2008 in collaboration with the then Economic and Information Commission of Guangdong Province (GDEIC) (now the Department of Industry and Information Technology of Guangdong Province (GDDIIT)). Through funding support and technology promotion activities, the Programme encourages and facilitates adoption of cleaner production technologies and practices by Hong Kong-owned factories, thereby improving the regional environment<sup>1</sup>.

3. In the light of the continuous environmental benefits brought about by the Programme, the Government allocated \$150 million in 2015 to extend the Programme for five years from 15 June 2015 to 31 March 2020. This phase of the Programme focused on encouraging Hong Kong-owned factories to adopt new technologies for reducing the emission of major air pollutants that contributed to the regional smog problem, i.e. volatile organic compounds (VOC) and nitrogen oxides (NOx). The Hong Kong Productivity Council (HKPC) is the implementation agent of the Programme.

<sup>&</sup>lt;sup>1</sup> The Programme covers Hong Kong-owned factories in Hong Kong and the Guangdong Province.

4. The Programme comprised four key initiatives (details at Annex A) –

- (a) to assist participating Hong Kong-owned factories in carrying out on-site improvement assessments;
- (b) to support Hong Kong-owned factories to carry out demonstration projects on cleaner production technologies and practices;
- (c) to support relevant trade and industry (T&I) associations of Hong Kong to carry out trade-specific promotion and publicity activities (the Organisation Support Initiative (OSI)); and
- (d) to organise cross-trade technology promotion activities by the HKPC under the Programme.

### MANAGEMENT OF THE PROGRAMME

5. A Project Management Committee (PMC) has been set up to oversee the implementation of the Programme. The PMC comprises representatives from four major chambers of commerce (i.e. the Chinese General Chamber of Commerce, the Chinese Manufacturers' Association of Hong Kong, the Federation of Hong Kong Industries and the Hong Kong General Chamber of Commerce) and an academic, as well as representatives from the EPD, the Trade and Industry Department, and the Innovation and Technology Commission. Over the past five years, the PMC held 18 meetings to oversee the operation of the Programme and scrutinise funding applications submitted by Hong Kong-owned factories and the relevant T&I associations in Hong Kong.

6. The HKPC has established a programme management team and a programme technical support team to co-ordinate and ensure effective implementation of the Programme. In addition, two support teams have been set up in Shenzhen and Dongguan respectively to manage local liaison work and co-ordination of programme activities.

### **KEY ACTIVITIES**

7. The cumulative number of approved applications for on-site improvement assessments, demonstration projects and OSI activities, as well as the total number of cross-trade technology promotion activities held by the HKPC over the five-year extension period are set out in the table below. On all key initiatives, the number of completed cases exceeded the targets set for the Programme.

	Applications Approved /Activities Held (as at 31 March 2020)						5-year
	2015/16	2016/17	2017/18	2018/19	2019/20	Total	Target
On-site							
Improvement	90	110	108	122	111	541	530 <sup>2</sup>
Assessments							
Demonstration	30	41	63	106	9	249	225
Projects	50	11	05	100		219	223
OSI Activities	17	25	25	34	0	101	100-130
Cross-trade							
Technology	40	41	12	26	16	176	110 140
Promotion	40	41	43	30	10	170	110-140
Activities							

### **On-site Improvement Assessments**

8. During the five-year extension period, on-site improvement assessments were conducted for 541 Hong Kong-owned factories under the Programme to identify areas for improvement and to propose practical solutions. These assessments focused on reduction of air pollutant emissions, energy efficiency as well as reduction and control of effluent discharge.

## Demonstration Projects

9. Among the 249 demonstration projects approved for Hong Kong-owned factories, 120 involved technologies on reduction of air

<sup>&</sup>lt;sup>2</sup> At the 42<sup>nd</sup> meeting held in November 2018, the PMC endorsed adjustment of the target set for on-site improvement assessments from 625 to 530 items so as to allocate more resources to meet the increasing demand for demonstration projects.

pollutant emissions, 100 on energy saving and 29 on reduction and control of effluent discharge. A summary of the key technologies demonstrated under the Programme in the past five years is at Annex B. These 249 demonstration projects contributed to annual reduction in pollutant emissions, carbon dioxide emission and effluent discharge within the region as tabulated below:

Annual reduction in emissions/discharge			
by the 249 demonstration projects (tonne/year)			
Volatile organic compounds (VOC)	2 200		
Sulphur dioxide (SO <sub>2</sub> )	1 000		
Nitrogen oxides (NO <sub>x</sub> )	1 000		
Carbon dioxide (CO <sub>2</sub> )	98 000		
Effluent	208 000		

Furthermore, the participating factories achieved an overall energy saving of 1 350 tera-joules and production cost saving of over \$120 million in each of the past five years.

### **OSI** Activities

10. During the five-year extension period, 17 OSI applications were approved under the Programme for organising a total of 101 trade-specific promotion activities by T&I associations in Hong Kong. These activities included factory visits for factory owners and their staff to view on-site the completed demonstration projects and other successful cleaner production technologies, seminars and workshops to share experience, and sectoral or environmental exhibitions to showcase The OSI activities also included cleaner production technologies. production of videos and guidebooks for promoting wider adoption of cleaner production technologies and practices by T&I associations or other organisations. A breakdown of these activities is given in the table below. The OSI activities attracted over 90 000 participants. The HKPC conducted quality checks on these activities to ensure that their implementation was in accordance with the plans specified in the approved applications.

OSI Activities	Number of Activities	
Factory Visit	25	
Seminar / Workshop	41	
Sectoral / Environmental Exhibition	11	
Production of Videos	21	
Production of Guidebooks	3	
Total	101	

Cross-trade Technology Promotion Activities

11. To facilitate sharing of knowledge and successful experience in adopting cleaner production technologies and practices by Hong Kong-owned factories, the HKPC did not only support T&I associations to carry out trade-specific promotion and publicity activities (i.e. the OSI activities mentioned in paragraph 10 above), but also organised various kinds of cross-trade technology promotion activities for the Hong Kong-owned factories. During the five-year extension period, a total of 176 such activities were held as tabulated below. These activities were well-received and attracted over 17 000 participants.

Cross-trade	Promotional	and	Publicity	Number of Activities
Activities				
Factory Visit				69
Seminar / Wor	89			
Environmenta	13			
Others	5			
Total				176

12. The HKPC promoted the Programme through various channels, including interviews and reports by the media as well as briefings for T&I associations. A logo for the Programme has been designed, and promotional leaflets have been distributed to publicise the Programme. An online cleaner production toolbox has been developed and uploaded to the Programme website to facilitate and encourage factories to adopt cleaner production technologies. In addition, to provide different trades with information about completed demonstration projects or proven technologies, we have compiled 139 case reports and a technical report summarising the VOC removal efficiencies of various technologies

demonstrated under the Programme. All these reports have been uploaded to the Programme website. Apart from establishing a website to provide an effective platform for sharing cleaner production information with the trades, the HKPC also operates two enquiry hotlines to enhance communication with the trades and to share experience.

13. The above cross-trade technology promotion activities have been well received, and effective in enhancing Hong Kong-owned factories' awareness of cleaner production and facilitating their adoption of similar technologies in their own operations.

14. The total expenditure incurred upon completion of the five-year extension period of the Programme on 31 March 2020 was \$145.98 million. The unspent funding, i.e. a balance of \$4.02 million, will be returned to the Treasury of the Government.

## PARTNERSHIP WITH ENVIRONMENTAL TECHNOLOGY SERVICE PROVIDERS

15. With rich experience and expertise in various areas of cleaner production technologies, Environmental Technology (ET) service providers play an important role in the Programme by offering professional advice and technical services to participating factories on the design and implementation of cleaner production technology solutions for on-site improvement assessments and demonstration projects. Since launch of the Programme in 2008, a total of 261 ET service providers have registered under the Programme. Among them, 110 are based in Hong Kong, 145 in the Guangdong Province and 6 from other regions or overseas countries. The HKPC has conducted quality checks on the work of registered ET service providers from time to time to ensure their service quality.

# COLLABORATION WITH THE MAINLAND

# Collaboration with municipal authorities of the Guangdong Province

16. The Programme has also fostered regional collaboration with the relevant Mainland authorities in reducing pollution arising from industrial activities. We have worked with various municipal authorities in the Guangdong Province in publicising the Programme and promoting cleaner production. Of the 89 seminars and workshops held during the

past five years as mentioned in paragraph 11 above, 53 were jointly organised with the Mainland authorities to reach out to Hong Kong-owned factories in the Guangdong Province, attracting over 3 200 participants.

The Hong Kong-Guangdong Cleaner Production Partners Recognition Scheme (JRS)

17. To encourage participation of Hong Kong-owned factories in the Programme and recognise their efforts in pursuing cleaner production, we have been launching the JRS since 2009 with the then GDEIC (now the GDDIIT). Commendations were given to 562 Hong Kong-owned manufacturing enterprises, 53 ET service providers and 8 sourcing enterprises during the past five years.

The Hong Kong-Guangdong Joint Working Group on Cleaner Production (JWGCP)

18. Promoting cleaner production has been one of the priority areas of Hong Kong-Guangdong co-operation to improve the regional To strengthen collaboration and exchange on cleaner environment. production with Guangdong, the two sides signed a Hong Kong-Guangdong Co-operation Agreement on Cleaner Production in 2014, and established the JWGCP under the Hong Kong-Guangdong Co-operation Joint Conference. The JWGCP has been promoting the adoption of cleaner production technologies and practices by the industries in the region. Key efforts include publicising the use of energy saving technologies in the energy-intensive industries; encouraging adoption of cleaner production technologies to reduce and control VOC emission and effluent discharge; and engaging Hong Kong-owned enterprises in the training for and practice of cleaner production audits.

### WAY FORWARD

19. Members are invited to note the key activities and achievements of the Programme upon the completion of its five-year extension period. In view of the environmental benefits brought about by the Programme, the Legislative Council approved a funding of \$311 million in May 2020 for the Government to further extend the Programme for five years until 31 March 2025. We will continue to provide this Panel with progress reports during the new five-year extension period of the Programme on an annual basis.

# **Environmental Protection Department July 2020**

#### Annex A

#### **Cleaner Production Partnership Programme**

The Programme aims to encourage and facilitate Hong Kong-owned factories adopting cleaner production technologies and practices with focus on reduction of air pollutant emissions, energy efficiency and effluent reduction and control, thereby contributing to improving the regional environment. The Programme targets at eight industry sectors, i.e. textiles, non-metallic mineral products, metal and metal products, food and beverage, chemical products, printing and publishing, furniture and paper/paper products.

#### **Key Initiatives**

2. The key initiatives of the Programme in this phase (from 15 June 2015 to 31 March 2020) and the 5-year targets are as follows –

- (a) on-site improvement assessments: to assist about 530 Hong Kong-owned factories to identify and analyse the problems they face and propose practical improvement solutions. The Government sponsors 50% of the assessment cost, subject to a ceiling of \$28,000;
- (b) demonstration projects: to support Hong Kong-owned factories to carry out around 225 projects to demonstrate the effectiveness of cleaner production technologies through installation of equipment and/or modification of production processes. The Government sponsors 50% of the project cost, subject to a ceiling of \$330,000;
- (c) organisation support initiative activities: to support relevant trade and industry associations of Hong Kong to carry out around 100 to 130 trade-specific promotion and publicity activities. The Government sponsors up to 90% of the project cost and the applicant has to contribute at least 10% of the project cost; and

(d) cross-trade technology promotion: the Hong Kong Productivity Council to organise around 110 to 140 activities, mainly to facilitate sharing of knowledge and successful experience in adopting cleaner production technologies and practices. These activities comprise seminars, workshops, factory visits, conferences and exhibitions in Hong Kong or key industrial cities in the Guangdong Province.

#### Annex B

## **Cleaner Production Technologies Demonstrated Under the Cleaner Production Partnership Programme**

The key cleaner production technologies demonstrated under the Programme during the reporting period are summarised below.

#### (a) Volatile organic compounds (VOC) reduction

- to treat VOC through direct thermal combustion technology, iron carbon micro-electrolysis, low temperature plasma, ultraviolet (UV) degradation, catalytic oxidation, chemical scrubbing, Zeolite adsorption, activated carbon adsorption or bio-filtration;
- to reduce solvent consumption through UV cured coating systems, automatic enclosed screen printing systems, membrane press machines, burn-off ovens, or water-based flexographic printing machines; and
- to recycle solvent/gaseous organics through centralised low-VOC dampening solution, cryogenic condensation technology or vapour permeable membrane.

#### (b) Air pollutant emissions reduction

- to reduce  $NO_x$  emission through oxy-fuel combustion technology, flue gas recirculation (FGR), selective non-catalytic reduction (SNCR), or natural gas-fired heating systems; and
- to reduce fugitive SO<sub>2</sub> emission through wet spraying scrubber with quicklime, infrared (IR) heating furnace or high-temperature heat pumps with automatic control.

#### (c) Energy saving

- to optimise the overall energy efficiency of factories through the applications of central control and monitoring systems (CCMS), turbine driven boiler feed pumps, centralised refrigerated fresh air dehumidifiers, phase change material (PCM) cooling thermal storage or flash steam recovery systems;
- the energy through use of non-invasive • to save electromagnetic scale control systems, thermal installation covers on rotary cylinder dryers, automatic cartooning and film wrapping machines, time-programmed dyeing systems, automatic paint spraying and curing systems, servo motor control, variable speed drives, energy efficient infrared heating coils, energy efficient rotary screw air compressors, oil-free magnetic-bearing centrifugal blowers or split module adsorption dryers; and
- to reclaim waste heat through the use of waste heat recovery systems on production machinery, compressed air systems or exhaust systems.

### (d) **Effluent reduction and control**

- to reduce water and chemical consumption through the use of fabric dyeing machines, dry cleaning machines with cleaning agent vapour recovery systems, low liquor ratio garment dyeing machines, vertical continuous plating technology, or jeans denim laser engraving machines;
- to recycle wastewater and/or production materials through the use of integrate moving bed biofilm reactors (MBBR) with anaerobic/anoxic/oxic (A2O) process, inline acidic/alkaline etchant regeneration and copper recovery systems, on-line recirculating de-smear solution filtration systems, electrically driven membrane, ceramic

nanofiltration (NF) membrane or nano activated carbon adsorption;

- to enhance treatment efficiency of wastewater through the use of jet aerator systems or non-invasive electromagnetic scale control systems; and
- to reduce the amount of waste chemicals through the use of etching solution electrolysis regeneration, side stream pipeline electro-adsorption control systems or photo-Fenton treatment.