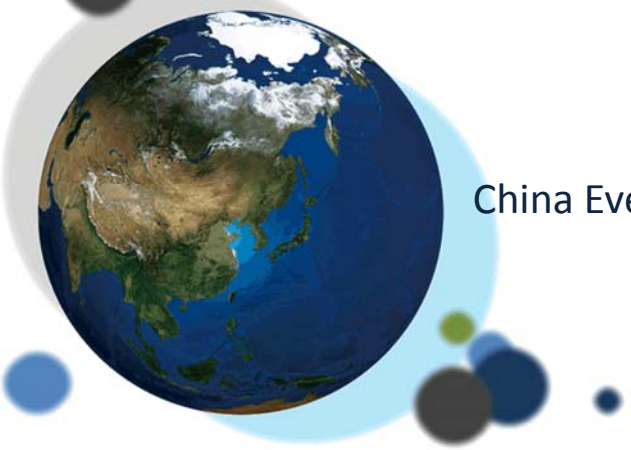
光大國際
Everbright International

Practical Experience in Solid Waste Treatment in China and Ideas on Solid Waste Treatment in Hong Kong



China Everbright International Limited

May 2013

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Everbright International

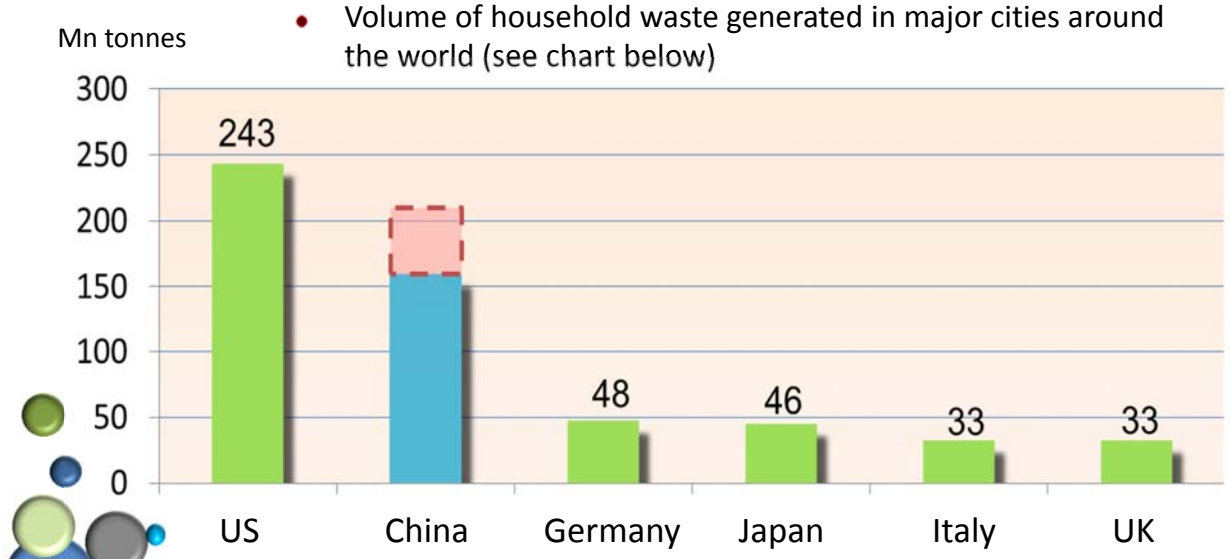
I. Current Status of Solid Waste Treatment in China

- Basic Facts about Household Solid Waste

I. Current Status of Solid Waste Treatment In China

Basic Facts about Household Solid Waste (I)

- The earth is home to all human beings and is vital to our very existence
- Volume of household waste generated in major cities around the world (see chart below)

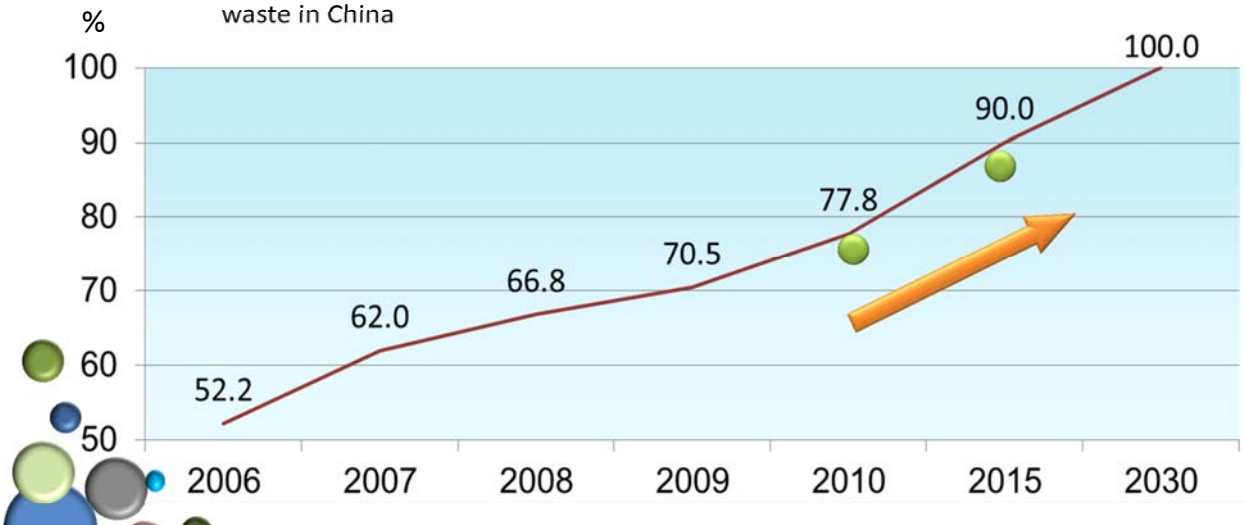


Sources: United Nations Statistics Division, US Environmental Protection Agency, Japan Ministry of Environment

I. Current Status of Solid Waste Treatment In China

Basic Facts about Household Solid Waste (II)

- The accumulated urban household waste in China has reached 7bn tonnes
- Currently, 150mn tonnes of household waste are generated each year and this is expected to reach 210mn tonnes in 2015
- The chart below shows the non-hazardous treatment rate of urban household waste in China



Sources: National Bureau of Statistics of China, United Nations Statistics Division, Ministry of Housing and Urban-Rural Development of China

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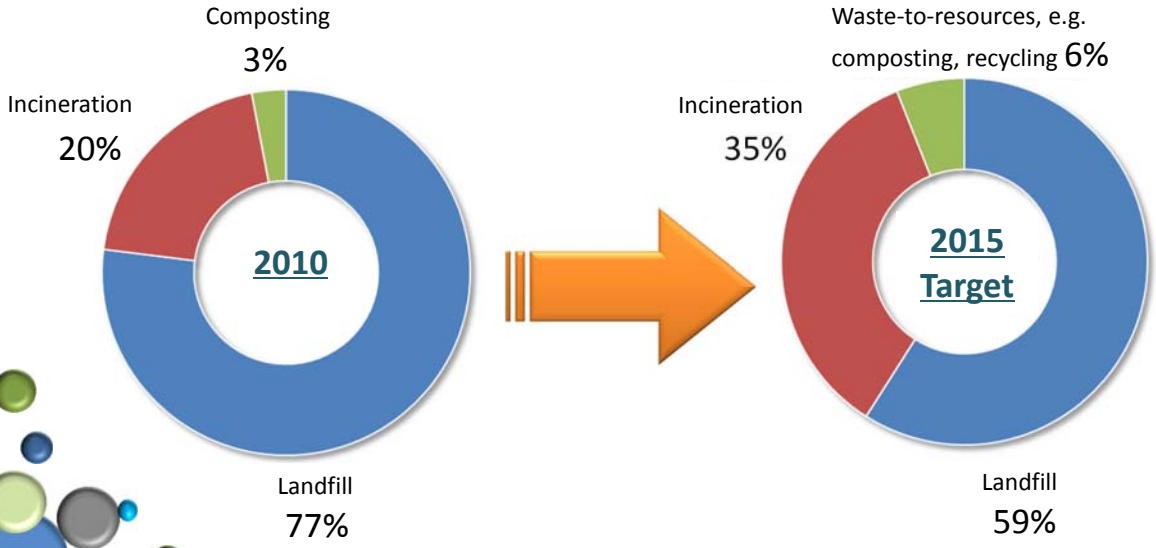
I. Current Status of Solid Waste Treatment In China

Basic Facts about Household Solid Waste (III)

- The distribution of different non-hazardous treatment methods of urban household waste in China (see chart below)



Sources: The National Plan for the Construction of Facilities for Treatment of Urban Household Waste in a Non-Hazardous Way under the 12th Five-Year Plan

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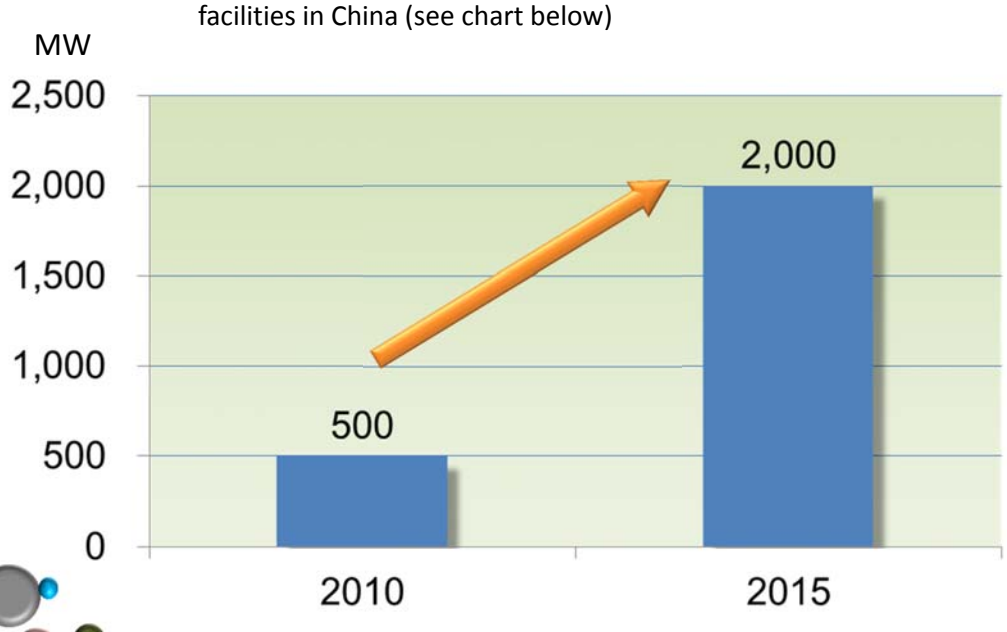
I. Current Status of Solid Waste Treatment In China

Basic Facts about Household Solid Waste (IV)

- The installed power generation capacity of waste-to-energy facilities in China (see chart below)



Sources: China Industrial Energy Conservation and Cleaner Production Association

I. Current Status of Solid Waste Treatment In China

Basic Facts about Household Solid Waste (V)

The National Plan for the Construction of Facilities for Treatment of Urban Household Waste in a Non-Hazardous Way under the 12th Five-Year Plan

- The non-hazardous treatment rates of household waste in municipalities, provincial capitals and designated cities in the state are expected to reach 100% by 2015
- The non-hazardous treatment rates of household waste in planned cities is expected to reach over 90%
- The non-hazardous treatment rate of household waste on county level is expected to reach above 70%
- Out of this, incineration will account for over 35% of household waste processed in a non-hazardous way nationwide and over 48% in eastern China
- The processing capacity of non-hazardous treatment will increase by 580,000 tonnes nationwide, with the incineration processing capacity to increase by 200,000 tonnes

II. Practical Experience in Solid Waste Treatment in China

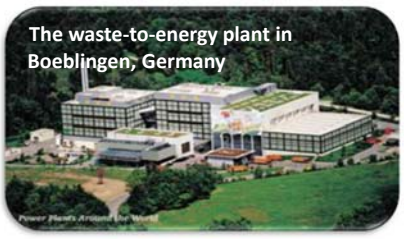
- **A Decade of Exploration for Everbright International**

光大國際 Everbright International

II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (I)

- Starting high: Application of advanced incineration technology
  - 22 projects with a daily household waste processing capacity of 25,000 tonnes
  - Has become the largest investor, constructor and operator in the solid waste treatment industry in China



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II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (II)

- High standards: All our projects are managed in accordance with the emissions standards established by the European Union
  - Higher standards of construction and operation

Gas Emission Standards

Testing items	Everbright standard	Euro 2000 Standard	Existing standard in China
TSP (mg/m^3)	10	10	80
NO_x (mg/m^3)	200	200	400
SO_2 (mg/m^3)	50	50	260
CO (mg/m^3)	50	50	150
TOC (mg/m^3)	10	10	--
HCl (mg/m^3)	10	10	75
HF (mg/m^3)	1	1	--
Hg (mg/m^3)	0.05	0.05	0.2
Cd+Tl (mg/m^3)	0.05	0.05	--
Cd (mg/m^3)	--	--	0.1
Sb+As+Pb+Cr+Co+Cu+ Mn+Ni+V (mg/m^3)	0.5	0.5	--
Pb (mg/m^3)	--	--	1.6
(ngTEQ/Nm^3)	0.1	0.1	1

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II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (III)

- Advanced technologies: We have adopted and engaged in R&D on new technology to address the problems of high moisture content, high ash content and low heating value:

▸ **Grate furnace technology**	▸ **Automatic control technology**
▸ **Emission purification technology**	▸ **Leachate treatment system**
▸ **Slag treatment**	

Sustainability Report

International Certification Report


Occupational Health and Safety Management System Certification


Environmental Management System Certification

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II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (IV)

- Public's right to information: Disclosure, government regulation, public participation


Public display screen


Online monitoring console linked to government system

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II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (V)

- Integrated utilization: Maximizing the efficiency of turning waste into useful resources
  - Solving the issues of electricity consumption in factories and grid power generation
  - Biomass power generation produced by anaerobic treatment of leachate
  - Water recycling, water to be used in greening works in factory zone, water replenishment for furnaces
  - Incineration-residues-to-bricks project




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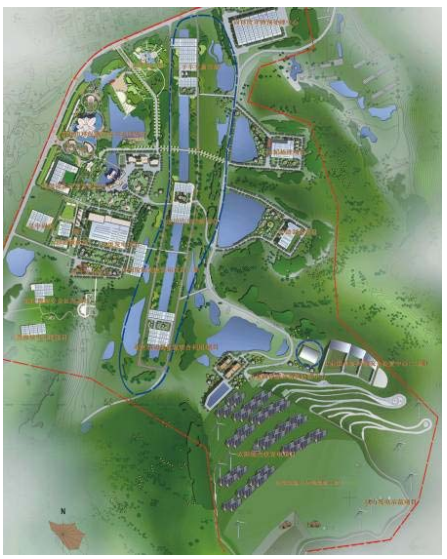
II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (VI)

- Demonstrative projects: Landfill greening
  - Combining elements of environmental greening and ecological restoration in project construction
  - Promotion of environmental education in operation management

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II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (VII)

Before and after the completion of selected projects at Suzhou Veinous Industrial Park

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II. Practical Experience in Solid Waste Treatment in China

A Decade of Exploration for Everbright International (VIII)

- Operation model of Everbright Environmental Protection Veinous Industrial Park
- Maximize conservation of land resources
- Minimize secondary pollution
- Maximize the efficiency of turning waste into useful resources
- Entered into agreements with governments of Suzhou, Zhenjiang, Suqian, Nanjing, Weifang and Zibo for the construction of the Environmental Protection Veinous Industrial Park

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III. Ideas on Solid Waste Treatment in Hong Kong

- Suggestions and Measures

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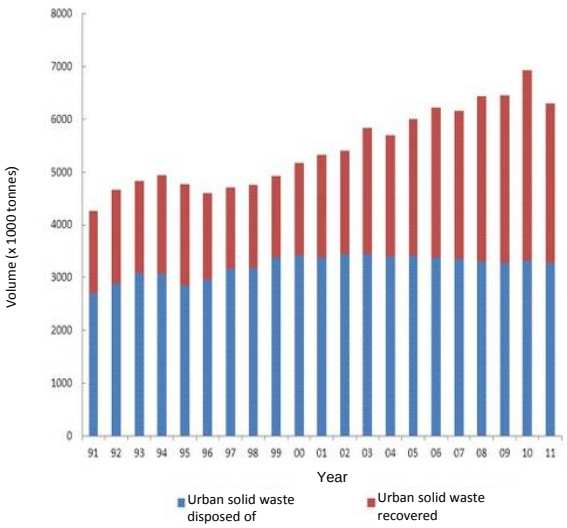
III. Ideas on Solid Waste Treatment in Hong Kong (I)

Status of Solid Waste Treatment in Hong Kong in 2011

- With a population size of over 7 million, the daily household waste in Hong Kong was over 13,500 tonnes, and the daily household waste per head was 2.11kg.
- The volume of urban solid waste has been rising even with the launch of the Programme on Source Separation of Domestic Waste (SSW) and the Waste Reduction Framework Plan (WRFP) in 2005.
- 48% of solid waste recycling capacity, 52% of solid waste landfill and three landfills with a total processing capacity of 110mn m^3 will be exhausted by 2014/15, 2016/17 and 2018/19 respectively.

Volume of Urban Solid Waste Disposed of and Recovered in 1991-2011



Sources: Environmental Protection Department of Hong Kong

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III. Ideas on Solid Waste Treatment in Hong Kong (II)

Waste Disposal Crisis: Conflicts and Challenges

The three landfills will be exhausted by 2018/19

The four small-sized waste incinerators have been closed since 1990s

The sites for the new facilities have yet been confirmed

How to solve the waste disposal paradox in Hong Kong?

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III. Ideas on Solid Waste Treatment in Hong Kong (III)

- Take Immediate Action:

Public awareness-

The problem of dioxin emissions

Scientific studies-

Analysis of waste incineration and landfills

Rational planning-

The model of Environmental Protection Veinous Industrial Park

III. Ideas on Solid Waste Treatment in Hong Kong (IV)

Public Awareness: The Problem of Dioxin Emissions

- The results of the dioxin survey in Jiangsu have passed the national audit. Dioxin emitted by waste-to-energy plants in operation accounted for **1/10,000** of the total amount of emissions in the Province.

** Sources: The White Paper for the Construction of Waste-to-energy Engineering Work, Jiangsu Housing and Urban Construction Bureau

- According to reports by the Environment Agency of the UK, 15 minutes of millennial firework celebrations in London produced an amount of dioxins that was 100 times the annual emission by the waste incineration plants in South East London.

** Sources: UK Environment Agency 2000, briefing note from the APSWG (Associate Parliamentary Sustainable Waste Group) by Neil Carrigan and Prof. Chris Coggins

III. Ideas on Solid Waste Treatment in Hong Kong (V)

Scientific Studies:

Eco-efficiency Analysis of Waste Incineration and Landfills

Isabell Schmidt, German Geo-Ecologist and Michael Weltzin, Scientific Assistant to the Parliament of Germany, published research reports on the eco-efficiency of waste incineration and landfills in 2001 and 2010. The conclusions were as follows:

- Compared with landfills, waste incineration significantly reduces waste in terms of volume and weight (reduction of volume by 90%, reduction of weight by 75%)
- Landfill leachate may cause serious contamination of underground water and groundwater
- Landfills release large amounts of greenhouse gases and gases containing CI substances, which may intensify the greenhouse effect, depletion of ozone layer, and photochemical pollution
- Regarding water, gas and slag discharge, waste incineration is a more appropriate choice
- Landfills may cause long-term environmental damage and taking into account environmental toxins, waste incineration is a more suitable option.

** Sources: ① Isabell Schmidt , Andreas Kicherer (2001) Eco-efficiency Analysis Residual Waste Disposal.
② Michael Weltzin, ESWET Workshop, Brussels (2010) Saving resources and protecting the climate – waste policy concept of Alliance 90/ The Greens in Germany.

III. Ideas on Solid Waste Treatment in Hong Kong (V)

Scientific Studies: Comparison of Waste Incineration and Landfills in China

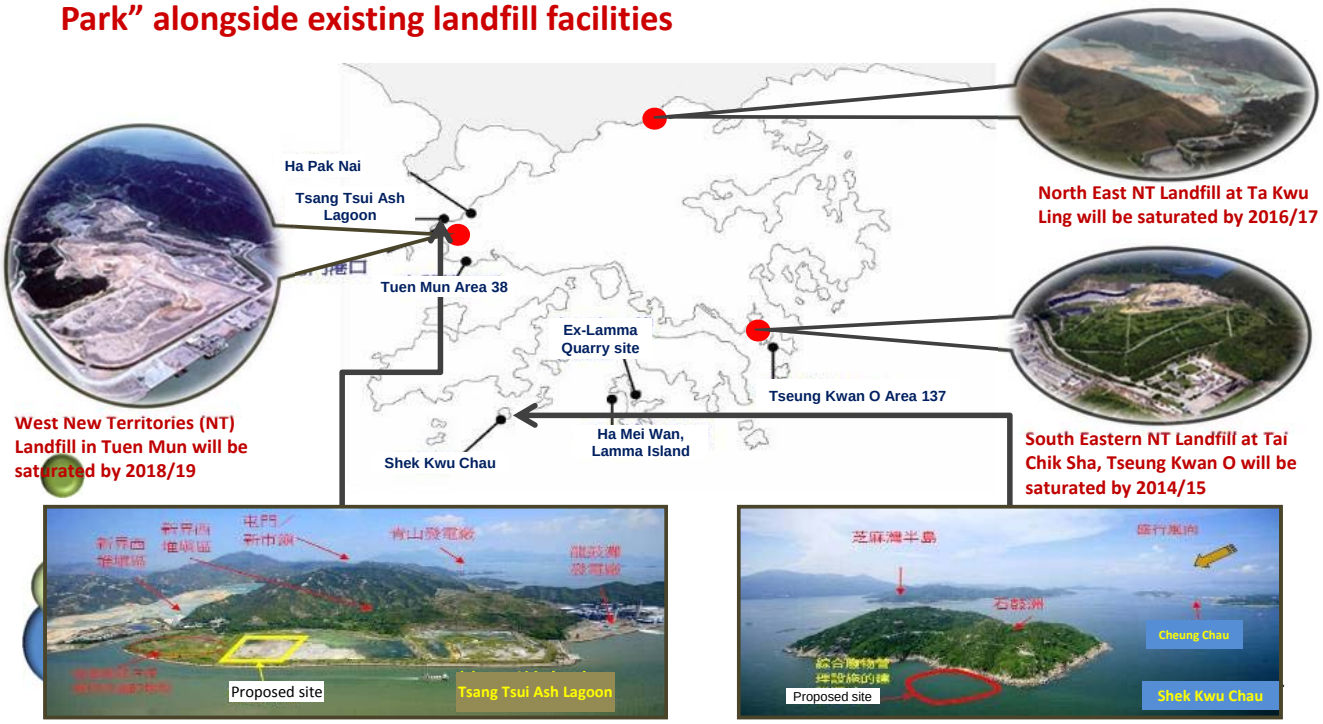
	Waste incineration	Landfill	Remarks
Site area	Less than 60,000m^2	Operational lifetime: Over 30 years; Storage capacity: 24.5 million m^3	Measured with a daily processing capacity of 5,000 tonnes
Quantity of leachate discharged	5~10% of the volume of waste	More than 20% of the volume of waste	
Quantity of pollutant emission	Less in variety, point source pollution, high controllability	More in variety, non-point source pollution, low controllability	
Utilization of resources	All: 1. Generating power from combustion; 2. Biomass power generation; 3. Incineration-residues-to-bricks ; 4. Utilization of fly ash; 5. Reuse of leachate, etc.	Only a few: 1. Collection of biomass; 2. Reuse of leachate	

III. Ideas on Solid Waste Treatment in Hong Kong (VI)

Rational Planning (I)

Solution to waste disposal in Hong Kong:

Adopt the model of the "Environmental Protection Veinous Industrial Park" alongside existing landfill facilities



III. Ideas on Solid Waste Treatment in Hong Kong (VI)

Rational Planning (II):
The Model of the Environmental Protection Veinous Industrial Park

- Adoption of the model of the Environmental Protection Veinous Industrial Park in existing landfill facilities
  - Construction of waste-to-energy plants to generate power for incineration and integrated treatment facilities as well as other production and general facilities;
  - The existing system of waste collection and transportation remains unchanged;
  - Relieving concerns about the selection of new sites

III. Ideas on Solid Waste Treatment in Hong Kong (VI)

Rational Planning (III):
The Model of the Environmental Protection Veinous Industrial Park

- Existing landfills to be closed down and phased out
  - Carry out greening work on the closed landfills as part of the creation of a balanced ecosystem
  - Carry out environmental remediation of the peripheral areas as part of the construction of a scenic landscape
- Use as a base for environmental education, vacation and leisure activities

Conclusion

- In our opinion, the solution to solid waste disposal in Hong Kong is not about solving technical or funding issues, but about the concept of protecting the environment and taking responsibility for our actions