

For information
28 February 2005

Legislative Council Panel on Environmental Affairs
Management of Municipal Solid Waste in Hong Kong

Purpose

This paper informs Members of the strategy in managing Municipal Solid Waste¹ (MSW) and the progress of measures to promote the prevention and recovery of MSW.

The waste problem

2. In 2004, about 6.4 million tonnes of wastes were disposed of in our three strategic landfills². About 53% of these were MSW, 38% were construction waste³, and 9% were special waste such as sludge. On average, each person in Hong Kong is discarding about 1.4kg of MSW per day.

3. At present, we mainly rely on our three strategic landfills to meet our waste disposal need. They occupy 270 hectares of land, costing \$6 billion to build and over \$400 million a year to operate. When planned in the 1980s, they were expected to serve our waste disposal need till 2020. However, as the amount of waste requiring disposal has been increasing, the landfills have been filling up much faster than expected. By the end of 2004, we had a remaining landfill capacity that is estimated to last for another 6 to 10 years if waste continues to grow at the current trend.

¹ Municipal solid waste includes domestic, commercial and industrial waste.

² Strategic landfills are the South East New Territories (SENT) Landfill located at Tseung Kwan O, West New Territories (WENT) Landfill at Nim Wan, Tuen Mun and North East New Territories (NENT) Landfill at Ta Kwu Ling, North District.

³ 88% of the construction waste were disposed at public fills.

Waste management strategy

4. An effective waste management strategy comprises three key elements:
 - (a) waste avoidance and minimisation;
 - (b) recovery, recycling and reuse; and
 - (c) bulk reduction and disposal of unrecyclable waste.

Waste prevention and recycling have been and will continue to be our main focus in waste management.

Waste avoidance and minimisation

5. Environmental education and public awareness play an important role in waste avoidance and minimisation. The Environment and Conservation Fund (ECF) provides funding for waste recovery projects undertaken by green groups and community organizations. Since 2002, a total of \$19.6 million has been granted for such purpose.

6. The Environmental Campaign Committee (ECC) and the Environmental Protection Department (EPD) have continued to promote waste prevention through campaigns, seminars and exhibitions to the public. Since 1999, EPD has administered a “Wastewi\$e” Scheme to encourage businesses to adopt waste reduction measures. So far, over 770 companies and institutions have enrolled in the Scheme and 244 have been awarded the “Wastewi\$e” logo to commend their achievement of waste reduction targets. In 1999, EPD issued the “Guideline on the Reduction of Disposable Plastic Foam Food / Drink Containers” to recommend measures to reduce waste made of expanded polystyrene⁴ (EPS) for schools, food manufacturers, restaurant / catering trade and the public. To encourage the introduction of more EPS alternatives, EPD, in collaboration with FEHD, the Consumer Council, trade associations and academics, promulgated the “Testing Guideline on the Degradability and Food

⁴ In 2003, some 114 tonnes of EPS (representing 1.2% by weight of total MSW) were disposed of at our landfills every day, 68% of which were in the form of contaminated food/drink containers and have no recycling value.

Safety of Containers and Bags” in 2000. As at 31 January 2005, one product was qualified and registered under the Testing Guideline. Under the Hong Kong Eco-Business Award organized by ECC, property management companies are commended for implementing effective waste management plans to reduce, reuse and recycle waste materials for the housing estates under their management. The Buildings Department has issued a Practice Note for authorized persons and registered structural engineers, providing guidelines for waste minimisation in the planning, design and construction. EPD, in collaboration with the Hong Kong Construction Association and the Real Estate Developers Association, has produced a set of publicity materials for promoting waste reduction in the construction industry. Publicity and community education programmes will continue to highlight the importance of waste avoidance and minimization.

Recovery, recycling and reuse

7. Where waste cannot be avoided or minimized, waste should be recovered for recycling and reuse as far as possible to reduce the amount that needs to be disposed of. Developing a habit among the public to separate waste from recyclables at the point of disposal and not to discard recyclables as waste is vital to effective recovery and recycling of waste. EPD has been testing various waste recovery systems to identify the most cost-effective and suitable mode. There are currently 28,000 3-coloured waste separation bins placed at some 9,300 points⁵ throughout the territory. In 2004, 140,000 tonnes of waste were collected for recycling through this scheme.

8. A 16-month pilot scheme on wet/dry domestic waste sorting in four housing estates in Eastern District was conducted from April 2003 in July 2004. Under the pilot scheme, households disposed of their dry waste (i.e. recyclables) separately which was then collected and delivered to Island East Refuse Transfer Station for further sorting by type, i.e. paper, plastic, glass and metal, etc. The sorted recyclables were recovered and sold to recyclers. The

⁵ The 9,300 points include parks, sports venues, leisure and cultural facilities, government buildings, hospitals, clinics, public/private housing estates, schools, refuse collection points and the roadside.

wet/dry scheme in tandem with the 3-coloured bin scheme in the four participating estates recovered 12% more recyclables than the 3-coloured bin scheme alone in non-participating estates. However, the scheme is not sustainable as the processing cost is high.

9. With the experience gained in the wet/dry waste sorting pilot scheme, EPD launched a 12-month pilot programme on separation of waste at source in August 2004 in 13 housing estates in the Eastern District. The pilot programme aims to make it more convenient for residents to separate domestic waste at source by encouraging and assisting property management companies to provide waste separation facilities on each floor of the building. The programme also aims to expand the types of recyclables to be collected to include all plastics, all metals, and other types of recyclables such as old clothing and waste electrical products. Under the pilot programme, recyclables are separated within each estate and sold to recyclers direct without having to be transported to a central location for additional sorting, which makes the operation more cost-effective. Initial results of the pilot programme show that the volume of recovered recyclables has increased significantly. In view of such encouraging results, we rolled out a territory-wide campaign in January 2005 at the Environmental Protection Festival organized by the ECC which will be followed by a further educational and publicity campaign to promote separation of domestic waste at source.

10. Product Responsibility Scheme (PRS) is one of the tools to enhance recovery, recycling and reuse of wastes. Under PRS, the manufacturers, importers, retailers and consumers of goods are required to take responsibility for the collection and disposal of end-of-life products. As a first step, a Regulatory Impact Assessment (RIA) Study of PRS on tyres and rechargeable batteries has been conducted. We are considering the cost-effectiveness and the impact on stakeholders on the various regulatory options of a mandatory PRS on tyres. We will consult the public on the viable options this year.

11. The large amount of plastic bags being disposed of at landfill is causing concern. In addition to continuous efforts in stepping up public education on reducing use of plastic bags, we will also study the overseas experience in putting a levy on plastic bags with a view to reducing plastic bag waste.

12. Since April 2002, a voluntary PRS programme to recover mobile phone rechargeable batteries has been in place. To date, 8.6 tonnes of batteries have been collected for recycling in an overseas facility. This scheme will be expanded in April 2005 to include other types of rechargeable batteries and to include more members of the trade⁶.

13. Studies on the implementation of PRS on beverage containers and electrical and electronic appliances will commence in 2005. Recovery programmes are organized in tandem to gather experience and to facilitate recovery and recycling.

14. Details of the recovery and recycling programmes organised by EPD are at Annex.

Bulk reduction and disposal of unrecyclable waste

15. Hong Kong has an efficient public cleansing and waste disposal system. The vast majority of our wastes are collected and disposed of at landfills. However, even the most environmentally advanced country in the world cannot rely solely on landfilling to deal with its wastes. In Hong Kong, while waste reduction and recovery will continue to be of top priority, there would still be large volumes of waste (4 million tonnes a year) which cannot be recycled and need to be properly disposed of. Maintaining the current manner of disposing of waste without treatment at landfills and using landfill as the only waste management method is clearly not sustainable. There is a need to establish alternative waste treatment methods to reduce the volume of waste before final disposal.

⁶ The number of companies co-organizing the rechargeable batteries recycling programme has increased from 17 in 2004 to more than 30 in 2005.

16. To deal with the huge quantity of MSW in Hong Kong, we need to explore new waste treatment technologies for the development of Integrated Waste Management Facilities (IWWMF). IWWMF focus primarily on waste treatment but also embody waste recovery and recycling at the same location so that our MSW can be managed more efficiently and in a sustainable manner. There are many different technologies available that could reduce the volume of waste and make waste treatment more effective and sustainable. To ensure that we will not miss out any potential technologies that are suitable for Hong Kong, particularly some new and innovative ones that have emerged in recent years, an expression of interest (EoI) exercise was launched in late April 2002 to invite local and overseas suppliers and facility operators to propose waste treatment technologies for the development of IWWMF in Hong Kong. A total of 59 submissions were received, in which the following six major technology types were proposed:

- (a) **Composting** – a biological process where the organic fraction of the waste stream, mainly biodegradable yard waste and food wastes, are decomposed to a residue (that can be used as soil conditioner) in the presence of oxygen through bacterial activity;
- (b) **Anaerobic Digestion** – a biological degradation process of organic materials by microbial activity in the absence of oxygen which produces biogas (that can be used to generate heat or electricity) and organic residue (that can be processed for use as soil conditioner);
- (c) **Incineration** – waste is combusted (typically over 850°C) to reduce its volume and hazardous properties, and to generate heat and/or electricity;
- (d) **Gasification** – waste is heated to a high temperature (typically over 1000°C) which volatilises the organic fraction of the waste to produce a combustible gas called syngas. The syngas is in turn combusted to generate heat energy or, used as a fuel after cleansing to generate electricity; and

- (e) **A combination of mechanical and biological treatment (MBT)** – mixed waste is first treated through a series of mechanical operations separating them into recyclable materials, non-recyclables that could be further processed to become fuel (for transfer to a dedicated facility as energy) and a biodegradable fraction which is treated and stabilized by a biological process before application on land.
- (f) **Combustion of fuel derived from waste for the production of cement** – Recyclable materials are recovered from the wastes. The remaining non-recyclable materials are processed to become “refuse derived fuel” that can be used as a supplementary fuel in the co-combustion process for cement production.

17. An Advisory Group on Waste Management Facilities (AG) has been set up to assist in assessing the 59 EoI submissions received and to advise the Government on the most suitable technology option for the IWMF. Overseas countries have valuable experience in adopting advanced technology in waste management. The AG therefore visited several large-scale waste management facilities in Japan and South Korea in November 2004 to familiarize themselves with some of the above advanced technologies in paragraph 16 adopted by these countries. The AG observed that thermal treatment such as incineration or gasification are commonly used in Japan for MSW treatment and that these facilities could be designed and built to very high standards with good emission quality and pleasing visual appearance. Also, such modern facilities integrate well with the neighbourhood. The visit to Korea showed that biological treatment technologies are suitable for specific organic waste stream, such as food waste or manure, and that product outlet and cost-effectiveness would be key factors contributing to successful development of large-scale biological waste treatment plant. The AG also visited facilities with the following two advanced technologies to treat incineration ash –

- (a) Ash melting – incineration ash is melted at temperatures over 1300°C, then cooled down to be transformed into vitrified slag which is a glassy-like inert material.

- (b) Eco-cement – fly ash and bottom ash from the incineration plants are blended and ground with limestone and burnt in a rotary kiln at 1,350°C for further grinding with gypsum to turn into a material called eco-cement which has the properties of cement and can be used for construction.

18. We will consult the public in the second quarter of 2005 on the technology options which should be adopted in Hong Kong.

19. No waste treatment technology can entirely eliminate waste. Landfills will still be required as the final repositories for wastes that cannot be recycled or treated, or for the residues after treatment. As the three landfills will be filled up soon, there is an urgent need to expand the existing landfills and to identify new sites for landfills to cater for Hong Kong's waste disposal needs.

Results of waste prevention and recovery measures

20. In our paper "Promoting Prevention and Recovery of Domestic Waste (Paper CB(1)2103/00-01(06)) presented to this Panel in September 2001, we set the following targets to facilitate evaluation of the effectiveness of the measures:

- (a) to contain the quantity of MSW requiring disposal to 3.4 million tonnes in 2004 and 3.7 million tonnes in 2007;
- (b) to raise the overall MSW recovery rate from 34% to 36% in 2004 and 40% in 2007; and
- (c) to raise the domestic waste recovery rate from 8% to 14% in 2004 and 20% in 2007.

21. These targets have been met as follows –

- (a) the quantity of MSW requiring disposal was maintained at around 3.4 million tonnes each year from 2000 to 2004. This compares favourably with the 3.5% annual growth rate in the years before 2000;
- (b) the overall MSW recovery rate rose from 36% in 2002 to 41% in 2003 and to about 40% in 2004⁷; and
- (c) the domestic waste recovery rate rose from 8% to 14% in 2003⁸.

22. The overall waste recovery rate has continued to maintain at a high level of about 40% in 2004⁹. This reflects the result of our effective measures in the promotion of waste recovery.

23. We will continue with our existing measures to further promote waste separation and recovery in the coming year. We spent about \$12 million in providing waste separation bins throughout the territory, and the recyclables collection cost was about \$4 million in 2003-04¹⁰. Also, in 2004-05, EPD spent about \$4 million in organizing public education and publicity programmes on waste reduction and recovery. Through the ECF, \$19.6 million were given to support 63 community waste recovery projects, and \$1.76 million were granted to ECC for carrying out territory-wide campaigns in housing estates on waste reduction and recovery, of which \$236,000 were used to purchase recycling bins.

24. In 2004, Hong Kong recovered about 2.3 million tonnes of waste. Based on a landfill disposal cost of about \$125/tonne¹¹, the waste diverted to recycling has saved around \$288 million in landfill disposal cost.

⁷ Provisional figure only.

⁸ The domestic waste recovery rate for 2004 will be available in March 2005.

⁹ Provisional figure only.

¹⁰ The figure for 2004-05 will be available in March 2005.

¹¹ The landfill disposal cost of \$125/tonne covers the construction, operation, restoration and post-completion environmental monitoring of the three existing landfills.

Other measures

25. As an integral part of our waste management strategy, we will continue to implement the polluter pays principle. As a first step, we will introduce a charging scheme for construction waste. The enabling legislation and the two sets of subsidiary legislation were passed by LegCo. We are now actively undertaking the necessary preparatory work for the implementation of the scheme, including upgrading of existing waste disposal facilities, provision of sorting facilities, dry-runs, and education and publicity programmes. We aim to implement the charging scheme in the summer of 2005. Drawing on the experience of the construction waste charging scheme, we will study the feasibility of an MSW charging scheme. Since an MSW charging scheme will be more complicated and will directly affect the whole community, the operational arrangements and charging method of such a scheme will require careful study. We will consult the public before introducing any scheme on MSW charging.

Conclusion

26. Members are invited to note the progress of Government's measures to promote MSW prevention and recovery.

Environment, Transport and Works Bureau
February 2005

Waste Recovery and Recycling Programmes

Period	Name of Recycling Programme	Characteristics of the Programme	Outlet	Result
2002 – present	Packaging Expanded Polystyrene (EPS) Recycling Programme	Funded by Environment and Conservation Fund (ECF), Friends of the Earth (FoE) tested various modes of operation for recovery of EPS, including on-site compaction of EPS for large and regular producers and bulk collection service for ad-hoc producers.	The EPS collected is first compacted or melted and then sold to local recyclers for production of products such as photo frame.	About 1 tonne of EPS was collected every month. EPD plans to collaborate with FoE to extend the collection network by setting up more collection points.
2002 – present	Spent Mercury Lamp Recovery Programme	A set of equipment was installed at the Chemical Waste Treatment Centre to recover mercury from fluorescent tubes and energy-saving bulbs and street lamps from Government departments.	Mercury reclaimed will be sold as raw material.	By end 2004, the facility has taken in more than 250,000 of mercury lamps. To evaluate its effectiveness to see if the service could be extended to include commercial buildings and other waste with mercury content.
Apr 02 – Mar 05	Mobile Phone Battery Recycling Programme	The first voluntary Product Responsibility Scheme (PRS) programme, co-organized by the mobile phone, battery manufacturers and the	Batteries collected were sorted and shipped to an overseas facility for recycling.	Since April 2002, about 8.6 tonnes of mobile phone batteries (about 172,000 pieces) have

Period	Name of Recycling Programme	Characteristics of the Programme	Outlet	Result
		telecommunication industry. Collection points were set up in the retail shops and service centers of the co-organizers.		been collected. 7.5 tonnes of recovered batteries have been exported for recycling. The programme will be expanded to recover all types of rechargeable batteries in April 2005. So far, more than 30 companies have confirmed participation.
Aug 02 – present	Plastic Bags (Domestic) Recovery Trial	Collection bins are placed at 36 public/private housing estates and 24 supermarket stores to recover plastic bags.	Plastic bags recovered would be arranged for recycling by the collectors.	So far, 22 tonnes of plastic bags (equivalent to 3.9 million plastic bags) have been collected.
mid-02 – end-05	Recovery of waste electrical and electronic appliances at waste management facilities	Pilot recycling plant at North West New Territories Refuse Transfer Station was set up to recover discarded electronic and electrical appliances.	Appliances are dismantled to retrieve useful materials for recycling.	So far, about 5,000 appliances have been processed.
Jan 03 – Dec 05	Waste Electrical and Electronic Equipment (WEEE) Recovery	St. James Settlement and Caritas were engaged to undertake the programme.	WEEE collected is refurbished for donation to the needy. The equipment that is beyond repair	25,000 and 40,000 units of appliances were collected in 2003 and 2004

Period	Name of Recycling Programme	Characteristics of the Programme	Outlet	Result
	Programme		will be dismantled to retrieve useable components and materials for reuse and recycling.	respectively.
Apr 03 – Apr 05	Pilot Scheme in Recycling of Waste Tyres collected at Kowloon Bay Transfer Station	Recovery and recycling of waste tyres produced by the Government vehicle fleet and collected from the street by FEHD.	Rubber chips reclaimed were locally used in production of “RubberSoil” for application as slope fill and road base, etc; and steel reclaimed was sold as scrap.	By end 2004, about 4,600 tonnes of waste tyres were recovered.
Aug 04 – present	Pilot Programme on Separation of Domestic Waste at Source	Pilot programme is tried at 13 housing estates in the Eastern District aiming to facilitate residents to separate waste at source by providing waste separation facilities on each floor, and to broaden the types of recyclables. The programme is now expanded to the whole territory.	Paper, metals and plastics recovered are sold directly by participating estates to recyclers for recycling. Periodic programmes are also organized to recover other materials such as old clothing.	Preliminary data show that the amount of waste recovered has increased in various degree: metal – 15 times more than before (before the programme : 2 tonnes; after the programme : 30 tonnes); paper – up 40%; plastics – up 10%.
Sep – Oct 04	Mooncake containers recovery programmes	EPD collaborated with property management companies, restaurant trade, and mooncake manufacturers to recover and recycler mooncake containers at shopping arcades.	Mooncake containers collected were sold to recyclers for recycling	42,000 containers were collected during the nine-day period at the shopping arcades.

Period	Name of Recycling Programme	Characteristics of the Programme	Outlet	Result
		EPD also facilitated property management companies to organize their own collection programmes.		42,000 containers were collected from 170 estates.
Jan 05 – Jan 06	PET Beverage Bottle Recycling Programme	Launched and funded by Swire Coca-Cola and Vitasoy and co-organised by EPD. The programme provides reward to the public for returning plastic beverage containers of the organized beverage companies to designated community centre.	Plastic bottles were collected by local plastic recycler for recycling.	The programme commenced on 28 Jan 2005.