For information

LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS

Report on the Cleaner Production Partnership Programme

PURPOSE

This paper takes stock of the key activities and achievements of the Cleaner Production Partnership Programme (the Programme) upon the completion of its two-year extension on 31 March 2015.

BACKGROUND

2. The Environmental Protection Department (EPD), in collaboration with the Economic and Information Commission of Guangdong Province (GDEIC) [1], first launched the Programme in April 2008 for five years. It aims to encourage and facilitate Hong Kong-owned factories in both Hong Kong and the Pearl River Delta (PRD) region to adopt cleaner production (CP) technologies and practices, thereby contributing to the improvement of the regional environment, in particular air quality. The Programme costs $93.06 million during the five-year term.

3. The Programme was extended for two years from 1 April 2013 to 31 March 2015 with $50 million approved by the Legislative Council (LegCo) in December 2012. The geographical coverage of the Programme was extended to cover the entire Guangdong Province, with a focus on the promotion of new technologies for reducing volatile organic compounds (VOC) and nitrogen oxide (NO_x), which are the culprits of the smog problems of the PRD region.

4. The Programme is implemented by the Hong Kong Productivity Council (HKPC). It has four key initiatives, including –

(a) organising technology promotion activities;

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1 GDEIC is the lead department of the Guangdong Provincial Government for promoting voluntary cleaner production to enterprises in Guangdong.

(b) providing on-site improvement assessments for participating factories;

(c) conducting demonstration projects on CP technologies and practices; and

(d) providing third party verification services for improvement projects implemented by participating factories.

Annex A Details of the key initiatives and the targets set for the extension of the Programme are at **Annex A**.

5. In the light of the significant environmental benefits brought by the Programme, EPD has further extended it for five years until 31 March 2020. A funding of $150 million was approved by the LegCo in May 2015.

MANAGEMENT OF THE PROGRAMME

6. To oversee the implementation of the Programme, we have set up a Project Management Committee (PMC) comprising representatives from four major chambers of commerce (i.e., the Hong Kong General Chamber of Commerce, Federation of Hong Kong Industries, Chinese Manufacturers' Association of Hong Kong and Chinese General Chamber of Commerce), EPD, Trade and Industry Department, Innovation and Technology Commission as well as an academic. Over the past two years, the PMC held eight meetings to provide steer to the operation of the Programme and scrutinise funding applications.

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

KEY ACTIVITIES

8. To facilitate sharing of knowledge and successful experience in adoption of CP technologies and practices by Hong Kong-owned factories, we carried out in conjunction with trade and industry associations and municipal authorities in the PRD a total of 88 technology promotion activities in the past

two years. These included seminars, workshops, factory visits and exhibitions, which attracted some 6 100 participants. In addition, 8 video clips and some 180 case reports and technical bulletins on CP technologies demonstrated or verified under the Programme were produced and publicised on the Programme website operated by HKPC. The website serves as a resource platform on CP related materials for sharing with the industries. The HKPC also operates an enquiry hotline to enhance information dissemination and sharing of the related experience.

9. The nature and number of funding applications approved during the two-year period are summarised below. The numbers exceeded the targets set for the Programme.

	Approved Applications as at 31 March 2015			**Targets**
	2013/14	2014/15	**Total**	
On-site Assessments	164	107	**271**	**250**
Demonstration Projects	47	51	**98**	**90**
Verification Services	56	37	**93**	**80 - 120**

10. Among the 98 approved demonstration projects, 38 involved technologies mainly for reduction of air pollution, 19 for effluent control and reduction, and 41 for energy saving. Examples of the technologies tested in these demonstration projects include –

- adoption of electrostatic precipitation or regenerative carbon adsorption technology to recycle gaseous organics/solvent, application of bio-filtration or low temperature plasma technologies for treatment of VOC, application of selective non-catalytic reduction technology to reduce NO_x emission, and use of electric heat-conducting heaters to replace conventional coal-fired boiler for reduction of air pollutant emissions;
- application of nano-bubble technology for fabric softening or in-line etchant regeneration with copper recovery system to reduce water and chemical consumption, and use of reverse osmosis membrane in combination with other filtration technologies to recycle wastewater; and

- use of grid-connected photovoltaic system to utilise renewable energy, and adoption of oil-free magnetic-bearing centrifugal compressor or infra-red heating coil on moulding machine to enhance energy efficiency, etc..

Annex B A summary of the key technologies demonstrated under the Programme in the past two years is at **Annex B**.

11. As the Programme focused on the promotion of VOC and NO_x reduction technologies, the percentage of demonstration projects involving relevant technologies increased from 13% in the first five-year term to 32% in the two-year extension period.

12. Majority of the demonstrated technologies for VOC and NO_x reduction can help reduce the emission levels ranging from 20% to 90%, while those for reducing other air pollutants (e.g. SO_2) can achieve a reduction level ranging from 10% to 80%. On effluent reduction and control as well as enhancing energy efficiency, the reduction potentials of the demonstrated technologies are also significant ranging from 30% to 90% and from 30% to 80% respectively.

13. Participating factories have shared their knowledge and experience gained from demonstration projects with other factories with a view to encouraging others to follow suit.

14. The total committed expenditure upon completion of the two-year extension of the Programme on 31 March 2015 is $49.98 million, against the total funding of $50 million. The balance of the unspent funding will be returned to the Treasury.

ENVIRONMENTAL BENEFITS

15. While the Programme is primarily a technology promotion initiative, the demonstration projects sponsored by the Programme as well as follow-up investment made by the participating factories have brought significant environmental and economic benefits to the region. It has contributed to the reduction of emissions/discharges as set out in the table below –

Pollutants	Emission/Discharges Reduction (tonnes)
VOC	7 900
SO_2	700
NO_x	9 300
CO_2	840 000
Effluent discharges	7 800 000

The annual energy saving is about 6 700 TJ and the annual saving in production costs is around $1 billion.

PARTNERSHIP WITH ENVIRONMENTAL TECHNOLOGY SERVICE PROVIDERS

16. Environmental Technology (ET) service providers play an important role in the Programme through providing professional advice and technical services to the participating factories for conducting on-site assessments and demonstration projects. A total of 192 ET service providers have been registered under the Programme. Amongst them, 106 are based in Hong Kong, 80 in Guangdong and six in other regions. HKPC has conducted quality checks on the work of ET service providers from time to time.

COLLABORATION WITH THE MAINLAND

17. The Programme has fostered regional collaboration with the relevant Mainland authorities in reducing pollution arising from industrial activities. We have worked with the nine PRD municipalities in publicising the Programme and promoting CP. As at the end of the two-year term, a total of 18 events had been jointly organised with the Mainland authorities to reach out to Hong Kong-owned factories in Guangdong.

18. In 2009, we launched the Hong Kong-Guangdong Cleaner Production Partners Recognition Scheme jointly with GDEIC to encourage participation of Hong Kong-owned factories in the Programme and to recognise their efforts in pursuing CP. Commendations were given to a total of 165 Hong Kong-owned manufacturing enterprises, 26 ET service providers and seven sourcing enterprises during the past two years.

19. To strengthen co-operation and exchanges on cleaner production with Guangdong, we signed with GDEIC a Hong Kong-Guangdong Cooperation Agreement on Cleaner Production at the 17th Plenary of the Hong Kong-Guangdong Co-operation Joint Conference held in November 2014. A Hong Kong-Guangdong Joint Working Group on Cleaner Production co-chaired by the Secretary for the Environment of the Hong Kong Special Administrative Region and the Director-General of GDEIC has been established and had its first meeting on 5 February 2015.

WAY FORWARD

20. Members are invited to note the key activities and achievements of the Programme over the two-year extension period. We will continue to provide progress reports to this Panel for the new five-year programme on an annual basis.

Environmental Protection Department
July 2015

Annex A

Key Initiatives under the Two-Year Extension Period of the Cleaner Production Partnership Programme

The objective of the Programme is to encourage and facilitate Hong Kong-owned factories in Guangdong and Hong Kong to adopt cleaner production technologies and practices, thereby contributing to improving the regional environment by reducing emissions of pollutants and energy consumption. 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 product manufacturing.

Key Initiatives

2. The key initiatives of the Programme in the two-year extension period include –

(a) *technology promotion: to organise 60 to 80 activities* to facilitate sharing of knowledge and successful experiences in adoption of CP technologies and practices. These activities comprise seminars, workshops, factory visits and exhibitions;

(b) *on-site improvement assessment: to assist about 250 factories* to identify and analyse the problems they face and propose practical improvement solutions. The Government would sponsor 50% of the assessment cost, subject to a ceiling of $25,000;

(c) *demonstration projects: to support some 90 projects* to demonstrate the effectiveness of CP technologies through installation of equipment and/or modification of production processes. The Government would sponsor 50% of the project cost, subject to a ceiling of $300,000; and

(d) *verification service: to verify some 80 to 120 improvement measures* implemented by participating factories at their own costs. This service was provided free of charge to participants, subject to a ceiling of $20,000 per project.

Annex B

Cleaner Production Technologies Demonstrated
Under the Cleaner Production Partnership Programme

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

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

- to recycle solvent/gaseous organics through the application of electrostatic precipitation technology, regenerative carbon adsorption, or Dimethylformamide recovery system by condensation;
- to reduce solvent consumption through the use of enclosed vacuum degreasing machine with solvent recovery system, enclosed automatic paint spraying line, digital ink-jet textile printer, ultraviolet (UV) cured coating system, or centralized dampening solution filtration system; and
- to treat VOC through the application of air ionization technology, micro-bubble wet scrubbing technology, low temperature plasma, UV-degradation, bio-filtration, or activated carbon concentrator with catalytic oxidation technologies.

(b) **Reduction of other air pollutant emission**

- to reduce NO_X emission through the application of selective non-catalytic reduction technology;
- to reduce fugitive SO_2 emission through the use of enclosed scroll discharge filter centrifuge; and
- to reduce air pollutant emissions through the use of pulse-jet filters, electric food waste dryer, renewable biomass burner, natural gas-fired steam boiler or electric heat-conducting oil heaters to replace conventional coal-fired boiler.

(c) **Effluent and pollutant reduction**

- to reduce water and chemical consumptions through the application of in-line alkaline/acidic etchant regeneration and copper recovery system, ozone induced plasma technology for

discoloration of denim fabric, nano-bubble technology for fabric softening, or conductive polymer direct metallization system;

- to recycle wastewater and/or production materials through the use of on-line recirculating de-smear solution filtration system, reverse osmosis (RO) membrane filtration system, on-line ion-exchange with RO system, magnetic separator with cascading ultra-filtration system, or vibrating membrane filtration system; and
- to enhance treatment efficiency of wastewater through the use of non-invasive electromagnetic scale control system, submerged aerated bio-filter (SAF) technology, anaerobic baffled reactor (ABR), membrane-enhanced sequential batch reactor (SMBR), ammonia stripping and anaerobic-anoxic/oxic (A2/O) biological process, or electro-coagulation with membrane bioreactor.

(d) **Energy saving**

- to utilise renewable energy through the use of grid-connected photovoltaic system as ancillary electricity supply;
- to optimise the overall energy efficiency of the factory through the application of automatic monitoring or management systems;
- to save energy through the use of centralised automatically-controlled chiller system, moulding machine with infra-red heating coil, servo motor, steam driven concentrator with steam regeneration unit, non-invasive electromagnetic scale control system, two-stage rotary screw air compressor, oil-free magnetic-bearing centrifugal compressor, thick film heaters, variable speed drive, high frequency switching-mode power supply, UV-LED printed circuit board exposure machine, turbulence suppressing and pressure boosting device on water pump, or cooling thermal storage units; and
- to reclaim waste heat through the use of waste heat recovery systems on production machinery or exhaust system of boiler/furnace.