




IWMF : A Sustainable Solution for MSW Management Problem for Hong Kong ???

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為處理廢物作好妥善安排 Key milestones for waste management

今日 Today	2015	2016/18
<ul style="list-style-type: none"> 回收率：49% Recovery rate at 49% 回收設施覆蓋人口80% Recycling facilities cover 80% of population 膠袋徵費第一期業已實施 Plastic shopping bag levy Phase I in place 	<ul style="list-style-type: none"> 回收率：55% Recovery rate at 55% 生產者責任計劃陸續實施 Other PRS kicks in 污泥處理設施啓用 (2013) Sludge treatment facility in operation 第一期有機資源回收中心啓用 Phase I of OWTF in operation 	<ul style="list-style-type: none"> 回收率：假設不變 Recovery rate assumed unchanged 生產者責任計劃陸續實施 Other PRS continues to be implemented 第一期綜合廢物管理設施啓用 Phase I of IWMF in operation 第二期有機資源回收中心啓用 Phase II of OWTF in operation
 每日堆填： 13,300公噸 (tonnes / day landfilled)	 每日堆填： 11,500公噸 (tonnes / day landfilled)	 每日堆填： 8,500公噸 (tonnes / day landfilled)

Source :ENB

都市固體廢物 Municipal Solid Waste

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 每日堆填： 9,000公噸 (tonnes / day landfilled)	 每日堆填： 8,000公噸 (tonnes / day landfilled)	 每日堆填： 5,000公噸 (tonnes / day landfilled)

Adapted from ENB

Recycling Rate : 49% → 55%

Additional 1000t recycling/day

- How ????????

- OWTF (200t from C&I sources)

Plate 2.8 Composition of municipal solid waste in 2009

Composition	Average daily quantity (tpd) and percentage by weight				
	Domestic waste	Commercial waste	Industrial waste	Commercial & industrial waste	Municipal solid waste
	(a)	(b)	(c)	(d)=(b)+(c)	(e)=(a)+(d)
Glass	213 (3.5%)	94 (4.1%)	14 (2.2%)	108 (3.7%)	321 (3.6%)
Metals	95 (1.6%)	45 (1.9%)	30 (4.7%)	74 (2.5%)	169 (1.9%)
Paper	1,471 (24.5%)	545 (23.5%)	48 (7.6%)	592 (20.1%)	2,064 (23.0%)
Plastics	1,123 (18.7%)	475 (20.5%)	107 (17.0%)	581 (19.7%)	1,705 (19.0%)
Putrescibles	2,671 (44.4%)	987 (42.6%)	57 (9.1%)	1,044 (35.4%)	3,715 (41.4%)
Textiles	180 (3.0%)	48 (2.0%)	25 (4.0%)	73 (2.5%)	253 (2.8%)
Wood/Rattan	81 (1.3%)	26 (1.1%)	219 (34.9%)	245 (8.3%)	326 (3.6%)
Household hazardous wastes (HHWs) ⁽¹⁾	68 (1.1%)	17 (0.7%)	11 (1.7%)	28 (1.0%)	96 (1.1%)
Others ⁽²⁾	113 (1.9%)	83 (3.6%)	118 (18.8%)	201 (6.8%)	314 (3.5%)
Sub-total	6,015 (100%)	2,319 (100%)	629 (100%)	2,948 (100%)	8,963 (100%)

Remark: Figures denote quantities and percentages by wet weight, they may not add up to total due to rounding off.

Source : EPD

Plate 2.9 Composition of municipal solid waste in 2009– Breakdown of major components

Composition	Domestic waste		Commercial & industrial waste	
	Quantity (tpd)	% by weight	Quantity (tpd)	% by weight
Glass				
~ Glass bottles	168	(2.8%)	87	(3.0%)
~ Other glass	45	(0.8%)	21	(0.7%)
(Glass) Sub-total	213	(3.5%)	108	(3.7%)
Metals				
~ Ferrous metals	69	(1.2%)	62	(2.1%)
~ Aluminium cans	16	(0.3%)	5	(0.2%)
~ Other non-ferrous metals	10	(0.2%)	7	(0.2%)
(Metals) Sub-total	95	(1.6%)	74	(2.5%)
Paper				
~ Cardboard	263	(4.4%)	139	(4.7%)
~ Newsprint	508	(8.4%)	76	(2.6%)
~ Office paper	80	(1.3%)	68	(2.3%)
~ Others ⁽¹⁾	612	(10.2%)	309	(10.5%)
(Paper) Sub-total	1,471	(24.5%)	592	(20.1%)
Plastics				
~ Plastic bags	484	(8.0%)	197	(6.7%)
~ Polyfoam - dining wares	33	(0.5%)	12	(0.4%)
~ Polyfoam - others	31	(0.5%)	16	(0.6%)
~ PET plastic bottles	58	(1.0%)	29	(1.0%)
~ Non-PET plastic bottles	53	(0.9%)	14	(0.5%)
~ Others ⁽²⁾	465	(7.7%)	313	(10.6%)
(Plastics) Sub-total	1,123	(18.7%)	581	(19.7%)
Putrescibles				
~ Food waste	2,316	(38.5%)	964	(32.7%)
~ Yard waste	57	(1.0%)	25	(0.9%)
~ Others ⁽³⁾	297	(4.9%)	54	(1.8%)
(Putrescibles) Sub-total	2,671	(44.4%)	1,044	(35.4%)

Remark: Figures denote quantities and percentages by wet weight, they may not add up to total due to rounding off.

Source : EPD

Composition of municipal solid waste

Composition	Tonne (%) 2007	Tonne (%) 2009
Bulky waste and other misc. waste	292 (3.1%)	314 (3.5%)
Glass	366 (3.9%)	321 (3.6%)
Metals	196 (2.1%)	169 (1.9%)
Paper	2,404 (25.5%)	2,064 (23%)
Plastics	1,717 (18.2%)	1705 (19%)
Putrescibles	3,713 (39.4%)	3,715 (41.4%)
Textiles	255 (2.7%)	253 (2.8%)
Wood / Rattan	384 (4.1%)	326 (3.6%)
Household hazardous wastes	100 (1.1%)	96 (1.1%)

Recovery Rates of Common Recyclable Materials in 2006 (source EPD)

Paper	53.0%
Ferrous Metals	92.1%
Non-Ferrous metals	87.8%
Plastics	53.0%
Textile/ clothes	14.6%
Glass	1.6%
Wood	10.1%
Rubber tyre	55.2%
Electrical and Electronic (E&E)	78.8%

- Putrescibles ????? (with OWTF in 2016) 13%

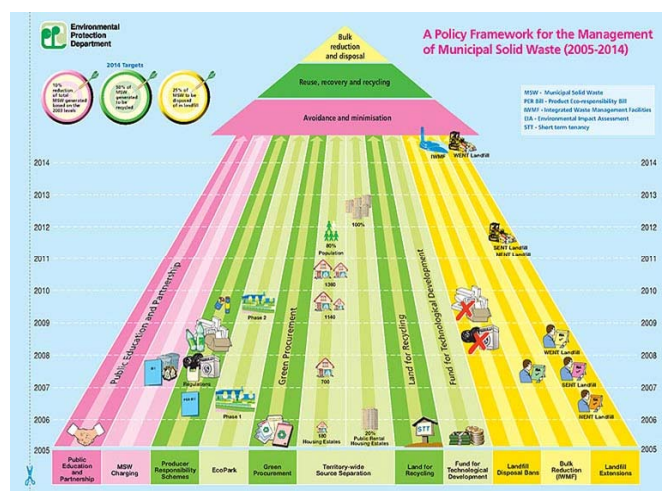
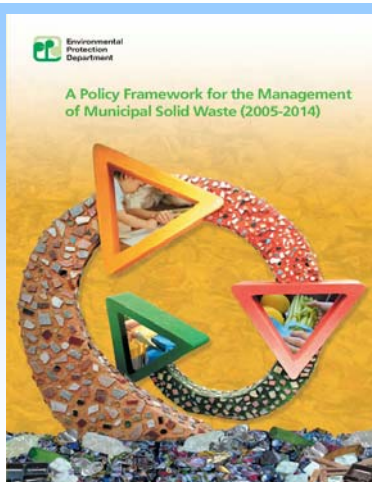
Recycling Rate :49% → 55% Additional 1000t recycling/day

- How ????????

1. OWTF (200t from C&I sources)
2. Other food waste sources
3. Glass
4. Packaging
5. Paper and Plastics

Tools

- Education
- Waste charges
- Product Responsibility Scheme (PRS)



PRS 2005 Policy Framework Targets

Products	Target Date
 Electrical and Electronic Equipment (EEE)	2007
 Vehicle tyres	2007
 Plastic shopping bags	2007
 Packaging materials	2008
 Beverage containers	2008
 Rechargeable batteries	2009

Source : EPD

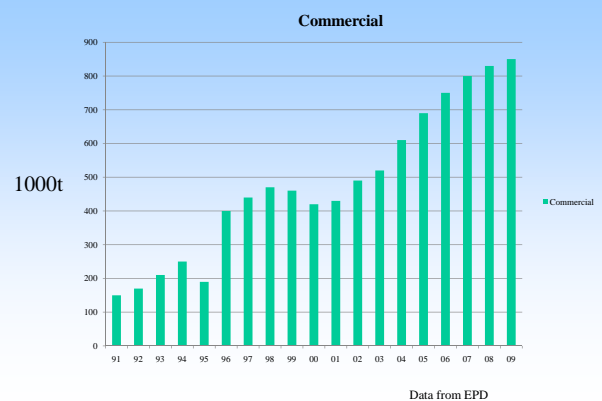
PRS for Waste Reduction Plastic Shopping Bag Levy Since July 2009



PRS for Waste Recycling

- Voluntary schemes on
 - rechargeable batteries,
 - WEEE,
 - glass containers,
 - Fluorescent lamp
- Without mandatory scheme, effectiveness is limited.

Commercial waste disposed of at landfills



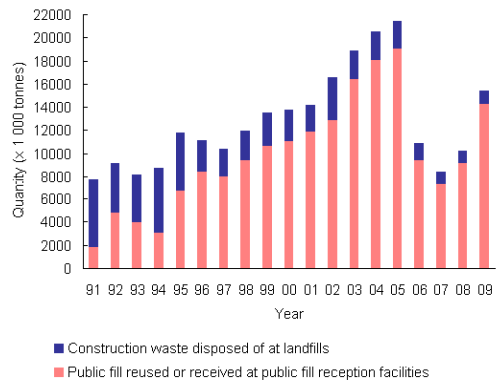
Charging for Waste Disposal

Charging scheme implemented for C&D waste since 2006

Currently no charge for MSW

2005 Policy Framework Target :
to introduce MSW charging by 2009

C&D Waste 1991-2009

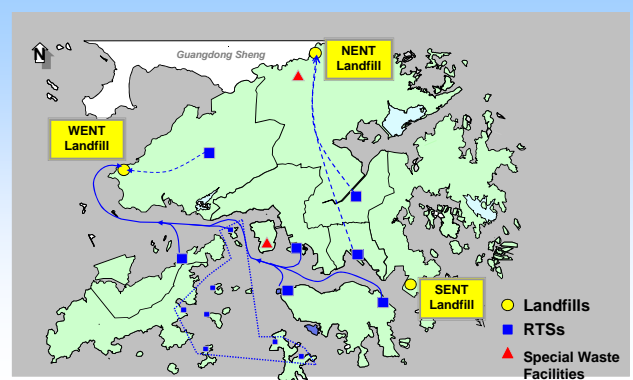


Source : EPD

Suggestion

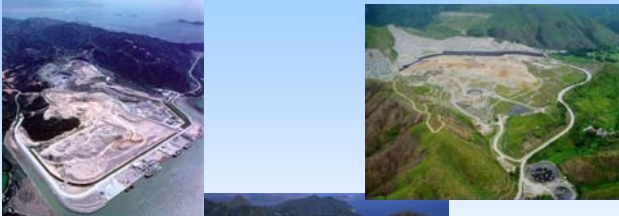
- Implement charges for MSW disposal ASAP.
- In necessary, charges for C&I waste first
- Implement PRS ASAP

Waste Management Infrastructure in Hong Kong



Source : EPD

3 Mega Landfills



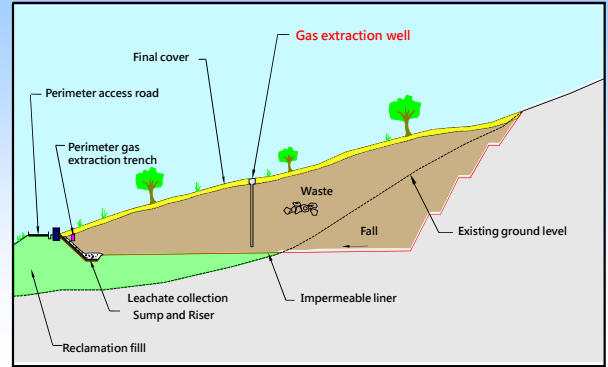
Nim Wan
稔灣

Tseung Kwan O
將軍澳

Ta Kwu Ling
打鼓嶺

Source : EPD

Typical Cross Section of SENT Landfill



Source : EPD

Problems with Landfills

- Require much land (HK landfill capacity will be exhausted in 2-6 years time)
- Aftercare of completed landfill sites >30 yrs
- Long-term liability (leachate and landfill gas)
- Odour, VOC
- Green-house gases (Global warming potential of landfill gas (mainly methane) is about 21xCO₂).



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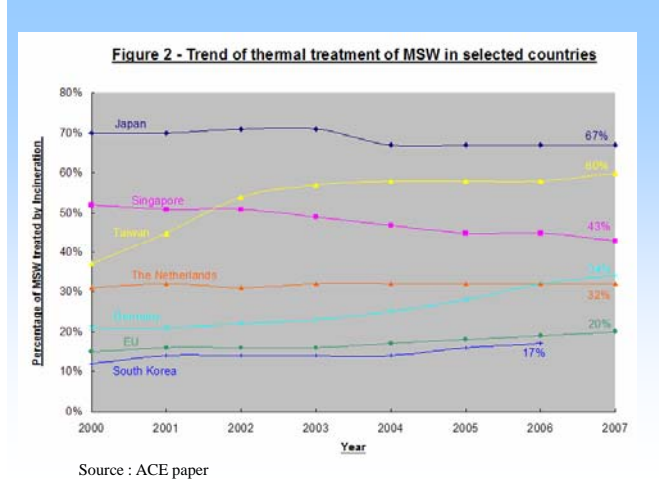
DEPARTMENT OF CIVIL & STRUCTURAL ENGINEERING



Source : EPD



WENT Extension : 200 ha;
total : 81Mm³ IWMF, 11 ha
1Mt/year



Use of Thermal Treatment for MSW (2007)

Japan	Taiwan	Singapore	The Netherlands	Germany
67%	60%	43%	32%	34%

Hong Kong: current 0%
After fist IWMF (2016/18) : 17%

Historic development of waste treatment in Hong Kong

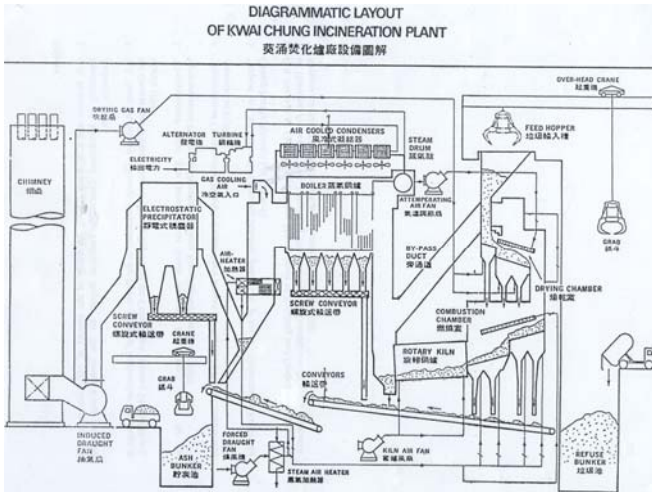
Closed Old-Generation Incinerators in Hong Kong 香港已關閉的舊式焚化爐

Lai Chi Kok
荔枝角
1,000 tpd
(1969 - 1990)

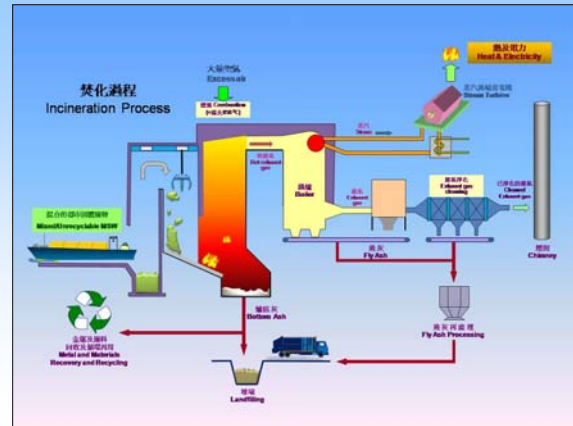
Kennedy Town
堅尼地城
650 tpd
(1967 - 1993)

Kwai Chung
葵涌
900 tpd
(1978 - 1997)

Source : EPD



Incineration Process

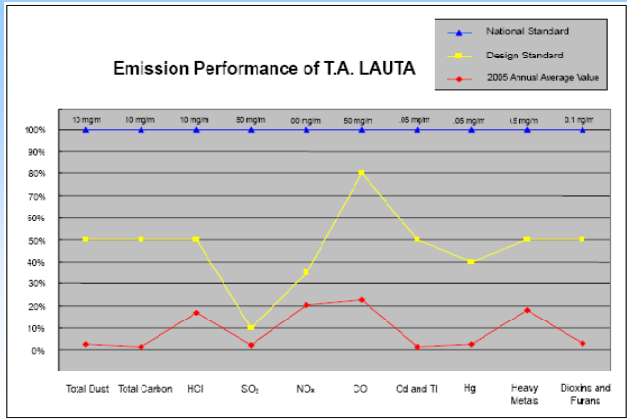


Air Pollution Control System

- Combustion controls (*high temperature*)
- Fully enclosed and *negative pressure* operation
- **Bag house** to remove soot, smoke and particulates
- **Lime scrubber** to neutralize acid gases
- **Selective catalytic reactor (SCR)** to convert nitrogen oxides to nitrogen
- **Activated carbon injection** to remove metals and dioxin

T.A. Lauta Incinerator (Ger)

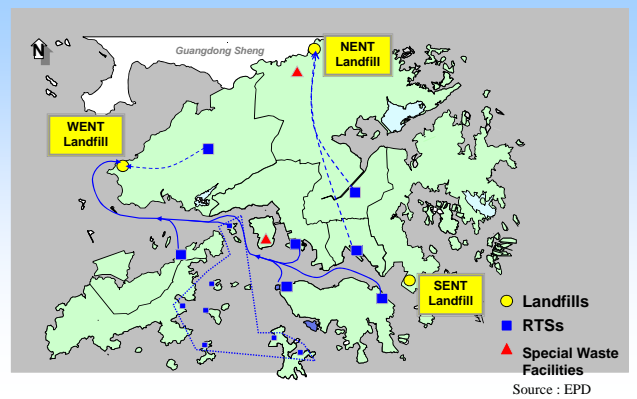




Incineration Process



Waste Management Infrastructure in Hong Kong





External Design is important



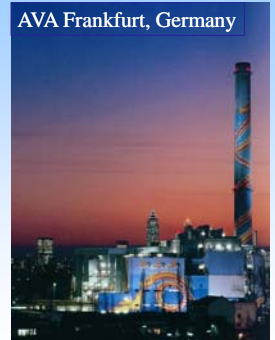
Overseas Incinerators



Ariake, Tokyo



Maishima, Osaka



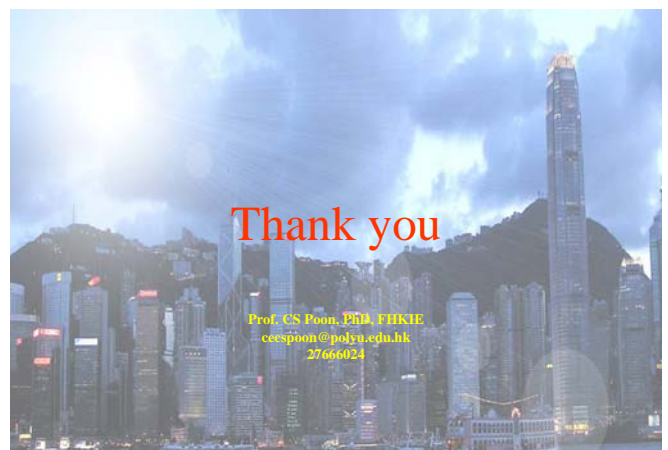
AVA Frankfurt, Germany

IWMF : A Sustainable Solution for MSW Management Problem for Hong Kong ???

No. It is **not** THE SOLUTION.
It is **part** of the solution.

To achieve sustainable MSW management for HK -

The commissioning of both the IWMF and OWTF **must be tied in with the implementation of MSW charging scheme and PRS**



Thank you

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