

INSTITUTION OF MECHANICAL ENGINEERS HONG KONG BRANCH  
EVEING LECTURE “TRAIL PROGRAMME ON MUNICIPAL SOLID WASTE  
CHARGING IN HONG KONG” ON 9/4/2018



*Ir Kenny Wong, Deputy General Manager of Hong Kong Productivity Council delivered the lecture in PolyU on 9/4/2018 [David Law]*

### **Waste Reality**

Currently, Hong Kong disposes of over 15,500 tonnes of solid waste daily, and the territory generates more domestic waste per capita per day than its neighbouring cities. For instance, comparing with Metro Tokyo, Seoul City and Taipei City which dispose of 0.77, 0.95 and 1.00 kg of domestic waste per capita per day respectively, Hong Kong disposes of 1.41 kg per capita per day. In parallel, out of 5.7 million tonnes of solid waste disposed of in 2016, which was equivalent to about 15,332 tonnes per day (tpd), the municipal solid waste (MSW) was 10,345 tpd, or about 67 % of the total. 34 %, or 1.9 million tonnes, of the waste was recovered, while the remainder of 66 % was disposed of in the three (3) landfills. The recovery rate of 34 % was significantly lower than the nearby jurisdictions of Hong Kong, such as Taipei which achieved

over 60 % of recovery. Hong Kong is still at the low level of recycling in comparison to the municipals nearby. Particularly food waste is one of the major sources of MSW.

The shorter design life of the portable personal electronic devices, such as mobile phone, has caused the residents of Hong Kong to change their devices more frequently and disposed of their obsolete ones more frequently. The speed textile products, facilitated by the powerful on-line shopping platforms, have encouraged people to buy and dispose of clothing in shorter interval of time. In addition, the waste generated by the high turn-over of tourists in Hong Kong has counted into the local capita, resulting in the relatively high waste disposal rate of 1.41 kg per capita per day. The tourist factor is even more significant to Macau which, notwithstanding its much smaller population than Hong Kong, MSW disposal per capita reaches 2 kg per capita per day.

### **Government Efforts**

Assumed Secretary for the Environment in 2012, Mr. Kam-Sing Wong directed the publication of the waste management policies in 2013 and 2014, namely “Blueprint for Sustainable Use of Resources” and “Food Waste and Yard Waste Plan” respectively, setting the target of reducing the waste generated per capita per day to 0.8 kg by 2022. Dropping the 2016 level of 1.41 kg per person per day (kg/person/day) to 0.8 kg/person/day in 2022 represented 40 % reduction within six (6) years. It is an ambitious target and no single policy and solution can be the silver bullet.

To achieve the target, the government has set three (3) key actions, namely:-

- i) Invest in waste treatment infrastructure, including Organic Waste Treatment Facilities, which is now termed Organic Resources Recovery Centre (ORRC), waste-to-energy MSW treatment and the extension of the existing landfills, etc.;
- ii) Mobilise the community through targeted campaigns, such as “Big Waster” and the “three colour recycling bins”; and
- iii) Drive behavioural change through policies and legislation to reduce waste, such as MSW charging and Producer Responsibility Scheme (PRS).

### *Waste Infrastructure*

The waste treatment infrastructure is tabled as below:-

Infrastructure	Capacity	Remark(s)
<ul style="list-style-type: none"> <li>• West Territories New Landfill</li> <li>• North Territories New Landfill</li> <li>• South Territories New Landfill</li> </ul>	<ul style="list-style-type: none"> <li>• 61 million m<sup>3</sup>, 110 ha</li> <li>• 35 million m<sup>3</sup>, 61 ha</li> <li>• 43 million m<sup>3</sup>, 100 ha</li> </ul>	-

EcoPark / WEEE Park	12 ha for recycling trade	Waste Electrical and Electronic Equipment Treatment and Recycling Facility (WEEE Park) processes the following wastes:- <ul style="list-style-type: none"> <li>• Refrigerators and Freezers</li> <li>• Television sets</li> <li>• Washing machines</li> <li>• Air-conditioning units</li> <li>• Computer and computing appliances</li> </ul>
T-Park	-	Reduce the volume of sludge, generated by the sewage treatment plants, by 90 % before disposal of at landfill
Integrated Waste Management Facilities	3,000 tpd	Reduce the MSW volume by 90 % before disposal of at landfill
ORRC (phase 1)	200 tpd	Process principally food wastes

Besides, the operations of the local recycling industry are primitive and, to facilitate the upgrade of the capability and productivity of the industry, the government established Recycling Fund in 2014. Endowed with HK\$1 billion, the eligible recycling enterprises and non-profit organisations may be granted maximum subsidy of HK\$5 million and HK\$15 million respectively. Such amount can be considered high for a single subsidy provided by the government.

Currently, MSW of over 5.5 million populations is collected at the location of waste generation. MSW from public and private residential estates, new single block residential buildings, government and institutional buildings is first centrally collected by their respective property management office (PMO). Food and Environmental Hygiene Department of the government (FEHD) or its contractor takes MSW from PMO for disposal. Alternatively, commercial and industrial (C&I) buildings, some residential estates and some new single block residential buildings have their MSW centrally collected by PMO whereas disposed of by the private waste collectors.

However, less than 1.5 million populations residing in village houses and old single block buildings and some C&I rely on FEHD 2,000 refuse collection points for the collection of their waste. Either their PMO or self-employed individual refuse collectors collect their waste and gather it in the refuse collection points. FEHD or its contractor picks-up the waste from the refuse collection points and disposes of it in the landfill.

#### *Producer Responsibility Scheme*

PRS, enshrining the principle of “polluter pays” and the element of “eco-responsibility”, requires manufacturers, importers, wholesalers, retailers and consumers to share the responsibility for the collection, recycling, treatment and disposal of end-of-life products with a view to avoiding and reducing the

environmental impacts caused by such products at the post-consumer stage [*Environmental Protection Department website*]. The environmental levy scheme on plastic shopping bags is the first PRS which, by imposing on the consumers a mandatory charge, incentivises the reduced use of plastic shopping bags by economic means. The minimum yet nominal charge of HK\$0.50 per plastic bag issued by the retailer has successfully changed the general public behaviour of heavy reliance on plastic bags and has substantially cut the plastic bag consumption.

Notwithstanding the triumph on plastic shopping bags, PRS on other products is less successful. The government set the legislation target of PRS on the following products and the result is tabled as follows:-

Product	Target of Completing Legislation	Legislature
Electrical and electronic equipment	2007	Bill approved in 2016
Vehicle tyres	2007	Bill not put up
Plastic shopping bags	2007	First phase in 2009 Second phase in 2018
Packaging materials	2008	Bill not put up
Beverage containers	2008	Glass only approved in 2016
Rechargeable batteries	2009	Bill not put up

### **Waste Charging and Behavioural Change**

After two (2) territory-scale public consultation in 2012 and 2014, executing MSW charging has been on the government agenda.

Charging the public for MSW disposal is not a new creation. In Guangzhou in the mainland China, a flat rate is chargeable to every household for refuse collection. The purpose is to recover part of the costs of waste treatment. In Hong Kong, conversely, the quantity-based charging system, which directly links between charge and quantity of waste requiring treatment or disposal, is actively explored to incentivise the eventual change in behaviour in MSW disposal.

There are two (2) modes to implement quantity-based charging, namely weight-based and volume-based. The former mode characters identifying the MSW producer and charging him the MSW he disposes of by weight. This is possible with the radio frequency identification (RFID) technology, whereby the refuse truck recognises the owner of the refuse skips and measures the waste mass upon collection that were being practised in other countries. The latter mode relies upon the collection of only designated refuse bags which are charged by their volume.

In fact, Hong Kong already possesses experience in waste charging through gate fee system. The weight-based charging scheme on construction waste since 2005 has reduced the daily construction waste disposal by 50 %.

Weight-based charging scheme is implementable where the waste producer is a single entity. On the contrary, for the multi-storey and multi-tenant buildings the weight-based approach is very difficult to administer. Volume-based charging scheme is a

solution for domestic waste. The charge is proportional to the volume of disposal. Taipei City has implemented volume-based MSW charging and, with the elimination of 95 % of the street-side bins and stringent collection of only designated bag-carried waste, the daily MSW disposal reduced by 40 % in 10 years.

### **Scheme for Hong Kong**

The Taipei City case demonstrates that charging MSW is effective to drive waste reduction and, to suit the extraordinarily high population density and the diverse method of MSW collection, Hong Kong is exploring a dual weight-based and volume-based MSW charging scheme.

In principle, all the households will be charged for the disposal of their domestic waste by volume. They will have to buy the designated refuse bags and pay according to the bag volume. The higher the bag volume, the higher the price they pay. With the latest legislative proposal, the principle cost is HK\$0.11 per litre and the maximum caps at HK\$11 for the large bag of 100 litres and also for over-sized waste items. It is estimated that a normal household will bear several tens of dollars every month for the volume of MSW of which it disposes.

Consideration has been given to the underprivileged residents who are financially sensitive to prices and expenses. Several tens of dollars may be burdensome for them to pay every month additionally and, to relief their financial pressure due to pay for waste disposal, it is suggested to grant them allowance in the similar amount. An advantage over offer them free waste disposal quota is that they may be financially incentivised to reduce waste. The difference between the allowance and the cost of the designated refuse bags will be their surplus at their disposal.

For some C&I premises, their waste is processed by compactor to reduce the volume prior to disposal. Charging them by volume may not be the best method; thus the weight-based scheme will be applicable to them. Same as the existing arrangement, they will charter private waste collectors to take away their waste and their waste will be subject to a gate-fee at the rate of HK\$365 to HK\$395 per tonne.

### **Concept Trail**

A trail programme has been implemented to test the effectiveness of MSW charging in achieving waste reduction. Over 60 % of all the retail and food and beverages (F&B) outlets in CityPlaza of Swire Properties, as well as the office block CityPlaza One and the adjacent hotel EAST, Hong Kong, participated in the trail championed by Hong Kong Productivity Council (HKPC) in the following order:-

Premises	Business	Number of Participants
CityPlaza	Retail	82
	F&B	23
CityPlaza One	Office	26
EAST, Hong Kong	Hotel	6
	Total	137

The participants, zoned by their business and premises, had their waste measured by either weight or volume, in terms of number of bags of waste collected and the fullness of each bag. The weights measured and the participants identified were logged using RFID and stored in Cloud data-base. The information collected, either from weight or volume, was used generate a waste report and a mock invoice, which contained the amount of waste disposed and the amount of money liable to pay should the waste charging scheme be effective. The mock invoice was found helpful for the participants to understand the cost impact of waste to their business and quantify the financial benefit of reducing waste.



*The speaker, Ir. Kenny Wong, received the appreciation from Mr. Raymond To, Convener of Education of IMechE-HKB Activity Sub-Committee*

The trail recorded 18 % of waste reduction achieved with no additional cost incurred. Around 70 % of the participants achieved moderate or significant reduction of waste disposal, and improved their recycling of papers, plastics, metals (including moon-cake boxes), food waste, glass bottles, used cooking oil, printer cartridges, styrofoam, and tooth brushes (from the hotel). These resulted in the total recycling increased by 15 %, and specifically food waste recycling 30 % more.

Around 60 % of the participants opined that the trail assisted them to achieve waste reduction and recycling; yet 70 % of the participants responded that no additional waste reduction and recycling plan would be implemented. The primary reasons were the waste reduction and recycling habit had been embedded in their business and the implementation of any additional plan would be decided by their head office. Moreover, about 70 % of the participants were willing to extend their practice of waste reduction and recycling beyond the trail, and all agreed that the monthly report was clear and easy to understand. About 60 % of the participants preferred volume-based charging method, which 88 % opined that the method was convenient, economical and easy to

measure.

Following the successful trail on retail, F&B, office and hotel, HKPC is exploring the trail on wet market.

### **Remarks**

The continuous growth of MSW is unsustainable to Hong Kong and charging the MSW disposal, in addition to the investment in the waste processing infrastructure and PRS, will be implemented to incentivise the entire society to reduce waste disposal and increase recycling. Both weight-based and volume-based modes will be available for charging MSW disposal. Domestic waste will be predominately charged by volume, by means of designated refuse bags charged by size. C&I waste will be

charged by both volume and weight based approached, depending on the waste handling equipment in the premises. The MSW charging trail in CityPlaza has demonstrated its effectiveness in achieving the objective. Hong Kong will embrace charging MSW, and its residents will adapt changes in their way of living and conducting business to minimise their own MSW disposal costs and the burden to the MSW process infrastructure.

IMechE-HKB thanks Ir Kenny Wong, Deputy General Manager of HKPC for his delivery of the evening lecture.

*Reference*

*Environmental Protection Department, Hong Kong,*  
[https://www.epd.gov.hk/epd/english/environmentinhk/waste/pro\\_responsibility/index.html](https://www.epd.gov.hk/epd/english/environmentinhk/waste/pro_responsibility/index.html)

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**IMechE Hong Kong Branch**  
Activity Sub-Committee  
Education and Training Group

## **TECHNICAL SEMINAR**

### **Trial programme on municipal solid waste charging in Hong Kong**

**Hong Kong Branch**

Institution of  
**MECHANICAL  
ENGINEERS**

**Date: 09 April 2018**  
**Time: 19:00 to 20:30**  
**Speaker : Ir. Kenny Wong**  
**Venue: HJ303, PolyU**

In 2016, the municipal solid waste (MSW) disposed in Hong Kong was around 3.8 million tonnes, which represented an increase of 1.8% as compared to 2015. The disposal rate was 1.41kg/person/day, which is much higher than our nearby cities, such as Taipei, Seoul, etc. This is obviously unsustainable. The Government is well aware of this unsatisfactory trend and determined to introduce quantity based MSW charging in Hong Kong after 2 rounds of tertiary wide consultations in 2012 & 2014 respectively. In fact this tool has been proven effective in other jurisdictions for inducing behavioural change of waste generators as well as suppressing further growth in solid waste disposal. Before the implementation of this rather complex charging scheme in Hong Kong, the speaker will briefly introduce the published charging scheme and share with the audience on the encouraging results of a recently completed trial programme in a mega sized shopping complex, hotel and office building.