

CHAPTER 1

Environment Bureau Environmental Protection Department

Government's efforts in managing municipal solid waste

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Audit Commission
26th floor, Immigration Tower
7 Gloucester Road
Wan Chai
Hong Kong

Tel : (852) 2829 4210
Fax : (852) 2824 2087
E-mail : enquiry@aud.gov.hk

GOVERNMENT'S EFFORTS IN MANAGING MUNICIPAL SOLID WASTE

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GOVERNMENT'S EFFORTS IN MANAGING MUNICIPAL SOLID WASTE

Executive Summary

1. In 2013, Hong Kong generated 5.49 million tonnes of municipal solid waste (MSW), of which 3.48 million tonnes (63%) were disposed of at landfills and the remaining 2.01 million tonnes (37%) were recovered for recycling. Compared to the published statistics five years ago, the MSW quantity disposed of at landfills had increased by 6.4% from 3.27 million tonnes in 2009 to 3.48 million tonnes in 2013, and MSW recovery rate had decreased from 49% in 2009 to 37% in 2013. In terms of weight, the quantity of the MSW disposed of at landfills every day in 2013 was equivalent to that of about 650 double-decker buses. However, the MSW-generation quantities and the MSW-recovery rates estimated by the Environmental Protection Department (EPD) had subsumed unknown quantities of import recyclables being processed for export (see paras. 3 and 8 below).

2. As the executive arm of the Environment Bureau (ENB), the EPD is responsible for implementing waste management policies and strategies. In December 2005, the EPD published the “Policy Framework for the Management of Municipal Solid Waste (2005-2014)” (2005 Policy Framework) which set out strategies, targets and action plans on avoidance and minimisation; reuse, recovery and recycling; and bulk reduction and disposal of MSW. In May 2013, the ENB published the “Hong Kong Blueprint for Sustainable Use of Resources (2013-2022)” (2013 Blueprint) which set out targets to reduce the per-capita-per-day MSW disposal rate. The Audit Commission (Audit) has recently conducted a review to examine the Government’s efforts in managing MSW with a view to identifying areas for improvement.

Reduction in municipal solid waste

3. *MSW-generation quantities and MSW-recovery rates having incorrectly subsumed unknown quantities of import recyclables.* MSW-generation quantity and MSW-recovery rate are two key performance indicators on Government’s actions in managing MSW. The former is the sum of the quantity of MSW disposed

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of at landfills and the quantity of locally-generated MSW recovered for recycling. The latter is a function of the quantity of MSW recovered and the quantity of MSW generated. The 2005 Policy Framework set a target to reduce the MSW-generation quantity by 1% per annum up to 2014, using 2003 as the base year. Accordingly, the MSW-generation quantities were expected to decrease by 5% from 5.77 million tonnes in 2005 to 5.48 million tonnes in 2010. However, due to the inclusion of unknown quantities of import recyclables in the estimation, these two indicators had been over-estimated by the EPD. Mainly due to increases in the quantities of import recyclables from 2005 to 2010, the over-estimation had become more apparent during the period where the former had increased by 15% from 6.01 million tonnes to 6.93 million tonnes, and the latter from 43% to 52%. These two indicators had dropped to 5.49 million tonnes and 37% respectively in 2013. In estimating the quantities of locally-generated recyclables recovered for export, the EPD had made use of statistics on domestic-export recyclables compiled by the Census and Statistics Department (C&SD) which were based on the information contained in trade declaration forms submitted by exporters to the Customs and Excise Department (C&ED). In this connection, import recyclables that had been processed in Hong Kong for export had been classified as “domestic exports” for trade declaration purposes. Therefore, the quantities of domestic-export recyclables comprised both locally-generated and import quantities. The over-estimation of the quantities of MSW recovered (and MSW generated) had distorted the effectiveness of the Government’s efforts to increase MSW recovery and recycling (see para. 8 below and paras. 2.2, 2.5 to 2.11 and 2.15).

4. Since April 2014, in order to facilitate the collection of reliable data on the quantities of locally-generated recyclables recovered for export, the C&SD and the C&ED have taken actions to collect additional information from exporters in order to differentiate between export recyclables that are generated locally and those imported from overseas (paras. 2.20 to 2.22).

5. *Time targets for implementing producer responsibility schemes (PR schemes) and MSW charging scheme not met.* The 2005 Policy Framework set time targets for implementing PR schemes on six products, namely plastic shopping bags (PSBs) in 2007, waste electrical and electronic equipment in 2007, vehicle tyres in 2007, glass beverage bottles in 2008, packaging materials in 2008 and rechargeable batteries in 2009, and for introducing an MSW charging bill to the Legislative Council (LegCo) in 2007. However, Audit noted that Phase 1 and Phase 2 of the PR scheme on PSBs were only implemented in July 2009 and April 2015 respectively, and up to August 2015, six to eight years later than the

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time targets, PR schemes on the other five products had not been implemented. Moreover, the MSW charging bill would only be submitted to LegCo in the 2016-17 legislative session, nine years later than the time target (paras. 2.23, 2.26, 2.31, 2.32, 2.40 and 2.43).

6. *Need to be more comprehensive in reporting the impact of the PR scheme on PSBs.* In 2007 and 2008, the EPD informed LegCo of the introduction of the PR scheme on PSBs, with the objective of inculcating behavioural changes to reduce the excessive use of PSBs. In July 2009, the EPD launched Phase 1 of the PR scheme on PSBs (PSB Phase 1) under which prescribed retailers (mainly supermarkets, convenience stores and personal-item stores) meeting specified requirements were required to charge customers not less than 50 cents for each PSB distributed. Audit noted that, based on the EPD's landfill-survey results, the number of PSBs bearing the features of supermarkets, convenience stores or personal-item stores (pertinent PSBs) being disposed of at landfills had decreased from 657 million weighing 13,493 tonnes in 2009 to 116 million (82% decrease) weighing 1,949 tonnes (86% decrease) in 2013. However, the number of other PSBs had increased from 4,021 million weighing 64,942 tonnes in 2009 to 4,506 million (12% increase) weighing 65,222 tonnes (0.4% increase) in 2013. Although the reduction of 11,544 tonnes (13,493 less 1,949 tonnes) of pertinent PSBs being disposed of at landfills from 2009 to 2013 was notable, its impact in reducing the total quantity of MSW being disposed of at landfills (3.48 million tonnes in 2013) was quite small. However, in informing LegCo that PSB Phase 1 had been implemented successfully, the EPD only informed LegCo of the reduction in the number of pertinent PSBs but not the reduction in their weight. The additional information would provide a more comprehensive account of the effects on landfills by the implementation of PSB Phase 1 (paras. 2.39 to 2.48).

7. Audit also noted that the number of pertinent PSBs (see para. 6) being disposed of at landfills based on the EPD's landfill-survey results was significantly greater than that of PSBs distributed by registered retailers at registered outlets based on their returns. For example, in 2012, landfill surveys found 156 million of pertinent PSBs whereas registered retailers reported that their registered outlets had only distributed 59.5 million of PSBs (para. 2.49).

Recovery of municipal solid waste

8. ***Over-estimation of MSW-recovery rates.*** Waste recovery comprises processes of waste recycling, composting and energy generation, aiming to extract the maximum benefits from products, postpone the consumption of virgin resources, and reduce the quantity of waste disposed of at landfills so as to minimise landfill use. MSW-recovery rate is a key performance indicator of Government's efforts made in MSW recovery. The 2005 Policy Framework set a target of achieving an MSW-recovery rate of 50% by 2014 and the 2013 Blueprint stated that 55% of MSW would be recycled by 2022. While the published MSW-recovery rates had increased from 43% in 2005 to 52% in 2010, the rate had dropped to 37% in 2013. As elaborated in paragraph 3, Audit found that the inclusion of import recyclables processed for export in the estimation of the MSW generation and recovery quantities had led to distortion of the MSW-recovery rates and thereby the MSW recycling performance in the past years (paras. 3.2, 3.4 and 3.6 to 3.13).

9. ***Need to take action to increase recovery of waste plastics.*** Audit noted that, in 2013, only 26% of waste plastics were recovered (which included unknown quantities of import recyclable plastics — see para. 3), comparing with 90% of waste metals and 61% of waste paper. According to the EPD, recovery of waste plastics produced a lower profit margin because of the high labour cost involved in sorting recyclable plastics and high transportation cost. Hence, the waste-plastics recovery rate was lower than those of the other recyclables (paras. 3.11 and 3.14 to 3.19).

10. ***Lack of statistics on collected recyclables being disposed of at landfills.*** In order to facilitate the collection of recyclables, the Government provided waste-separation bins at public places. The Food and Environmental Hygiene Department incurred about \$9,000 for engaging contractors to collect a tonne of recyclables from waste-separation bins for delivery to approved recyclers. Moreover, government contractors would separate recyclables collected from waste-separation bins into contaminated ones and non-contaminated ones. According to the EPD, for hygiene reasons, only non-contaminated recyclables can be recovered for recycling. Hence, the contaminated recyclables would be disposed of at landfills and the non-contaminated ones transported to approved recyclers.

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However, due to the lack of reporting requirements in the contracts for collecting recyclables, the Government did not have statistics on the quantities of recyclables collected from waste-separation bins which were disposed of at landfills due to contamination or other reasons (paras. 3.24 and 3.36 to 3.38).

Recycling of municipal solid waste

11. In order to support local recycling industries, the Government spent \$308 million to develop a 20-hectare EcoPark in Tuen Mun to provide long-term land at affordable cost for use by recyclers. EcoPark was developed under two phases, comprising six land lots under Phase 1 (Lots 1 to 6) which had been made available for leasing since December 2006, and ten lots under Phase 2 (Lots 7 to 16) which had been made available for leasing from October 2009 to July 2012 (paras. 4.2 to 4.4).

12. *Some tenancy requirements not being complied with.* Audit examination revealed that: (a) from 2011 to 2014, the reported recyclables throughput of the tenant of Lot 1 only attained 16% to 85% of throughput requirements stated in the tenancy agreement; (b) the tenant of Lot 3 only commenced recycling operation in May 2010, 24 months later than the time specified in the tenancy agreement. The operation was later suspended for 20 months from November 2011 to June 2013 and again for 8 months from January to September 2015; (c) up to August 2015, five years later than the operation-commencement time of August 2010 specified in the tenancy agreement, recycling operation at Lot 4 had not commenced; and (d) up to August 2015, 29 months later than the operation-commencement time of April 2013 specified in the tenancy agreements of Lots 9, 10 and 14, recycling operation at these three land lots had not commenced (paras. 4.6 to 4.21).

13. *Some tenants being permitted to use vacant land lots free of charge.* Audit examination revealed that, from July 2012 to August 2015, the EPD had permitted five EcoPark tenants (tenants of Lots 3, 8, 11, 13 and 14) to use certain areas in vacant Lots 15 and 16 for storage purposes free of charge for periods ranging from three to six months for each period of permission (para. 4.23).

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Treatment and disposal of municipal solid waste

14. ***Target for reducing MSW disposal at landfills not met.*** The 2005 Policy Framework set a target of reducing the percentage of MSW disposed of at landfills from 60% in 2004 to 25% in 2014, with the remaining 50% of MSW being recovered and 25% being treated by an integrated waste management facility. However, Audit noted that, in 2013, more than 63% of MSW were disposed of at landfills (paras. 5.2 and 5.12).

15. ***Rising MSW disposal at landfills in recent years.*** The 2013 Blueprint set a target of reducing the per-capita-per-day MSW disposal quantities from 1.27 kilogram (kg) in 2011 to 1 kg or less by 2017, and further to 0.8 kg or less by 2022. However, Audit noted that the per-capita-per-day MSW disposal quantities had increased from 1.27 kg in 2011 to 1.35 kg in 2014, representing a 6.3% increase (paras. 5.13, 5.14 and 6.3).

16. ***LegCo not provided with quantifiable information and assumptions relating to serviceable lives of landfills.*** Hong Kong has three landfills that occupy 271 (100 + 61 + 110) hectares of land and have an aggregate design capacity of 139 million cubic metres (m³). In March 2012, the EPD informed LegCo that, given that 79 million m³ of the total landfill capacity had been used up as of end 2011, the three landfills would reach their capacities commencing from 2014 to 2018. Based on the total quantity of waste disposed of at the three landfills from 1993 to 2011 and the landfill capacity being used up during the period, Audit estimated that the remaining serviceable lives of the three landfills could last for some years after 2018. According to the EPD, its estimated years of the remaining serviceable lives of the three landfills were based on the assumptions that some landfill capacities would be reserved for other uses and there would be growth in the quantities of MSW, construction waste and special waste being disposed of at landfills in the forthcoming years. However, the EPD had not provided LegCo with the related quantifiable information and the underlying assumptions (paras. 5.16 to 5.20).

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Way forward

17. Owing to the disposal of large quantities of MSW at landfills in the past years, Hong Kong's limited landfill space (after implementing extension works) will be progressively used up in the coming two decades. In December 2014, in applying for LegCo funding approval of \$9.6 billion for the extension works for two of the three landfills, the EPD estimated that their useful lives would extend to 2023 and 2028. The EPD also commissioned a detailed study with a view to extending the serviceable life of the remaining landfill to 2033-34. Subject to the FC funding approval for extension works of a landfill and after completing the approved and proposed extension works, the three landfills would occupy a total of 554 hectares of land, which is approximately the size of 550 standard football pitches. In view of the scarcity of land in Hong Kong, both the Government and the community need to make utmost efforts on minimising MSW disposal at landfills, which will help preserve the precious landfill space for use by this generation and future generations (paras. 1.7, 6.8 and 6.9).

Audit recommendations

18. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Government should:**

Reduction in municipal solid waste

- (a) **take measures to obtain accurate statistics on the quantities of locally-generated recyclables recovered for export for estimating the MSW-generation quantities and recovery rates (para. 2.34(a)(i));**
- (b) **expedite actions to implement the PR schemes and the MSW charging scheme (para. 2.34(c) and (d));**
- (c) **strengthen actions with a view to improving the accuracy of statistics collected for evaluating the effectiveness of PR schemes in future (para. 2.52(b));**

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Recovery of municipal solid waste

- (d) **vigilantly monitor significant fluctuations in the MSW-recovery rates and ascertain the causes as soon as possible in future (para. 3.20(a));**
- (e) **consider providing appropriate assistance through the Recycling Fund to promote the sustainable development of the waste-plastics recycling industry (para. 3.20(c));**

Recycling of municipal solid waste

- (f) **explore ways and means to effectively enforce tenants' compliance with requirements stated in EcoPark tenancies (para. 4.30(a));**
- (g) **charge reasonable rental for temporary use of vacant land lots by profit-making organisations (para. 4.30(d));**

Treatment and disposal of municipal solid waste

- (h) **strengthen efforts with a view to reducing MSW generation and increasing MSW recovery (para. 5.21(a));**
- (i) **in seeking funding approval for landfill extension works in future, provide LegCo with quantifiable information and the underlying assumptions in estimating the remaining serviceable lives of landfills (para. 5.21(b)); and**

Way forward

- (j) **strengthen efforts to clearly publicise the significant landfill problem (para. 6.15(a)).**

Response from the Government

19. The Government agrees with the audit recommendations.

PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

Background

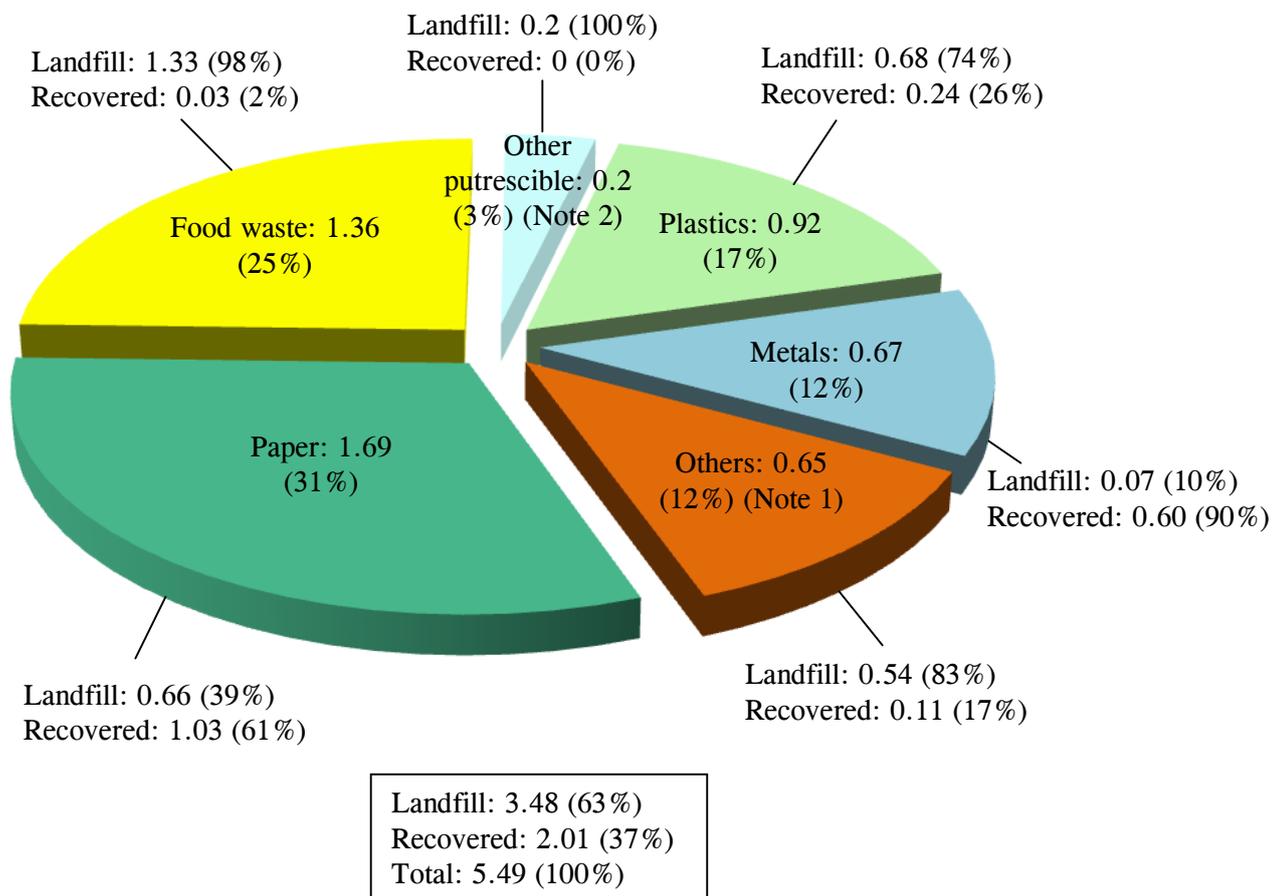
1.2 Municipal solid waste (MSW) is generated from homes, schools, public buildings and streets (known as domestic waste) and from shops, restaurants, offices, hotels, factories and other businesses (known as commercial and industrial (C&I) waste). In 2013, Hong Kong generated 5.49 million tonnes of MSW, of which 3.48 million tonnes (63%) (or 9,547 tonnes a day) were disposed of at landfills and the remaining 2.01 million tonnes (37%) (or 5,503 tonnes a day) were recovered for recycling (Note 1). In terms of weight, about 650 double-decker buses (Note 2) of MSW were disposed of at landfills every day. MSW mainly comprises food waste, waste plastics, metals, paper and other putrescible (see Figure 1).

Note 1: *The 5.49 million tonnes of MSW generated and 2.01 million tonnes of MSW recovered included unknown quantities of import recyclables processed for export (see paras. 2.5 to 2.22).*

Note 2: *According to the Environmental Protection Department (EPD), the weight of Hong Kong's daily food-waste disposal of 3,648 tonnes in 2013 is equivalent to that of 250 double-decker buses. Therefore, 9,547 tonnes of MSW disposed of at landfills a day is equivalent to the weight of about 650 double-decker buses $((9,547 \div 3,648 \text{ tonnes}) \times 250)$.*

Figure 1

**MSW generation
(in million tonnes)
(2013)**



Source: Audit analysis of EPD records

Note 1: Other MSW mainly included waste glass, textiles, wood, rattan and miscellaneous household waste.

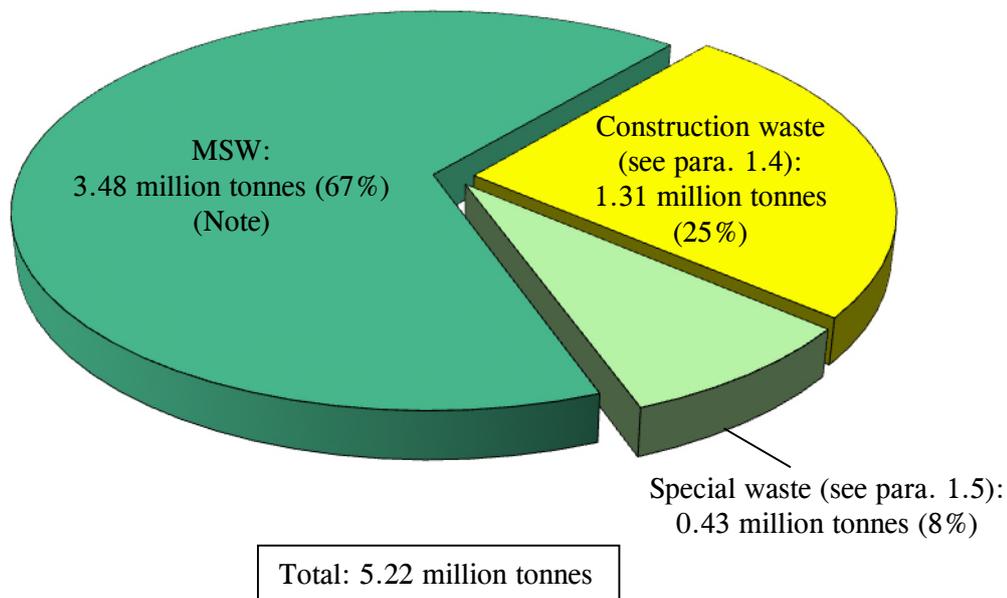
Note 2: Other putrescible mainly included yard waste and other organic waste.

Remarks: The MSW recovery quantities included unknown quantities of import recyclables processed for export (see paras. 2.5 to 2.22). As of September 2015, most of the related statistics for 2014 were not available.

1.3 In addition to MSW, landfills also accept construction waste and special waste for disposal. In 2013, a total of 5.22 million tonnes of waste were disposed of at landfills (see Figure 2).

Figure 2

Waste disposal at landfills
(2013)



Source: EPD records

Note: Of the 3.48 million tonnes of MSW disposed of at landfills, 2.32 million tonnes (67%) were from domestic sources and 1.16 million tonnes (33%) were from C&I sources.

1.4 At times, construction and demolition materials (including debris, rubble, earth and concrete) are abandoned from construction, renovation and demolition activities as well as land excavation and road works. Over 90% of construction waste is inert and known as public fill, which is suitable for land reclamation and site formation. In 2013, of the 23.9 million tonnes of abandoned construction and demolition materials, 12.9 million tonnes (54%) were public fill which were stockpiled for reuse, 9.7 million tonnes (41%) were exported to the Mainland for gainful use such as reclamation, and the remaining 1.3 million tonnes (5%) were disposed of at landfills.

Introduction

1.5 Special waste comprises dredged mud and excavated materials (which are not suitable for reuse as fill materials), dewatered sludge from sewage treatment plants, livestock waste, clinical waste and chemical waste. In 2013, Hong Kong generated 31 million tonnes of special waste, of which 29.8 million tonnes (96.1%) were disposed of by marine dumping, 0.77 million tonnes (2.5%) were recovered as useful materials or treated for other uses, and 0.43 million tonnes (1.4%) were disposed of at landfills. Since April 2015, dewatered sludge from sewage treatment plants has been disposed of by incineration at a newly commissioned sludge treatment facility in Tuen Mun. The residue of incineration is disposed of at landfills.

Three landfills

1.6 There are three landfills in Hong Kong for the disposal of MSW, construction waste and special waste, namely Southeast New Territories (SENT) Landfill occupying an area of 100 hectares (ha — Note 3) in Tseung Kwan O, Northeast New Territories (NENT) Landfill occupying an area of 61 ha in Ta Kwu Ling and West New Territories (WENT) Landfill occupying an area of 110 ha in Nim Wan (Note 4). In 2013, 0.72 million tonnes (21%), 0.78 million tonnes (22%) and 1.98 million tonnes (57%) of MSW were respectively disposed of at SENT, NENT and WENT Landfills (totalled 3.48 million tonnes). From January 2016, SENT Landfill will cease receiving MSW and will only receive construction waste. About 65% of the MSW was delivered to the three landfills through a network of refuse-transfer stations (Note 5), with the remaining 35% being directly transported to the landfills. Waste delivered to refuse transfer stations is compacted into purpose-built containers for transportation to landfills, which help reduce the transportation cost and minimise environmental nuisance during transportation. Figure 3 shows the locations of the landfills and the refuse-transfer-station network.

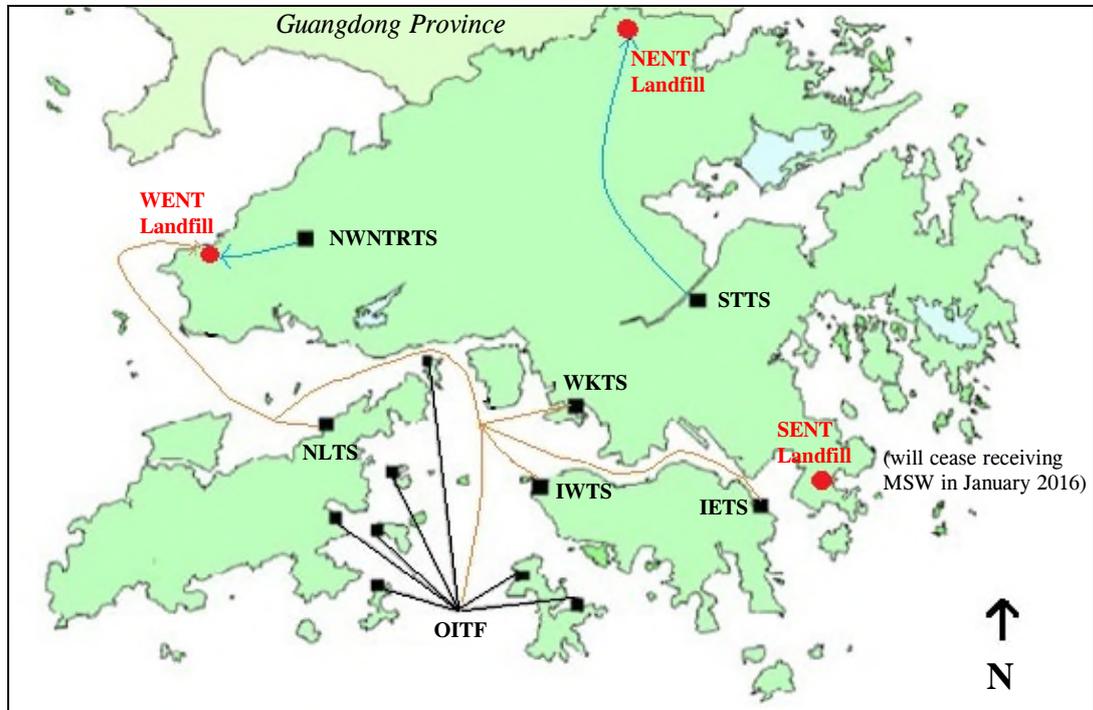
Note 3: *A hectare (or 10,000 square metres (m²)) of land is approximately the size of a standard football pitch. Of the 100 ha of land of SENT Landfill, 50 ha is reclaimed land.*

Note 4: *Of the 110 ha of land of WENT Landfill, 43 ha is reclaimed land.*

Note 5: *As of August 2015, there were six refuse-transfer stations serving the urban areas and new towns, namely Island East Transfer Station, Island West Transfer Station, West Kowloon Transfer Station, Sha Tin Transfer Station, North Lantau Transfer Station, North West New Territories Refuse Transfer Station and seven smaller facilities serving the outlying islands (collectively referred to as Outlying Islands Transfer Facilities).*

Figure 3

**Landfills and refuse-transfer-station network
(August 2015)**



- Legend:
- IETS — Island East Transfer Station
 - IWTS — Island West Transfer Station
 - NLTS — North Lantau Transfer Station
 - NWNTRTS — North West New Territories Refuse Transfer Station
 - OITF — Outlying Islands Transfer Facilities
 - STTS — Sha Tin Transfer Station
 - WKTS — West Kowloon Transfer Station

Source: EPD records

Introduction

1.7 In December 2014, the EPD estimated that SENT, NENT and WENT Landfills would reach their original design capacities by 2015, 2016-17 and 2018-19 respectively. In the same month, the Finance Committee (FC) of the Legislative Council (LegCo) approved funding of \$2,101.6 million and \$7,510 million (totalling \$9,611.6 million or \$9.6 billion) for extension works for SENT and NENT Landfills respectively, which would extend the serviceable lives of the two landfills to 2023 and 2028 respectively. Upon completion of extension works, the areas of SENT Landfill will increase from 100 ha to 113 ha (Note 6) and NENT Landfill from 61 ha to 131 ha. Furthermore, the FC also approved in December 2014 funding of \$38 million for carrying out the detailed study, site investigation and tender preparation work for WENT Landfill extension works. Subject to FC funding approval, the proposed works would extend WENT Landfill area from 110 ha to 310 ha.

Government strategies and action plans

1.8 As the executive arm of the Environment Bureau (ENB), the EPD is responsible for, inter alia, implementing waste management policies and strategies. The EPD is headed by the Permanent Secretary for the Environment who also assumes the office of the Director of Environmental Protection. Appendix A shows an extract of the organisation chart of the EPD.

1.9 In December 2005, the EPD published the “Policy Framework for the Management of Municipal Solid Waste (2005-2014)” (hereinafter referred to as the 2005 Policy Framework), which set out strategies, targets and action plans on avoidance and minimisation; reuse, recovery and recycling; and bulk reduction and disposal of MSW. The waste reduction and recycling targets and related action plans were updated in January 2011. In May 2013, the ENB published the “Hong Kong Blueprint for Sustainable Use of Resources (2013-2022)” (hereinafter referred to as the 2013 Blueprint), which set out targets to reduce the per-capita-per-day MSW disposal rate from 1.27 kilogram (kg) in 2011 to 1 kg or less by 2017, and further to 0.8 kg or less by 2022.

Note 6: *According to the EPD, the landfill extension would occupy 13 ha of additional land in Tseung Kwan O Area 137.*

1.10 As of March 2014, the capital costs of providing the three landfills and the refuse-transfer-station network were \$4,129 million and \$2,724 million respectively. In 2014-15, the estimated recurrent expenditure of the EPD's waste management programme was \$2,049 million, of which \$705 million (34%) and \$419 million (20%) were for meeting the operation costs of the three landfills and the refuse-transfer-station network respectively. The estimated operation cost (including collection and transfer cost) of disposing of a tonne of MSW was \$520.

Audit review

1.11 From 2001 to 2010, the Audit Commission (Audit) completed four reviews to examine Government actions on management of MSW. The review results were included in the following reports:

- (a) Chapter 8 of the Director of Audit's Report No. 36 of March 2001 entitled Provision of refuse transfer stations;
- (b) Chapter 7 of the Director of Audit's Report No. 39 of October 2002 entitled Management of municipal solid waste;
- (c) Chapter 11 of the Director of Audit's Report No. 51 of October 2008 entitled Reduction and recovery of municipal solid waste; and
- (d) Chapter 5 of the Director of Audit's Report No. 54 of March 2010 entitled Development of EcoPark.

1.12 The reviews found areas for improvement in the implementation of various strategies and action plans on reduction, recycling and disposal of MSW. The Public Accounts Committee (PAC) of LegCo conducted public hearings in 2008 and 2010 to examine the findings included in two audit reports (see para. 1.11(c) and (d)).

Introduction

1.13 In January 2015, Audit commenced a review to examine the Government's efforts in managing MSW (the subject matter of this review). In May 2015, Audit commenced a review of the reduction and recycling of food waste by the Government (see Chapter 2 of the Director of Audit's Report No. 65). This review examines the overall recovery of MSW and reduction of MSW disposal at landfills, and ENB/EPD efforts to reduce and recycle MSW.

1.14 This review focuses on the following areas:

- (a) reduction in municipal solid waste (PART 2);
- (b) recovery of municipal solid waste (PART 3);
- (c) recycling of municipal solid waste (PART 4);
- (d) treatment and disposal of municipal solid waste (PART 5); and
- (e) way forward (PART 6).

Audit has identified areas where improvement can be made by the Government in the above areas and has made recommendations to address the issues.

Acknowledgement

1.15 Audit would like to acknowledge with gratitude the full cooperation of the staff of the ENB, the EPD and the Food and Environmental Hygiene Department (FEHD) during the course of the audit review.

PART 2: REDUCTION IN MUNICIPAL SOLID WASTE

2.1 This PART examines actions taken by the ENB and the EPD in reducing MSW, focusing on:

- (a) achievement of MSW-reduction targets (see paras. 2.2 to 2.37); and
- (b) implementation of producer responsibility scheme (PR scheme — Note 7) on plastic shopping bags (PSBs) (see paras. 2.38 to 2.53).

Achievement of MSW-reduction targets

2.2 In relation to avoidance and minimisation of MSW, the 2005 Policy Framework set the following target:

Reducing the quantity of MSW generation by 1% per annum up to 2014, using 2003 as the base year.

2.3 Furthermore, the 2011 Action Plan laid down the following action plans:

- (a) expediting legislative proposals to introduce PR schemes; and
- (b) engaging the public in continued discussions on possible options to introduce MSW charging as a direct economic measure to reduce waste at source.

Note 7: *A PR scheme enshrines the polluter-pays principle under which manufacturers, importers, wholesalers, retailers and consumers are required to share the cost of collection, recycling, treatment and disposal of end-of-life products. For example, under the first phase of the PR scheme on PSBs, prescribed retailers are required to charge customers not less than 50 cents for each PSB distributed (see para. 2.41(a)).*

Reduction in municipal solid waste

2.4 Moreover, with a view to reducing the per-capita-per-day MSW disposal from 1.27 kg (using 2011 as the base year) to 1 kg or less by 2017, and to 0.8 kg or less by 2022, the 2013 Blueprint laid down the following action plans:

Between 2013 and 2015

- (a) stakeholder engagement and law drafting for MSW charging;
- (b) finalising a bill on extension of the PR scheme on PSBs;
- (c) finalising a bill on the PR scheme on waste electrical and electronic equipment (WEEE);
- (d) conducting public consultation and law drafting for the PR scheme on glass beverage bottles; and

Between 2016 and 2018

- (e) studying PR schemes on other waste types (e.g. rubber tyres, wood, packaging materials and rechargeable batteries).

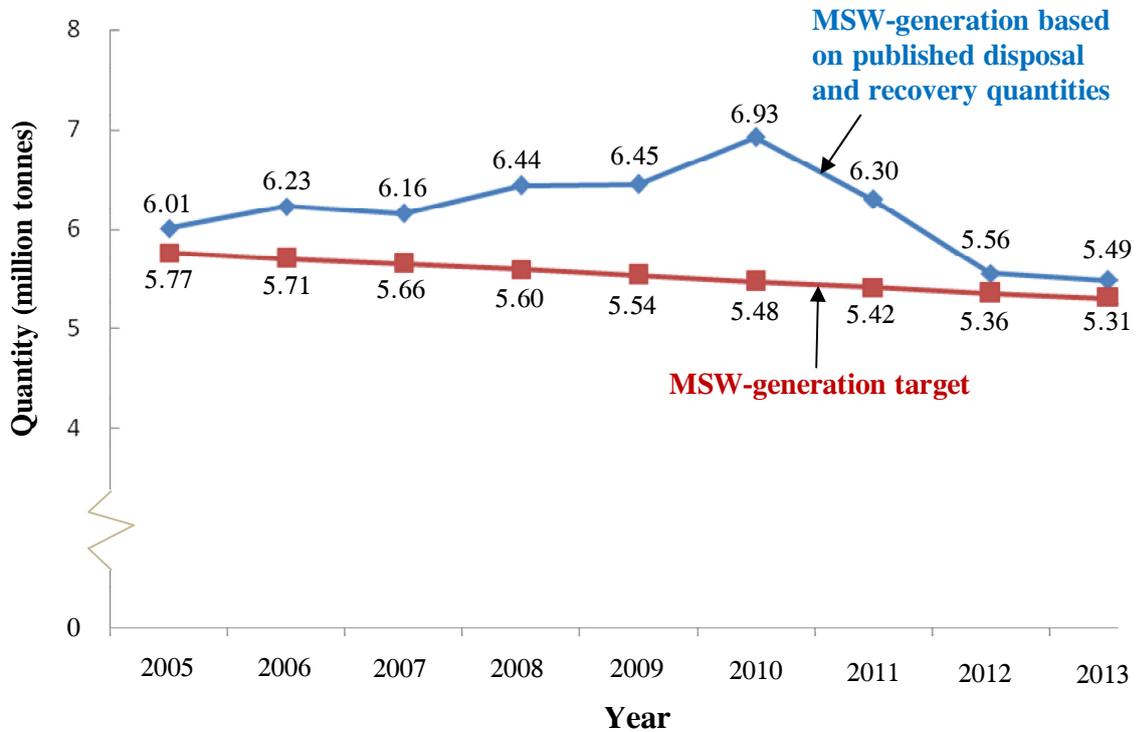
Areas for improvement

MSW-generation quantities having incorrectly subsumed unknown quantities of import recyclables

2.5 The 2005 Policy Framework set a target of reducing the MSW-generation quantity by 1% per annum up to the year 2014, using 2003 as the base year. Figure 4 shows the MSW-generation quantities (according to published disposal and recovery quantities) and the targets for 2005 to 2013.

Figure 4

Targets and MSW-generation quantities
(2005 to 2013)



Source: Audit analysis of EPD records

2.6 As shown in Figure 4, according to government targets, the MSW-generation quantities were expected to decrease from 5.77 million tonnes in 2005 to 5.48 million tonnes in 2010 (a 5% decrease). However, the MSW-generation quantities during the period had increased from 6.01 million tonnes to 6.93 million tonnes (a 15% increase). Thereafter, the MSW-generation quantities had significantly decreased from 6.93 million tonnes in 2010 to 5.49 million tonnes in 2013 (a 21% decrease), which still slightly exceeded the target of 5.31 million tonnes by 3%.

Reduction in municipal solid waste

2.7 The EPD estimated the quantity of locally-generated MSW (mainly waste plastics, metals and paper) by aggregating the quantities of the following:

- (a) MSW disposed of at landfills;
- (b) recyclables recovered and processed for local use (hereinafter referred to as locally-generated recyclables recovered for local use); and
- (c) recyclables recovered for export outside Hong Kong (hereinafter referred to as locally-generated recyclables recovered for export).

2.8 The following methods were used by the EPD to measure and estimate the quantities of MSW disposed of at landfills and recovered:

- (a) for MSW disposed of at landfills, EPD landfill contractors conducted weighing of each truckload of MSW before its disposal at landfills for compiling the total quantity of MSW disposed of there;
- (b) for locally-generated recyclables recovered for local use, the EPD conducted annual waste-recovery surveys to obtain the related statistics. The EPD maintained a directory of major recyclers, and requested the relevant recyclers to complete and return questionnaires on the quantities of recyclables recovered for local use and for export outside Hong Kong periodically; and
- (c) for locally-generated recyclables recovered for export, the EPD periodically made estimates of the quantities with reference to the “domestic export” statistics compiled by the Census and Statistics Department (C&SD), which were based on information contained in trade declarations submitted by exporters to the Customs and Excise Department (C&ED — see paras. 2.11 to 2.15). Although the survey mentioned in (b) above also provided statistics on the quantities of locally-generated recyclables recovered for export, the EPD relied on the trade-declaration information for the purpose because it was a statutory requirement for exporters to make export declarations, whereas waste-recovery surveys could not cover all recyclers in the trade and could only gather information provided voluntarily by recyclers through completing and returning questionnaires in EPD surveys.

Reduction in municipal solid waste

2.9 Table 1 shows the components of the MSW-generation quantities from 2009 to 2013 based on EPD published statistics.

Table 1
Components of MSW-generation quantities
(2009 to 2013)

Year	Quantity of MSW							
	Disposal at landfills		Recovered for local use		Recovered for export		Total	
	Million tonnes	%	Million tonnes	%	Million tonnes	%	Million tonnes	%
2009	3.27	50.7	0.03	0.5	3.15	48.8	6.45	100
2010	3.33	48.1	0.03	0.4	3.57	51.5	6.93	100
2011	3.28	52.1	0.04	0.6	2.98	47.3	6.30	100
2012	3.40	61.1	0.06	1.1	2.10	37.8	5.56	100
2013	3.48	63.4	0.14	2.5	1.87	34.1	5.49	100

Source: EPD records

2.10 According to the EPD, traders may import recyclables (mainly waste plastics) from overseas and may either:

- (a) put the import recyclables through recycling processes in Hong Kong, such as changing the shape of recyclables (e.g. shredding plastic bottles), and then export them outside Hong Kong for gainful use (hereinafter referred to as import recyclables processed for export); or
- (b) re-export the recyclables outside Hong Kong without going through recycling processes (hereinafter referred to as import recyclables for re-export).

Reduction in municipal solid waste

2.11 Under the existing trade declaration system administered by the C&ED, import recyclables having been processed locally and thereafter exported could be reported in the trade declaration form (Note 8) as “domestic exports”. The C&ED trade declaration form did not require exporters to differentiate between export recyclables that were generated locally and those imported from overseas. Consequently, the EPD was not able to differentiate between these two types of recyclables. An unknown quantity of import recyclables having been processed locally and exported was counted by the EPD as locally-generated recyclables. As a result, the locally-generated MSW quantities had been over-estimated in the past years.

2.12 In March 2014, the EPD informed the LegCo Panel on Environmental Affairs (EA Panel) of the quantities of import and export recyclables from 2009 to 2013. Given that Hong Kong does not have factories carrying out large-scale recycling processes to transform recyclables into consumer products, most of the import recyclables will be exported. Therefore, the total quantities of import recyclables plus locally-generated recyclables should be roughly equal to those of export recyclables. Accordingly, based on the data provided to the EA Panel in March 2014, Audit made a comparison of the related data. Details are shown in Table 2.

Note 8: *Under the trade declaration system, exporters were required to state in the form the origin country/territory of each type of export, and for goods subjected to a manufacturing process in Hong Kong which had changed permanently the shape, form and utility of the basic materials of the goods, they were Hong Kong origin for trade declaration purposes.*

Table 2

**Import and export recyclables
(2009 to 2013)**

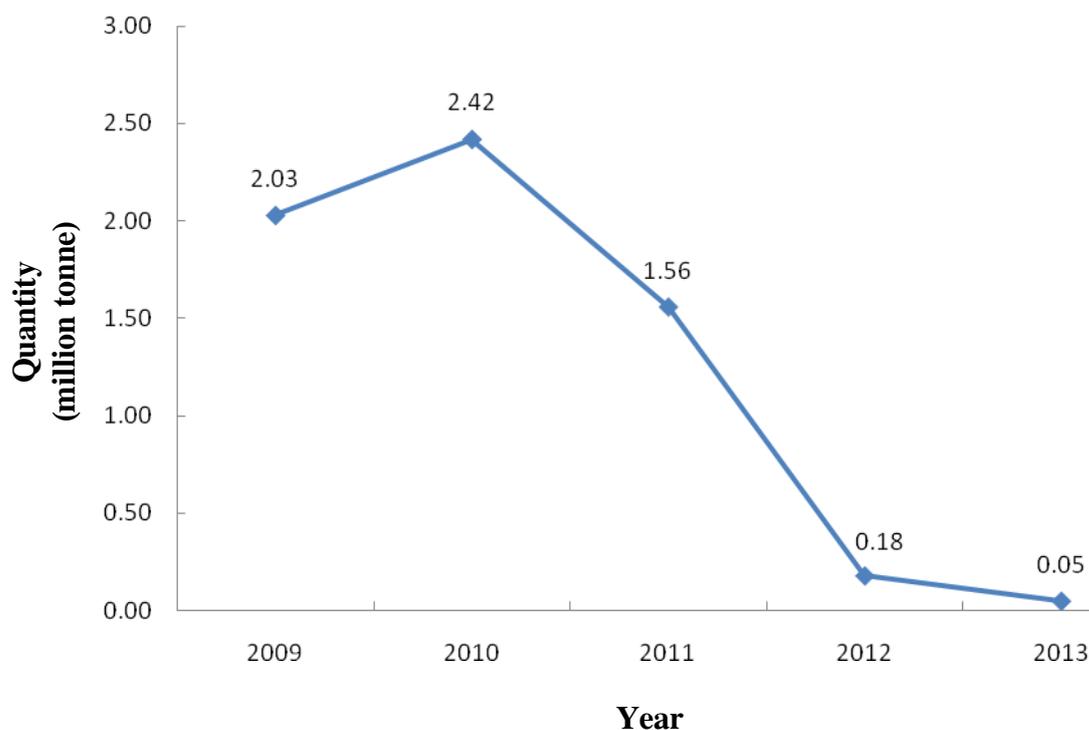
Year	Import recyclables (a) (million tonnes)	Locally-generated recyclables recovered for export (b) (million tonnes)	Import plus local recyclables (c) = (a) + (b) (million tonnes)	Export recyclables (d) (million tonnes)	Import plus local less export recyclables (e) = (c) – (d) (million tonnes)
2009	5.60	3.15	8.75	6.72	2.03
2010	5.72	3.57	9.29	6.87	2.42
2011	4.83	2.98	7.81	6.25	1.56
2012	3.93	2.10	6.03	5.85	0.18
2013	3.13	1.87	5.00	4.95	0.05
Total	23.21	13.67	36.88	30.64	6.24

Source: Audit analysis of C&ED and EPD records

2.13 As shown in Table 2, in 2009, 2010 and 2011, the aggregates of the quantities of import recyclables and those of locally-generated recyclables having been recovered for export exceeded the quantities of export recyclables by 2.03 million tonnes, 2.42 million tonnes and 1.56 million tonnes respectively. The excesses decreased to 0.18 million tonnes in 2012 and 0.05 million tonnes in 2013 (see Figure 5).

Figure 5

**Excess quantities of import plus locally-generated recyclables
over export recyclables
(2009-2013)**



Source: Audit analysis of EPD records

2.14 The excess quantities of recyclables shown in Figure 5 give rise to concerns that some import recyclables might have been disposed of at local landfills. According to the EPD: (a) it is unlikely that the import recyclables had been disposed of at local landfills because, under the Waste Disposal Ordinance (Cap. 354), disposal of import recyclables at local landfills and refuse-transfer stations requires the EPD's approval, and the EPD had not granted such approval in the past years; and (b) a reason for the excesses was that some import recyclables had been processed into products and exported outside Hong Kong under product categories other than the recyclable categories.

2.15 The significant quantities of 2.03, 2.42 and 1.56 million tonnes of import and locally-generated recyclables recovered for export in excess of those of export recyclables in 2009, 2010 and 2011 respectively might be attributed to some quantities of import recyclables processed for export having been incorrectly subsumed into the quantities of locally-generated recyclables recovered for export, resulting in over-estimating the quantities of the latter (see para. 2.11). In Audit's view, the EPD, in collaboration with the C&ED and C&SD, needs to strengthen actions with a view to enhancing the accuracy of the import and export recyclable statistics and take remedial actions where warranted.

2.16 In view of the significant fluctuations in the MSW-recovery rates (see PART 3 for details), in 2012, the EPD commissioned a consultant (Consultant A) at a cost of \$1.5 million to review the abnormal fluctuations of MSW-recovery rates (see Figure 8 in para. 3.8) and the methodologies for compiling the related statistics. In his report of February 2014, Consultant A found that:

- (a) there were anomalies in the fluctuations in the quantities of recyclable plastics in the past years whereas those of waste paper and waste metals had remained relatively stable;
- (b) the likely inclusion of import recyclable plastics processed for export in the estimation of the quantity of locally-generated waste plastics recovered for export would result in an over-estimation of the overall MSW-recovery rate;
- (c) in trade declarations, traders could not clearly differentiate between locally-generated recyclables recovered for export and import recyclables processed for export. Owing to the nature of the import and export declaration system, which was not designed for estimating MSW-recovery quantities, it was practically not possible to determine the quantities of non-locally generated waste plastics from the statistics of "domestic exports". In the circumstances, it was not possible to adjust the quantities of locally-generated waste plastics recovered for export to exclude non-locally generated ones; and
- (d) the current methodology used for estimating MSW-recovery rates was the most appropriate approach, subject to a number of improvement measures (see para. 2.20).

Reduction in municipal solid waste

2.17 In October 2015, the EPD informed Audit that:

- (a) under the trade declaration system of Hong Kong, import recyclable plastics for export which had not undergone any processing in Hong Kong should be declared as re-exports. However, some traders and exporters might have erroneously declared such recyclable plastics as domestic exports in the past;
- (b) traders and exporters had no problem in correctly declaring import waste metals and paper as either re-exports or domestic exports; and
- (c) it had put in place stringent control at landfills to prevent illegal disposal of import waste, and it had not found loads of import recyclable plastics being disposed of at landfills.

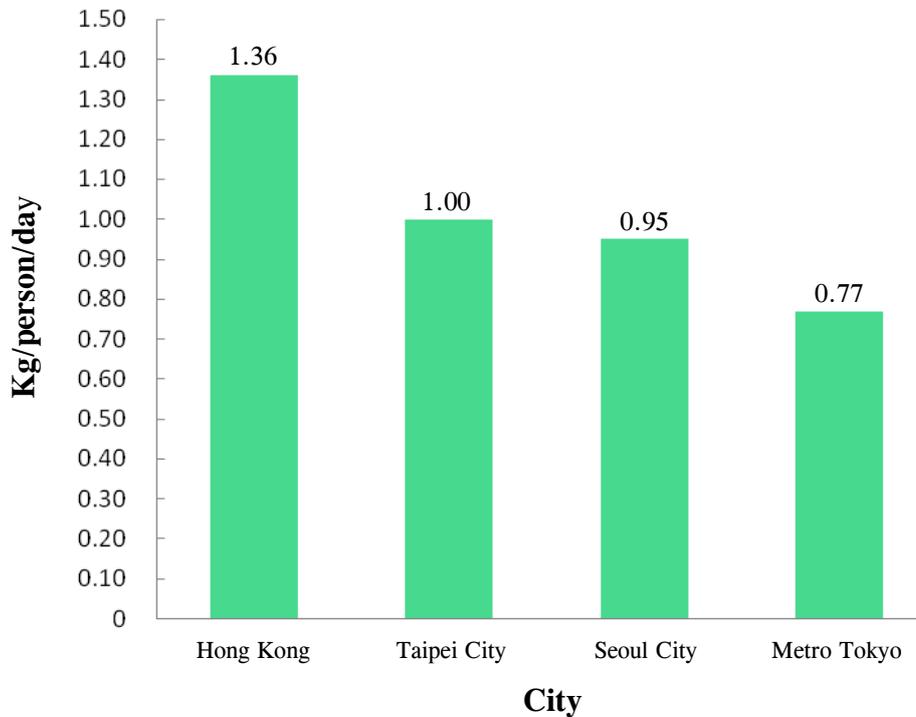
In order to remove the distortion in compiling the MSW-recovery rates and better evaluate the effectiveness of government actions to reduce local MSW generation, the EPD needs to explore ways and means to obtain accurate statistics on the quantities of locally-generated recyclables recovered for export as far as practicable.

High domestic per-capita MSW generation

2.18 The domestic per-capita-per-day MSW generation is high in comparison with other similar Asian cities in terms of economic development (see Figure 6).

Figure 6

Per-capita-per-day domestic MSW generation
(2011)



Source: EPD records

2.19 As elaborated in paragraphs 2.5 to 2.17, similar to the MSW-generation quantities, the domestic per-capita-per-day MSW-generation quantity had also been over-estimated. According to the EPD, Hong Kong population produced and disposed of more MSW than other Asian cities in 2013. Details are as follows:

City	Hong Kong	Metro Tokyo	Seoul City	Taipei City
Kg/person/day	0.88	0.56	0.30	0.27

Audit considers it unsatisfactory that the over-estimated per-capita MSW-generation quantity had been used to compare with those of some Asian cities.

Reduction in municipal solid waste

Recent developments

2.20 In March 2014, given that some traders might have incorrectly treated direct re-export recyclables as import recyclables processed for export in trade declarations, the EPD informed the EA Panel that it would, in collaboration with the C&ED and the C&SD, adopt appropriate measures in the collection of data so as to ensure that the data could better reflect the quantities of locally-generated recyclables. Such measures included:

- (a) the C&ED would issue additional guidelines on trade declarations in April 2014, and would work together with the EPD and the C&SD to organise regular thematic workshops for recyclable-plastics recyclers and exporters to keep them well informed of the requirements and relevant definitions in lodging accurate and complete trade declarations. The C&SD would strengthen the checking of export declarations on recyclable plastics; and
- (b) the C&SD would collect additional data (by making telephone calls to related exporters on a sample basis) on the sources (recovered locally or import recyclables) of recyclable plastics which have been declared as domestic exports and the recycling processes, if any, carried out in Hong Kong.

2.21 In September and October 2015, the EPD, the C&SD and the C&ED informed Audit that:

EPD

- (a) the compilation of the MSW-recovery rate for 2014 would adopt the enhanced measures mentioned in paragraph 2.20(b);
- (b) despite the fluctuations in MSW recovery quantities and recovery rates in the past years, the MSW-disposal quantities at landfills had remained stable, reflecting that the effectiveness of the EPD's various waste reduction and recovery measures had not been compromised, and that the import recyclables processed locally had largely been exported outside Hong Kong;

C&SD

- (c) the enhanced quality check procedures (see para. 2.20(b)) had been implemented for recyclable plastics since April 2014. The C&SD would strengthen checking to detect traders' incorrect reporting of re-export recyclable plastics as domestic-export ones. The information obtained from the additional quality check had also been used to compile additional data on the sources of domestic-export recyclable plastics (either recovered locally or imported from overseas) for the EPD's reference when compiling MSW-recovery rates;

C&ED

- (d) the C&ED would clarify with the declarants if they had doubts on the information stated in the declaration form. The C&ED would collect additional information from traders in order to differentiate between export recyclables which had been generated locally and those imported from overseas; and
- (e) in order to enhance the accuracy of the import and export recyclable statistics, from 2014 to April 2015, the EPD, the C&ED and the C&SD jointly conducted four thematic workshops for waste-plastic recyclers and exporters. A total of 52 representatives from 41 companies attended the workshops.

2.22 In Audit's view, the EPD, in collaboration with the C&SD and the C&ED, needs to strengthen efforts to implement the proposed new measures in paragraph 2.20 with a view to obtaining accurate statistics on the quantities of locally-generated recyclables recovered for export. These statistics would help improve the accuracy of the quantity of locally-generated MSW and MSW-recovery rates.

Time targets for implementing PR schemes on six products not met

2.23 According to the 2005 Policy Framework, the Government proposed to establish a framework for introducing PR schemes on specific products, with priority given to those that had significant impacts on waste disposal. Table 3 shows the time targets set for implementing PR schemes on six products.

Table 3

Time targets for implementing PR schemes on six products promulgated in 2005 Policy Framework

Product	Time target
PSBs	2007
WEEE	2007
Vehicle tyres	2007
Glass beverage bottles	2008
Packaging materials	2008
Rechargeable batteries	2009

Source: EPD records

2.24 As stated in the 2013 Blueprint:

- (a) the bill for Phase 2 of the PR scheme on PSBs would be finalised between 2013 and 2015;
- (b) the bill for the PR scheme on WEEE would be finalised between 2013 and 2015;
- (c) public consultation and law drafting for the PR scheme on glass beverage bottles would be carried out between 2013 and 2015; and
- (d) for other products (i.e. vehicle tyres, packaging materials and rechargeable batteries), studies would be launched between 2016 and 2018 to assess the need and consider whether they could be part of PR schemes.

2.25 According to the EPD, the PR schemes aimed to:

- (a) minimise the environmental impact of various types of products; and

- (b) based on the “polluter pays” principle, require manufacturers, importers, wholesalers, retailers, consumers and relevant stakeholders to share the responsibility for the reduction in the use, recovery, recycling or proper disposal of related products.

2.26 Audit examination revealed that, with the exception of the PR scheme on PSBs (Phase 2 of which was implemented on 1 April 2015 — see para. 2.43), notwithstanding that time targets of 2007 to 2009 had been set in the 2005 Policy Framework for implementing the PR schemes on WEEE, glass beverage bottles, vehicle tyres, packaging materials and rechargeable batteries, up to August 2015 (six to eight years later than the time targets), the related PR schemes had not been implemented.

2.27 In September and October 2015, the EPD informed Audit that the original time targets of implementing the PR schemes promulgated under the 2005 Policy Framework were based on the following considerations:

- (a) the originally intended legislative approach was that the Product Eco-responsibility Ordinance (Cap. 603) would provide the framework for PR schemes whereas product-specific measures would be subsequently introduced through subsidiary legislation. In the event, LegCo did not support this approach and required that each PR scheme must be implemented through legislative amendment to the Ordinance and subject to the three-reading scrutiny of LegCo; and
- (b) overseas experience suggested that the original intended legislation approach would prompt the relevant trade to introduce voluntary waste-reduction-and-recycling programmes which, if implemented successfully, might obviate the need (or at least relieve the immediate pressure) for implementing mandatory PR schemes. In practice, the trade had implemented voluntary PR schemes to promote recycling of computer and electronic equipment, fluorescent lamps, rechargeable batteries and glass beverage bottles.

2.28 Audit noted that, other than the PR schemes on PSBs, WEEE and glass beverage bottles, the EPD had not set revised time targets for implementing PR schemes on vehicle tyres, packaging materials and rechargeable batteries.

Reduction in municipal solid waste

In Audit's view, the EPD needs to set revised time targets for implementing PR schemes on the three types of product and expedite actions to implement the PR schemes on WEEE and glass beverage bottles, taking into consideration the experience gained.

Time target for implementing MSW charging scheme not met

2.29 According to the EPD, MSW charging provides an effective incentive that changes behaviour and leads people to cut down on waste generation. Overseas experience shows that MSW charging could contribute to significant reductions in waste generation (Note 9).

2.30 In December 2005, the EPD informed the Advisory Council on the Environment (Note 10) that the main objectives of MSW charging were to:

- (a) create an economic incentive for waste producers to avoid and reduce, or to recover and recycle waste; and
- (b) prevent indiscriminate use of landfills and other waste treatment facilities.

2.31 According to the 2005 Policy Framework, the Government envisaged that the MSW charging bill could be introduced by 2007. In the 2013 Blueprint, the EPD stated that it would engage stakeholders for law drafting relating to MSW charging from 2013 to 2015. Table 4 shows the chronology of key events relating to implementation of MSW charging.

Note 9: *According to the EPD, since implementing the MSW charging scheme, South Korea's per-capita disposal rate had dropped by 40% in a few years' time while Taipei City's per-capita disposal rate of household garbage had dropped by 65% in about 11 years.*

Note 10: *The Advisory Council on the Environment is the Government's principal advisory body on matters relating to pollution control, environmental protection and nature conservation. It is chaired by an academic with members comprising academics, businessmen, professionals and representatives from major environmental groups, and trade and industrial associations.*

Table 4

**Chronology of key events of implementing MSW charging scheme
(2006 to 2015)**

Month	Event
November 2006 to February 2007	Trial runs carried out in 20 housing estates (involving private and public housing estates and government quarters) to test the logistical arrangement on the use of designated garbage bags.
August 2007 to July 2008	The EPD engaged a consultant to review overseas experience on MSW charging and conduct surveys on local waste management practices.
November 2008 to March 2010	The EPD engaged another consultant to collect key information on waste generation and management practices of different C&I establishments.
January 2012 to April 2012	The EPD carried out public consultation to collect public views on the different MSW charging approaches.
December 2012	The EPD affirmed the direction of introducing quantity-based MSW charging in Hong Kong and invited the Council for Sustainable Development (Note) to conduct public engagement on the implementation framework.
September 2013 to January 2014	The Council for Sustainable Development carried out public engagement on the implementation framework of the MSW charging.
April 2014 to February 2015	The EPD carried out trial schemes in seven private housing estates and two rural villages.
December 2014	<p>The Council for Sustainable Development published the public engagement results, and recommended that:</p> <ul style="list-style-type: none"> (a) MSW charging should be implemented across the board for all sectors in one go; (b) MSW charging should be built upon the existing MSW collection and disposal system so as to minimise adverse impacts on environmental hygiene; and (c) the level of MSW charges should be directly related to the quantity of waste disposed of by MSW producers.

Reduction in municipal solid waste

Table 4 (Cont'd)

Month	Event
February 2015	The EPD confirmed at an EA Panel meeting that the Council of Sustainable Development's recommendations had been accepted by the Government.
May 2015	The Advisory Council on the Environment urged the Government to implement the MSW charging scheme as soon as practicable.

Source: EPD records

Note: The Council comprises representatives from government departments and members from the environment, social and business sectors. It advises the Government on key issues relating to Hong Kong's long-term sustainability.

2.32 The Government set a time target in the 2005 Policy Framework that the MSW charging bill would be submitted to LegCo in 2007. However, up to August 2015 (eight years after the original time target), the MSW charging bill had not been submitted to LegCo. According to the EPD, the MSW charging bill would be submitted to LegCo as soon as practicable within the 2016-17 legislative session, and the implementation of MSW charging would contribute to 20% reduction in MSW generation which would significantly help reduce the quantity of MSW disposal at landfills. Therefore, the EPD needs to strengthen efforts with a view to implementing the MSW charging scheme as soon as possible.

Need to conduct a post-implementation review of the 2005 Policy Framework

2.33 In Chapter 4 of Part 8 of the PAC Report No. 51 of February 2009, the PAC recommended that the ENB and the EPD should keep the Committee informed of the progress made in achieving the MSW reduction target laid down in the 2005 Policy Framework and the measures taken to achieve the target. In May 2010, the ENB informed the PAC that it would regularly report to the EA Panel on the implementation progress of the 2005 Policy Framework. Given that the 10-year 2005 Policy Framework was completed in 2014, for public accountability and transparency, the EPD needs to conduct a post-implementation review of the achievement of 2005 Policy Framework and inform the EA Panel of the review results.

Audit recommendations

2.34 **Audit has *recommended* that the Secretary for the Environment and the Director of Environmental Protection should:**

Over-estimation of MSW-generation quantities

- (a) **in collaboration with the Commissioner for Census and Statistics and the Commissioner of Customs and Excise:**
 - (i) **take measures to obtain accurate statistics on the quantities of locally-generated recyclables recovered for export for estimating the MSW-generation quantities and recovery rates; and**
 - (ii) **strengthen actions to enhance the accuracy of import and export recyclable statistics and take remedial actions where warranted;**

Time targets for implementing PR schemes

- (b) **set revised time targets for implementing the PR schemes on vehicle tyres, packaging materials and rechargeable batteries;**
- (c) **expedite actions to implement the PR schemes on WEEE and glass beverage bottles;**

Implementation of MSW charging scheme

- (d) **strengthen efforts with a view to implementing the MSW charging scheme as soon as possible; and**

Implementation of 2005 Policy Framework

- (e) **conduct a post-implementation review of the implementation of the 2005 Policy Framework and inform the EA Panel of the review results.**

Response from the Government

2.35 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations. They have said that the ENB and the EPD will:

- (a) in collaboration with the C&SD and the C&ED, continue to implement measures to enable trade declarants to understand and comply with export declaration requirements for recyclables, and collect additional information from the recyclable-plastics exporters to enhance the MSW-recovery-rate estimation. They will also continue to exercise stringent control over EPD waste-disposal facilities to guard against any disposal of import waste;
- (b) study the PR schemes on other products such as rubber tyres, wood, packaging materials and rechargeable batteries from 2016 to 2018;
- (c) expedite action on the PR schemes on WEEE and glass beverage bottles. The WEEE Bill is being examined by LegCo, and the bill on glass beverage bottles was introduced to LegCo in July 2015; and
- (d) bring forward the preparatory work on formulating implementation plans of the MSW charging scheme, developing complementary systems, stepping up public education and community involvement, and drafting of the related legislation.

2.36 The Commissioner for Census and Statistics agrees with the audit recommendations in paragraph 2.34(a). He has said that:

- (a) the C&SD and the C&ED will continue to implement measures to facilitate trade declarants to understand and comply with the export declaration requirements for waste items to facilitate the EPD's compilation of recyclable statistics; and
- (b) the C&SD will continue to monitor the effectiveness of the new procedures for checking the domestic export declarations of waste plastics.

2.37 The Commissioner of Customs and Excise agrees with the audit recommendations in paragraph 2.34(a). He has said that:

- (a) the C&ED will strengthen actions to educate traders to provide accurate import and export recyclable statistics; and
- (b) the C&ED may initiate prosecution against any person who knowingly or recklessly lodges any declaration that is inaccurate in any material particular.

Implementation of producer responsibility scheme on plastic shopping bags

2.38 According to the 2005 Policy Framework:

- (a) plastic bags are non-biodegradable and their excessive consumption burdens the landfills; and
- (b) through implementing a PR scheme on PSBs, the Government aimed to cut back the number of bags used.

2.39 In May 2007, the ENB informed the EA Panel that the main objective of the PR scheme on PSBs was to inculcate behavioural changes to reduce excessive use of PSBs and to cultivate a bring-your-own-bag culture. In January 2008, the EPD informed LegCo that the PR scheme on PSBs could address the problem of a large number of PSBs being disposed of at landfills.

2.40 In July 2008, the Product Eco-responsibility Ordinance (Cap. 603) was enacted, which provided a legal framework for implementing PR schemes. In April 2009, the Product Eco-responsibility (Plastic Shopping Bags) Regulation (Cap. 603A — hereinafter referred to as the PSB Regulation) for implementing the first phase of the PR scheme on PSBs (hereinafter referred to as PSB Phase 1) was enacted, which came into effect in July 2009.

Reduction in municipal solid waste

- 2.41 Under the PSB Phase 1:
- (a) prescribed retailers (Note 11) providing PSBs (Note 12) to customers were required to register with the EPD and to charge customers not less than 50 cents for each PSB distributed;
 - (b) registered retailers were required to submit to the EPD quarterly returns on the number of PSBs distributed by the registered retail outlets and make payment to the EPD for the levy collected at 50 cents each;
 - (c) as of end of 2014, registered retailers comprised 48 chain-stores (mainly supermarkets, convenience stores and personal-item stores which met the criteria set out in the legislation — see Note 11 to (a) above) with a total of 3,534 registered retail outlets; and
 - (d) in 2014, registered retailers reported that their registered outlets had distributed 70.7 million PSBs and paid \$35.4 million of levy to the EPD.

In 2014-15, the EPD incurred about \$10 million in implementing PSB Phase 1.

Note 11: *A prescribed retailer under PSB Phase 1 was defined as one which carried out a retail business at five or more qualified retail outlets or at one or more qualified retail outlet with a retail floor area of not less than 200 m². A qualified retail outlet was one offering for sale at the same time all the three specified types of goods, i.e. food or drink, medicine or first aid items, and personal hygiene or beauty products. The prescribed retailer had to register the qualified retail outlets (registered outlets) and submit quarterly returns to the EPD.*

Note 12: *PSBs covered under PSB Phase 1 included:*

- (a) *PSBs that were wholly or partly made of plastic including non-woven bags; and*
- (b) *PSBs with a handle, handle hole, perforated line for tearing out a handle hole, carrying string or strap, or any other carrying device on, or attached to, the bags.*

2.42 In May 2011, the EPD informed LegCo that PSB Phase 1 had been implemented successfully, and that:

- (a) based on two landfill surveys (Note 13) conducted in mid-2009 (before PSB Phase 1) and mid-2010 (after PSB Phase 1), the number of pertinent PSBs (which bore the features of supermarkets, convenience stores or personal-item stores) disposed of at landfills had decreased from 657 million in 2009 to 153 million in 2010 (77% reduction); and
- (b) according to a government telephone survey, over 75% of the respondents did not ask for PSBs when shopping at registered retail outlets.

2.43 In March 2014, after conducting a three-month public consultation in 2011 and subsequent law drafting by the Government and scrutiny by LegCo, a bill was passed to amend the Product Eco-responsibility Ordinance which extended the PR scheme on PSBs to cover the entire retail sector with over 100,000 retail outlets (hereinafter referred to as PSB Phase 2), which came into effect on 1 April 2015. Different from PSB Phase 1, under PSB Phase 2:

- (a) all retailers would be covered under the extended scheme. However, retailers could retain the PSB charges and they are not required to keep records of distribution of PSBs nor submit related returns to the EPD;
- (b) flat-top bags would be subject to charge; and
- (c) notwithstanding (b), PSBs used to carry food containing in non-airtight packaging and frozen or chilled food would be exempted from the charge.

In 2014-15, the EPD incurred about \$14.8 million in preparing for the implementation of PSB Phase 2.

Note 13: *EPD landfill contractors conducted sample counting of PSBs disposed of at landfills on randomly selected loads of MSW in 40 days (for the 2010 landfill survey) and 53 days (for the 2009 landfill survey) to estimate the annual disposal quantities. During landfill surveys, according to the displayed features found on the bags, PSBs were classified into: (a) those bearing the features of supermarkets, convenience stores or personal-item stores; and (b) those not bearing such features.*

Reduction in municipal solid waste

Areas for improvement

Need to be more comprehensive in reporting the impact of the PR scheme on PSBs

2.44 Audit noted that, from 2009 to 2013, based on the EPD's landfill surveys, whilst the number of PSBs disposed of at landfills bearing the features of supermarkets, convenience stores or personal-item stores (pertinent PSBs) had decreased from 657 million to 116 million (82% decrease), the number of other PSBs had increased by 12% from 4,021 million to 4,506 million during the period (see Table 5).

Table 5

**Number and weight of PSBs disposed of at landfills
(2009 and 2013)**

	2009		2013		Increase/(decrease)	
	Number (a) (million)	Weight (b) (tonnes)	Number (c) (million)	Weight (d) (tonnes)	Number (e) = (c) – (a) (million)	Weight (f) = (d) – (b) (tonnes)
Pertinent PSBs (Note)	657	13,493	116	1,949	(541)	(11,544)
Other PSBs	4,021	64,942	4,506	65,222	485	280
Total	4,678	78,435	4,622	67,171	(56)	(11,264)

Source: Audit analysis of EPD records

Note: These refer to PSBs bearing the features of supermarkets, convenience stores or personal-item stores of both registered and non-registered retailers.

Remarks: The annual numbers and weight of PSBs were projected from the average daily numbers and weight of PSBs found in landfill surveys.

2.45 As shown in Table 5, implementation of PSB Phase 1 resulted in reduction of 541 million pertinent PSBs weighing 11,544 tonnes from 2009 to 2013. Although the reduction was notable, its impact in reducing the total MSW disposed of at landfills (3.48 million tonnes in 2013) was quite small.

2.46 According to the EPD, the objectives of implementing the PR scheme on PSBs included:

- (a) inculcating behavioural changes to avoid excessive use of PSBs and cultivating a bring-your-own-bag culture; and
- (b) addressing the problem of a large number of PSBs being disposed of at landfills (see para. 2.39).

Based on the 82% reduction in the number of pertinent PSBs being disposed of at landfills after implementing PSB Phase 1, the objective stated in (a) above was achieved.

2.47 Audit noted that, in proposing to implement the PR scheme on PSBs, the EPD did not inform LegCo of the weight of PSBs and their proportion to that of the total MSW disposed of at landfills, and the estimated weight reductions after implementation of the PR scheme. In October 2015, the ENB and the EPD informed Audit that:

- (a) it was the ENB/EPD's conscious decision to illustrate the waste problem associated with PSBs with reference to the number of PSBs being distributed or disposed of because the core objective of the PR scheme was to reduce the use of PSBs, which would lead to a reduction in weight of plastic used assuming that the thickness of PSBs remained largely consistent;
- (b) it was not uncommon that reference was made to the number of PSBs being distributed or disposed of in the deliberation on similar initiatives in other places in the world, such as Ireland and Taiwan; and
- (c) the general public would understand the PSB problem easier by using the "number of PSBs" as the "quantifier" to describe the problem.

Reduction in municipal solid waste

2.48 For public accountability and to enhance evaluation of the effectiveness of the PR scheme on PSBs, Audit considers that, in addition to the reduction in number of PSBs, the EPD should also provide LegCo with and publish information on the reduction in weight of PSBs disposal at landfills after implementation of the PR scheme on PSBs. This information will show the extent of relieving the pressure on landfills by the implementation of the PR scheme on PSBs.

Numbers of PSBs disposed of at landfills significantly greater than those distributed

2.49 Under the PSB Regulation, registered retailers under PSB Phase 1 were required to submit to the EPD quarterly returns on the number of PSBs distributed and remit the levy collected. On the other hand, EPD contractors conducted landfill surveys to estimate the number of pertinent PSBs of both registered and non-registered retailers having been disposed of at landfills. Table 6 shows the numbers of such PSBs obtained from the two sources.

Table 6
**Number of PSBs distributed and
disposed of at landfills under PSB Phase 1
(2010 to 2014)**

Year	2010	2011	2012	2013	2014
Number of PSBs distributed by registered retailers at registered outlets based on their returns (million)	49.8	53.6	59.5	66.0	70.7
Number of pertinent PSBs disposed of at landfills based on landfill surveys (million)	153	147	156	116	(Note)

Source: EPD records

Note: As of August 2015, the 2014 landfill survey statistics were not available.

2.50 In October 2015, the EPD informed Audit that:

- (a) some pertinent PSBs found in landfill surveys belonged to supermarkets, convenience stores or personal-item stores of non-registered retailers; and
- (b) pertinent PSBs found in landfill surveys might not be distributed by registered retail outlets because an outlet of a registered retailer, although carrying out related business, might not meet the requirements of a registered outlet (see Note 11 to para. 2.41(a)).

2.51 The EPD did not have statistics on the number of PSBs belonging to registered retail outlets being disposed of at landfills from 2010 to 2014. Accordingly, the reduction in the number of pertinent PSBs found in landfill surveys might not accurately reflect the effectiveness of the PR scheme on PSBs. Audit considers that the EPD needs to consider conducting consumer surveys to assess the effectiveness of PR schemes in future. The large variances between the numbers of PSBs distributed and disposed of at landfills would raise concerns over the accuracy of the data. The EPD therefore needs to strengthen actions with a view to improving the accuracy of statistics collected for evaluating the effectiveness of PR schemes in future.

Audit recommendations

2.52 **Audit has *recommended* that the Secretary for the Environment and the Director of Environmental Protection should:**

- (a) **consider conducting consumer surveys to assess the effectiveness of PR schemes in future; and**
- (b) **strengthen actions with a view to improving the accuracy of statistics collected for evaluating the effectiveness of PR schemes in future.**

Response from the Government

2.53 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations. They have said that the ENB and the EPD will:

- (a) in addition to conducting landfill surveys, consider tracking behavioural changes of consumers through dedicated surveys to assess the disposal of PSBs under PSB Phase 2; and
- (b) strengthen actions to collect reliable statistics in assessing effectiveness of PR schemes in future.

PART 3: RECOVERY OF MUNICIPAL SOLID WASTE

3.1 This PART examines the actions taken by the ENB and the EPD in recovery of MSW, focusing on:

- (a) achievement of MSW-recovery targets (paras. 3.2 to 3.21); and
- (b) implementation of the source-separation programme (SS Programme — paras. 3.22 to 3.40).

Achievement of MSW-recovery targets

3.2 Waste recovery comprises processes of waste recycling, composting and energy generation, aiming to extract the maximum benefits from products, postpone the consumption of virgin resources, and reduce the quantity of waste disposed of at landfills so as to minimise landfill use. MSW-recovery rate is a key performance indicator of the recovery efforts made.

3.3 According to the EPD, an MSW-recovery rate is calculated by:

$$\frac{\text{Quantity of MSW recovered}}{\text{Quantity of MSW generated}} \times 100\%$$

3.4 The 2005 Policy Framework set the following two targets for increasing the MSW-recovery rate to:

- (a) 45% by 2009; and
- (b) 50% by 2014.

Recovery of municipal solid waste

3.5 As stated in the 2005 Policy Framework, in order to increase MSW recovery, the EPD would roll out an SS Programme under which waste-separation bins (WS bins) would be provided at appropriate locations for separation and collection of recyclables (mainly recyclable plastics, metals and paper).

3.6 In the 2013 Blueprint, the Government stated that it would continue the on-going efforts to step up the SS Programme. As shown in the 2013 Blueprint, in 2022, 55% of MSW would be recycled, 23% treated by incineration and 22% disposed of at landfills.

Areas for improvement

Over-estimation of MSW-recovery rates

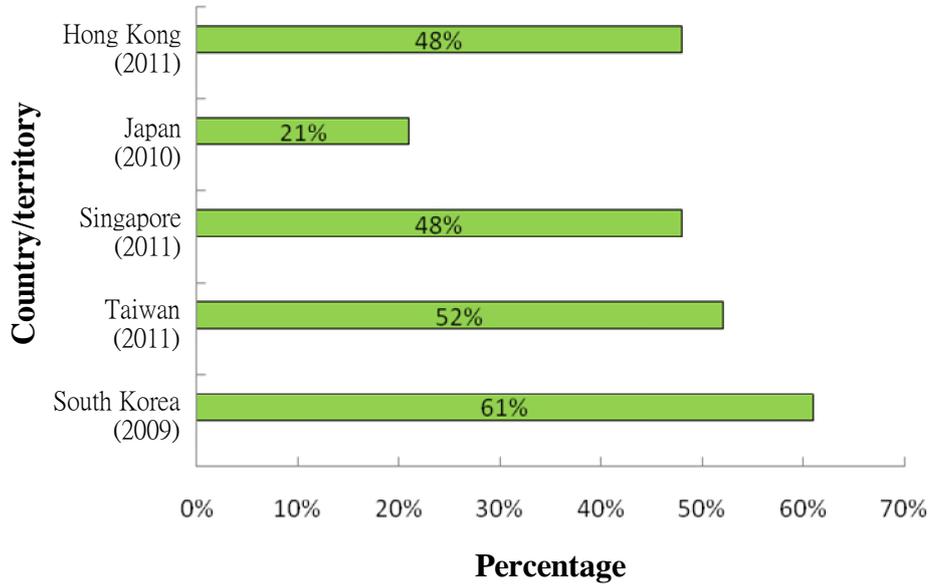
3.7 In March 2012, the EPD informed the EA Panel that:

- (a) as at 2010, the MSW-recovery rate of Hong Kong stood at 52%, which exceeded the Government's original target of attaining an MSW-recovery rate of 50% by 2014; and
- (b) the Government aimed to raise the MSW-recovery rate to 55% by 2015 through a range of enhanced or new initiatives.

3.8 The 2013 Blueprint showed the MSW-recovery rates of nearby countries and territories at a similar level of economic development of Hong Kong (see Figure 7). Figure 8 shows the targets and published MSW-recovery rates from 2005 to 2013.

Figure 7

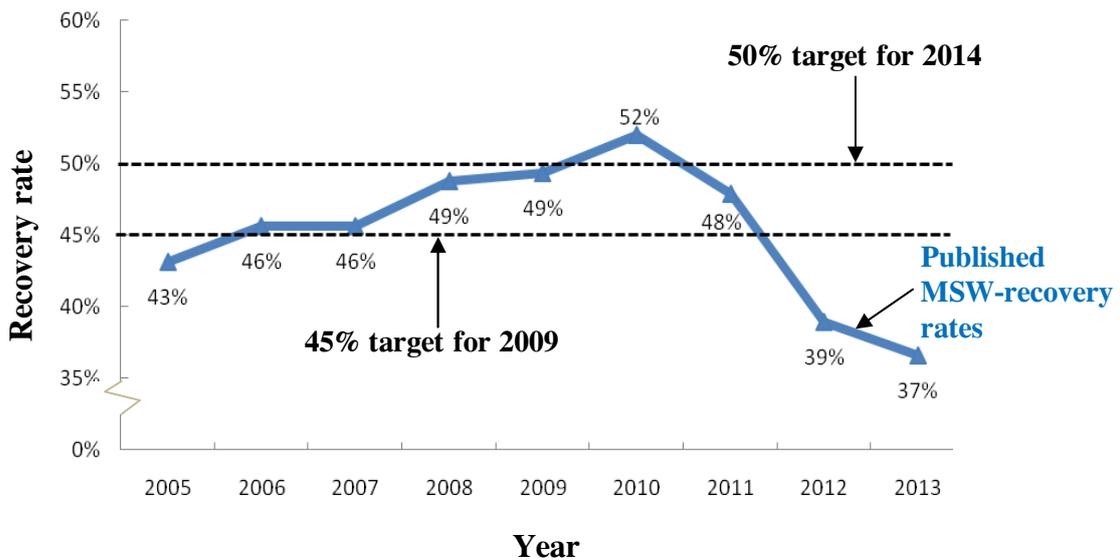
MSW-recovery rates of some Asian countries/territories



Source: EPD records

Figure 8

Targets and published MSW-recovery rates (2005 to 2013)



Source: EPD records

Recovery of municipal solid waste

3.9 As stated in paragraph 2.7, the quantity of MSW generation was the sum of the quantities of:

- (a) MSW disposed of at landfills;
- (b) locally-generated recyclables recovered for local use; and
- (c) recyclables recovered for export.

3.10 An MSW-recovery rate is calculated based on the quantities of the MSW recovered for local use and export, and MSW generation. However, as mentioned in paragraph 2.11, the statistics used by the EPD in arriving at the quantity of locally-generated MSW recovered for export comprised unknown quantities of import recyclables processed for export, which had distorted the numerator and denominator of the formula used in computing the MSW-recovery rate. For example, in 2013, the MSW-recovery rate of 37% was derived from:

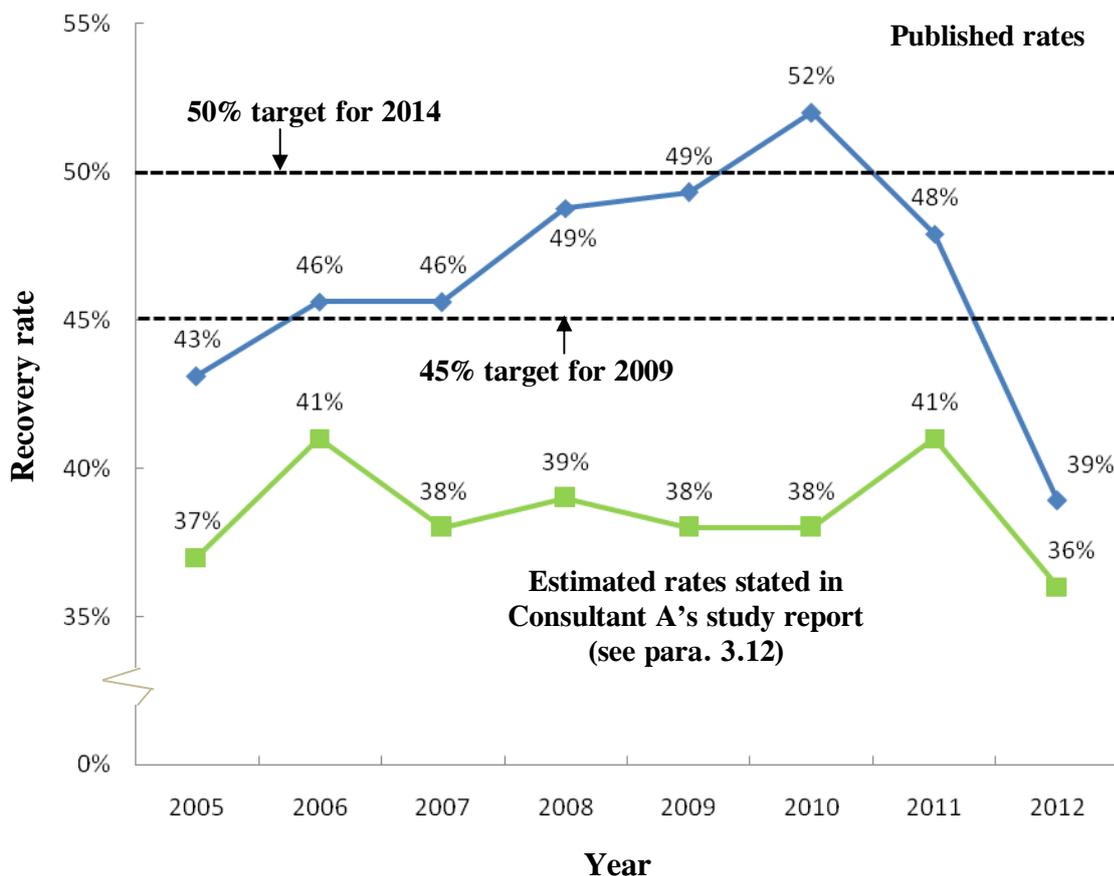
$\frac{0.14 \text{ million tonnes of locally-generated recyclables recovered for local use} + 1.87 \text{ million tonnes of locally-generated and import recyclables recovered/processed for export ("A")}{3.48 \text{ million tonnes of MSW disposed of at landfills} + ("A")} \times 100\%$

3.11 In view of the fact that both the quantities of MSW generation and MSW recovered had incorrectly included that of import recyclables processed for export, the possible increases in the quantity of import recyclables processed for export from 2005 to 2010 might have led to increases in the MSW-recovery rates from 43% to 52% during the period (a 21% increase), and the possible decreases of which from 2010 to 2013 might have led to decreases in the MSW-recovery rates from 52% to 37% during the period (a 29% decrease).

3.12 Owing to the fact that the trade declarations did not show separate statistics for locally-generated recyclables recovered for export and import recyclables processed for export, the EPD was unable to accurately compute the MSW-recovery rates in the past years. In his study report of February 2014, Consultant A found that there were abnormal fluctuations in the quantities of recyclable plastics but not waste paper and metals (see para. 2.16). He made estimates of the MSW-recovery rates for 2005 to 2012 based on the quantities of locally-generated recyclable plastics recovered for export obtained from the EPD's

annual waste recovery surveys (see para. 2.8(b)). Details are shown in Figure 9. According to Consultant A, due to the incomplete coverage and less-than-100% response rates of the surveys, the estimated rates were lower-bound estimates and should not be adopted alone to represent the overall waste-recovery situation in Hong Kong. Audit considers that, although the estimates had some limitations, a comparison of the waste-recovery rates based on trade-declaration information and those based on results of waste-recovery surveys would provide some insights into the potential magnitude of the distortions of the published MSW-recovery rates in previous years.

Figure 9
Published and estimated MSW-recovery rates
(2005 to 2012)



Source: Audit analysis of EPD records

Remarks: Both the published rates and Consultant A's estimated rates accounted for the quantities of recyclable plastics, metals and paper and other recyclables.

Recovery of municipal solid waste

3.13 Audit noted that the MSW-recovery-rate targets and published recovery rates had been over-estimated in the past years. In Audit's view, the EPD needs to improve the methodology for estimating the quantities of locally-generated recyclables recovered for export (see para. 2.34(a)), and vigilantly monitor significant fluctuations in the MSW-recovery rates and ascertain the causes as soon as possible in future. It also needs to periodically publish the enhanced MSW-recovery rates achieved.

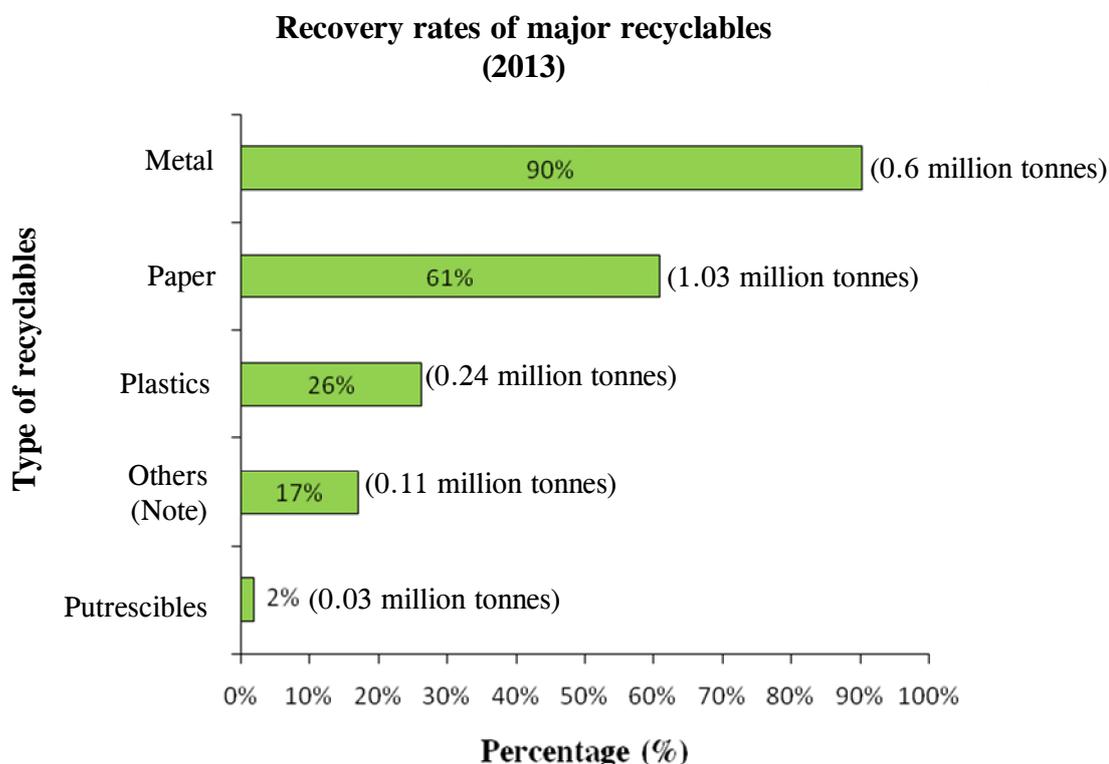
Need to take action to increase the low recovery rate of waste plastics

3.14 According to the EPD:

- (a) in 2013, the total weight of recovered waste plastics, paper and metals of 1.87 (0.24+1.03+0.6) million tonnes accounted for 93% of the total 2.01 million tonnes (see Figure 1 in para. 1.2) of MSW recovered in the year;
- (b) the waste collection industry in Hong Kong is more willing to collect higher-value recyclables, such as waste metals, paper and electrical and electronic products, for reprocessing or reuse; and
- (c) for lower-value recyclables, such as waste plastics and glass, and food waste, their low commercial value is not attractive to the waste collection industry.

3.15 Figure 10 shows the recovery rates of major recyclables in 2013. Audit noted that the recovery rates shown in Figure 10 had subsumed unknown quantities of import recyclables processed for export which should have been excluded (see para. 3.11).

Figure 10



Source: *Audit analysis of EPD records*

Note: *Other recyclables mainly included waste glass, rubber tyres, textiles, wood, and electrical and electronic equipment.*

3.16 In December 2014, the EPD published a report on “A Study to Promote Recycling of Plastics, Paper and Cooking Oil in Hong Kong”. As stated in the report:

- (a) the scarcity of land, high labour cost involved in intensive sorting and high transportation costs were major factors adversely affecting the waste-plastics recovery; and
- (b) the plastic-recycling trade was highly vulnerable to the changes in supply of and demand for waste plastics, as well as the Mainland’s related national policies. In view of the lower profit margin of waste plastics than other recyclables, it was commercially less attractive for the trade to

Recovery of municipal solid waste

invest in recycling this type of recyclables. In order to increase the commercial value of recyclable plastics, the Government needed direct measures to:

- (i) promote separation of different types of waste plastics at source with a view to reducing mixing of different types of waste plastics, and raising public awareness of preventing contamination of recyclable plastics in order to maximise recycling opportunities; and
- (ii) provide financial assistance to promote waste-plastics recycling, taking into account that the low density and bulky nature of waste plastics would increase the cost of collection and require large storage areas.

3.17 In July 2015, LegCo approved the setting up of the Recycling Fund with a financial injection of \$1 billion to facilitate local recycling industries to upgrade their operational capabilities and efficiency to enhance sustainable development. The EPD would set up a committee to oversee the operation of the Fund and process funding applications from recyclers for facilitating the upgrading of related recycling operations. According to the EPD, one of the guiding principles for assessing a funding application would be the capability of a project in raising the quantity and quality of recycled products. The Recycling Fund was launched in early October 2015.

3.18 Audit considers that, in view of the low recovery rate and low profit margin of waste plastics, the EPD needs to review its strategy on separation and recycling of waste plastics, and consider providing appropriate assistance through the Recycling Fund (see paras. 3.16(b)(ii) and 3.17) to promote the sustainable development of the recycling industry with a view to enhancing the recovery and recycling of waste plastics.

3.19 Furthermore, the EPD also needs to closely monitor the quantity of recovery of locally-generated waste plastics reused locally or exported outside Hong Kong, and periodically publish the recovery quantities.

Audit recommendations

3.20 Audit has *recommended* that the Secretary for the Environment and the Director of Environmental Protection should:

Over-estimation of MSW-recovery rates

- (a) **vigilantly monitor significant fluctuations in the MSW-recovery rates and ascertain the causes as soon as possible in future;**
- (b) **periodically publish the enhanced MSW-recovery rates achieved;**

Low recovery of waste plastics

- (c) **consider providing appropriate assistance through the Recycling Fund to promote the sustainable development of the waste-plastics recycling industry with a view to enhancing the recovery and recycling of waste plastics; and**
- (d) **closely monitor and periodically publish the quantity of recovery of locally-generated waste plastics.**

Response from the Government

3.21 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations.

Implementation of source-separation programme

3.22 Locally-generated recyclables being recovered for local use or export is sourced mainly from recyclable plastics, metals and paper which are:

- (a) deposited in WS bins, and collected and transported to recyclers mainly by government contractors; or
- (b) directly transported to recyclers by individual waste collectors and waste producers.

Recovery of municipal solid waste

3.23 Recyclers usually carry out processes on recyclables collected (such as sorting, shredding and cleaning of waste plastics, and compression and baling of waste paper) before exporting them outside Hong Kong.

3.24 As laid down in the 2005 Policy Framework, the SS Programme aimed to:

- (a) improve the recyclables-collection network by providing WS bins at both public places (such as roadside, government buildings, public housing estates, schools, public recreational venues and country parks) and private places (such as C&I buildings and private housing estates) throughout the territory; and
- (b) foster public participation in waste separation and recovery at source, which would help improve waste recovery and recycling.

3.25 The related targets set under the 2005 Policy Framework included:

- (a) domestic MSW recovery would increase from 14% in 2004 to 26% by 2012; and
- (b) 80% of Hong Kong's population would join the SS Programme on domestic waste by 2010.

3.26 In September 2015, the EPD informed Audit that:

- (a) the key objectives of the SS Programme were to disseminate information on waste reduction and recycling, and to encourage public participation in waste reduction and source separation of waste; and
- (b) as reflected by the increasing participation rates in the related schemes, the implementation of the SS Programme since 2005 had contributed to raising the public awareness about waste reduction and recycling.

3.27 As of August 2015, under the SS Programme, the following government departments were responsible for providing WS bins and collecting recyclables at specific locations:

- (a) the FEHD would provide WS bins at public places at roadside and villages, as well as refuse-collection points under its management. The FEHD also collected recyclables from WS bins provided at 848 schools, 20 clinics under the management of the Department of Health, and one collection point each at a venue of the EPD and the Water Supplies Department;
- (b) the Housing Department would provide WS bins at public housing estates;
- (c) the Leisure and Cultural Services Department (LCSD) would provide WS bins at parks, sports venues, and leisure and cultural facilities; and
- (d) the Agriculture, Fisheries and Conservation Department (AFCD) would provide WS bins at country parks.

3.28 The related government departments engaged contractors to collect the recyclables deposited into WS bins at specific time intervals or when being notified of the bins reaching full capacity. The contractors were required to transport the recyclables to recyclers for processing. These government departments provided the EPD with statistics on the quantities of recyclables collected from WS bins. For waste-plastics recyclers nominated under recyclable-collection-service contracts of the FEHD, the LCSD and the AFCD, the EPD conducted checking and evaluation of the facilities of nominated recyclers before designating the satisfactory ones as approved recyclers for receiving waste plastics under the contracts.

3.29 The SS Programme for the domestic sector was implemented in 2005. As published on EPD website, as of end 2010, 1,637 housing estates (comprising public rental housing estates, government quarters and private estates) and over 700 rural villages had joined the SS Programme, with residents representing 80.5% of Hong Kong's population, exceeding the target of 80% (see para. 3.25(b)).

3.30 In 2013, the EPD commissioned a consultant (Consultant B) to carry out a survey on the public awareness and participation rate of the SS Programme. The survey results found that over 80% of the respondents had heard of the SS Programme and the majority of the respondents practised waste separation and recycling, though they might selectively recycle part of their waste or only practise recycling when convenient to them.

Recovery of municipal solid waste

3.31 The SS Programme for the C&I sector was implemented in 2007. According to the EPD:

- (a) the number of participating C&I buildings increased from 442 in 2008 to 860 in 2013; and
- (b) the average quantity of recyclables recovered by the participating buildings increased from 22.7 tonnes per-building-per-year in 2008 to 29.7 tonnes per-building-per-year in 2013 (a 31% increase).

Areas for improvement

Insufficient statistics for assessing effectiveness of SS Programme

3.32 Under the SS Programme, the EPD would send invitations to both public and private estates, villages and C&I buildings inviting them to participate in the Programme. For estates, villages and C&I buildings indicating agreement to join the SS Programme, they could apply for funding from the Environment and Conservation Fund (Note 14) for procuring WS bins. The participating estates and C&I buildings needed to arrange for the collection and transportation of recyclables to recyclers. The EPD requested the participating estates and C&I buildings to provide it with statistics on the quantities of recyclables collected from WS bins. The FEHD also provided the EPD with statistics on the quantities of recyclables collected from WS bins at public places at rural villages and roadside, as well as refuse-collection points under its management.

3.33 Audit examination revealed that:

- (a) as of end 2013, 1,979 housing estates (comprising public rental housing estates, government quarters and private estates) and 700 rural villages had joined the SS Programme, with residents representing 82.5% of Hong Kong's population. Moreover, 860 C&I buildings had also joined the SS Programme;

Note 14: *The Environment and Conservation Fund was established in 1994 under the Environment and Conservation Fund Ordinance (Cap. 450). The Fund provides funding support for educational, research, technology demonstration and other projects and activities in relation to environmental and conservation matters, as well as community waste recovery projects. The Secretary for the Environment is the trustee of the Fund and the EPD acts as its administrative arm.*

- (b) in 2013, 971 (49%) of the 1,979 housing estates provided the EPD with statistics of the quantities of recyclables (85,870 tonnes) collected from WS bins;
- (c) in 2013, the FEHD collected 707 tonnes of recyclables from WS bins provided at public places at roadside and villages, refuse-collection points under its management, 879 schools, 485 collection points at LCSD venues and 17 collection points at country parks, and 4 tonnes from WS bins provided at 20 clinics under the management of the Department of Health and one collection point each at one venue of the EPD and the Water Supplies Department (Note 15);
- (d) in 2013, 582 (68%) of the 860 C&I buildings, including government offices, provided the EPD with statistics of the quantities of recyclables (25,575 tonnes) collected from WS bins; and
- (e) in 2013, 86,577 tonnes (85,870 tonnes plus 707 tonnes) and 25,575 tonnes of recyclables were collected from WS bins provided at the domestic and C&I sector respectively (totalled 112,152 tonnes).

3.34 Audit noted that, in 2013, 1,008 (51%) of the 1,979 participating housing estates and 278 (32%) of the 860 participating C&I buildings did not provide the EPD with the related statistics, which had adversely affected the assessment of the effectiveness of the SS Programme. In Audit's view, the EPD needs to strengthen promotion efforts to encourage participating estates and C&I buildings to provide related statistics by completing and returning standard forms. The EPD also needs to consider publishing the number of participating housing estates and the corresponding population which have provided the EPD with related statistics and those not providing the statistics.

Note 15: *Since 1 August 2014, the FEHD has ceased providing collection of recyclables from WS bins provided at LCSD venues and country parks, as the LCSD and the AFCD have made their own collection arrangements.*

Recovery of municipal solid waste

- 3.35 In October 2015, the EPD informed Audit that:
- (a) there was no mechanism to account for the quantity of recyclables taken by the public for recycling through other channels;
 - (b) upon joining the SS Programme, the management agent of a housing estate/building might provide monthly reports of the quantities of recyclable waste recovered through a designated account on the Hong Kong Waste Reduction website or providing the information to the EPD by fax. It would strengthen promotion efforts through enhanced communications with the housing estates and C&I buildings with a view to achieving a better response rate;
 - (c) it had published on the Hong Kong Waste Reduction website a list of participating housing estates/buildings and a list of award-winning housing estates and residential buildings in the annual competitions under the SS Programme. It had also included in the published lists of award-winning housing estates and residential buildings the average per-household-per-day quantities of recyclables collected by the estates/buildings with reference to the awards they obtained. For example, a housing estate or building would be extended a Diamond Award if their average recyclables collected were equal to or greater than 30 kg per household per month; and
 - (d) it would continue to solicit support from participating estates/buildings for publishing more information relating to the per-household-per-day quantities of recyclables collected by them.

With a view to enhancing the evaluation of effectiveness of the SS Programme and to encourage participating estates to increase collection of recyclables, the EPD needs to compute and publish the per-household-per-day quantities of recyclables collected from the participating estates which have provided the EPD with related statistics.

3.36 The related government departments (the FEHD, the LCSD, the Housing Department and the AFCD — see para. 3.27) and the C&I sector provided the EPD with statistics of the annual quantities of recyclables collected from WS bins by their contractors. The total quantity of such recyclables collected in 2013 was 112,152 tonnes (see para. 3.33(e)). In the year, the FEHD incurred \$6.35 million

for collecting recyclables weighing 711 tonnes (707 plus 4 tonnes) from WS bins (see para. 3.33(c)), representing an average cost of \$8,931 per tonne of recyclables collected. The Housing Department, the LCSD and the AFCD did not have related cost information because recyclables collection was part of the cleansing work under their cleansing contracts.

3.37 Audit noted that government contractors would separate recyclables collected into contaminated ones and non-contaminated ones. According to the EPD, for hygiene reasons, the former would be disposed of at landfills and the latter transported to approved recyclers. In September and October 2015, the EPD informed Audit that:

- (a) in early 2015, the EPD launched a Clean Recycling Campaign to arouse public awareness on the contamination problem of recyclables and encourage them to practise clean recycling. The Campaign aimed to promote source separation and cleaning of recyclables at the community level, so as to increase the recovery rate and recycling value of recyclables;
- (b) there were practical difficulties and inherent limitation in obtaining the quantities of recyclables collected which were disposed of at landfills due to contamination or other reasons, or those which were actually recovered and used locally or exported outside Hong Kong;
- (c) in the recyclable collection service contracts, the FEHD, the AFCD, the LCSD, the Housing Department and other government-office-management agents did not have contractual authority to require their contractors to obtain and provide statistics on the quantities of recyclables collected which were disposed of at landfills due to contamination or other reasons. Bringing in contractual requirements for contractors to compile additional statistics would take considerable time and would substantially increase the operation costs; and
- (d) the collection of recyclables at a private housing estate/C&I building was coordinated by the property management company. While the EPD would continue to liaise with property management companies to obtain statistics on quantities of contaminated recyclables discarded, many of them might have reservations to provide the information because additional resources would be required to weigh and report the quantities of contaminated recyclables discarded.

Recovery of municipal solid waste

3.38 Audit noted that members of the public had made efforts to clean and deliver recyclable plastics to WS bins and the FEHD had incurred about \$9,000 for collecting a tonne of recyclables from WS bins (see para. 3.36). With a view to enhancing public accountability and transparency, ascertaining the magnitude of the recyclables contamination problem and better evaluating the effectiveness of the SS Programme, Audit considers that there are merits for the EPD to take actions to ascertain and publish the quantities of recyclables collected which are disposed of at landfills due to contamination or other reasons, and those actually recovered and used locally or exported outside Hong Kong.

Audit recommendations

3.39 Audit has *recommended* that the Secretary for the Environment and the Director of Environmental Protection should, in implementing the SS Programme:

- (a) strengthen promotion efforts to encourage participating housing estates and C&I buildings to provide the EPD with statistics on recyclables collected from WS bins by completing and returning standard forms;
- (b) consider publishing the number of housing estates and the corresponding population which have provided the EPD with statistics on recyclables collected and those not providing the statistics; and
- (c) compute and publish the per-household-per-day quantities of recyclables collected by the participating estates which have provided the EPD with statistics on recyclables collected.

Response from the Government

3.40 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations.

PART 4: RECYCLING OF MUNICIPAL SOLID WASTE

4.1 This PART examines the actions taken by the ENB and the EPD in facilitating MSW recycling.

Operation of EcoPark

4.2 According to the 2005 Policy Framework, the objectives of the EcoPark project were to:

- (a) provide long-term land at affordable cost for the recycling industry; and
- (b) encourage investment in value-added and higher-end environmental and recycling technologies that help minimise waste generation.

4.3 According to a paper seeking funding for constructing EcoPark submitted to LegCo in February 2006, the EcoPark would:

- (a) provide an outlet for locally recovered materials and alleviate the heavy reliance on exporting recyclables; and
- (b) achieve a target throughput of 58,600 tonnes a year.

In March 2006, the FC approved funding of \$319 million for the development of EcoPark occupying an area of 20 ha in Tuen Mun Area 38. In July 2006, construction works commenced. The construction works were completed at a cost of \$308 million.

Recycling of municipal solid waste

4.4 In November 2006, the EPD awarded a contract to a management company to manage, maintain and market EcoPark for 7 years from April 2007 at a total cost of \$98.5 million. With the approval of the Financial Services and the Treasury Bureau, the management contract was extended from April 2014 to October 2014. In September 2014, after conducting open tendering, the EPD awarded a contract to another company to manage and maintain EcoPark for 4 years from October 2014 at a total cost of \$59 million. EcoPark comprises the following three parts:

- (a) an administration building, roads and marine frontage occupying an area of 6.6 ha which were completed between May 2007 and October 2010;
- (b) Phase 1 comprising six land lots (Lots 1 to 6) occupying a total area of 3.6 ha which were made available for leasing from December 2006; and
- (c) Phase 2 comprising 10 land lots (Lots 7 to 16) occupying a total area of 9.8 ha which were made available for leasing in three stages, namely Lots 7 and 8 in October 2009, Lots 9 to 14 in January 2011 and Lots 15 and 16 in July 2012.

4.5 According to the EPD, as of August 2015:

- (a) except Lots 4 and 15 (see Tables 7 and 8), the remaining 14 land lots occupying a total area of 12.5 ha had been leased/allocated for recycling operation;
- (b) the quantity of recyclable materials recovered by tenants had increased from about 9,000 tonnes in 2010 to more than 150,000 tonnes in 2014; and
- (c) EcoPark had created about 200 new jobs for labourers, and management and technical personnel.

Tables 7 and 8 respectively show the use of land lots under Phases 1 and 2 of EcoPark as of August 2015.

Table 7

**Use of six land lots under EcoPark Phase 1
(August 2015)**

Lot	Lot size (m²)	Monthly Rental	Recyclables for processing	Minimum throughput according to tenancy (tonnes per quarter)
1	5,000	\$80,000	Waste plastics	1,000
2	9,500	\$200,000	Waste metals	10,000
3	5,000	\$53,250	Waste wood	600
4	4,000	(Note)	(Note)	(Note)
5	6,500	\$85,000	Waste computers	300
6	6,000	\$50,000	Used cooking oil	1,500
Total	36,000 (or 3.6 ha)	\$468,250	—	13,400

Source: EPD records

Note: In the light that the tenant did not commence operation long after the time specified in the tenancy, the EPD issued a termination letter to the tenant in January 2013. As of August 2015, the EPD was taking litigation action against the tenant for repossession of Lot 4 (see paras. 4.15 to 4.17).

Recycling of municipal solid waste

Table 8

**Use of 10 land lots under EcoPark Phase 2
(August 2015)**

Lot	Lot size (m ²)	Rental	Recyclables for processing	Minimum throughput according to tenancy	
				Quantity (tonnes)	Quantity per quarter (tonnes)
7 (Note 1)	5,000	\$1 per quarter	WEEE	20 tonnes per month (not less than 720 tonnes over 3 years)	60
8 (Note 1)	9,070	\$1 per quarter	Waste plastics	About 6 tonnes per day	540
9	4,400	\$45,000 per month	Rubber tyres/ WEEE/oil	Rubber tyres: 190 tonnes per month WEEE: 90 tonnes per month Oil: 30 tonnes per month	570 270 90
10	10,000	\$200,000 per month	Lead-acid batteries	300 tonnes per month	900
11	10,000	\$150,000 per month	Construction and demolition materials/glass	Construction and demolition materials: 3,500 tonnes per month Glass: 183 tonnes per month	10,500 549
12	8,500	\$180,000 per month	Food waste	2,800 tonnes per month	8,400
13	10,000	\$180,000 per month	Waste metals	4,500 tonnes per month	13,500
14	5,000	\$80,000 per month	WEEE	450 tonnes per month	1,350
15	5,000	(Note 2)	(Note 2)	(Note 2)	(Note 2)

Recycling of municipal solid waste

Table 8 (Cont'd)

Lot	Lot size (m ²)	Rental	Recyclables for processing	Minimum throughput according to tenancy	
				Quantity (tonnes)	Quantity per quarter (tonnes)
16	30,970	(Note 3)	WEEE	Electrical appliances: 4,000 tonnes per month Electronic equipment: 800 tonnes per month	12,000 2,400
Total	97,940 (or 9.8 ha)	\$835,001 per month	—	—	51,129

Source: Audit analysis of EPD records

Note 1: Lots 7 and 8 were respectively leased to two non-governmental organisations (NGOs).

Note 2: Lot 15 was originally designated for use as a works area during plant construction at Lot 16 but the use was later not required (see paras. 4.22 to 4.26). The land lot was available for leasing as of September 2015.

Note 3: In order to support the implementation of the PR scheme on WEEE, in March 2015, the EPD engaged a contractor under a design-build-and-operate contract for building and operating a WEEE treatment facility at Lot 16 (see para. 4.22).

Areas for improvement

4.6 Audit examination revealed that:

- (a) of the six land lots under Phase 1, three involved unsatisfactory issues, including low recycling throughput (see paras. 4.7 to 4.10), prolonged suspension of recycling operation (see paras. 4.11 to 4.14) and land lot not being repossessed for re-letting long time after lease termination (see paras. 4.15 to 4.17); and

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- (b) of the 10 land lots under Phase 2, three land lots involved long delays in commencing operation (see paras. 4.18 to 4.21) and some existing tenants had been permitted to use two land lots free of charge (see paras. 4.22 to 4.26).

Throughput of Lot 1 not meeting tenancy requirement

4.7 In April 2008, after conducting open tendering, the EPD entered into a tenancy (Tenancy A) with a tenant (Tenant A) at a monthly rent of \$80,000 for recycling waste plastics at Lot 1 (with an area of 5,000 m²) for 10 years. Under Tenancy A, Tenant A should commence operation from June 2009 (12 months from site possession), and was required to process 1,000 tonnes of waste plastics per quarter. The recycling process involved sorting, baling and shredding of waste plastics for export to the Mainland. In January 2011, Tenant A commenced operation.

4.8 Notwithstanding that Tenant A was required under Tenancy A to recycle 1,000 tonnes of waste plastics per quarter, the average actual quantities of waste plastics processed at Lot 1 significantly fell short of the tenancy requirement (see Table 9).

Table 9

Required and average actual throughput of Lot 1

Required throughput per quarter (tonnes)	Average actual throughput per quarter (tonnes)			
	2011	2012	2013	2014
1,000 (100%)	160 (16%)	588 (59%)	849 (85%)	718 (72%)

Source: EPD records

4.9 In October 2015, the EPD informed Audit that:

- (a) the significant fluctuations in the market prices of recyclable plastics had affected the business of Tenant A. The EPD had assisted Tenant A to expand its business networks and explore partnership arrangements with relevant organisations such as trade associations, NGOs and government departments; and
- (b) it had issued warning letters on Tenant A's failure to comply with the minimum throughput requirement. Tenant A had achieved the required throughput since January 2015.

4.10 Audit considers it unsatisfactory that, from 2011 to 2014, the actual throughput of Lot 1 only accounted for 16% to 85% of the throughput as specified in Tenancy A. Audit considers that, with a view to attaining the required throughput set for each land lot as far as possible, the EPD needs to monitor the throughput of the tenants closely, provide necessary assistance to the related tenants, and explore ways and means to effectively enforce tenants' compliance with the minimum-throughput requirement stated in EcoPark tenancies in future.

Prolonged suspension of recycling operation at Lot 3

4.11 In April 2007, after conducting open tendering, the EPD entered into a tenancy (Tenancy B) with a tenant (Tenant B) at a monthly rent of \$53,250 for recycling waste wood at Lot 3 (with an area of 5,000 m²) for 10 years. Under Tenancy B, Tenant B should commence operation from May 2008 (12 months from site possession), and was required to process 600 tonnes of waste wood per quarter. The recycling process involved shredding of waste wood into wood chips for export to the Mainland for manufacturing flakeboards. In February 2010, Tenant B commenced construction works for related buildings. In May 2010, Tenant B commenced operation.

4.12 In November 2011, Tenant B suspended business. According to Tenant B, owing to the low selling price of wood chips and high transportation cost, the business had become financially not viable. In mid-2012, Tenant B commenced modification works to upgrade the production line for manufacturing wood-fuel pellets which had a higher value. In July 2013, Tenant B changed the operation to

Recycling of municipal solid waste

recycling waste wood into wood-fuel pellets. In January 2015, Tenant B again suspended operation. Tenant B informed the EPD that he was planning to adjust his operation mode to producing both wood chips and wood-fuel pellets for export to the Mainland. On 8 September 2015, the EPD issued a warning letter to Tenant B, requiring him to resume operation by October 2015. Subsequently, Tenant B resumed operation on 17 September 2015.

4.13 Audit considers it unsatisfactory that:

- (a) Tenant B only commenced recycling operation in May 2010, 24 months after the time specified in Tenancy B;
- (b) waste-wood recycling operation at Lot 3 was suspended for 20 months from November 2011 to June 2013; and
- (c) the recycling operation was again suspended for 8 months from January to September 2015.

4.14 In Audit's view, the EPD needs to closely liaise with Tenant B with a view to facilitating continued operation of the waste-wood recycling business at Lot 3. Furthermore, with a view to minimising prolonged suspension of recycling operation by tenants, the EPD also needs to explore ways and means to effectively enforce tenants' compliance with the operation requirement stated in EcoPark tenancies in future. These actions would help better achieve the objectives of EcoPark.

Lot 4 not repossessed for re-letting long time after lease termination

4.15 In February 2009, after conducting open tendering, the EPD entered into a tenancy (Tenancy C) with a tenant (Tenant C) at a monthly rent of \$41,000 for recycling used batteries at Lot 4 (with an area of 4,000 m²) for 10 years. Under Tenancy C, Tenant C should commence operation from August 2010 (12 months from site possession), and he was required to process 30 tonnes of used batteries per quarter. In December 2010, Tenant C commenced construction works for related buildings.

4.16 In August 2012, under section 58 of the Conveyancing and Property Ordinance (Cap. 219) (Note 16), the EPD issued a final notice requiring Tenant C to commence operation by November 2012. In October 2012, Tenant C proposed to commence operation in January 2013. In January 2013, noting Tenant C's failure to commence operation, the EPD issued a termination letter demanding Tenant C to deliver vacant possession of Lot 4 within three months. In April 2013, the EPD issued another letter to demand Tenant C to deliver vacant possession of Lot 4 and stated the EPD's right to commence legal proceedings. In May 2013, the EPD referred the case to the Department of Justice. In November 2014, Tenant C proposed to settle the issue by mediation. In December 2014, the EPD agreed to resolve the dispute by mediation. In August 2015, Tenant C had not responded to the proposed mediation arrangement. After consulting the Department of Justice, the EPD decided to proceed to take litigation actions.

4.17 Under Tenancy C, Tenant C should commence operation from August 2010. However, up to August 2015, five years after the commencement date specified in Tenancy C, the used-battery recycling operation at the land lot had not commenced. In Audit's view, the long delay in commencing the used-battery recycling operation at EcoPark is unsatisfactory which has adversely affected achievement of the objectives of EcoPark. Therefore, the EPD needs to expedite necessary actions with a view to repossessing Lot 4 and re-letting the site as early as possible. Furthermore, the EPD also needs to explore ways and means for the EPD to repossess a leased site earlier in future if the related tenant fails to comply with significant tenancy requirements, such as the operation commencement date.

***Long delays in commencing operation
at Lots 9, 10 and 14 of Phase 2***

4.18 After completion of site construction works, Lots 7 to 16 under Phase 2 were available for leasing to tenants in three stages from October 2009 to July 2012 (see para. 4.4(c)). Audit noted that, as of August 2015, tenants of three land lots under Phase 2 had not commenced operations 29 months after the time specified in the tenancies (see Table 10).

Note 16: *Section 58 of the Ordinance states that a right of re-entry in a lease shall not be enforceable unless the lessor serves on the lessee a notice specifying the breach and the lessee fails to remedy the breach within a reasonable time.*

Table 10

**Delay in commencing operation of Phase 2 tenants
(August 2015)**

Tenant	Type of recycling materials	Date of commencing operation as specified in tenancy	Period of delay in commencing operation (up to August 2015)
Lot 9 (Tenant D)	Waste rubber tyres/ WEEE/oil	April 2013	29 months
Lot 10 (Tenant E)	Lead-acid batteries	April 2013	29 months
Lot 14 (Tenant F)	WEEE	April 2013	29 months

Source: EPD records

4.19 According to the EPD, as of August 2015:

- (a) plant construction works were being carried out at Lot 9. Tenant D of Lot 9 planned to commence operation by end of 2015;
- (b) planning and design of plant at Lot 10 was in progress. Tenant E of Lot 10 planned to commence operation by mid-2016; and
- (c) machinery testing was being conducted at Lot 14. Tenant F of Lot 14 planned to commence operation by end of 2015.

4.20 The EPD informed Audit in October 2015 that it had closely liaised with the Buildings Department to expedite the statutory approval processes for related building works as far as practicable, and provided advice and guidance to the tenants on the approval procedures. The EPD had also issued warning letters to the tenants concerned.

4.21 Audit considers that, with a view to ensuring that EcoPark tenants would commence operation according to the time specified in tenancies, the EPD needs to provide necessary assistance and explore ways and means to effectively enforce tenants' compliance with the operation-commencement requirement stated in EcoPark tenancies in future.

Some tenants being permitted to use vacant land lots free of charge

4.22 In order to support the implementation of PR scheme on WEEE, in March 2015, after conducting open tendering, the EPD awarded a design-build-and-operate contract at a sum of \$1,728 million to Contractor A for building a WEEE treatment facility at Lot 16 (occupying an area of 30,970 m²) and operating the facility for 10 years. Lot 15 (occupying an area of 5,000 m²) was originally intended for use by Contractor A as a works area during plant construction but the use was later not required.

4.23 From completion of site works of Lots 15 and 16 in July 2012 to awarding the design-build-and-operate contract for Lot 16 in March 2015 (2 years and 9 months), for the purpose of providing assistance to resolve the operation difficulties of EcoPark tenants, the EPD permitted five tenants (tenants of Lots 3, 8, 11, 13 and 14) to use areas in Lots 15 and 16 for storage purposes free of charge for periods ranging from three to six months for each period of permission. In this connection, the related tenants were required to sign an undertaking on not subletting the areas and indemnifying the EPD for any loss and damage incurred. Table 11 shows the areas under Lots 15 and 16 and the durations of occupation by the five existing tenants.

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Table 11

**Free use of Lots 15 and 16 areas by other tenants
(July 2012 to August 2015)**

Tenant of Lot	Vacant lot		Duration (days)
	Lot	Area (m ²)	
3 (Tenant B)	15	5,000	771
	15	2,500	201
14 (Tenant F)	15	2,500	201
8	16	10,000	716
11	16	5,000	92
	16	10,000	897
13	16	5,000	92
	16	10,970	585

Source: EPD records

Remarks: Part of Lot 16 (10,000 m²) was provided to the tenant of Lot 11 for use as a storage area free of charge from July 2012 to March 2015. The other areas of Lot 16 were provided for use by tenants of Lots 8 and 13 from February 2013 to March 2015. According to the EPD, it had notified Tenants B and F to vacate and return to the EPD the occupied areas in Lot 15 by the end of September 2015.

4.24 In September and October 2015, the EPD informed Audit that:

- (a) upon completion of construction works of Lots 15 and 16 in July 2012, these land lots were earmarked for the implementation of a waste management facility project (see para. 4.22). At that time, the EPD planned to commence the project in December 2013. Given the short period and in the absence of an established charging mechanism, the EPD had difficulties in putting the vacant land lots into beneficial use. If the EPD had not allowed the pertinent tenants to use Lots 15 and 16 as

temporary storage areas, the land lots would have been left vacant pending the development of the WEEE treatment facility and no rental revenue would have been generated;

- (b) the provision of temporary storage areas to existing tenants was one of the EPD's supporting measures to address the temporary commissioning and operational difficulties of existing tenants and achieve better site utilisation; and
- (c) without providing the storage space for use by the existing tenants, some of the recyclable materials might need to be disposed of at landfills and some tenants might not be able to conduct operation commissioning tests smoothly.

4.25 In May 2009, in relation to charging a nominal rent for letting Lots 7 and 8 to two NGOs (see Table 8 in para. 4.5), the Financial Services and the Treasury Bureau informed the EPD that:

- (a) the Government should not use public money to subsidise a commercial or profit-making business when it was commercially viable to run the business; and
- (b) the Government should not be seen to provide funding to enhance the profit of private businesses or compete with the private sector.

4.26 While vacant land lots should be put into gainful use, Audit considers that reasonable rental should be charged for temporary use of vacant land lots at EcoPark by profit-making organisations. Apart from the tenant of Lot 8 who is an NGO, the tenancies of Lots 3, 11, 13 and 14 were awarded to commercial operators after conducting open tendering. Under the tenancies of Lots 3, 11, 13 and 14, the tenants could operate their businesses within the areas (5,000 m² for Lot 3, 10,000 m² for Lot 11, 10,000 m² for Lot 13 and 5,000 m² for Lot 14) allocated at specific monthly rentals (\$53,250 for Lot 3, \$150,000 for Lot 11, \$180,000 for Lot 13 and \$80,000 for Lot 14). Given that the temporary use of additional areas was not made known in the open tendering, free allocation of the areas after the tendering is not satisfactory. In Audit's view, the EPD needs to take measures to prevent recurrence of similar anomalies in future.

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Significant reduction in short-term-tenancy sites for recycling industry

4.27 As of June 2015, the Lands Department had let out 33 short-term tenancies (STTs) of government sites for exclusive use by the recycling industry (see Table 12). The tenancy periods ranged from one month to 7 years. Most recycling operators made use of the STT sites for sorting, baling and temporary storage of collected recyclables.

Table 12

**STT sites for recycling use
(June 2015)**

Size of STT site (m²)	Number of sites	Total area (m²)	Total monthly rental
Below 1,000	18	5,775	\$373,478
1,000 to below 3,000	10	17,540	\$1,168,430
3,000 and above	5	23,790	\$1,287,238
Total	33	47,105	\$2,829,146

Source: EPD records

4.28 According to the EPD, of the 33 STT sites occupying a total area of 47,105 m² for recycling use, 18 sites occupying a total area of 15,967 m² (34%) would be taken back from 2015-16 onwards for land sale or other uses, with the remaining 15 sites occupying a total area of 31,138 m² (66%) continuing to be designated for use by the recycling industry.

4.29 Audit considers that, given the significant reduction in the number and size of STT sites for the recycling industry, and with a view to providing necessary support to the recycling industry, the EPD needs to, in collaboration with the Lands Department and the Planning Department, explore suitable land sites for letting to the recycling industry under STTs.

Audit recommendations

4.30 **Audit has *recommended* that the Secretary for the Environment and the Director of Environmental Protection should, in managing EcoPark tenancies:**

- (a) provide necessary assistance to related tenants and explore ways and means to effectively enforce tenants' compliance with related requirements stated in EcoPark tenancies with a view to minimising:
 - (i) actual recycling throughput being significantly lower than that specified in tenancies;**
 - (ii) prolonged suspension of recycling operation; and**
 - (iii) significant delays in commencing recycling operation;****
- (b) expedite necessary actions with a view to repossessing Lot 4 and re-letting the site as early as possible;**
- (c) explore ways and means to repossess a leased site earlier in future if the related tenant fails to comply with significant tenancy requirements;**
- (d) charge reasonable rental for temporary use of vacant land lots by profit-making organisations; and**
- (e) in collaboration with the Director of Lands and the Director of Planning, explore suitable land sites for letting to the recycling industry under STTs.**

Response from the Government

4.31 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations. They have said that the ENB and the EPD:

- (a) will continue to provide feasible assistance to tenants and step up lease enforcement actions to ensure that the tenants can commence operation as planned, meet their recycling throughput and operate without disruptions;
- (b) will continue to liaise with the Department of Justice with a view to repossessing Lot 4 and re-letting the site as early as possible;
- (c) will explore with the Department of Justice ways to expedite legal actions to repossess a leased site in the event the tenant concerned fails to comply with significant tenancy requirements;
- (d) will explore setting up a suitable charging scheme for temporary use of vacant land lots by commercial tenants in future; and
- (e) has been working with the government departments concerned to step up efforts in identifying suitable STT sites to address the needs of the recycling industry and will continue to do so.

4.32 The Secretary for Financial Services and the Treasury has said that, as regards the audit recommendation in paragraph 4.30(d), vacant lots should be awarded to commercial operators through open tendering, and the rental to be charged should reflect the open market rentals.

4.33 The Director of Planning agrees with the audit recommendation in paragraph 4.30(e). He has said that the Planning Department will work with the government departments concerned to search for suitable temporary sites for letting to the recycling industry under STTs.

PART 5: TREATMENT AND DISPOSAL OF MUNICIPAL SOLID WASTE

5.1 This PART examines actions taken by the ENB and the EPD in reducing the quantity of MSW disposal.

MSW-disposal targets

5.2 In Hong Kong, MSW generated would either be recovered (mainly for export) or disposed of at landfills. The 2005 Policy Framework set the following target on reduction of the quantity of MSW disposed of at landfills:

Reducing the percentage of MSW disposed of at landfills from 60% in 2004 to 25% in 2014, with the remaining 50% of MSW being recovered and 25% being treated by an integrated waste management facility (IWWMF).

5.3 Furthermore, the 2013 Blueprint set the following target:

Reducing the per-capita-per-day MSW disposal from 1.27 kg in 2011 to 1 kg or less by 2017, and further to 0.8 kg or less by 2022.

Means of treating and disposing of MSW

5.4 According to the 2005 Policy Framework:

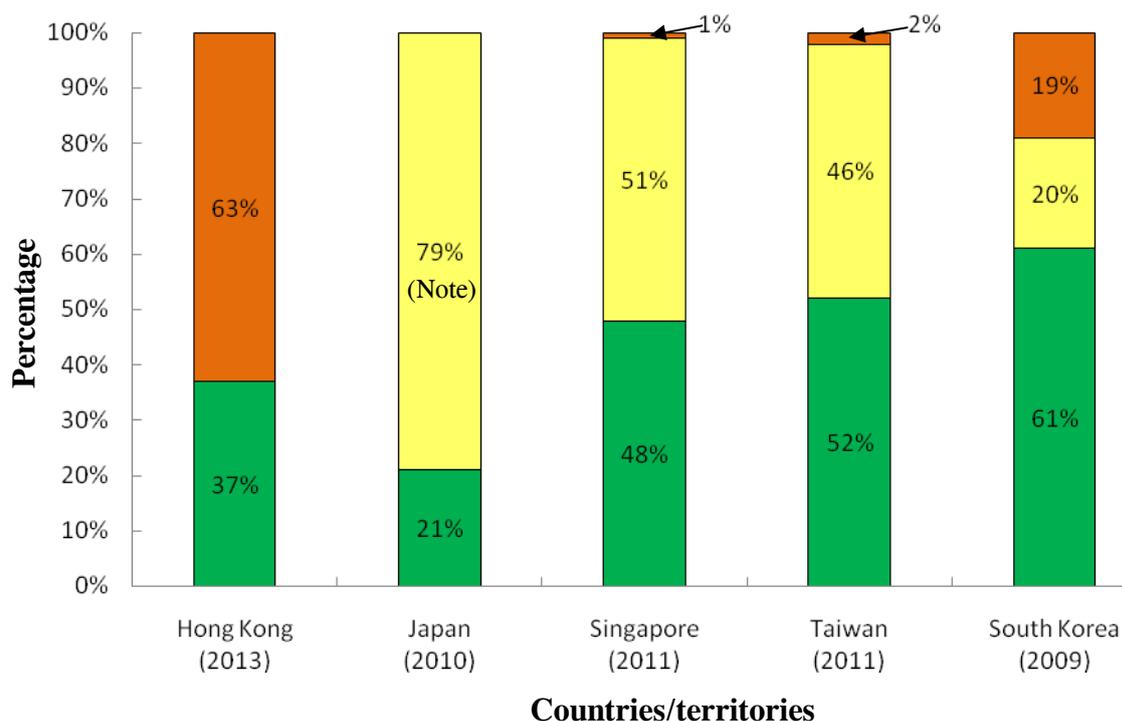
- (a) solely relying on landfills for waste disposal was not sustainable for Hong Kong; and
- (b) the existing landfills were running out of capacity, and the Government faced increasing difficulty in identifying suitable sites for new landfills. The landfill capacity should be conserved only for the disposal of unavoidable and treatment waste.

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5.5 At present, Hong Kong relies on landfills and waste recovery for disposal of MSW. However, some Asian countries/territories have adopted incineration as a third way for disposing of MSW (see Figure 11).

Figure 11

Waste disposal arrangements of some Asian countries/territories



Legend: ■ Landfill
■ Incineration
■ Recycling

Source: EPD records

Note: This quantity included residue of incineration disposed of at landfills.

Development of waste treatment and disposal facilities

5.6 As laid down in the 2013 Blueprint, an IWMTF, a sludge treatment facility and two organic waste treatment facilities (OWTFs) would be installed from 2013 to 2022 (see Table 13).

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Table 13

**Installation of waste treatment and disposal facilities
(August 2015)**

Facility	Forecast annual treatment quantity (tonnes)	Approved project estimate (APE) (Date of FC approval)	Target completion date stated in 2013 Blueprint	Position as of August 2015
Sludge treatment facility	730,000	Original APE: \$5,154.4 million (June 2009) Revised APE: \$5,364.3 million (June 2015)	2013-15	<ul style="list-style-type: none"> - Contract awarded in September 2010 - Stage 1 of the facility commissioned in April 2015 with an annual capacity of 584,000 tonnes - Whole facility targeted for completion in June 2017
OWTF				
- Phase 1	73,000	\$1,589.2 million (October 2014)	2016-18	<ul style="list-style-type: none"> - Contract awarded in December 2014 - Target for completion in mid-2017
- Phase 2	109,500	Funding not yet sought	2016-18	<ul style="list-style-type: none"> - Tender preparation started in second quarter of 2014
IWMF				
- Phase 1	1,095,000	\$19,203.7 million (January 2015)	2019-22	<ul style="list-style-type: none"> - Judicial review in progress - Target for completion in 2023
Other waste treatment facilities (including waste-to-energy facilities)	Under study	Funding not yet sought	No target set	<ul style="list-style-type: none"> - Carrying out site searches and researches on the most appropriate technology
Total	2,007,500	\$26,157.2 million		

Source: EPD records

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5.7 In 2013, 299,538 tonnes of dewatered sewage sludge generated from the sewage treatment plants of the Drainage Services Department were disposed of at landfills. After commissioning of the sludge treatment facility located in Tuen Mun in April 2015, dewatered sewage sludge has been treated by incineration at the facility, with residuals being disposed of at landfills.

5.8 An OWTF is designed for recycling and treating food waste using biological treatment technologies, which would produce biogas (a source of renewable energy similar to natural gas) as well as a residue that can be processed for use as compost or fertilizer. Details of OWTF Phases 1 and 2 are elaborated in Chapter 2 of the Director of Audit's Report No. 65.

Implementation of the IWMF

5.9 In 1998, the EPD announced a plan to commission a waste-to-energy facility (later renamed IWMF) by 2006. The 2005 Policy Framework set a target of commissioning a waste-to-energy plant by mid-2010s. The 2013 Blueprint revised the commissioning time to "2019 to 2022". In January 2015, the FC approved funding of \$19,203.7 million for the development of IWMF Phase 1 on an artificial island near Shek Kwu Chau, south of Lantau Island. As stated in the funding paper, the annual recurrent expenditure of IWMF Phase 1 would be \$402 million and the plant would be commissioned in 2022-23. The facility would adopt advanced incineration technologies for disposing of MSW which would generate electricity for gainful use. The residual of treatment (about 10% in volume of the MSW) would be disposed of at landfills.

5.10 In 2012, a member of the public filed an application for judicial review of the EPD's approval of the environmental impact assessment report for development of IWMF Phase 1. After being dismissed by the Court of Appeal, the applicant appealed to the Court of Final Appeal and an appeal hearing was scheduled for November 2015. A chronology of key events of the issue is shown in Appendix B.

Areas for improvement

Target for reducing MSW disposal at landfills not met

5.11 The 2005 Policy Framework set a target of reducing the percentage of MSW disposed of at landfills from 60% in 2004 to 25% in 2014, with the remaining 50% of MSW being recovered and 25% being treated by an IWMP. Owing to the postponement in commissioning the IWMP from mid-2010s to 2023 (see paras. 5.6 and 5.9), MSW which was originally targeted for treatment by the IWMP would have to be disposed of at landfills during the period of postponement. Therefore, in 2014, 50% of MSW was expected to be disposed of at landfills and the remaining 50% to be recovered (mainly for export outside Hong Kong).

5.12 As shown in Figure 8 in paragraph 3.8, the published MSW-recovery rate had decreased from 52% in 2010 to 37% in 2013. As elaborated in PART 2, due to inclusion of import recyclables in the estimation, the 5.49 million tonnes of MSW generation and the 2.01 million tonnes of MSW recovery in 2013 had been over-estimated, and hence the MSW-recovery rate of 37% had also been over-estimated. Accordingly, in 2013, more than 63% (100% less 37%) of locally-generated MSW should have been disposed of at landfills. The Government's target stated in the 2005 Policy Framework of disposing of 50% of MSW either at landfills or treated by the IWMP was not achieved.

Rising MSW disposal at landfills in recent years

5.13 The 2013 Blueprint set a target of reducing the quantity of per-capita-per-day MSW disposal from 1.27 kg in 2011 to 1 kg or less by 2017, and further to 0.8 kg or less by 2022.

5.14 Audit noted that the total quantities and per-capita-per-day quantities of MSW disposed of at landfills had increased in recent years (see Table 14).

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Table 14

**MSW disposal at landfills
(2005 to 2014)**

Year	Total quantity (million tonnes)	Per-capita-per-day quantity (kg/person/day)
2005	3.42	1.38
2006	3.39	1.35
2007	3.35	1.33
2008	3.30	1.30
2009	3.27	1.29
2010	3.33	1.30
2011	3.28	1.27
2012	3.40	1.30
2013	3.48	1.33
2014	3.57	1.35

Source: EPD records

5.15 Notwithstanding the various actions taken by the EPD in recent years with a view to reducing MSW generation and increasing MSW recovery, the rising trend in both the total quantities and per-capita quantities of MSW disposed of at landfills from 2011 to 2014 is a cause for concern. In Audit's view, for the purpose of reducing MSW disposal at landfills, the EPD needs to strengthen efforts with a view to reducing MSW generation and increasing MSW recovery.

LegCo not provided with quantifiable information relating to serviceable lives of landfills

5.16 In March 2012, the EPD informed the EA Panel that, as of end 2011, the three landfills had used up 79 million cubic metres (m³) of the total capacity of 139 million m³, and that they would reach their capacity commencing from 2014 to 2018, based on the following considerations:

- (a) since landfills were the last resort for waste disposal, prudent and realistic planning assumptions had been adopted; and
- (b) such assumptions included a moderate growth in waste due to population growth, increases in economic activities and major development projects, having regard to historical trends and economic forecasts.

5.17 In May 2013, the EPD informed the EA Panel that, in estimating the serviceable lives of the three landfills, it was assumed that the quantities of construction waste being disposed of at landfills would remain constant. In December 2014, the FC approved funding of \$2,101.6 million and \$7,510 million for extension works for SENT Landfill and NENT Landfill respectively, and \$38 million for carrying out the detailed study, site investigation and tender preparation work for WENT Landfill extension works. In seeking funding approval for extending the three landfills, the EPD informed the FC that the three landfills were estimated to reach their capacity from 2015 to 2018-19, and the proposed works would extend the estimated serviceable lives of WENT Landfill by 15 years from 2018-19, SENT Landfill by 6 years from 2017 and NENT Landfill by 10 years from 2018. Table 15 shows the capacities of the three landfills and their estimated serviceable lives at different times.

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Table 15

Capacities and estimated serviceable lives of three landfills

Landfill	Year of commissioning	Design capacity		Estimated time of landfill reaching capacity		
		Original (million m ³)	After approved and proposed extension works (million m ³)	As of March 2012	As of December 2014	
					Before extension works	After approved and proposed extension works
WENT (Note 1)	1993	61	142	2018	2018-19	2033-34 (Note 2)
SENT	1994	43	49.5	2014	2015	2023
NENT	1995	35	54	2016	2016-17	2028
Total		139	245.5			

Source: Audit analysis of EPD records

Note 1: As of August 2015, the FC had approved \$38 million for carrying out the detailed study, site investigation and tender preparation work for WENT landfill extension works. The Government had not sought FC funding approval for the construction works.

Note 2: According to the EPD, the estimated time of extended WENT Landfill reaching its capacity is subject to the findings of the detailed study and the timeframe of securing funding for the extension works.

5.18 In January 2011, the EPD informed the public that 5 ha of land located at the Clear Water Bay Country Park originally included in SENT Landfill extension works would be excluded from the works, and the proposed SENT Landfill extension area would only receive construction waste. The EPD later announced that, with effect from January 2016, the SENT Landfill would only receive construction waste. In April 2015, the EPD commenced the pre-qualification process for the NENT Landfill extension project. In May 2015, the EPD awarded a design and construction consultancy for SENT Landfill extension works.

Treatment and disposal of municipal solid waste

5.19 From 1993 to 2011, the three landfills received waste with a total weight of 98.3 million tonnes, which had used up 79 million m³ of the total capacity of 139 million m³ of the three landfills. Accordingly, the weight-to-volume ratio during the period was 1.24 tonnes of waste : 1 m³ of landfill space (98.3 million tonnes ÷ 79 million m³), compared to the EPD's estimated ratio of 1 tonne : 1 m³ (Note 17). With the total remaining capacity of the three landfills of 60 million m³ as of end 2011, they would be able to receive 60 million tonnes (based on the EPD's estimated ratio of 1 tonne : 1 m³) to 74 million tonnes (based on the historical ratio of 1.24 tonnes : 1 m³) of waste in future. In the event that a constant annual quantity of 5.22 million tonnes of waste (see Figure 2 in para. 1.3) is disposed of at the three landfills in the forthcoming years, the remaining serviceable lives of the three landfills could last for some years after 2018, contrary to the EPD's estimates made in 2012 that the three landfills would reach their capacities from 2014 to 2018. In September 2015, in response to Audit's above-mentioned observations, the EPD informed Audit that the estimated time of the three landfills reaching their capacity of 2014 to 2018 (as of March 2012 — see Table 15 in para. 5.17) were based on the following assumptions:

- (a) an area of 15 ha in WENT Landfill had to be reserved for providing freshwater ponds as required under the environmental permit for the WENT Landfill extension project, resulting in a loss in the landfill capacity of about 8 million m³;
- (b) enhanced daily soil cover, liner and drainage layers, leachate and landfill gas-collection-pipeline networks were required to be implemented at the landfills to address the nearby community's concerns, resulting in a loss in the landfill capacity of about 6 million m³;
- (c) by end 2011, the remaining usable capacity of the three landfills had been reduced to 46 (60 less 8 less 6) million m³, which would be able to receive 46 million tonnes of waste in future (i.e. at a weight-to-volume ratio of 1 tonne of waste : 1 m³ of landfill space); and

Note 17: *According to the EPD: (a) it had adopted a conservative weight-to-volume ratio of 1 tonne : 1 m³ in estimating the remaining serviceable lives of the three landfills (see para. 5.16); and (b) the ratio of 1.24 tonnes : 1 m³ according to waste disposal in the past years was due to a higher proportion of construction waste being disposed of at landfills before 2006. Since 2006, with the implementation of the Construction Waste Disposal Charging Scheme, the quantity of inert construction waste disposed of at landfills had decreased.*

Treatment and disposal of municipal solid waste

- (d) instead of using a constant disposal quantity, the EPD assumed that there would be a 2.5% annual growth of MSW, a 10% annual growth of construction waste and a 5% annual growth of special waste disposed of at the landfills.

5.20 Audit noted that, in informing the EA Panel in March 2012 of the remaining serviceable lives of the three landfills, the EPD did not provide quantifiable information on the basis of estimation and the underlying assumptions as outlined in paragraph 5.19. Audit considers that, in seeking funding approval for landfill extension works in future, the EPD needs to provide LegCo with quantifiable information and the assumptions made in estimating the remaining serviceable lives of landfills.

Audit recommendations

5.21 **Audit has recommended that the Secretary for the Environment and the Director of Environmental Protection should:**

- (a) **strengthen efforts with a view to reducing MSW generation and increasing MSW recovery; and**
- (b) **in seeking funding approval for landfill extension works in future, provide LegCo with quantifiable information and the underlying assumptions in estimating the remaining serviceable lives of landfills.**

Response from the Government

5.22 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations. They have said that the ENB and the EPD will:

- (a) continue to vigorously pursue the various MSW reduction and recycling measures set out in the 2013 Blueprint; and
- (b) endeavour to provide LegCo with quantifiable information, including the underlying assumptions, for estimating the remaining serviceable lives of landfills, in funding applications for landfill extension works in future.

PART 6: WAY FORWARD

6.1 This PART outlines the major audit observations and examines the way forward.

Achievement of MSW targets

6.2 The 2005 Policy Framework set a target of achieving an MSW-recovery rate of 50% by 2014 (see para. 3.4(b)) and the 2013 Blueprint stated that about 55% of MSW would be recycled by 2022 (see para. 3.6). This audit reveals that, owing to the fact that both locally-generated and import recyclables processed for export were classified as “domestic export” in trade declarations, the quantities of locally-generated MSW and recovered MSW had been over-estimated. As a result, the MSW-recovery rates had also been over-estimated. As the targets for MSW generation and MSW-recovery rates had been based on historical statistics, the targets had also been overstated. Had the correct statistics been used, more realistic MSW-recovery-rate targets would have been set, and recovery rates better reflecting the local recycling situation would have been compiled and published. Audit has recommended that the EPD should take remedial measures to prevent recurrence of similar anomalies in future.

MSW disposal at landfills

6.3 This audit also reveals that, notwithstanding the various actions taken by the EPD in recent years with a view to reducing MSW disposal at landfills, the rising trend in both the total quantity (from 3.28 million tonnes in 2011 to 3.57 million tonnes in 2014, or a 8.8% increase) and per-capita-per-day quantity of MSW (from 1.27 kg in 2011 to 1.35 kg in 2014, or a 6.3% increase) disposed of at landfills is a cause for concern. Audit has recommended that the EPD should make improvements in these areas.

Way forward

Implementation of major measures for MSW reduction and recovery

6.4 In comparison with the time targets set in the 2005 Policy Framework, there were delays in implementing the MSW charging scheme and the PR schemes on WEEE, glass beverage bottles, vehicle tyres, packaging materials and rechargeable batteries. Audit has recommended that the EPD should expedite actions on implementing the MSW charging scheme and the various PR schemes.

6.5 Regarding implementation of the PSB Phase 1 and the SS Programme, Audit examination reveals that there is room for improvement in assessing the effectiveness of the two programmes. Audit has recommended that the EPD should make improvement in implementing similar programmes in future.

6.6 In relation to the management of EcoPark, Audit examination reveals that the tenants of some land lots had not complied with the tenancy requirements on time of commencing operation and meeting the minimum quantities of recycling throughput. Audit has recommended that the EPD should make improvements in these areas.

Way forward

6.7 In 2013, Hong Kong's population of 7.19 million and the recyclable import/export industries together generated 5.49 million tonnes of MSW, of which 3.48 million tonnes (63%) were disposed of at landfills and the remaining 2.01 million tonnes (37%) were recovered and mainly exported outside Hong Kong for recycling. In terms of weight, the quantity of MSW disposed of at landfills every day is equivalent to that of about 650 double-decker buses. As of March 2014, the capital costs of providing the three landfills and the refuse-transfer-station network were \$4,129 million and \$2,724 million respectively. The estimated recurrent cost of disposing of a tonne of MSW at landfills was \$520. For recovery of MSW, as of March 2014, the Government had spent \$308 million to develop EcoPark to provide land at low cost to assist the recycling industry. Among the various government departments (such as the FEHD, the LCSD, the Housing Department and the AFCD) involved in the SS Programme, in 2013, the FEHD incurred \$6.35 million for collecting 711 tonnes of recyclables from WS bins (or on average spending \$8,931 for collecting a tonne of recyclables) for delivery to approved recyclers.

6.8 The Government has made substantial efforts and incurred significant expenditures in collecting and disposing of large quantities of MSW generated by Hong Kong's population. Apart from the high cost of MSW disposal, the large quantity of MSW generation has given rise to a significant problem in Hong Kong, namely Hong Kong's limited landfill space will be progressively used up in the coming two decades. According to the EPD, recently approved extension works to SENT and NENT Landfills and proposed extension works to WENT Landfill (subject to FC funding approval) would extend the serviceable lives of the three landfills to 2023, 2028 and 2033-34 respectively. In other words, SENT, NENT and WENT Landfills would reach their capacity in 8, 13 and 19 years from present respectively.

6.9 Owing to the scarcity of land, further extension of the three landfills or finding a place for developing a new landfill will be very difficult if not impossible. It is important to note that, after completing the approved and proposed extension works, the three landfill sites would occupy a total area of 554 ha of land (Note 18), which is approximately the size of 550 standard football pitches. According to the EPD, the existing landfill capacity should be conserved only for the disposal of unavoidable and treatment waste (see para. 5.4(b)). In Audit's view, both the Government and the community need to make utmost efforts on minimising MSW disposal at landfills, which will help preserve the precious landfill space for use by this generation and future generations.

6.10 For the purpose of minimising MSW disposal at landfills, Audit considers that the EPD needs to strengthen efforts to clearly publicise the significant landfill problem with a view to gaining public consensus and support on the vital need for Hong Kong to implement a holistic strategy on MSW handling focusing on the three key areas of reduction in MSW generation, increase in MSW recovery and increase in MSW treatment by IWMMF.

Note 18: *After completion of approved and proposed extension works, SENT, NENT and WENT Landfills would respectively occupy areas of 113 ha, 131 ha and 310 ha.*

Way forward

Reduction in MSW generation

6.11 As evidenced by overseas experience, the proposed MSW charging scheme would lead to changes in people's MSW disposal behaviour and a significant reduction in MSW generation.

Increase in MSW recovery

6.12 In a free market, recyclables with relatively high market values, such as waste metals, would normally be recovered by commercial recyclers for gainful use without the need for government assistance or subsidy. However, commercial recyclers may not have incentives to recover low-value recyclables, such as food waste and waste plastics. Therefore, the EPD needs to closely monitor the market prices of and demand for related recyclables and consider providing appropriate assistance to support the sustainable recovery and recycling of such recyclables (see para. 3.18), bearing in mind the high cost of MSW disposal at landfills and the vital need for preserving the precious landfill space.

Increase in MSW treatment by IWWMF

6.13 Asian countries/territories similar to Hong Kong in terms of economic development, such as Japan, Singapore, Taiwan and South Korea, have adopted incineration and recycling as the main means for MSW treatment. Notwithstanding that Hong Kong faces an acute shortage of land for landfill purposes, it has heavily relied on landfills for MSW disposal. Despite the fact that a proposal for providing a waste-to-energy facility for MSW was made as early as 1998, such a facility (with a capacity of treating 1.1 million tonnes of MSW a year) would only be provided in 2023 (according to the EPD's latest plan). Whilst Audit notes that the long time taken in providing the facility is due to the need to obtain public consensus on related issues, the long lapse of time has led to the limited landfill space having been dwindled by the disposal of large quantities of MSW, some of which could have been disposed of by the waste-to-energy facility if it had been installed earlier.

6.14 Audit also notes that the 1.1 million tonnes of MSW to be treated annually by IWWMF Phase 1 when it commences operation in 2022-23 would only account for 32% of the total quantity of 3.48 million tonnes of MSW being disposed of at landfills in 2013. Therefore, the EPD needs to explore ways and means to increase the quantity of MSW treatment instead of disposing of it at landfills.

Audit recommendations

6.15 **Audit has *recommended* that the Secretary for the Environment and the Director of Environmental Protection should:**

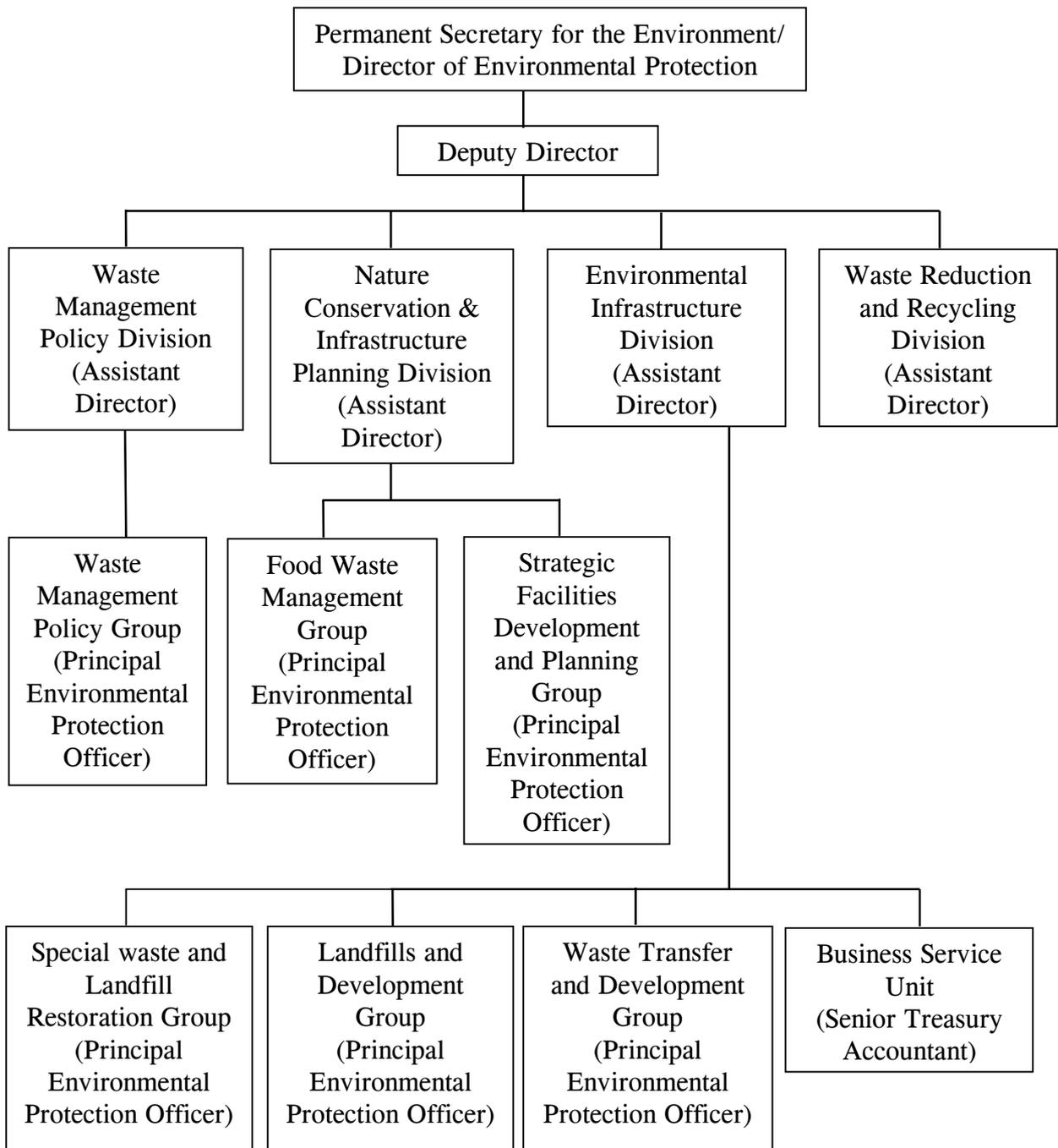
- (a) **strengthen efforts to clearly publicise the significant landfill problem with a view to gaining public consensus and support on the vital need for Hong Kong to implement a holistic strategy on handling MSW, focusing on reduction in MSW generation, increase in MSW recovery and increase in MSW treatment by IWWMF; and**
- (b) **explore ways and means to increase the quantity of MSW treatment instead of disposing of large quantities of MSW at landfills.**

Response from the Government

6.16 The Secretary for the Environment and the Director of Environmental Protection agree with the audit recommendations. They have said that the ENB and the EPD will continue to:

- (a) clearly publicise the waste disposal problems and challenges faced by Hong Kong with a view to gaining public support of the holistic strategy on waste management as set out in the 2013 Blueprint; and
- (b) explore ways to encourage the community to enhance waste prevention, reuse, recycling and recovery, instead of disposing of waste at landfills.

**Environmental Protection Department:
Organisation chart (extract)
(30 June 2015)**



Source: EPD records

**Chronology of key events of the IWWMF development
(1998 to 2015)**

Year	Event
1998	The EPD planned to commission a waste-to-energy facility (renamed IWWMF since 2005) in 2006.
1999	The Chief Executive of the Hong Kong Special Administrative Region announced the Government's plan to consult the community on building the waste-to-energy facility.
2000	The EPD carried out an 18-month feasibility study for the waste-to-energy facility and revised its plan to commission the facility in 2007.
2001	Representatives of the Advisory Council on the Environment and the Government conducted study visits to waste-treatment facilities in the United Kingdom, Norway, France and Netherlands.
2002	The Advisory Group on Waste Management Facilities (WMF Advisory Group – Note) was formed to advise the Government on the selection of waste treatment technologies. The EPD planned to commence consultation in 2003 and commission the facility in 2012.
2003	The EPD carried out another study for the facility.
2004	The WMF Advisory Group members visited waste-treatment facilities in Japan and Korea. The Council for Sustainable Development carried out stakeholder's engagement processes with a view to formulating an initial sustainable development strategy for the waste-to-energy facility.
2005	The WMF Advisory Group recommended adopting the multi-technology approach (incineration as the core treatment technology) for the IWWMF. The Council for Sustainable Development reported the results of the IWWMF public engagement process. The EPD planned to commission the IWWMF in mid-2010s.
2006	The Advisory Council on the Environment held an open forum to discuss and exchange views with stakeholders and the public. The Advisory Council on the Environment members, LegCo Members and some government officials visited some waste treatment facilities in the Netherlands, Germany, Japan, Denmark and Finland. The EPD commenced a site search for the IWWMF.

Note: *The Advisory Group was chaired by the former Permanent Secretary for the Environment, Transport and Works (Environment) and comprised non-official members from professional bodies, academics, green groups and business sectors.*

Appendix B
(Cont'd)
(para. 5.10 refers)

Year	Event
2007	The EPD planned to commission the IWMF by around late 2016 or early 2017.
2008	The capacity of IWMF Phase 1 was proposed to be 1,095,000 tonnes a year. After site search studies, two sites at Shek Kwu Chau and Tuen Mun Tsang Tsui Ash Lagoons were identified as the potential sites for developing IWMF Phase 1. The EPD commissioned a consultant to carry out the engineering investigation and environmental studies for the two potential sites for IWMF Phase 1.
2009	The Advisory Council on the Environment endorsed the technology adopted (incineration as the core technology). EPD staff and members of the Tuen Mun and Islands District Councils conducted a study visit to Tokyo and Osaka to study the use of the advanced incineration technology for waste and sludge treatment in Japan.
2010	The Chief Executive of the Hong Kong Special Administrative Region visited some advanced waste-treatment facilities in Tokyo.
2011	The engineering investigation and environmental studies for the two potential sites for IWMF Phase 1 were completed. The Government identified a preferred option to develop an artificial island near Shek Kwu Chau for building IWMF Phase 1. The EPD planned to commission the IWMF before or by 2018. The EPD informed the Islands District Council of and gazetted the amended zoning plans.
2012	The Director of Environmental Protection approved the environmental impact assessment report and issued an environmental permit for the IWMF project. A judicial review application relating to the environmental impact assessment report was filed at the court.
2013	The court dismissed the judicial review application. The applicant filed a Notice of Appeal against the judgement. Islands District Council members conducted two visits to the refuse incineration plant in Macao.
2014	Some LegCo Members and government officials visited incinerators in Europe. The Court of Appeal dismissed the judicial review appeal. The applicant applied leave to appeal against the judgement.
2015	The FC approved funding of \$19,203.7 million for implementing the IWMF project, with target commissioning in 2022-23. The Court of Final Appeal granted leave for the judicial review appeal. The appeal hearing was scheduled for November 2015.

Source: EPD records

Acronyms and abbreviations

AFCD	Agriculture, Fisheries and Conservation Department
APE	Approved project estimate
Audit	Audit Commission
C&ED	Customs and Excise Department
C&I	Commercial and industrial
C&SD	Census and Statistics Department
EA Panel	Panel on Environmental Affairs
ENB	Environment Bureau
EPD	Environmental Protection Department
FC	Finance Committee
FEHD	Food and Environmental Hygiene Department
ha	hectare
IWMF	Integrated waste management facility
kg	kilogram
LCSD	Leisure and Cultural Services Department
LegCo	Legislative Council
m ²	square metre
m ³	cubic metre
MSW	Municipal solid waste
NENT	Northeast New Territories
NGO	Non-governmental organisation
OWTF	Organic waste treatment facility
PAC	Public Accounts Committee
PR scheme	Producer responsibility scheme
PSB	Plastic shopping bag
SENT	Southeast New Territories
SS Programme	Source-separation Programme
STT	Short-term tenancy
WEEE	Waste electrical and electronic equipment
WENT	West New Territories
WMF Advisory Group	Advisory Group on Waste Management Facilities
WS bin	Waste-separation bin