
INFORMATION NOTE

Management of Municipal Solid Waste in Selected Places

1. Background

1.1 The Panel on Environmental Affairs of the Legislative Council (Panel), at its meeting on 28 February 2005, requested the Research and Library Services Division (RLSD) to conduct a research on the management of municipal solid waste in other cities. In particular, the Panel was interested in obtaining information on the strategies of municipal solid waste management and the policies on promoting the development of the sorting and recycling industry.

1.2 RLSD initially selected Taipei, London and Shanghai for the study, and enquiries had been sent to the respective governments of the three cities to obtain the required information. As at the publication of this information note, the Taipei city government (TCG) and the Greater London Authority responded to our enquiries by providing some basic materials. Since the information obtained is not sufficient to compile a research report, a factual information note is prepared for Members' deliberation.

1.3 Further, Singapore is added to the study to replace Shanghai, as she has formulated a strategy on solid waste management, which is known as the Singapore Green Plan 2012. In addition, among the selected places, Singapore achieved a relatively high recycling rate of 47% in 2003. Hence, its experience may be valuable to Hong Kong.

2. Taipei

Municipal solid waste management strategy

Vision for 2010 Total Recycling and Zero Landfill Programme

2.1 TCG implemented the Vision for 2010 Total Recycling and Zero Landfill Programme in 2000. The Programme aims at transforming Taipei into an eco-city capable of sustainable development. The term "Zero Landfill" means that all municipal solid waste will be either recycled or reused, and it includes:

- (a) reusing organic wastes as compost feed;
- (b) recycling and reusing all scrap metal, glass, plastic and paper;

- (c) making use of the heat energy released from the incineration of combustible garbage; and
- (d) sorting, recycling and reusing construction materials and incineration ash.

2.2 TCG has set a series of total sorting and recycling rates between 2005 and 2010. The rates are 15%, 33%, 67% and 100% by 2005, 2007, 2008 and 2010 respectively. In order to achieve these targets, TCG is committed to controlling the volume of solid waste generated, developing the reuse technologies that are more economically competitive, and promoting the market of recycled materials and products.

2.3 In 2004, the city generated 799 572 metric tonnes of solid waste. Among the three treatment methods, incineration¹ was the most important one (accounting for 62.7% of the total), followed by recycling (36%) and land filling (1.3%). According to TCG, the land filling rate was only 1.3% in 2004, reflecting the effective implementation of the city's solid waste management strategy.

Restricting the use of plastic shopping bags and disposable plastic (including styrofoam) tableware

2.4 When the Legislative Yuan amended the *Waste Disposal Act*² in 2001, it also approved a decision as follows:

*"With respect to package materials and containers that may result in serious pollution upon the local environment, the EPA [Environmental Protection Administration] shall finish review after the amendment being approved within three months and then after six months shall declare such results. In dividing into several stages to finish the restricted use as follows: plastic bags, styrofoam and disposable plastic tableware ..."*³

2.5 The *Waste Disposal Act* stipulates that plastic shopping bags and disposable plastic tableware⁴ must not be offered to customers for free. At the time, the society was concerned about the impact on the community when implementing this policy. Under such circumstances, EPA agreed to implement the policy by two stages.

¹ The city currently has three large scale waste incinerators, located at Neihu, Mucha and Peitou.

² The *Waste Disposal Act* is the main legislation governing the collection, treatment and disposal of wastes in Taiwan.

³ For details, please see *The Purpose of Promotion for the Restricted Use Policy on Plastic Shopping Bags and Disposable Plastic Tableware*, published by EPA in 2003.

⁴ In this information note, disposable plastic tableware also covers styrofoam tableware.

2.6 The first stage of the policy was launched in October 2002. The use of plastic shopping bags⁵ and disposable plastic tableware was restricted in government agencies, government-run enterprises, military units, military general stores, public and private schools, and public hospitals. The second stage commenced in January 2003, extending the policy to department stores, large-scale markets, supermarkets, chain stores, fast food chain stores, and food and beverage stores. In effect, this restrictive policy has nearly covered all retailers in Taipei.

2.7 The current charging rates for plastic shopping bags range from NT\$1⁶ (HK\$0.23) to NT\$3 (HK\$0.69). In the case of disposable plastic tableware, it is sold to customers separately. Its price may vary, depending on the size and volume of the product concerned.

2.8 EPA points out that since the introduction of the restrictive policy on the use of plastic shopping bags and disposable plastic tableware, Taipei residents have already changed their habit of using these products and have become more aware of environmental protection.

Municipal solid waste charging scheme

Per Bag Trash Collection Fee Programme

2.9 TCG replaced the Water Based Trash Collection Fee System⁷ with the Per Bag Trash Collection Fee Programme in July 2000 so as to bring the policy in line with the polluters pay principle⁸. Under the new Per Bag Trash Collection Fee Programme, Taipei residents must use specially made trash bags that can be purchased at designated locations throughout the city.⁹ The bags, which are available in six sizes, are priced based on a flat rate of NT\$0.45 (HK\$0.12) per litre. Recyclables are collected for free, to encourage Taipei residents to save money on trash fees by separating recyclables from trash items. Bulky or large trash items are collected for free by appointment with the city trash crews.

⁵ Plastic bags which are used for the following purposes do not fall within the scope of the policy: (a) being packed in the form of merchandise and exhibited on the goods shelves for sale; (b) being used to pack fish, meats, vegetables, fruits and other raw merchandise or foods; (c) package materials being adopted in the factory; and (d) package materials being adopted to contain medicine in a hospital.

⁶ The average exchange rate in 2004 was NT\$1 = HK\$0.23.

⁷ Under the Water Based Trash Collection Fee System, a trash collection fee was attached to each household's monthly water bill. The fee was calculated based on water consumption as an indicator of household size and trash generation. The drawback of this system was that there was no direct connection between the amount of trash generated and the trash collection fee charged. In other words, the water-based system lacked an incentive for residents to reduce the amount of trash they generated.

⁸ The principle requires that the polluter should bear the expense of carrying out measures to clean up the environment.

⁹ There are more than 2 200 sales outlets in the city.

2.10 In addition, TCG issues special free-bags to volunteers to maintain the cleanliness of public areas such as parks and schoolyards. General industrial wastes are collected through arrangements with private waste handlers.

2.11 TCG considers that the Per Bag Trash Collection Fee Programme has yielded impressive results: household waste volume decreased 53% in 2004, compared to the total in 2000, and the recycling rate increased from 10% in 2000 to 36% in 2004.

2.12 Further, Taipei residents also provide full support to this Programme. According to TCG, the usage rate of the special trash bags nears 100% and the number of illegally discarded bags is very low. A public survey conducted by TCG in October 2000 revealed that 75% of the public believed that the policy was successful and 51% made an intentional effort to reduce the trash volume.

Sorting and recycling programmes

Compulsory Garbage Separation Programme

2.13 According to the Review and Prospects of the Garbage Disposal Plan approved by the Executive Yuan, Taiwan (including Taipei) implemented the Garbage Sorting, Recycling, and Reduction Action Plan in 2003, which required residents to separate garbage.

2.14 In Taipei, household wastes must be separated into three categories: recyclable waste, kitchen waste and general household waste. Violators are fined between NT\$1,200 (HK\$280) and NT\$6,000 (HK\$1,398). The number of non-compliance cases in 2004 was 2 948.

2.15 TCG offers a household waste collection service six days a week. Residents are required to bring the waste to designated locations at a specific time. At the same time, TCG implements a recyclable collection programme five times a week, encouraging people to sort their garbage items on separate days. Flatten recyclable wastes such as waste paper, old clothes and clean plastic bags are collected on Mondays and Fridays, while cubic recyclable wastes¹⁰ and clean styrofoam, are collected on Tuesdays, Thursdays and Saturdays. Recyclables are collected to sorting facilities for further sorting and recycling.¹¹

2.16 TCG also has plans to build a total sorting facility adjacent to an incinerator to mechanically and effectively perform detailed sorting. TCG estimates that 60% - 85% of the municipal waste can be recycled when the total sorting facility is operated.

¹⁰ These include cans, bottles, containers, small home appliances, tires, batteries and light bulbs.

¹¹ TCG has outsourced the sorting and recycling services to two private companies. Effective manual sorting is capable of handling approximately 120 tonnes of recyclables per day.

Kitchen Waste Recycling Programme

2.17 TCG implemented the Kitchen Waste Recycling Programme in 2003, which required Taipei residents to separate food waste from household¹² garbage and encouraged the composting of food waste¹³ to bring down the city's waste volume. Those who mix their kitchen waste with regular garbage are fined between NT\$1,200 (HK\$280) and NT\$6,000 (HK\$1,398).

2.18 To ensure an effective operation of the Programme, TCG provides Taipei residents with recycling bins for kitchen waste. Survey results provided by TCG show that Taipei residents have grown accustomed to the Programme. With the support of Taipei residents, the city has achieved the goal of collecting 150 tonnes of kitchen waste daily.

Initiatives provided to the sorting and recycling industry

Recycling Management Fund

2.19 In Taiwan, the Recycling Management Fund (RMF) was established in January 1997 to promote waste recycling and garbage reduction through providing financial assistance to the sorting and recycling industry. RMF is split into a trust fund and a non-business fund. The current ratio of trust fund to non-business fund is 80% to 20%.

2.20 The main function of the trust fund is to subsidize projects dealing with collection, disposal and treatment of recyclable materials. All companies receiving subsidies are regulated by the Resource Recycling Fund Management Committee (RRFMC)¹⁴. Recipients must meet both the facilities requirements and the environmental standards as set by RRFMC. As regards non-business fund, it is used for administering the operation of RMF.

Recycling park

2.21 TCG is considering a proposal of establishing a recycling park in the city, but the details have not been finalized.

¹² RLSD has not been able to ascertain whether the kitchen waste recycling programme is applicable to the food and beverage industry.

¹³ The kitchen waste is recycled and reused as pig feed.

¹⁴ This committee was established under EPA in 1998.

Programmes for encouraging the use of recycled products

Green Mark Programme

2.22 The Green Mark Programme, launched in August 1992 by EPA, aims at promoting recycling of waste and reducing pollution levels. The objectives of awarding the Green Mark¹⁵ are to guide consumers in product purchasing and to encourage manufacturers to design and supply environmental benign products.

2.23 Manufacturers must first apply to have their products undergone screening at the Industrial Technology Research Institute before obtaining the Green Mark. EPA has already granted the Green Mark label to more than 1 200 products.

Government Green Procurement Programme

2.24 A revised *Government Procurement Act* was put into effect in May 1999 to promote the priority purchase of green mark products over similar products by allowing a maximum difference of 10% in price on such purchases. Since then, this procurement priority has been extended to other products certified by EPA to be recyclable, low-pollution, energy-saving, and made of regenerated materials.

2.25 TCG has formulated its own green procurement programme which is based on the policy to purchase equipment and office supplies with eco-label. Since the implementation of these green purchasing measures, TCG has increased the purchase of Green Mark products annually.

Educational programmes for enhancing public awareness of reducing municipal solid waste

Educational and public awareness programmes

2.26 TCG has produced films, television and radio programmes, videotapes, books and pamphlets to enhance public awareness on environmental protection. The targets of these educational programmes include children, youths and adults.

Environmental professionals training programme

2.27 Taiwan established the Environmental Professionals Training Institute in July 1991 to develop pollution control technologies and train environmental professionals. Students are mainly environmental protection agencies personnel, environmental professionals and technicians working in public and private sectors, and non-governmental organizations' personnel and volunteers.

¹⁵ The Green Mark depicts a green leaf enwrapping a pollution-free earth.

Kitchen waste recycling education programme

2.28 TCG educates the public on the benefits and methods of kitchen waste recycling by establishing a "Kitchen Waste Recycling Hotline", where professionals can answer any questions regarding kitchen waste recycling.

3. LondonMunicipal solid waste management strategy*Municipal Waste Management Strategy*

3.1 Under the *Greater London Authority Act*, the Mayor of London (Mayor) is required to prepare the *Municipal Waste Management Strategy*, which must include proposals and policies for implementing the *National Waste Strategy*¹⁶ within London¹⁷ and meet waste recycling and recovery targets. It must also contain the Mayor's proposals and policies for the recovery, treatment and disposal of municipal waste and may contain such other proposals and policies relating to municipal waste as the Mayor considers appropriate.

3.2 The draft *Municipal Waste Management Strategy* was published for public consultation in 2002. The Mayor incorporated the views of the public and published the final report entitled *Rethinking Rubbish in London* in September 2003.

3.3 The Mayor's vision is that London should manage its municipal waste in an eco-friendly way and thus becomes a sustainable city by 2020. To achieve this long-term goal, lifestyle habits must change so that each individual produces only the minimum amount of waste, reducing the pressure on the environment. The recycling industry and recycled products market must also be promoted.

¹⁶ The *National Waste Strategy* was published in 2000, which set out a framework within which the United Kingdom (UK) could reduce the amount of waste it produced and dealt with the waste in a more sustainable way.

¹⁷ London has 33 boroughs.

3.4 To meet the national targets listed in the *National Waste Strategy* and the requirements of the European Union (EU) landfill directive¹⁸, the Mayor sets out a series of targets for the recycling and composting of municipal waste: 17%, 25% and 33% by 2003, 2005 and 2015 respectively. He is committed to monitoring the performance of the councils¹⁹ to ensure that these targets are met.²⁰

3.5 In 2003-04, London generated 4.34 million tonnes of solid waste, of which 70% of the total was treated by land filling, followed by incineration (19%) and recycling (11%).

Restricting the use of plastic shopping bags and disposable plastic tableware

3.6 There are no specific measures in force for restricting the use of plastic shopping bags and disposable plastic tableware.

Municipal solid waste charging scheme

Council tax

3.7 Londoners are required to meet the cost of social services such as waste collection and disposal, street cleansing, street lighting and education through the council tax system. The amount of council tax is based on the price of property and is payable to the respective councils on a monthly basis.

3.8 If the councils dispose of waste by means of land filling, they have to pay landfill operators²¹ and the landfill tax²² to the UK government. The landfill tax rate is currently set at £18²³ (HK\$257) per tonne of household waste that is disposed of through a landfill site. The landfill tax rate for household waste will increase by £3 (HK\$43) per tonne each year from 2003 onwards to £35 (HK\$501) per tonne.

¹⁸ The EU landfill directive was transposed to UK legislation in 2002. This directive requires, amongst other things, that by 2010, the amount of biodegradable municipal waste going to landfill must be reduced to 75% of the total produced in 1995. By 2013, the amount must be reduced to 50% of the 1995 total, and by 2020, to 35%.

¹⁹ The councils refer to the governments of the London boroughs.

²⁰ The Mayor has plans to establish a single waste authority to co-ordinate the waste management policies among councils and develop more recycling infrastructure.

²¹ They are private companies.

²² This tax was created by the UK government in October 1996, which served the purposes of: (a) reducing the amount of waste thrown away in landfill sites through increasing the cost of landfill; (b) funding research projects for manufacturing environmentally friendly products; and (c) subsidizing educational programmes for enhancing public awareness on environmental protection.

²³ The average exchange rate in 2004 was £1 = HK\$14.3.

Discussion on the establishment of a direct charging scheme for collecting and disposing of municipal solid waste

3.9 A proposal to establish a direct charging scheme for collecting and disposing of municipal solid waste is currently being considered by the Mayor. The intention of imposing direct charging for waste is to make people more aware of the amount of waste they generate and to go along with the polluters pay principle. This view is supported by a study²⁴. This study finds that high levels of recycling can be achieved if there are direct charges for solid waste and the provision of recycling facilities. There might be problems during initial implementation of schemes due to adverse community reaction and a lack of understanding about what behavioural changes are required. Nevertheless, this phenomenon is relatively short-lived. However, there is a concern that this charge might create the problem of illegal waste dumping.²⁵ In sum, the Mayor is still considering the proposal and the decision has yet to be made.

Sorting and recycling programmes*Compulsory Garbage Separation Pilot Scheme*

3.10 There are currently no legal requirements for separating garbage in 32 out of the 33 London boroughs. Barnet, the only London borough, has recently introduced a pilot scheme making garbage separation compulsory across all the wards of the borough from 1 March 2005²⁶. Residents are required to place glass bottles, jars, tins, cans, paper and magazines²⁷ in their free household recycling boxes provided by the council.

3.11 Council recycling assistants monitor whether the recycling boxes are being used appropriately. Residents who persistently refuse to compulsorily separate their household waste will be issued with a warning notice under the *Environment Protection Act*. Failure to obey the warning notice may lead to prosecution with a maximum fine of £1,000 (HK\$14,300).

²⁴ The study is cited in a report entitled *Best Practice Evaluation of Local Authority Waste Charging Schemes* published by the Scotland and Northern Ireland Forum for Environmental Research in 2002.

²⁵ This view is supported by another research entitled *Household Waste Behaviour in London* published by the Resource Recovery Forum in 2002.

²⁶ Barnet introduced the first phase of the compulsory garbage separation in four wards in April 2004. The second phase was extended to cover all 113 000 households in the borough on 1 March 2005.

²⁷ The scheme may include other kinds of materials at a later stage.

Bank Schemes, Recycling Centre Programmes and Home Compost Schemes

3.12 All London councils provide grouped collection banks in public places for coloured segregated glass containers, newspapers and magazines, steel and aluminum cans, plastic containers, textiles, paper and books, and operate recycling centres for collecting recycled items such as plastic bottles, shoes, wood, metal, furniture and batteries. In addition, some councils encourage their residents to compost the garden waste and kitchen waste by offering them compost bins at subsidized rates.

Initiatives provided to reduce municipal waste*London Recycling Fund*

3.13 The London Recycling Fund (LRF), established in May 2002, aims to enable a reduction in the amount of household waste generated in London and to ensure that a higher proportion of what remains is recycled. The UK government and the London Waste Action (LWA)²⁸ are responsible for allocating funds to LRF. The amount of funding received by LRF totals £46.95 million (HK\$671.4 million) for the years 2002 to 2006.

3.14 Since its establishment, LRF has provided grants to over 130 recycling projects run by London boroughs and private waste management companies, representing a total investment of over £100 million (HK\$1,430 million) in the recycling sector. Applicants for funding are required to demonstrate how their projects can help minimize or recycle waste.

Programmes for encouraging the use of recycled products*London Remade and the Mayor's Green Procurement Code*

3.15 London Remade (LR), established in December 2000, is a recycling programme aimed at increasing markets for recycled products, delivering the Mayor's Green Procurement Code (Code) and business support programmes, and driving the development of an entrepreneurial recycling supply chain.²⁹ As a partnership among the business community, and the public and non-profit sectors, LR uses recycling as a vehicle to drive economic and social regeneration.

²⁸ LWA is a non-profit organization which aims to promote co-ordination among councils, manufacturers, retailers and the public to reduce waste.

²⁹ This incorporates the collection and reprocessing of recyclable materials and the procurement of recycled content and resource efficient products.

3.16 One of the major tasks of LR is to deliver the Code on behalf of the Mayor. The Code, launched in March 2001, aims to encourage businesses in London to purchase goods made from recycled materials. All 33 London boroughs and over 230 organizations and companies have signed the Code. They have committed themselves to working with the Mayor and LR to explore opportunities for buying recycled products and achieving measurable targets.

3.17 The Code operates at four levels of commitment. Signatories to the basic level of the Code agree to discuss the possibility of buying recycled products; at the highest level, signatories agree to set targets for green procurement. A team of brokers at LR offers free advice to signatories on green procurement issues and put them in contact with suitable suppliers for a wide range of recycled products, including paper, clothing and construction materials.

Educational programmes for enhancing public awareness of reducing municipal solid waste

Recycle for London

3.18 The Recycle for London campaign's objective is to assist Londoners to recycle more. It has a dedicated website (www.recycleforlondon.com) and helpline to help Londoners find out what services they have in their area, and how they can take part.

Waste and Resources Action Programme

3.19 The Waste and Resources Action Programme (WRAP) was established in 2001 in response to the UK government's Waste Strategy 2000 to promote sustainable waste management. Its mission is to accelerate resource efficiency by creating efficient markets for recycled materials and products. WRAP launched the national RecycleNow campaign in September 2004 to raise consumer awareness of recycling and to encourage people to recycle. The RecycleNow campaign has been spearheaded by a £10 million (HK\$143 million) multi-media advertising campaign.

London Schools Environment Awards

3.20 The London Schools Environment Awards, open to all London's primary schools, were set up in 2003 to develop children's sense of responsibility for their environment. A distinction award of £2,000 (HK\$28,600), and a highly commended award of £1,000 (HK\$14,300), will be presented annually until 2006 to two schools in each of the London boroughs.³⁰

³⁰ A total of 570 schools and 210 000 children in London took part in the 2004 annual competition. The areas which the schools focused on were waste management and recycling, energy, transport and biodiversity.

4. Singapore

Municipal solid waste management strategy

Singapore Green Plan 2012

4.1 The Singaporean government launched the Singapore Green Plan 2012 (SGP 2012)³¹ in August 2002 as the country's blueprint towards environmental sustainability for the next decade.³² The vision of SGP 2012 is "Towards an Enduring Singapore", whereas its goal is "To prevail over the limitations. To build a Singapore that will give its people the best living environment, one that will endure for generations to come."

4.2 Since its launch, a co-ordinating committee and action programme committees (APCs) on six functional areas, covering waste management, clean air, clean water, nature conservation, public health and international environmental relations, have been formed to formulate action programmes to meet the SGP 2012 targets and to oversee their implementation.

4.3 Six APCs have formulated 155 action programmes, grouped under 24 key thrusts. As regards waste management, the SGP 2012 targets are set as follows:

- (a) raise the overall waste recycling rate from 44% to 60% by 2012;
- (b) extend the lifespan of Semakau Landfill³³ to 50 years, and strive "towards zero landfill"; and
- (c) reduce the need for new incineration plants, from the current target of one every five to seven years to one every 10 to 15 years.

4.4 A triennial review of the above action programmes is currently undertaken by APCs and the results are expected to be released by the end of 2005.

³¹ SGP 2012 is predated by the 1992 Singapore Green Plan which laid out Singapore's early environmental thrusts.

³² In preparation for the World Summit on Sustainable Development (WSSD) in 2002, the then Ministry of Environment formed a WSSD National Preparatory Committee (NPC) to demonstrate the national efforts to co-ordinate sustainable development activities. Three focus groups on environment and public health, economic development, and regional and international relations were set up to assist NPC in making recommendations. Each focus group discussed the WSSD themes allocated to it and subsequently submitted a report on the directions, strategies and programmes to help Singapore attain environmental sustainability for the next 10 years.

³³ Semakau Landfill is the only landfill site in Singapore, which commenced operation in April 1999. It is an offshore landfill covering an area of 350 hectares and has a fill-capacity of 63 million cubic metres. Semakau Landfill receives primarily non-incinerable waste and incinerator ash. The original lifespan was estimated at between 25 and 30 years.

4.5 In 2003, a total of 4.73 million tonnes of solid waste were generated, of which 48% were treated by incineration, followed by recycling (47%) and land filling (5%).

Restricting the use of plastic shopping bags and disposable plastic tableware

4.6 There are no specific measures in force for restricting the use of plastic shopping bags and disposable plastic tableware. The Singaporean government has encouraged the public to use less plastic shopping bags and disposable plastic tableware by public education.

Municipal solid waste charging scheme

Solid waste disposal fees

4.7 Prior to 1 April 1996, the Singaporean government was responsible for the collection and disposal of solid waste from households, trade and institutional premises. The solid waste collection and disposal services for these premises were corporatized and taken over by Sembwaste Ltd, the first appointed public waste collector (PWC)³⁴, on 1 April 1996.

4.8 The collection and disposal services for the domestic and trade premises were further liberalized from 1999 onwards. The Singaporean government divided the country into nine geographical sectors. Pre-qualified companies were invited to participate and compete for the licences to provide the solid waste collection and disposal services. Successful tenders were appointed as PWCs for their respective sectors for a period of five to seven years.

4.9 The fees imposed on the residents for solid waste disposal in the nine sectors may vary, which are based on the successful tender rates submitted. Nevertheless, the fee structures³⁵ for domestic and trade premises are standardized, which are set out as follows:

- (a) a fixed monthly rate per domestic premises; and
- (b) a variable monthly rate for trade premises based on the volume of solid waste generated. There are six solid waste output categories. PWCs shall assess the average solid waste output to levy the appropriate fees accordingly.

³⁴ PWCs are required to comply with the *Environmental Public Health Act, the Environmental Public Health (Public Waste Collector) Regulations*, as well as the guidelines laid out in the *Code of Practice for PWCs*.

³⁵ For special removal services of items such as bulky waste and excessive garden waste, the occupier shall make special arrangements with licensed general waste collectors. A separate fee is chargeable for the service. There are currently more than 350 licensed general waste collectors in Singapore.

4.10 The solid waste disposal fees are collected through the monthly utility bills issued by the respective town councils. These fees are fixed and cannot be adjusted without prior approval of the National Environment Agency (NEA)³⁶.

4.11 Table 1 uses the case of Bedok as an example to show the current levels of charges for the disposal of solid waste. In regard to domestic premises, the charges for flats and condominiums are S\$6.17³⁷ (HK\$28.4) and S\$19.37 (HK\$89.1) respectively. Meanwhile, the charges for trade premises depend on the solid waste output generated.

Table 1 — The current levels of charges for solid waste disposal in Bedok

Types of premises	Fees per premises per month (inclusive of 5% Goods and Services Tax)
Domestic premises:	
Flats	S\$6.17 (HK\$28.4)
Condominiums	S\$19.37 (HK\$89.1)
Trade premises, with solid waste output:	
less than 120 litres per day	S\$30.45 (HK\$140.1)
120 to less than 240 litres per day	S\$82.95 (HK\$381.6)
240 to less than 360 litres per day	S\$105.00 (HK\$483.0)
360 to less than 660 litres per day	S\$315.00 (HK\$1,449.0)
660 to less than 1 100 litres per day	S\$483.00 (HK\$2,221.8)
equal to or more than 1 100 litres per day	See note (1)

Note: (1) For solid waste output in excess of 1 100 litres, the premises shall be levied a combination of fees based on the volumes of bins used.

Source: National Environment Agency. (2004) *Altvater Provides Refuse Collection in Bedok*. September.

³⁶ NEA, established under the Ministry of the Environment and Water Resources (MEWR) in July 2002, is responsible for examining tenders, issuing PWC licences, publishing the code of practice for PWCs on the requirements for proper handling and transportation of solid waste, and monitoring the performance of PWCs.

³⁷ The average exchange rate in 2004 was S\$1 = HK\$4.6.

4.12 Presently, the landfill and incineration disposal facilities are built, owned and operated by the Singaporean government.³⁸ PWCs are required to pay landfill and incineration disposal fees when treating their solid waste by these two methods. In 2001, NEA increased the landfill and incineration disposal fees from S\$67 (HK\$308) per tonne to S\$77 (HK\$354) per tonne to make it more expensive for PWCs to use such services, thus forcing them to turn to recycling companies.

Sorting and recycling programmes

National Recycling Programme

4.13 The National Recycling Programme was launched in April 2001. Under this programme, PWCs are required to tie up with recycling companies to implement door-to-door collection of recyclable materials in both Housing and Development Board (HDB)³⁹ estates and private apartments within their servicing sectors. Residents are given recycling bags, trays or bins, where they can put in paper, plastic and glass bottles, old clothing, metal cans, etc. The recyclable items are sorted and sold to local or overseas recycling companies.

4.14 NEA considers the National Recycling Programme a successful recycling programme. When the programme was launched in 2001, about 130 000 households in HDB and private housing estates participated. The participation rate increased to 51% or 450 000 households in October 2004. The volume of recyclables collected also saw an increase from 1 600 tonnes in 2001 to over 16 000 tonnes in 2003.

Recycling @ Condominiums Programme

4.15 NEA has been working with the managing agents of condominiums and PWCs to introduce recycling programmes in condominiums. Under such programmes, recycling bins are placed at strategic locations or residents are given recycling bags to deposit their recyclables for recycling. A practice note is also published to help managing agents to start recycling programmes in their condominiums. The participation rate of such programmes was 20% in 2004.

³⁸ A study is being conducted to determine the schedule for the corporatization of the incineration plants with the aim of enhancing operating efficiency.

³⁹ HDB, established in 1960, is now a statutory board under the Ministry of National Development and is Singapore's public housing authority.

Recycling @ Schools Programme

4.16 A structured waste recycling programme at schools, launched by NEA and the Singapore Environment Council (SEC)⁴⁰ in September 2002, aims to educate and inculcate the recycling habit among students. Talks, exhibitions and competitions are organized to publicize the recycling programme.

4.17 The recycling programme also involves the setting up of a Recycling Corner⁴¹ in school where recycling bins for paper, cans and plastic bottles as well as educational materials, are made available to students. Monthly tonnage of recyclables collected is provided to the participating schools to enable monitoring of the recycling programme.

Recycling @ Industrial Estates Programme

4.18 To raise awareness of waste minimization in industries and recover as much recyclables as possible for reuse or recycling, NEA has worked with the JTC Corporation (JTC)⁴² on recycling programmes, seminars and exhibitions. Recycling bins are also provided in strategic locations for the collection of wood, paper, aluminum cans, plastic, metal and glass. *A Guidebook on Waste Minimization for Industries* was also published to help companies reduce waste through more efficient and effective use of resources, reusing and recycling.

Initiatives provided to minimize waste and encourage recycling*Innovation for Environmental Sustainability Fund*

4.19 The Singaporean government has set up a US\$12 million (HK\$93.6 million) Innovation for Environmental Sustainability (IES) Fund to provide financing for innovative projects that will help Singapore attain the goal of environmental sustainability. All Singapore-registered companies are eligible to apply for funding if they have proposals that show strong innovation qualities as well as the early adoption of emerging technologies.

⁴⁰ SEC, a non-governmental organization, actively organizes activities to promote and create awareness on environmental issues.

⁴¹ The current participation rate is 40% (i.e. 147 schools).

⁴² JTC is a planner, developer and manager of industrial facilities and business parks in Singapore.

4.20 In practice, IES Fund provides assistance through grants to cover certain percentages⁴³ of the cost of a project, with a maximum amount of S\$2 million (HK\$ 9.2 million). Progress reports and audited statements are required to be submitted by the funded companies on a six-monthly basis. The funded companies shall also submit annual project reviews and a final report within three months from the completion/termination of the project.

Recycling parks

4.21 To provide a boost to the local waste recycling industry whereby low cost land is made available for entrepreneurs to operate recycling facilities in Singapore, NEA established the Sarimbun Recycling Park in 1995 and the Tuas Recycling Park in 2002. The lease period for the land parcel in these two recycling parks may be up to 30 years, which has the purpose of encouraging long term investment.

4.22 In the case of the Sarimbun Recycling Park, the rent is about S\$8.2 (HK\$37.7) per square metre a year. For a 20 000 square metre plot, the annual rent amounts to about S\$163,000 (HK\$749,800). Presently, there are 14 recycling plants in the park, mainly recycling plastic, paper, glass and wood wastes. The business volume was S\$12 million (HK\$55.2 million) in 2003.

Programmes for encouraging the use of recycled products

Singapore Green Labelling Scheme

4.23 SEC is responsible for implementing the Singapore Green Labelling Scheme (SGLS) to promote green consumerism. SGLS, launched in May 1992, applies to most products, except food, drinks, pharmaceuticals and services. Products which comply with the green label standards carry the green label logo⁴⁴. There are currently about 130 green label products, the most visible to consumers being stationery and household cleaning products.

Green procurement guide

4.24 SEC has also published a green procurement code, which encourages the purchase of environmentally-friendly products. At present, NEA is developing green procurement guidelines for government offices, which are expected to be published by the end of 2005.

⁴³ The amount of support may be 25%, 50%, 75% or 100% of the cost of the project.

⁴⁴ It is a white label with a green leaf on it.

Educational programmes for enhancing public awareness of reducing municipal solid waste

Environmental public education

4.25 In Singapore, environmental education is a compulsory subject of the educational curriculum of school children. The Singaporean government provides an environmental education package for primary and secondary schools. In the package, students are taught the importance of caring for the local environment as well as the global environment. Augmenting this, most schools have also initiated their own recycling programmes. In addition, one week is set aside every year for an environmental awareness campaign for school children, during which a number of environment-related activities are organized.

4.26 The Singaporean government also holds seminars and talks for environmental clubs and teachers. It provides assistance and materials for them to run their own environmental programmes.

Recycling Day

4.27 NEA organized its first Recycling Day on 21 November 2004, which aimed at raising awareness on waste minimization and recycling.

Green Volunteers Network

4.28 The Green Volunteers Network was started in 1997 to increase public participation in environmental protection by providing a range of activities and programmes, including waste minimization fairs, eco workshops and environmental exhibition. Presently, the network has 930 green volunteers.

5. Summary

5.1 Table 2 on pages 19 – 20 summarizes the main features of the municipal waste management strategy and its related measures adopted by the selected places.

Table 2 — Main features of the municipal waste management strategy and its related measures adopted by the selected places

	Taipei	London	Singapore
Municipal solid waste disposal, by percentages	<u>2004</u> (a) incineration: 62.7%; (b) recycling: 36%; and (c) land filling: 1.3%.	<u>2003-04</u> (a) incineration: 19%; (b) recycling: 11%; and (c) land filling: 70%.	<u>2003</u> (a) incineration: 48%; (b) recycling: 47%; and (c) land filling: 5%.
Municipal solid waste management strategy	Vision for 2010 Total Recycling and Zero Landfill Programme implemented in 2000. Targets: (a) a series of recycling rates between 2005 and 2010: 15%, 33%, 67% and 100% by 2005, 2007, 2008 and 2010 respectively.	Municipal Waste Management Strategy implemented in 2003. Targets: (a) a series of recycling rates between 2003 and 2015: 17%, 25% and 33% by 2003, 2005 and 2015 respectively.	Singapore Green Plan 2012 implemented in 2002. Targets: (a) raise the overall waste recycling rate from 44% to 60% by 2012; (b) extend the lifespan of the landfill site to 50 years, and strive "towards zero landfill"; and (c) reduce the need for new incineration plants, from the current target of one every five to seven years to one every 10 to 15 years.
Restriction on the use of plastic shopping bags and disposable plastic (including styrofoam) tableware	Plastic shopping bags and disposable plastic tableware (including styrofoam) must not be offered to customers for free.	No restriction.	No restriction.
Municipal solid waste charging scheme	Trash bags must be purchased under the Per Bag Trash Collection Fee Programme.	Cost of solid waste disposal is covered in the council tax.	Solid waste disposal fees are charged by public waste collectors.

Table 2 — Main features of the municipal waste management strategy and its related measures adopted by the selected places (cont'd)

	Taipei	London	Singapore
Sorting and recycling programmes implemented	(a) Compulsory Garbage Separation Programme; and (b) Kitchen Waste Recycling Programme.	(a) Compulsory Garbage Separation Pilot Scheme in the Barnet borough; and (b) Bank Schemes, Recycling Centre Programmes and Home Compost Schemes.	(a) National Recycling Programme; (b) Recycling @ Condominiums Programme; (c) Recycling @ Schools Programme; and (d) Recycling @ Industrial Estates programme.
Initiatives provided to the sorting and recycling industry	(a) financial assistance provided by the Recycling Management Fund.	(a) financial assistance provided by the London Recycling Fund.	(a) financial assistance provided by the Innovation for Environmental Sustainability Fund; and (b) low cost land parcels in the two recycling parks leased to the recycling industry.
Programmes for encouraging the use of recycled products	(a) Green Mark Programme; and (b) Government Green Procurement Programme.	(a) London Remade and the Mayor's Green Procurement Code.	(a) Singapore Green Labelling Scheme; and (b) green procurement guide.
Educational programmes for enhancing public awareness of reducing municipal solid waste	(a) education and public awareness programmes; (b) environmental professionals training programme; and (c) kitchen waste recycling education programme.	(a) Recycle for London; (b) Waste and Resources Action Programme; and (c) London Schools Environment Awards.	(a) environmental public education programmes; (b) Recycling Day; and (c) Green Volunteers Network.

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