

ECF Teacher Training Filed Trip Manual

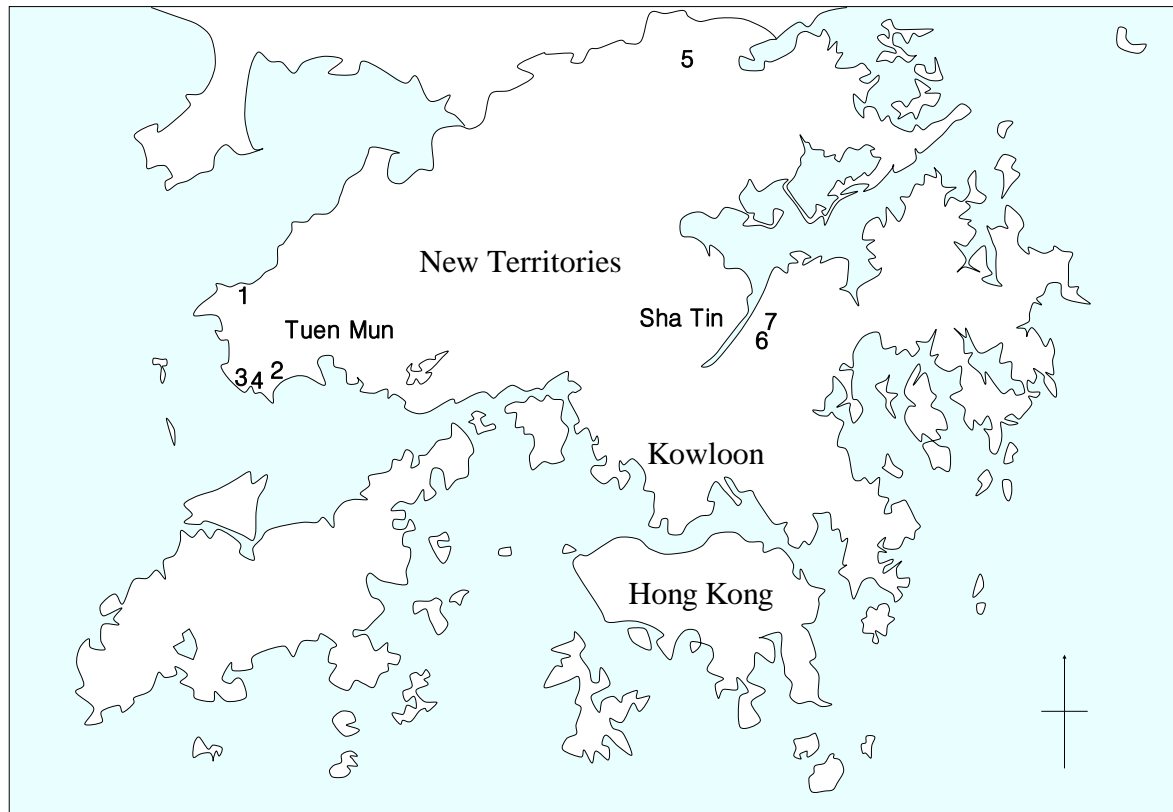
1. Aim of the field trips

- To give field experiences on current waste treatment technologies adopted in Hong Kong.
- To give a better understanding of local solid waste management approaches.
- To introduce local waste treatment and management facilities.
- To facilitate teachers for the preparation of teaching materials in municipal solid waste (MSW) management.

2. Programme Rundown

1 st Field Trip	2 nd Field Trip
3 July 2015 Friday	6 July 2015 Monday
09:30 – 17:00	10:30 – 16:30
1. Sludge Treatment Facility (STF) 污泥處理設施	5. North East New Territories (NENT) Strategic Landfill 新界東北堆填區
Lunch	
2. EcoPark Visitor Centre 環保園訪客中心	6. Shatin Transfer Station 沙田廢物轉運站
3. Yan Oi Tong EcoPark Plastic Resources Recycling Centre 仁愛堂環保園塑膠資源再生中心	7. Shatin Community Green Station 綠在沙田
4. WEEE Go Green 綠色家電環保園	

Figure 1. Locations of Local Waste Treatment and Management Facilities.



1. Sludge Treatment Facility (STF)
污泥處理設施
2. EcoPark Visitor Centre
環保園訪客中心
3. Yan Oi Tong EcoPark Plastic Resources Recycling Centre
仁愛堂環保園塑膠資源再生中心
4. WEEE Go Green
綠色家電環保園
5. North East New Territories (NENT) Landfill
新界東北堆填區
6. Shatin Transfer Station
沙田廢物轉運站
7. Shatin Community Green Station
綠在沙田

3. Background information of the sites

3.1 Sludge Treatment Facility (STF)

污泥處理設施



The Sludge Treatment Facility (STF), newly built in Tsang Tsui, Tuen Mun, is the world's largest sludge treatment works and the largest Integrated Waste Management Facilities in Hong Kong. It is designed to collect and treat sewage sludge from public Sewage Treatment plants using high temperature incineration by fluidized bed incinerators. The state-of-the-art thermal process in which evaporation of all of the water content in the sludge and burning of 90% of the remaining component would greatly reduce the capacity required for landfilling of sludge disposal. The handling process is both environmentally friendly and sustainable that the impacts to air quality, ecology, waste and water management will be minimised.

Environmental sustainability of the facility is demonstrated by its ability to recover thermal energy from the incineration process to generate electricity. In addition, the design of the STF has incorporated aesthetically and environmentally-sound green components featuring outdoor landscaping area with ecological garden and a water birds sanctuary to serve as a habitat for aviary species visiting the Tsang Tsui area. Rainwater will also be collected and all the wastewater from the entire facility will be treated and re-used on site for irrigation, flushing and cleansing purposes. An environmental education centre will also provide free services to the public that

convey environmental messages related to sustainable waste management, the design and operation of STF and other relevant environmental information.

Sources:

http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/WFdev_T_MSTF.html

http://www.arup.com/News/2011_03_March/25_Mar_2011_Arup_appointed_sludge_treatment_facility.aspx

3.2 EcoPark Visitor Centre

環保園訪客中心



The EcoPark Visitor Centre, with an area of 1,000 square meter, is situated in the South Wing of the Administration Building of EcoPark. It is the first large-scale education resource centre in Hong Kong with the theme of municipal waste. The primary purpose of the Centre is to provide information about waste management and waste reduction to the visiting public through educational promotion and outreach programmes, and to arouse public's awareness on solid waste issues, and improving the environmental ethic within the community. The ultimate goal of the Centre is to find a long-term solution for the MSW problem so that a clean, thriving and sustainable city can be developed.

The Centre consists of 8 zones, including Waste Corridor, Movie Area, 1:1 3-D Landfill Model, 3Rs Zone, Product Gallery, Reflection Pond and Group Game Zone. With interesting 3-D technology, advanced multimedia design, interactive games and movies demonstrating the importance of waste minimisation, visitors' understanding of municipal solid waste management in Hong Kong and environmental awareness can be enhanced, encouraging them to rethink about 3Rs - "Reduce", "Reuse" and "Recycle" and put green living style into practice.

EcoPark is situated in Tuen Mun Area 38, on west side of Hong Kong. It is similar to an industrial park exclusively for waste recycling and environmental engineering. This is the first of its kind in Hong Kong. The EcoPark occupies 200,000 square meters of land. It is one of the Government's initiatives to provide long-term land at affordable rent to nurture local recycling industry in Hong Kong with a view both to encourage investment in advanced technology, and to stimulate a circular economy to provide a sustainable solution to the city's waste problems. At present, a total of 14 lots in EcoPark have been leased for recycling waste cooking oil, waste metals, waste wood, waste electrical and electronic equipment (WEEE), waste plastics, waste batteries, waste construction materials, waste glass, waste rubber tires and food waste. It also features a large scale education resource centre with the theme of municipal waste that aims to find a long-term solution for the environmental problem and to encourage recycling of waste resources and returning them to the consumption loop. It is expected that the EcoPark will alleviate the heavy reliance on the export of recyclable materials recovered from Hong Kong.

Sources:

<http://www.ecopark.com.hk/en/visitors.aspx>

http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/eco_front.html

3.3 Yan Oi Tong EcoPark Plastic Resources Recycling Centre

仁愛堂環保園塑膠資源再生中心



Yan Oi Tong EcoPark Plastic Resources Recycling Centre is situated in EcoPark. It is operated by Yan Oi Tong, a social welfare organization in Hong Kong and funded by the Environmental Conservation Fund of Hong Kong.

The Centre is a waste plastics handling facility that collects waste plastics and carries out the separation, cleaning of recovered waste plastics and turns them into renewable materials for sale to other parties. This practice in turn reduced the load for the local landfills. The Centre has plastic recycling fleet of vehicles that circulates between various public and private-based institutions, housing estates to help collecting waste plastic.

YOT EcoPark Plastic Resources Recycling Centre webpage: <http://prrc.yot.org.hk/>

3.4 WEEE GO GREEN

綠色家電環保園



WEEE GO GREEN, short for EcoPark WEEE Recycling Centre, is situated in the 2nd phase of EcoPark and operated by St James' Settlement. It is the most comprehensive waste electrical and electronic equipment recycling centre in Hong Kong. Since October 2010, St James' Settlement was granted 3-year funding support from the Environment and Conservation Fund (ECF) to implement the WEEE GO GREEN programme. The WEEE Recycling Programme aims to channel waste electrical and electronic equipment (WEEE) for reuse and recycling instead of disposal. Collection of WEEE is focused on major designated items, namely television sets, refrigerators, washing machines, video or audio equipment, microwave ovens, fans, water heaters, rice cookers, air-conditioners, heaters, electronic games and mobile phones. The collected items are then inspected, repaired and/or dismantled. Appliances that can be repaired are donated to the needy. If there is no suitable recipient, the repaired goods are placed on charitable sale and the proceeds will be ploughed back to the programme to offset part of the operating cost. Items that are beyond repair are dismantled and their useable components and materials are recovered for reuse and recycling.

WEEE GO GREEN includes education centre, storage area, "Ice House Street", "Sai Yee Street", refurbishment area, dismantle area, outdoor storage area and donation area.

Storage area: Collected WEEE will be sorted orderly in different groups, to facilitate the registration and refurbishment process of technicians.

"Ice House Street": Refrigerators will undergo safety testing here: the general time for testing is from 1 to 2 weeks.

"Sai Yee Street": Washing machines will be testified for safety in this area, to make sure all appliances are up to the safety standard upon donation.

Refurbishment area: Registered electrical technician helps all the appliances to do the "Body Check" and workable appliances will be refurbished. Due to the effects of humidity to TV, they will undergo safety checking indoor.

Dismantle area: All the un-useable WEEE will be dismantled here and sorted into different types of recyclable materials.

Outdoor storage area: Different recyclable materials will be stored here. After a certain amount of specific material is collected, it will be recycled by qualified recyclers.

Donation area: All functioning WEEE which pass the safety test will be stored in this area, waiting for donation during caring visit.

Source:

<http://weegogreen.sjs.org.hk/>

3.5 North East New Territories (NENT) Landfill.

新界東北堆填區



The North East New Territories (NENT) Landfill is located in Ta Kwu Ling, New Territories. It is one of the three strategic landfills in Hong Kong and occupies a total area of 61 ha. Its current waste intake is about 2,700 tons per day (2012), responsible for collecting municipal, construction and special waste. It is estimated to become saturated by year 2016/2017. Because local waste disposal is rapidly overloading existing landfills, the Hong Kong government decided to extend the NENT Landfill to provide an additional capacity of 21Mm³, almost doubling its existing capacity.

A particular challenge was the assessment of odor impact on nearby residential premises due to the landfill extension, and the formulation of mitigation measures. To foster the community support and general consensus on the project, stakeholder engagement measures were taken seriously. A project website was launched to serve as a communication channel for the public.

On 27 July 2013, leakage of leachate from a recently commissioned temporary leachate storage lagoon at the NENT Landfill was detected. Leachate leaking from the toe of the temporary lagoon was observed. The landfill contractor was informed immediately to take action to rectify the leaking problem. The contractor took

immediate measures to contain the leachate within the landfill boundary but due to the heavy rainstorm, some leaked leachate mixed with a large amount of rainwater entered the surface water system serving the landfill and discharged into a nearby watercourse – the Kong Yiu Channel.

The development of NENT Landfill ensures the continued provision of disposal site for solid waste after the existing ones are full and avoids illegal dumping of construction waste and municipal waste that bring serious environmental problems.

Sources:

<http://www.legco.gov.hk/yr12-13/english/panels/ea/papers/ea0917cb1-1774-1-e.pdf>

http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/msw_nent.html

3.6 Shatin Transfer Station

沙田廢物轉運站



The Environmental Protection Department (EPD) has commissioned the Shatin Transfer Station (STTS) for use by private waste collectors as one of the department's many waste diversion measures to facilitate the designation of the South East New Territories Landfill in Tseung Kwan O to be the one in which only accept construction waste by the end of the year 2015. To enable the proper and convenient disposal of domestic, commercial and industrial waste collected from the districts of Shatin, Tai Po and Sai Kung, STTS is opened to private waste collectors at a service fee of \$30 per tonne of waste. Waste collectors must first apply for an account under the Refuse Transfer Service Scheme before using the station for waste disposal. The STTS is one of the waste collection and transportation facility that is essential to the local solid

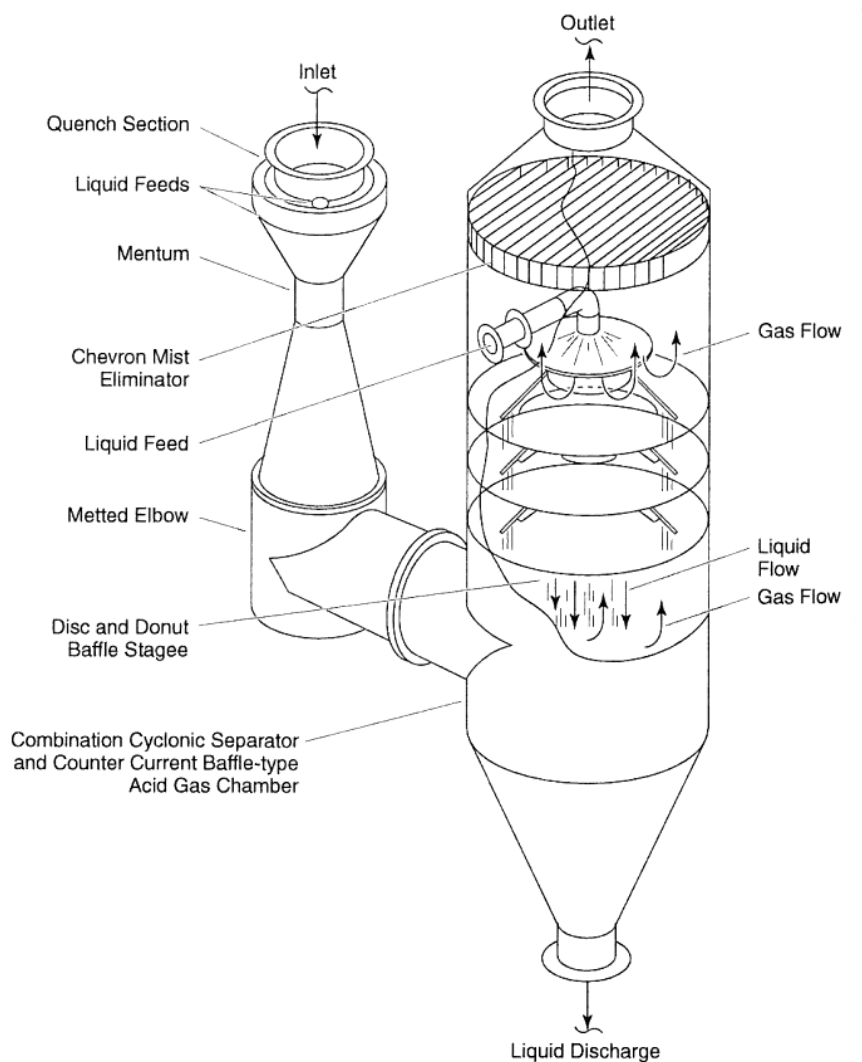
waste management system. Collected waste are centralized and compacted before transferring to the NENT strategic landfill for final disposal. The STTS has installed advanced odor control system, including a venture scrubber (Figure 2) and water treatment system.

Sources:

http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/msw_stts.html

<http://www.info.gov.hk/gia/general/201502/27/P201502270359.htm>

Figure 2. Venturi scrubber for fine dust and odor control (from Tchobanoglous & Kreith, 2002)



3.7 Shatin Community Green Station

綠在沙田



Shatin Community Green Station is one of the first of its kind in Hong Kong. It was opened to the public on 12 May 2015. It focuses on collecting recyclables of low economic value and promoting environmental education at the district level.

The station is at 10 On Ping Street and covers a gross floor area of about 1,600 square meters. It was previously used as temporary parking space and has been transformed into a public space made up of shipping containers and various types of green construction materials.

Recyclables with low economic value, including electrical appliances, compact fluorescent lamps and tubes, glass bottles and rechargeable batteries, will be collected at the station and delivered to qualified recyclers for proper treatment, turning waste into resources.

Since the station's trial run began in February, its operator, the Christian Family Service Centre, has already established collaboration arrangements with more than 70 housing estates, institutions and schools in Shatin.

The centre also plans to organize sharing sessions and regular guided tours to promote environmental education at the district level.

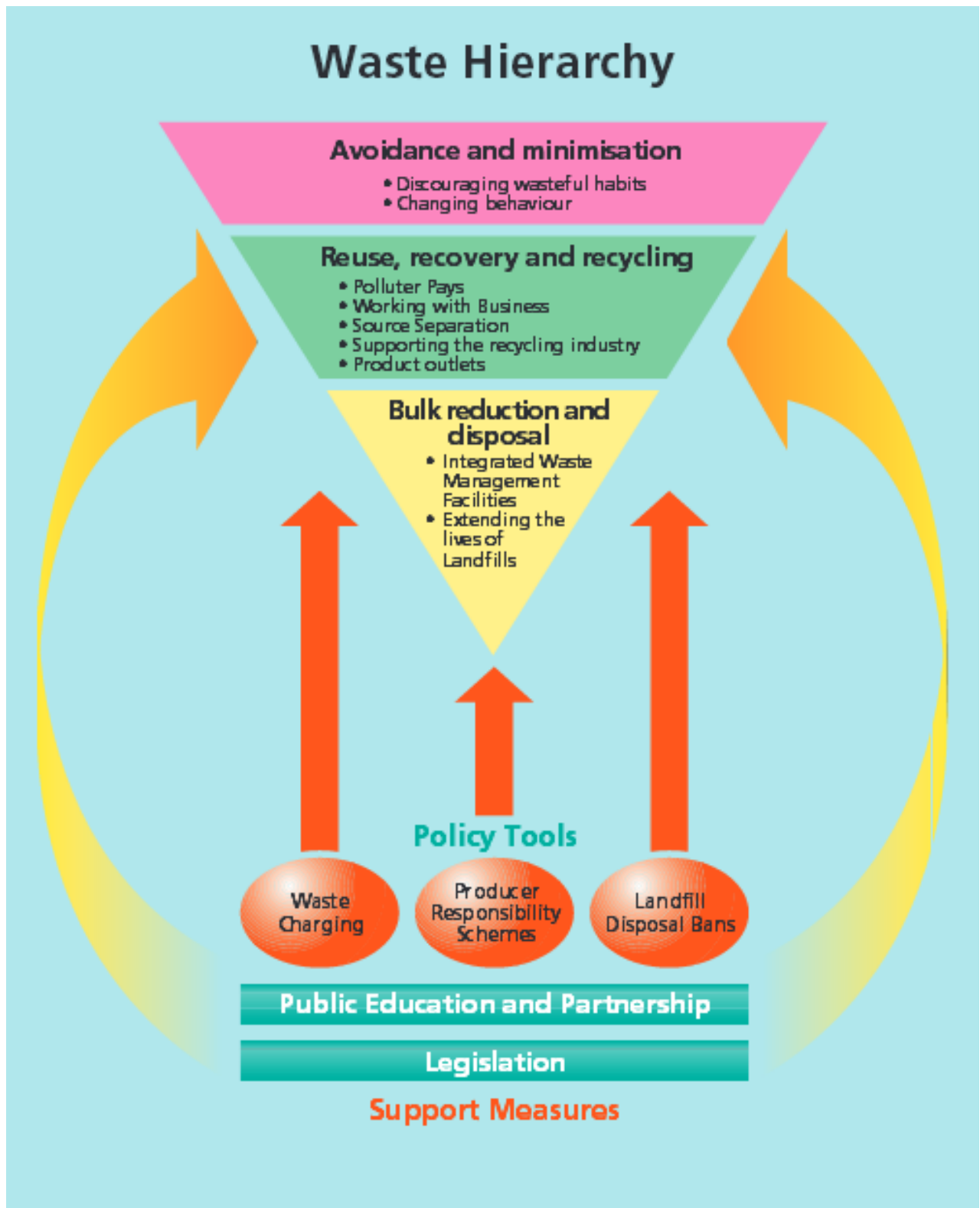
The Government is developing green stations in other districts. It hopes to open the Eastern District Community Green Station next, which will be run by the Po Leung Kuk. The remaining 16 stations are in different construction or planning stages.

Sources:

http://www.news.gov.hk/en/categories/environment/html/2015/05/20150511_140256.shtml

4. Questions for discussion

Figure 3. Hong Kong's Municipal Solid Wastes (MSW) Strategy



Source: http://www.epd.gov.hk/epd/msw/htm_en/pdf_e/ch04e.pdf

1. Complete the table by matching the numbers of the following facilities with the corresponding areas of Hong Kong's MSW Strategy.

1. Sludge Treatment Facility (STF)
2. EcoPark Visitor Centre
3. Yan Oi Tong EcoPark Plastic Resources Recycling Centre
4. WEEE Go Green
5. North East New Territories (NENT) Landfill
6. Shatin Transfer Station
7. Shatin Community Green Station

MSW Strategy	Facilities
Avoidance and minimisation	
Reuse, recovery and recycling	
Bulk reduction and disposal	
Public Education and Partnership	

2. What are the advantages and disadvantages of the NGO-Government partnership model usually adopted by the recycling industry of Hong Kong? (e.g. YOT on plastic recycling, St. James on WEEE, and Shatin Community Green Station)

Advantages	Disadvantages

3. Discuss the pros and cons of (i) incineration and (ii) landfill in the view of environmental, social and economic sustainability.

	Incineration		Landfill	
	Pros	Cons	Pros	Cons
Environmental				
Social				
Economic				

4. Sitting of solid waste management facility in a relatively remote location is an indication of our government's awareness and response of the "NIMBY" (Not In My Back Yard) nature of such facilities. Using examples, discuss the environmental, social and economic costs of this strategy in dealing with nimby attitudes of the public. In your opinion, what are the potential solutions, if any, that would overcome NIMBY?

Costs	Landfills	Incinerator
Environmental		
Social		
Economic		

Suggested Answers

1. Complete the table by filling the numbers of the following facilities which participate in the target areas of Hong Kong's WSD Strategy.

1. Sludge Treatment Facility (STF)
2. EcoPark Visitor Centre
3. Yan Oi Tong EcoPark Plastic Resources Recycling Centre
4. WEEE Go Green
5. North East New Territories (NENT) Landfill
6. Shatin Transfer Station
7. Shatin Community Green Station

MSW Strategy	Facilities
Avoidance and minimisation	
Reuse, recovery and recycling	3, 4, 7
Bulk reduction and disposal	1, 5, 6
Public Education and Partnership	1, 2, 3, 4, 5, 6, 7

2. Discuss the pros and cons of (i) incineration and (ii) landfill in the view of environmental, social and economic sustainability.

	Incineration		Landfill	
	Pros	Cons	Pros	Cons
Environmental	<ul style="list-style-type: none"> -Do not produce any methane -Require less land than landfills (reduce waste volume by 90%) -Less transportation needed -Effective Metal Recovery 	<ul style="list-style-type: none"> -Cannot guarantee zero Dioxin emission →air pollution -Burning acids, organics and heavy metals → severe consequences to environment 	<ul style="list-style-type: none"> -Do not release Dioxin 	<ul style="list-style-type: none"> -Produce greenhouse gas (40% to 60% methane) → climate change -Toxic substances from landfill waste →water and land pollution
Social	<ul style="list-style-type: none"> - High temperature ensure the destruction of pathogens (e.g. fungi, bacteria and viruses) - Use much less space than landfill → land for residential or recreation use will not be affected 	<ul style="list-style-type: none"> - Residents nearby maybe suffered from poor air quality - Increase the probability have cancer (Dioxins has been linked to cancer by some studies) 	<ul style="list-style-type: none"> - Do not release Dioxins → lower probability to have cancer 	<ul style="list-style-type: none"> -Extension of landfill use up more land that may have other uses - Residents nearby are affected by the odor.
Economic	<ul style="list-style-type: none"> - Turn waste into energy → produce electricity while burning waste 	<ul style="list-style-type: none"> -Cost may be high in long run -High construction cost 	<ul style="list-style-type: none"> -Leachate and methane can be collected and used as a gas 	<ul style="list-style-type: none"> -High transportation cost -Heavy financial burden in management, even after the saturation of landfills

3. What are the advantages and disadvantages of the NGO-Government partnership model usually adopted by the recycling industry of Hong Kong? (e.g. YOT on plastic recycling, St. James on WEEE, and Shatin Community Green Station)

Advantages	Disadvantages
<ul style="list-style-type: none"> - Grass-roots orientation, humanitarian versus commercial goal orientation, dedication and commitment - Possess systemic flexibility with respect to prioritization, planning, and operations compared to government owned facilities; ability to innovate - Have potential access to more revenue streams via diverse fundraising activities 	<ul style="list-style-type: none"> - Relies on subsidy by Government, not independent and self-sufficient, lack of incentive to seek for other sources of funding. - Cost of man power, space and tools for sorting is high while the revenue of reused materials is usually low - Operation kept in small capacity due to non-profit oriented nature - Due to high land rent, facilities are located in remote area, collection and transportation are therefore not efficient

4. Sitting of solid waste management facility in a relatively remote location is an indication of our government's awareness and response of the "NIMBY" (Not In My Back Yard) nature of such facilities. Using examples, discuss the environmental, social and economic costs of this strategy in dealing with nimby attitudes of the public. In your opinion, what are the potential solutions, if any, that would overcome NIMBY?

Costs	Landfills	Incinerator
Environmental	<ul style="list-style-type: none"> - Loss of natural land: extension of landfill, for example, North-East landfill in Ta Kwu Ling, used the land of greenbelt - Long journey of transportation - Release greenhouse gases (methane) 	<ul style="list-style-type: none"> - Sitting at ecological sensitive area (finless porpoises) - Transportation of waste potentially contributing to marine debris
Social	<ul style="list-style-type: none"> - Social differentiation: Residents who are living near to the landfills feel unfair when compared their situations with those living further away from the landfills 	<ul style="list-style-type: none"> - Social differentiation: Residents who are living near to the incinerator feel unfair when compared their situations with those living further away from the incinerator
Economic	<ul style="list-style-type: none"> - High transportation cost: transport the waste to landfills via land and sea routes 	<ul style="list-style-type: none"> - High transportation cost: transport the waste to incinerator site (Shek Kwu Chau) by shipping

Potential solutions:

- Better public participation and engagement efforts in order to gain local acceptance of undesirable land use developments in the local communities
- Improve risk communication. Research shown that people shows more acceptance to solid waste management facility if they are well-informed.
- Compensation to the affected stakeholders.