

2009

Japan-East Asia Network
of Exchange for Students
and Youths Program
2009 (JENESYS)
Group 4

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[WASTE TREATMENT IN TOKYO AND HONG KONG]

& how Hong Kong could do better in dealing with trash

Preface

As many become more aware of environmental issues nowadays, the issue with solid waste is gaining more and more attention as a local environmental problem, especially in densely populated cities such as Hong Kong. With landfills soon reaching saturation, the answer to the simple question of “Where to dump the trash?” is now more wanted than ever in this pico-Special Administrative Region in which we dwell. The answer might lay in another metropolis somewhere 2800km away—Tokyo, the capital of Japan which is close to reaching its goal of diminishing final waste disposal amounts to 1.6 million tons per year by 2010, that translates into a 35% reduction compared to year 2004.

Tokyo & Hong Kong—similar cities with common environmental issues

In terms of the economy, Hong Kong is, of course, barely comparable to its Japanese counterpart with the world’s largest metropolitan economy of a total GDP of roughly \$1191 billion(USD) in 2005, where Hong Kong only came in at the 14th with a total GDP of around \$244 billion—only a-fifth of Tokyo’s. Though, as the GDPs of both cities rely mainly on global financial activity, neither of them reflects the amount of solid waste generated by either city. The populations of the 23 special wards i.e. the core area of Tokyo totaled around 8.7 million, while the population of Hong Kong is around 7 million, with both highly urbanized.

With such vast populations, it is to nobody’s surprise that the amounts of solid waste generated each year of both cities are colossal. In Hong Kong, around 5.67 million tons of waste was generated in fiscal 2004, whereas Tokyo (only the 23 special wards), with a population of significantly greater size, produced only 3.73 million tons¹ in the same year. And over the past few years, trash generation in Hong Kong has only gradually grown whilst that in Tokyo continued to decline. More astonishingly, only around 870,000 tons of trash (treated)—equivalent to 23% of the total amount, was disposed of as landfill in Tokyo, while 60% of the trash generated in Hong Kong, i.e. around 3.4 million tons, was landfilled. With rather similar amounts of non-recyclable trash generated each year (Tokyo: ~3.4 million tons, HK: ~3.4 million tons, in fiscal 2004, though the gap is widening with trash generation in Tokyo declining and that in HK increasing every year), the different methods of treatment resulted in great differences in the final disposal amount. Thus, following the example of Tokyo might be one of the best methods of extending the lifespan of the landfills in Hong Kong.

¹ The most recent accessible complete statistics regarding trash generation (with the amount of recyclable waste)

Waste Treatment—in Tokyo (the 23 special wards, or “cities”)

Current Situation

Unlike Hong Kong, trash in Tokyo is divided into 4 major categories, namely

- Recyclable waste (e.g. used paper, glass bottles, cans, PET Bottles)
- Combustible waste (e.g. Kitchen refuse, wood and grass, waste paper)
- Non-combustible waste (e.g. Ceramics, metals, chinaware)
- Bulky waste (e.g. Furniture, futons, electronic waste, where treatment charges apply)

Which are mainly collected by government operated trash collecting services, where recyclable waste is collected once a week, combustible waste twice, and non-combustible waste once, while bulky waste is collected upon reservation. Combustible trash is also collected via “Pipeline Collection”, a collecting method that consists of transport tubes that transports trash from homes/offices to the incineration plants, which is currently employed at the waterfront area involving the Ariake Incineration Plant as an experimental scheme for the Super Eco-town Project that aims to transform Tokyo into a green city of low pollution, low waste generation/disposal.

Treatment for different types of waste

Recyclable waste, either domestic or construction, is recycled at high rates: 72% for paper, 99% for concrete, 80% for wood (as of 2006), thus is usually not included into consideration with the other 3 types waste (as the amount not recycled is rather insignificant).

Incombustible waste is first treated at specific processing centers before being sent to special incineration plants for incombustible waste, then to landfills.

After collection, bulky waste is pulverized, then according to nature, separated, and either

- sold as resource
- sent to landfills
- incinerated before being dumped at landfills

Note that air-conditioners, televisions, fridges, washing machines, along with computers are no longer treated as bulky waste but instead, recycled.

Treatment for combustible waste, however, is not as straightforward. After combustible waste is collected, it is weighed before being stored inside the refuse bunker of the incineration plants. The weighed waste is then churned with a refuse crane to diminish the negative effects of the different sizes and moisture of the waste on the incineration process. Afterwards the waste is transferred to the incinerator as fuel, which burns continually 24 hours a day, 7 days a week at 800 degrees Celsius to prevent the emission of toxic substances. It should be noted that the incinerator does not require any fuel other than trash after the initial incineration, which requires natural gas as fuel. The ash from incineration is then melted into slag at 1200 degrees Celsius, which decomposes the dioxins in the ash and traps in the heavy metals in the ash. The exhaust gas from the incinerator is then processed, removing any soot, dust, dioxin, mercury, hydrogen chloride, sulfur dioxide and nitrogen oxides utilizing common scrubbing and filtering technologies.



Figure 1 Refuse crane

While some of the incinerator ash is melted into slag, older incineration plants are not capable of such, thus landfills are still required for disposing of incinerator ash from 15 of the 22 incineration plants.

Benefits of incineration

The slag produced from incineration has properties that resemble sand, which renders it a fine substitute for sand that can be used widely as a civil/construction material. Currently slag is mainly used as backfilling, pavement material or skeletal material for concrete. It can also be used to produce various daily products such as shoes or clothing.



Figure 2 Shoe made from slag

The heat from incineration is used for generating electricity, which can be used for powering the facility, or sold to power companies which in turn sells the electricity to average households/commercial buildings. The heat is also used to produce “High-temperature water”, i.e. pressurized and heated water, which is either sold to heat supplying companies that provides heat to average households/commercial buildings, or used to heat swimming pools or tropical botanical gardens. In fiscal 2006, the total amount of electricity sold by all 22 incineration plants in the 23 cities of Tokyo was 373.55 million kWh, which translates into 3.14 billion yen of revenue.

Future Aims and Plans

“Tokyo Super Eco Town”--The Tokyo Metropolitan Government (TMG) has been proceeding with the development of waste treatment and recycling facilities utilizing TMG owned land in the city’s waterfront area. As one of the central government’s Urban Renaissance projects, this aims to propel Tokyo’s transformation into a recycling based society by resolving the issue of waste in the Greater Tokyo Area and providing locations for environmental industries.

In essence, this project involves the construction of multiple incineration and recycling facilities of greater capacity and better functionality. Aside from gasification plants which are able to reduce trash by plasma melting, a means similar to incineration yet only more efficient and produces much less emissions, the project also involves a PCB waste treatment plant, a biogas (from food waste) power plant, and several recycling plants.

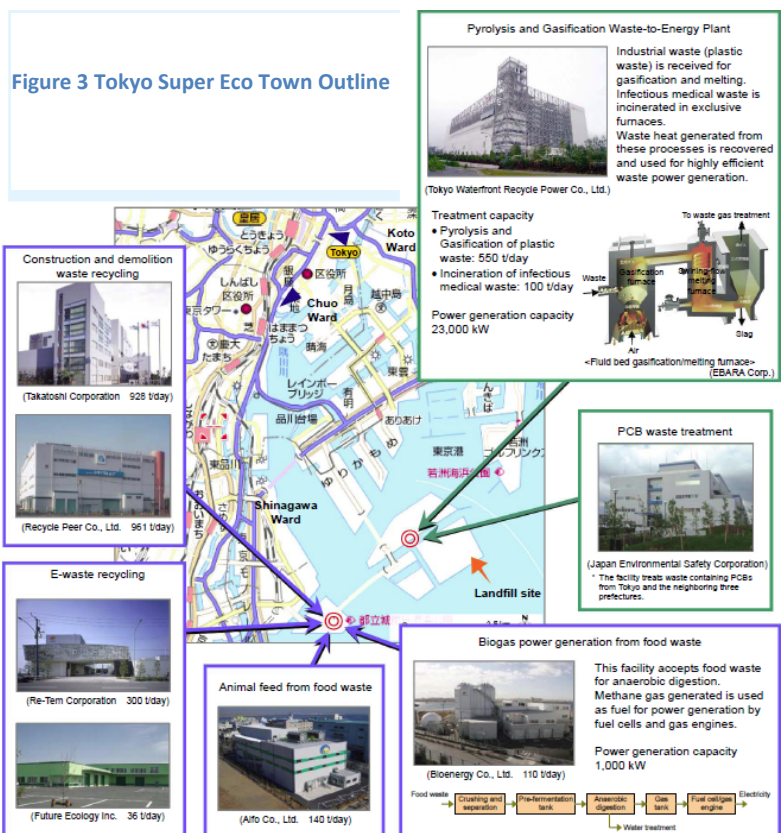


Figure 3 Tokyo Super Eco Town Outline

Waste Treatment—in Hong Kong

Current Situation

Recycling rates in Hong Kong have been greatly improved in the past decade and the total recycling rate has reached 45% in fiscal 2007—5% increase compared to 2004, mainly due to the categorizing of paper, plastic bottles and aluminum cans as recyclable trash and the introduction of several recycling programs. The revenue, for the government, of exporting recyclable trash, is also quite hefty, which totals HKD\$7.4 billion.

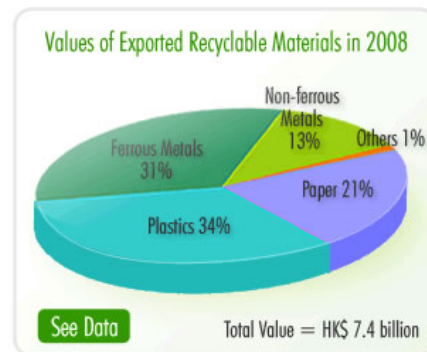


Chart 1 Values of Exported Recyclable Materials in 2008

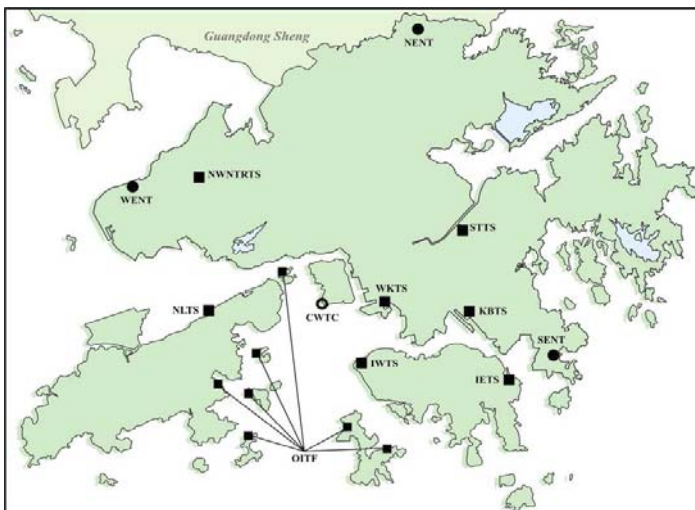


Figure 4 Locations of Waste Treatment Facilities

However, without further sorting after collection, trash not dumped in recycling bins or sent to recycling centers are virtually transported straight to the either 1 of the 7 refuse transfer centers (RTS[■]), which are then ‘transferred’ to either one of the 3 landfills(●), namely North East New Territories Landfill (NENT), South East New Territories Landfill (SENT), West New Territories (WENT).

As of fiscal 2007, a total of 6.25 million tons of waste was generated in Hong Kong, where 3.44 tons (i.e. 55%) was landfilled, with the major component comprising 39.4% of the

total amount being putrescibles (waste which could decay, e.g. kitchen waste, wasted food).

Future Aims and Plans

Although 45% of the total waste generated are recycled or exported for recycling, the 3 landfills will be fully exhausted one by one during the period from early to mid 2010s. There is a pressing need to further reduce the generation of waste and cut down the amount of waste we send to the landfills. The Government has published the “A Policy Framework for the Management of Municipal Solid Waste (2005-2014) in December 2005 for tackling this issue.

This Policy Framework sets out a comprehensive strategy aiming to to achieving the following targets

1. To reduce the amount of municipal solid waste (MSW) generated in Hong Kong by 1% per annum up to the year 2014.
2. To increase the overall recovery rate of MSW to 45% by 2009 and 50% by 2014.
3. To reduce the total MSW disposed of in landfills to less than 25% by 2014.

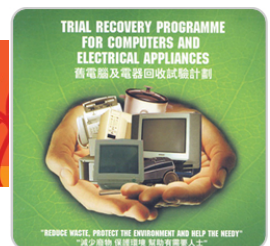
Suggestions for Hong Kong in the treatment of wastes

Obviously, Tokyo is ahead of Hong Kong both in terms of both source waste reduction and efficiency of waste processing. And without the luxury of processing and disposing of industrial trash outside the city, Hong Kong's landfills will be saturated significantly sooner than their Tokyo counterparts, as soon as in the mid 2010's. The issue with trash must be addressed as soon as possible. Following are a few suggestions based on our observations on the current situation and technological capabilities of Hong Kong, and what we have learned during and after our stay in Japan.

Short term suggestions

1. Promotion and extension of existing recycling programs

A practical method with comparatively the lowest cost would be to promote and extend the existing recycling programs aside from the recycling of bottles, aluminum cans and paper. The Hong Kong government has established multiple recycling programs to aid the reduction of trash, which includes the Fluorescent Lamp Recycling Program, the Computer Recycling Program, the Rechargeable Battery Recycling Program and the Waste Electrical and Electronic Equipment Recycling Program, that few Hong Kongers make good use of given that the recycling rates of trash belonging to the above categories remain low after the introduction of these programs. The government could take more of the earnings originated from exports of recyclable trash to promote these existing programs to the masses, as well as to establish more collecting centers so that participating in the programs will be more convenient for the public—who would bother to carry a load of unwanted electrical appliances to 1 of the 4 collecting centers when none is local? Recycling rates will most probably increase with better promotion of the existing programs, and most importantly, with more accessible collecting centers.



2. Establishment of incinerators

With the advancement of technology, incinerators nowadays are satisfyingly reliable. It is quite unreasonable for the citizens to reject the establishment of these incinerators. The Government should consult and explain to the citizen the advantages of building incinerator. It is believed that the establishment of incinerators could effectively solve the landfill shortage problem in Hong Kong. Apart from that, many useful materials could be produced from incineration of solid waste. For instance, construction materials, plastics paper etc. More importantly, the electricity produced from incineration can alleviate Hong Kong's dependence on fossil fuels for electricity generation.



3. Encourage the development of recycling industry

To facilitate the recycle process of general citizens, the Government should allocate more resources to districts to set up more recycling centers. By doing so, not only more job opportunities could be provided, citizens would find it more convenient to recycle different items. As we all know, the recycling bins in estates are just inefficient and the variety of items to be collected is just not enough. Electrical appliances, used batteries, CDs and other computer components could be collected more efficiently in those centers.



The development of environmental protection groups should also be encouraged. These groups play important roles in conservation as they permeate in society and often ask for business support. When more people are participating in these activities, the environmental awareness of general public would increase. However, the Government should monitor the industry attentively to ensure the legal operation of the recycling centers.

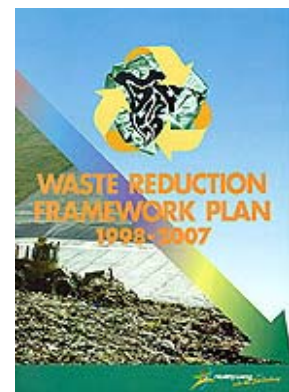


Long term suggestions

1. Education

In the long run, education is an imperative way to tackle the environmental problems. Through education, we can foster our next generation to be environmentally concerned. They would have a higher environmental consciousness and would actively protect our precious planet. To achieve this goal, the Government should consider the compulsory education of environmental conservancy as an essential subject taught in primary and secondary schools. Only when the students realize the adverse situation that we are facing, would they take the initiative to protect our environment.

There are many environmental protection museums in Japan which increase the environmental consciousness of students and general public. Hong Kong could consider the feasibility of establishing such museums.



2. City Planning

On the other hand, the Government should have a better city planning in which solid waste and sewage can be transferred to incineration plants and sewage treatment plants respectively through well-established underground pipe networks efficiently.

References

Gross Domestic Product (GDP) of Tokyo & Hong Kong

"GDP (most recent) by country." NationMaster - World Statistics, Country Comparisons. Web. 27 Aug. 2009. <http://www.nationmaster.com/graph/eco_gdp-economy-gdp-nominal>.

Data on waste generation & waste treatment in Tokyo

"Waste Management in Tokyo." Waste Management in Tokyo. Bureau of Environment, Tokyo Metropolitan Government. Web. 26 Aug. 2009. <<http://www.kankyo.metro.tokyo.jp/kouhou/english/pdf/Waste%20Management.pdf>>.

Information on Tokyo's "Super Eco Town Project"

"Tokyo Super Eco Town Project Outline". Bureau of Environment, Tokyo Metropolitan Government. Web. 27 Aug. 2009. <<http://www2.kankyo.metro.tokyo.jp/recycle/superecotown/outline.pdf>>.

Waste Recycling Statistics in Hong Kong

"Waste Recycling Statistics." Environmental Protection Department, Hong Kong Special Administrative Region (HKSAR) Government. Web. 26 Sept. 2009. <https://www.wastereduction.gov.hk/en/quickaccess/stat_recycle.htm>.

Waste Disposal Statistics in Hong Kong, and Information on the landfills of Hong Kong

Waste Disposal Statistics. Environmental Protection Department, Hong Kong Special Administrative Region (HKSAR) Government. Web. 26 Aug. 2009. <https://www.wastereduction.gov.hk/en/assistancewizard/waste_red_sat.htm>.

Waste Reduction Plans of the government of Hong Kong

"Policy Framework for the Management of Municipal Solid Waste (MSW) (2005-2014)." Environmental Protection Department, Hong Kong Special Administrative Region (HKSAR) Government. Web. 27 Aug. 2009. <http://www.epd.gov.hk/epd/msw/htm_en/content.htm>.

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