GO TEAM • GREEN GOAL
We-recycle@School

綠展隊 GO TEAM

環境保護署 Environmental Protection Department

6

Primary 6

Resources Circulation in Hong Kong

Topic：Environment and Living —— Survival of the Fittest

Learning time：35 minutes

GREEN GOAL

Primary 6

Lesson Plan

Primary 6

Resources Circulation in Hong Kong

General Studies Lesson Plan for Primary Schools

Topic:
Environment and Living–Survival of the Fittest

Learning time:
35 minutes

Prior knowledge

1. Concepts of resources recovery and recycling
2. Common types of recyclables

Learning objectives

Skills

1. To distinguish between recycling and upcycling

Knowledge

1. To reinforce the knowledge of waste reduction at source and clean recycling
2. To learn about recycling and upcycling
3. To understand the process of waste-to-resources / waste-to-energy

Learning objectives	Time	Teaching flow	Teaching materials
	5 MINS	**Lead-in / Motivation** • Teacher can invite students to list the 4R principles and related examples **The 4R principles** • Reduce: - Minimise the use of unnecessary items or energy For example: *Bring your own bags to reduce the use of plastic bags* • Reuse: - Reuse items before they become waste For example: *Write on both sides of papers and reuse plastic bags* • Replace: - Use environmentally friendly items For example: *Replace single-use batteries with rechargeable batteries* • Recycle: - Separate waste for recycling and turning them into different recycled materials For example: *Recycle papers for making of recycled paper*	

1

To understand the importance of waste reduction at source

5 MINS

Topic demonstration

Investigative Activity 1

Understanding the importance of waste reduction at source

- Teacher can randomly invite students to list various types of domestic waste and ask them to suggest
  methods to reduce the generation of such domestic
  waste

  Examples of waste reduction at source:
  - *Plastic bottles: Bring your own reusable water bottles*
  - *Plastic bags: Bring your own reusable shopping bags*
  - *Disposable tableware: Bring your own reusable tableware*
  - *Old electrical appliances: Try to repair before disposal*
  - *Food waste: Purchase food based on actual needs*
  - *Paper: Use electronic learning resources / single-sided used paper as draft paper*
- Teacher can emphasise to the students that waste reduction at source is the most important aspect of the 4R principles

Student worksheet

2

To learn about recycling and upcycling

10 MINS

Investigative Activity 2

Learning about recycling and upcycling

- Teacher can briefly introduce the proper recycling procedures for various types of recyclables and the importance of clean recycling
- Teacher can explain to students the differences between recycling and upcycling
  - Recycling: Transforming recyclables into new items through processes like sorting and shredding, reducing the consumption of raw materials
  - Upcycling: Using waste as raw materials to create new products by the infusion of creativity, giving new values to old items. The Forms of the original items will not be changed after upcycling
- Teacher can use eco-bricks as an example of upcycling:

(https://www.youtube.com/watch?v=AYB4-GU04Fs)
(https://www.youtube.com/watch?v=bu3opTWc9_I)

Source separation and recycling information, reference video on making eco-bricks, student worksheet

3

To understand the process of turning waste to energy

10 MINS

Investigative Activity 3

Understanding the process of turning waste to energy

- Teacher can introduce T·PARK
  - Hong Kong's first self-sufficient sludge treatment facility
  - "T" represents "transformation", signifying the continuous drive to shape Hong Kong's "waste-to-energy" ambitions
  - T·PARK has a treatment capacity of 2 000 tonnes of sludge per day
  - Advanced incineration technology can convert sludge into ash and residues, reducing sludge volume by up to 90%, significantly alleviating pressure on landfills
  - During the incineration process, the heat generated can be recovered for electricity generation to meet on-site operational needs. To extend the benefits to the public, surplus electricity generated from the process is exported to the public power grid
- Teacher can explain the process of handling sewage sludge and turning waste to energy at T·PARK (https://www.tpark.hk/tc/process/)

Student worksheet, reference video on turning sewage sludge to energy

5 MINS

Conclusion

- Teacher can list one to two recyclables and ask students about the proper ways for clean recycling
- Teacher can provide examples of turning waste to sources/ energy
- Teacher can instruct students to complete "Resources Circulation in Hong Kong" Student Worksheet as an assessment of learning, as well as reinforcing the relevant concepts

Student worksheet

Extended Activity

Teaching Materials

Extended Activity 1 (Indoor activity):
Green Classroom Design Competition

Extended activity kits

Extended Activity 2 (Indoor activity):
Upcycling Workshop: Making Eco-magnetic Chess from residue of Water Treatment Works

Extended activity kits

Extended Activity 3 (Outdoor activity):
Visit to T·PARK (Sludge Treatment Facility)

Extended activity kits

Extended Activity 4 (Outdoor activity):
Visit to WEEE·PARK (Waste Electrical and Electronic Equipment (WEEE) treatment and recycling facility)

Extended activity kits

Primary 6

Worksheet

Resources Circulation in Hong Kong

Student Worksheet

Name

1 Short questions

1. Suggest a way to practice the 4R principles of waste reduction in daily life.

Reduce	Reuse

Replace	Recycle

2. Write down the correct sequence for clean recycling for each recyclable

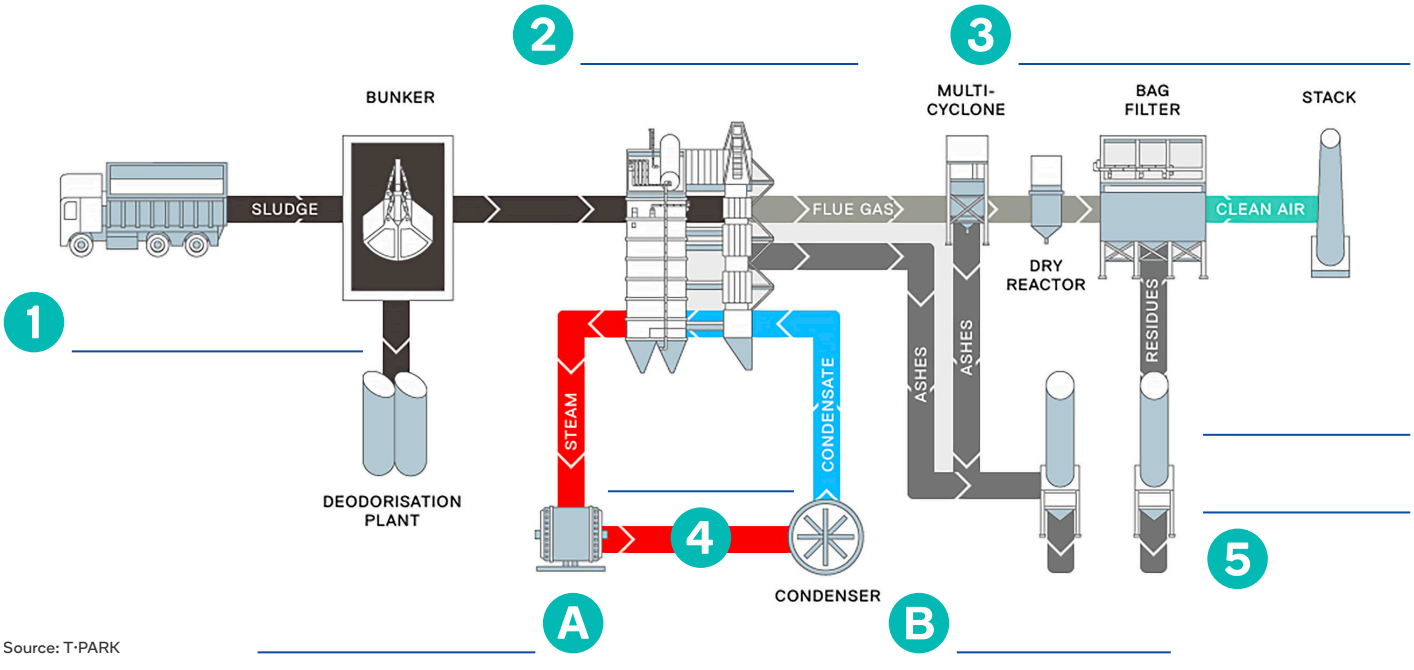
Steps for Clean Recycling

- A Separate recyclables and non-recyclables
- B Separate different components
- C Drain liquid
- D Rinse thoroughly
- E Empty the container
- F Cut and flatten
- G Remove impurities

Recyclable	Steps for clean recycling	Colour of recycling bin
Paper	◯	
Metals	◯ → ◯	
Beverage cartons	◯ → ◯ → ◯ → ◯ → ◯	
Glass bottles	◯ → ◯ → ◯	
Plastic bottles	◯ → ◯ → ◯	
Food waste	◯ → ◯	

2 Fill in the blanks: Fill in the blanks as appropriate.

Incineration | Food waste reception | Flue gas treatment | Steam turbine generator | Power generation | Sludge reception | Ash and residue handling | Condenser



Source: T·PARK

3 Reflective questions

1. Suggest one method to reduce waste at source.

2. Name one example of upcycling.

Primary 6

Extended Activity Kit

Green Classroom Design Competition

Objectives

1. To encourage students to practise the 4R principles through recycling, reusing, and upcycling used items
2. To encourage students to unleash their creativity and imagination in transforming old items, granting them a second life and enhancing the aesthetic appeal of the classroom

Activity Arrangements

Preparation

- Establish clear activity arrangements, including schedules, procedures, and materials preparation
- Specify the requirements of the activities, such as safety precautions, resource utilisation principles, and teamwork expectations

Activity flow

- Teacher can introduce the background and purposes of the "Green Classroom Design Competition" to students as well as highlighting the importance of recycling and upcycling, and explain the activity rules and the marking scheme
- Students can form groups of four, discuss and share their design ideas for the green classroom with the class. After consolidating the design from each group, teacher can guide students in transforming the used items with the use of necessary tools, such as scissors, glue and paint
- Students can collect used items, while the teacher can compile and record the amount of used items collected from each class (types, quantities, and quality of used items)
- Students can work in groups to transform collected used items into various decorations or daily products
- Teacher can provide simple tutorials and creative suggestions for students to create their own upcycling products. Teacher should also encourage collaboration between students
- Decorate the classroom with the upcycled items
- Teacher from each class can carry out evaluation based on three criteria: "Amount of used items collected", "elaboration of design concept", and "visual appeal"

  Criteria

  - Amount of used items collected (5 points): Quantity and variety of used items
  - Elaboration of design concept (5 points): Invite students to explain the design concept, purposes, and methods
  - Visual appeal (5 points): The overall decorative effect of the classroom

Green Classroom Design Competition

Activity Arrangements	**Conclusion** • Teacher can review the activity process and ensure that the objectives are achieved • Teacher can recognise outstanding works and teams • Teacher can guide students to review on the environmental means of the activity and the importance on reusing used items, advocating for the continued practice of waste reduction principles in daily life
Time	**Week 1:** Introduction of "Green Classroom Design Competition" and collection of used items **Week 2:** DIY transformation of used items **Week 3:** Classroom decoration **Week 4:** Exhibition and evaluation
Materials	• Various types of used items • Tools and materials (e.g. scissors, glue, and paint) • Log Sheet • Marking Scheme • Green Classroom Design Worksheet
Remarks	1. Ensure students to stay safe during the activity, especially when using sharp tools such as scissors, to avoid hurting themselves and others 2. Remind students to use resources wisely and avoid unnecessary wastage 3. Encourage students to explore alternative resources or reuse the resources as far as possible, to enhance the sustainability of the resources 4. Encourage students to help each other, promoting teamwork and respecting others' opinions

Log Sheet

Used items collated	Plastics (kg)	Metals (kg)	Paper (kg)	Others (pcs / kg)
Group 1				
Group 2				
Group 3				
Group 4				
Group 5				

Total				
Verification teacher's signature				

Marking Scheme

Assessment Criteria	Scoring indicators					Score
	5	4	3	2	1	
Amount of used items collected	High quantity with wide diversity of used items collected	Relatively high quantity, moderate diversity of used items collected	Moderate quantity, relatively low diversity of used items collected	Low quantity, little diversity of used items collected	Minimal or no used items collected	
Elaboration of design concept	Clear, creative design concept, high practicality	Generally clear, creative design concept, relatively high practicality	Average explanation, ordinary design concept, average practicality	Unclear explanation, lack of creativity and design concept, low practicality	No explanation or insufficient explanation, not practical	
Visual appeal	With very good aesthetically pleasing, and look artistic	With good aesthetically pleasing	Average design	Monotonous design	Unattractive or chaotic	
					Total Score	

Name

Green Classroom Design Worksheet

List of used items

Used item	Quantity	Used item	Quantity

Illustration of transformed items

Design description (50-100 words)

Position of decoration

List of tools

Tool	Quantity	Tool	Quantity

Upcycling Workshop: Making Eco-magnetic Chess from residues from Water Treatment Works

Objectives

1. To enhance students' knowledge and understanding on domestic waste in Hong Kong and residues from water treatment works
2. Through hands-on process of making eco-magnetic chess, students will experience the transformation of waste materials into useful products, thereby fostering an understanding and awareness of reuse of resources

Activity Arrangements

Preparation

- Teacher's demonstration kit and student's essentials kit can be provided by the Education University of Hong Kong upon request. Please contact the Education University of Hong Kong 5 working days prior to the activity for collecting the kits
- The 3D printing files can be provided by the Education University of Hong Kong upon request. 3D-printed moulds need to be self-printed using a 3D printer
- Purchase all the remaining materials, including magnets, disposable gloves, newspaper (as tablecloth), 5 mL needle-free syringe, and wooden sticks

Activity flow

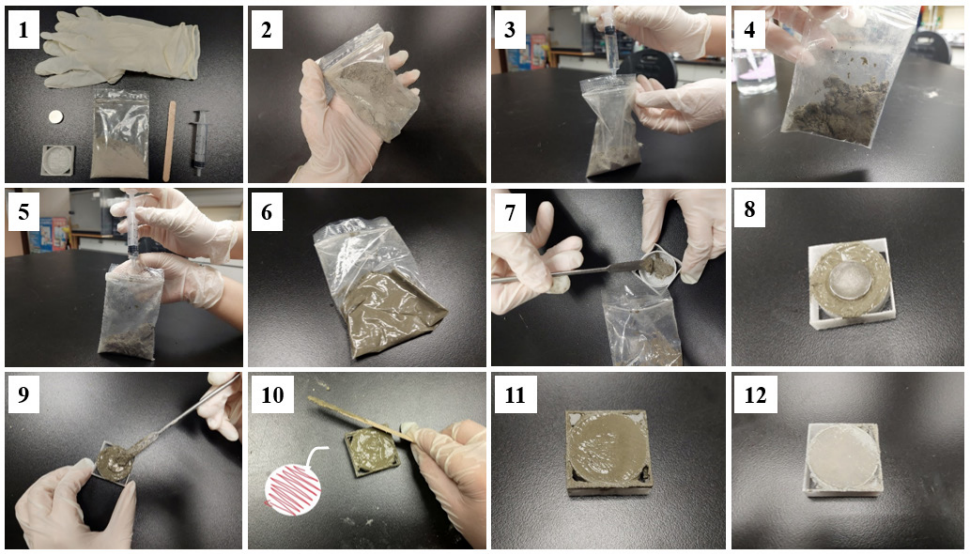
- Briefly introduce the domestic waste problem and the situation of sludge from Water Treatment Works in Hong Kong
- Introduce current recycling techniques and technologies for handling residues from waste treatment facilities, and introduce a successful local example: Eco-bricks
- Using the teacher's demonstration kit, teacher can demonstrate the steps and techniques of making eco-magnetic chess
- Using the student's essentials kit, students can work in groups to make eco-magnetic chess

Steps for making eco-magnetic chess

1. Place the materials on the table
2. Mix the residues from water treatment works and cement thoroughly (for teacher's demonstration only; students should use the ingredient mixture)
3. Add 5 mL of water using a syringe
4. Press until all the water is absorbed
5. Add approximately 1 mL of water (drop by drop)
6. Press until the mixture reaches a clay-like texture
7. Fill the bottom of the mould with a small amount of ingredient mixture

Upcycling Workshop: Making Eco-magnetic Chess from residues from Water Treatment Works

8. Insert the magnet upon filling half of the mould
9. Continue filling the mould with the ingredient mixture
10. Smooth the surface with a wooden stick in a zig-zag motion
11. Allow it to air-dry for approximately 24-48 hours for finishing
12. Demould



Conclusion

- Teacher can encourage students to share their experience and express their work in making the eco-magnetic chess
- Teacher can encourage students to take their eco-magnetic chess to home

Time

2 lessons

Upcycling Workshop: Making Eco-magnetic Chess from residues from Water Treatment Works

Materials	• Introduction of Solid Waste in Hong Kong • Teacher's demonstration kit (i.e. cement and residues from water treatment works) • Student's essentials kit (i.e. ingredient mixture, containing 29g of cement and 1g of residues from water treatment works) • 3D printing files • Eco-magnetic chess materials: magnets, disposable gloves, newspaper (as tablecloth), 5mL needle-free syringe, 3D-printed moulds (diameter: 34mm; height: 9mm), and wooden sticks
Remarks	• Remind students to be cautious and careful in the process to avoid accidents • Encourage students to clean up the venue after the activity to ensure a tidy environment and to dispose of waste materials properly • After the activity, the used syringes, 3D-printed moulds, and wooden sticks can be rinsed, dried for future use
Note	If schools are interested in obtaining kit (i.e., residues from water treatment works and ingredient mixture), please contact Miss Cheng Yan Laam (2948 7217) or Miss Xu Hui (2948 8826) of the Education University of Hong Kong. As the preparation of material packs takes time, please contact them 5 working days prior to the activity and provide the school address and contact information (i.e., name and phone number) for the delivery of the material packs. The supply of material packs is limited and will be distributed on a first-come, first-served basis.

Introduction of Solid Waste in Hong Kong

1. Solid waste in Hong Kong

At present, over 5 million tonnes of waste are disposed of each year in our three strategic landfills, namely the West New Territories (WENT) Landfill at Tuen Mun, the North-east New Territories (NENT) Landfill at Ta Kwu Ling, and the South-east New Territories (SENT) Landfill at Tseung Kwan O.

Waste prevention and recycling have always been the Government's main focus in tackling the waste problem. However, with the current economic situation, it is estimated that even with the achievement of waste recycling targets and the successful development of appropriate large-scale waste-to-energy facilities, there will still be significant amount of inert materials, un-recyclable wastes, construction waste and post-treatment residues requiring disposal at landfills.

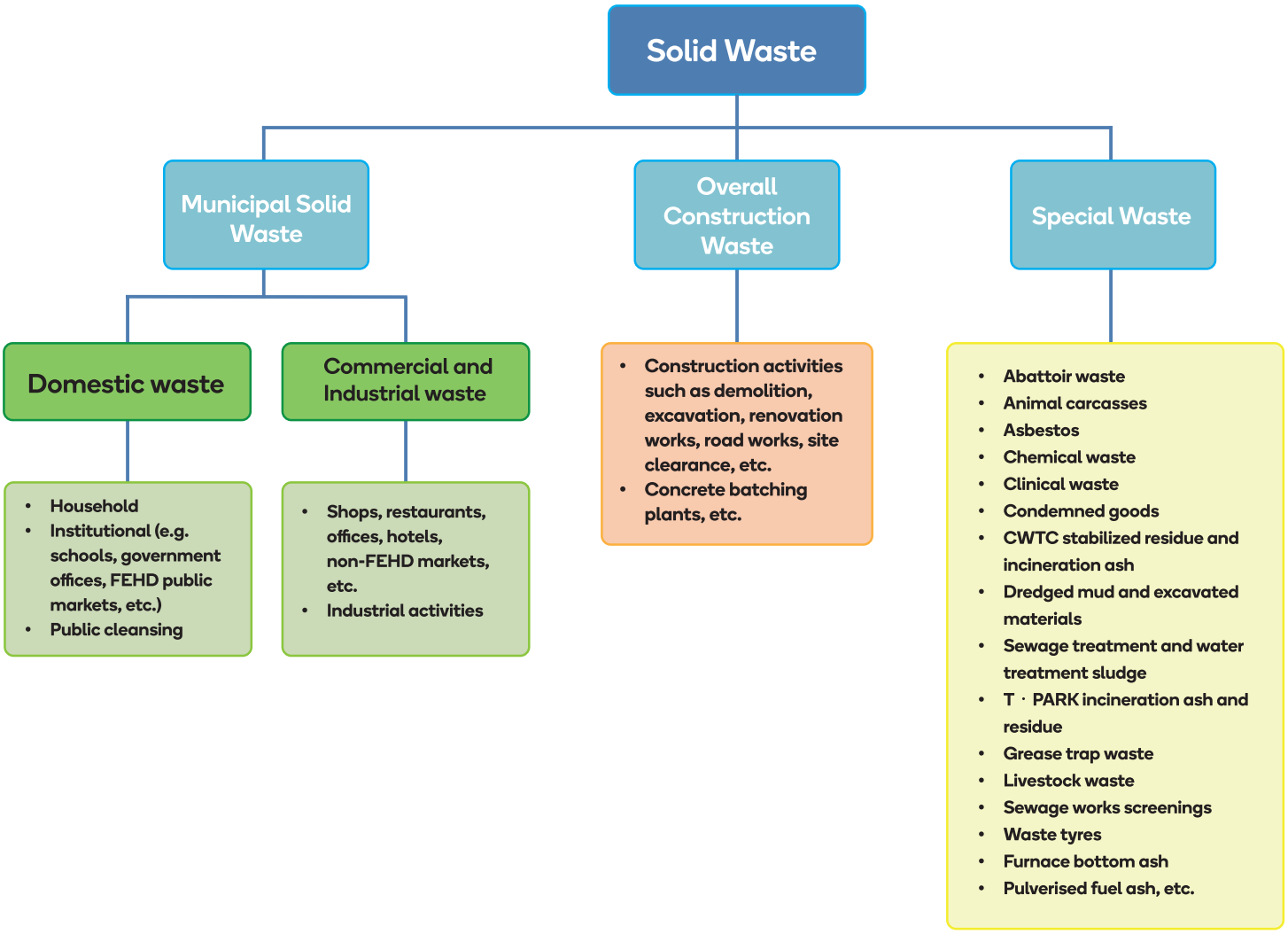
As the WENT and NENT Landfills, which began operation in 1990s, are nearing their full capacities, extension plans are being implemented to raise their capacities, with a view to meeting with the long-term needs. The initial works for the extension part of the SENT Landfill was completed which has started receiving construction waste since November 2021. According to the strategies set out in the Waste Blueprint for Hong Kong 2035, should there be sufficient waste-to-energy and waste-to-resources facilities in place by around 2035, we will no longer need to rely on landfills for direct disposal of MSW. By then, only waste that is non-combustible and cannot be recycled or reused, such as construction waste, will be disposed of at the landfills.

Hong Kong generates several different types of waste, and each has its own requirements for handling. The EPD keeps regular statistics on each waste type, such as composition, quantity sent for disposal, and quantity recycled.

Municipal solid waste (MSW)	Comprises solid waste from households, commercial and industrial sources. This excludes construction waste, chemical waste, clinical waste and other special waste. MSW is disposed of at landfills
Food waste	The major constituent of the municipal solid waste in Hong Kong. It comprises waste produced during food production, processing, wholesale, retail and preparation, as well as after meal leftovers and expired foods. It is highly degradable which can easily cause odour and hygiene problems
Construction waste	Waste arising from construction work such as construction, renovation, demolition, land excavation and road works. Through waste sorting and separation, inert material is used as fill in reclamation sites, when available. The non-inert portion of the waste still goes to landfills
Chemical waste	Substances specified under the Waste Disposal (Chemical Waste) (General) Regulation as posing a possible risk to health and / or the environment
Clinical waste	All waste generated from various healthcare, laboratory and research practices as defined in Section 2 and Schedule 8 of the Waste Disposal Ordinance. It should be managed properly so as to minimise danger to public health or risk of pollution to the environment

Introduction of Solid Waste in Hong Kong

Waste cooking oils (WCO)	Cooking oil abandoned from any cooking process for human consumption, regardless whether they have been used for their original purposes (e.g. grease trap waste, used cooking oil and unused cooking oil abandoned for reasons such as spoilage), other than those from households. WCO should be handled properly to promote recycling of local resources and prevent them from re-entering the food chain
Special waste	Include animal carcasses, livestock waste, radioactive waste, grease trap waste, sewage sludge and waterworks sludges. These wastes need to be treated separately. Arrangements are being developed for the proper treatment and disposal of these wastes, but more time is needed to address community concerns about such facilities
Other solid waste	Comprises dredged mud and excavated materials disposed of at marine disposal sites



Source: Environmental Protection Department

Introduction of Solid Waste in Hong Kong

2. Situation of special waste and waterworks sludge

The large amount of residues generated during the treatment process at environmental facilities is classified as special waste, with the Hong Kong Water Treatment Works (WTW) producing about 87 tonnes of dewatered waterworks sludge per day in 2022. At present, no suitable treatment method is available and the sludge is generally disposed of at landfills. Considering that the existing landfills will soon reach their capacity, there is an urgent need to recycle and upcycle the residues to reduce the burden on the landfills.

Special waste	Average daily quantity of special waste (tonnes per day)		
	2020	2021	2022
Abattoir waste	5	6	9
Animal carcasses and kennel waste	4	5	6
Asbestos waste	3	4	3
Chemical waste other than asbestos waste	5	4	4
Clinical waste (with package material)	3	1	4
Dewatered dredged materials	4	15	0
Dewatered sludges	65	39	34
Dewatered waterworks sludge	75	85	87
Incineration ash and stabilised residue	137	146	129
Livestock waste	69	74	76
Sewage works screenings	72	77	53
Waste tyres	52	57	47
Others (including condemned goods)	18	16	16
Total	512	529	469

Source: Environmental Protection Department

3. Recycling techniques of waste residues from different environmental facilities and local examples

Waste residues from different environmental facilities	Techniques	Local examples
Coal ash	Manufacture of concrete products, uses in fill and reclamation, highway construction and reinforced soil structures	Construction of Chek Lap Kok Airport, use in structural concrete for foundation works in the Housing Department's building projects
Sewage sludge, waterworks sludge, fly ash, bottom ash, etc.	Drying, crushing, sieving, mixing, moulding, vibrating, and curing	Eco-bricks

Visit to T·PARK

Objectives

1. To introduce T·PARK which is a Hong Kong's first self-sustained sludge treatment facility
2. To understand how the sludge generated in our daily life, and its impact on the environment, raising students' awareness on environmental protection
3. To learn about sludge incineration technologies adopted in T·PARK, as well as its power generation, desalination, and sewage treatment systems. Grasp and apply the concept of waste-to-energy in handling different types of waste to reduce environmental impacts
4. To encourage students to explore and practise towards a sustainable living style, collectively constructing a green future

Activity Arrangements

Preparation

- Teacher can make an online reservation or call 2910 9700 to book a visit two months in advance
- Teacher can prepare a list of participants with contact information, an activity schedule, and activity details, including transportation arrangements, pick-up and dismiss time, and rundown of activity, etc.
- Before the visit, teacher can notify students and parents about the purposes and requirements of the activity through school notice, and remind students to bring stationeries, water bottles, sunscreen, and insect repellent
- Teacher can prepare relevant learning materials, such as information about T·PARK

Requirements

- Students should respect the guidelines and instructions provided by T·PARK docents and staff
- Students should pay attention to safety, follow the safety guidelines set by T·PARK and tour schedules
- Students should actively participate in activities, ask questions, and share opinions
- Students should wear appropriate clothing and bring a jacket or rain gear according to the weather condition

Activity flow

- Students should gather at the school in the morning and take shuttle bus to T·PARK
- Upon arrival at T·PARK, students are given a brief introduction and then a guided tour

Visit to T·PARK

Activity Arrangements	• Students learn about sludge incineration techniques and self-sustained design, such as heat, power generation, and total water management • After the guided tour, teacher should wrap up the activity with a Q&A session at the end of the guided tour **Conclusion** • Teacher can conduct a short discussion after the activity for students to share their thoughts on the T·PARK visit and the knowledge acquired from the visit • Teacher can guide students to apply the environmental and sustainable development knowledge gained during the visit into their daily lives, such as using energy-efficient appliances at home
Time	**One lesson:** Preparation before the activity (distribution of notices, activity briefings, and collection of reply slips) **Half day:** Visit to T·PARK **One lesson:** Conclusion and discussion after the activity
Materials	• School Notice • Activity Details List • Introduction of T·PARK • Student Worksheet
Remarks	1. T·PARK is currently closed for accepting new applications from organisations and schools. If application remains suspended during the activity preparation stage, the arrangement will be rescheduled to WEEE·PARK. For details, please refer to "T·PARK Back-up Programme: Visit to WEEE·PARK" 2. Reservations are not transferable once accepted 3. Reservations are required to visit T·PARK, and guided tours are available at specific time slots and generally take 1.5 hours 4. Individual, organisation, and school applicants who have booked guided or interactive educational tours shall arrive on time. Late arrival for more than 30 minutes will be regarded as no-show 5. For organisation and school booking, applicants who have no-show or less than 50% of the total number of persons showing up for the visit, will have their booking right been suspended for 3 months

Visit to T·PARK

Remarks

6. All cancellation of bookings should be made at least 7 days prior to the date of visit via email. Late cancellation is regarded as no-show.
7. If there is a need to amend contact personal information (name, contact number, email address, etc.) or vehicle licence plate number, please call 2910 9700 or email info@tpark.hk. Amendment is generally not allowed unless there is a need to reduce the number of visitors / facilities reservation. A new booking application is required for extra visitors, additional facilities reservation or change of activity
8. Schools shall arrange their own transportation. All unregistered vehicles are not allowed to enter T·PARK. Coaches are allowed for drop-off and pick-up only. Please provide your licence plate number for registration via email at least 2 working days in advance
9. T·PARK is a sludge treatment facility located within an industrial establishment. For safety reasons, no access to restricted areas is allowed. Only the facilities inside the Environmental Education Centre building and certain outdoor areas, i.e. T·GARDEN, T·HABITAT, and T·ROOF are open to visitors

"Recources Circulation in Hong Kong" Extended Activity 3:

School Notice

XXX Primary School

Activity Notice on P.6 General Studies Visit to T·PARK

Dear Parents / Guardians,

To comply with the curriculum of General Studies of Primary 6, a visit to T·PARK will be arranged for Primary 6 students. The details are as follows:

Date	:	XX XX 20XX (X)
Venue	:	T·PARK (25 Nim Wan Road, Tsang Tsui, Tuen Mun)
Visiting hours	:	9:30 a.m. – 1:30 p.m.
Transportation	:	Shuttle bus
Teacher-in-charge	:	Mr. / Miss XXX
Remarks	:	1. Students are required to wear school sports uniform 2. The visit will be led by the General Studies teachers 3. Students should bring along student worksheet and stationeries

Students are required to participate in this activity in order to comply with the curriculum of their study. If there are any special circumstances, please discuss with the General Studies teacher. Parents are required to fill in the Reply Slip and submit it to the General Studies Teacher by XX XX (X). If you have any enquiry, please contact Mr. / Miss XXX at XXXX XXXX.

Yours sincerely,

Mr. / Miss XXX

Principal

XX XX 20XX

---------- Reply Slip ---------- (Parents please keep the above notice for reference)

Reply Slip for Activity Notice on P.6 General Studies Visit to T·PARK

To whom it may concern:

I agree to allow my child to attend the visit to T·PARK and have acknowledged the arrangements.

Student's Name: _____

Class: _____ ( )

Parent / Guardian's Name: _____

Parent / Guardian's Contact No.: _____

Parent / Guardian's Signature: _____

(Please sign with a ball pen)

XX XX 20XX

“Resources Circulation in Hong Kong” Extended Activity 3: Activity Details List

P.6 General Studies Visit to T·PARK		
Date: XX XX 20XX (X)		Time: 09:30-13:30
Venue: T·PARK (25 Nim Wan Road, Tsang Tsui, Tuen Mun)		
Time	Events	Materials
09:30-09:40	• Roll Call	Student List
09:40-10:40	• Take shuttle bus to T·PARK	/
10:45-12:10	• Guided Tour	/
12:10-12:30	• Conclusion	Student Worksheet
12:30-13:30	• Return to school by shuttle bus	/

P.6 General Studies Visit to T·PARK Student List

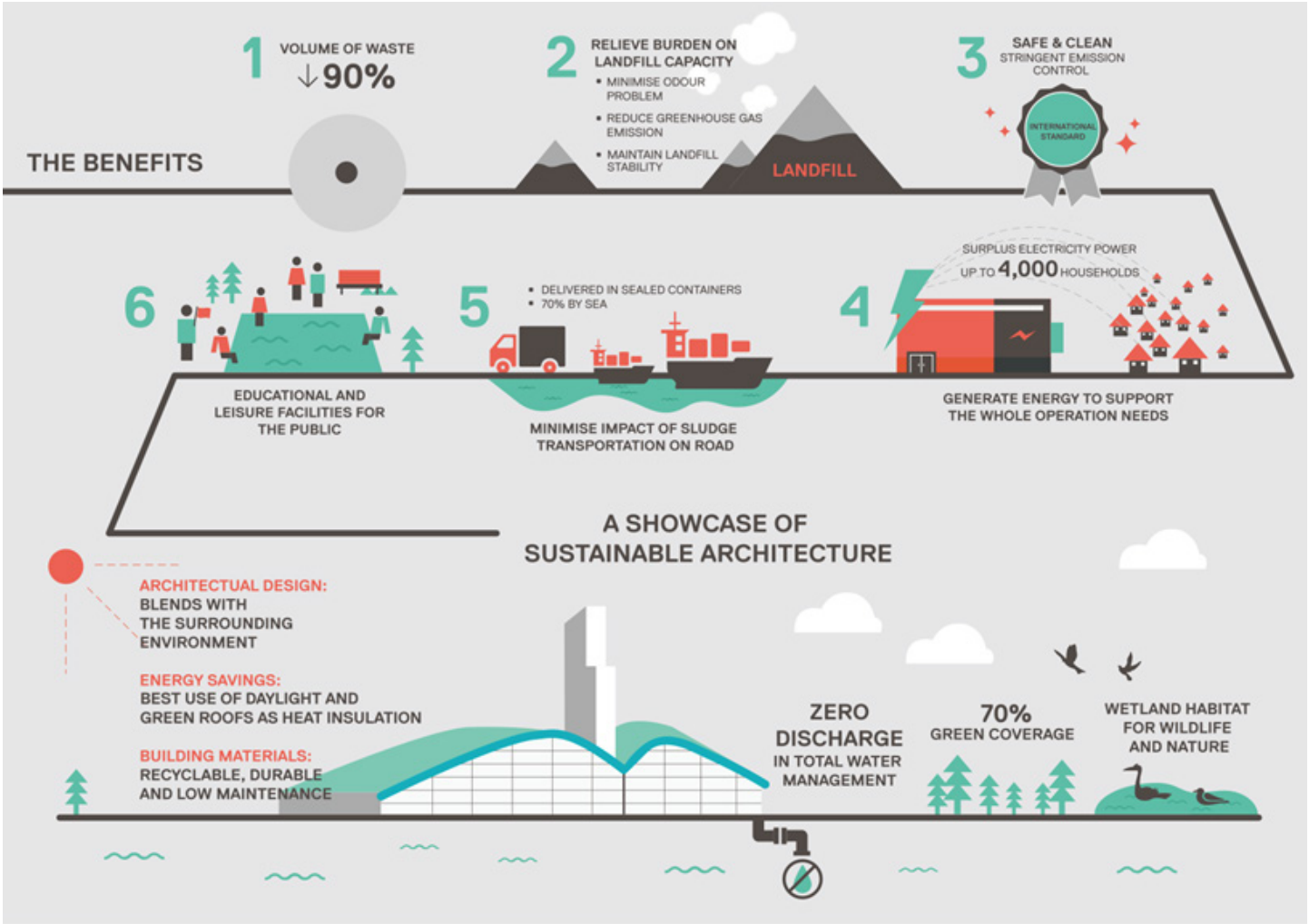
Teacher-in-charge: Mr. / Miss XXX

No.	Student no.	Student’s name	Gender	Parent / Guardian's contact no.	Attendance
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					

Introduction of T·PARK

What is T·PARK?

T·PARK is an important step in Hong Kong's waste-to-energy journey. T·PARK is a state-of-the-art sludge treatment facility, which is specifically designed to address one of the many waste challenges in Hong Kong. "T" stands for Transformation, representing the city's vision to embrace the concept of "waste-to-energy", and to drive positive change in the attitudes and behaviours of people towards waste management and resource recovery. T·PARK is a unique self-sufficient facility which combines a variety of advanced technologies into a single complex: sludge incineration, power generation, desalination and wastewater treatment. Additionally, T·PARK features an environmental education center with various recreational, educational and ecological facilities, allowing visitors to experience the benefits of "waste-to-energy" management and environmental protection.



Introduction of T·PARK

"Waste-to-energy" process

1. **Sludge reception: Receiving sludge all year round from 11 sewage treatment works**

   Truck passes through the weighbridge to record the weight of sludge received before proceeding to the delivery bay for discharging to the bunker. The enclosed delivery bay is equipped with an advance deodorisation system to prevent odour from escaping. The truck is required to be cleaned and dried before leaving the delivery bay. An automated grabber places the sludge into dedicated hoppers prior to mixing and pumping it into the incinerator

2. **Incineration: Proven and highly reliable fluidised bed technology for efficient combustion**

   A proven and high-tech thermal technology known as fluidised bed incineration is adopted to treat the sludge through high efficient combustion. The thermal gases in the incinerator reach a temperature above 850°C for at least 2 seconds to control the formation of organic pollutants. The treatment process considerably cuts the volume of waste to be disposed of in the landfills by up to 90% and reduces greenhouse gas emission into the atmosphere

3. **Flue gas treatment: Advanced flue gas treatment meets strict international standards**

   Highly effective flue gas cleaning system is used to remove particulates and pollutants in the flue gas. The series of treatment comprises the multi-cyclone, the dry reactor and the bag filter where large and fine particles are removed and acidic gases, organic pollutants and heavy metals are neutralised or captured. The cleaned flue gas is constantly monitored by a Continuous Emission Monitoring System (CEMS) to ensure full compliance with stringent international emission standards

4. **Power generation: Self-sustained power generation**

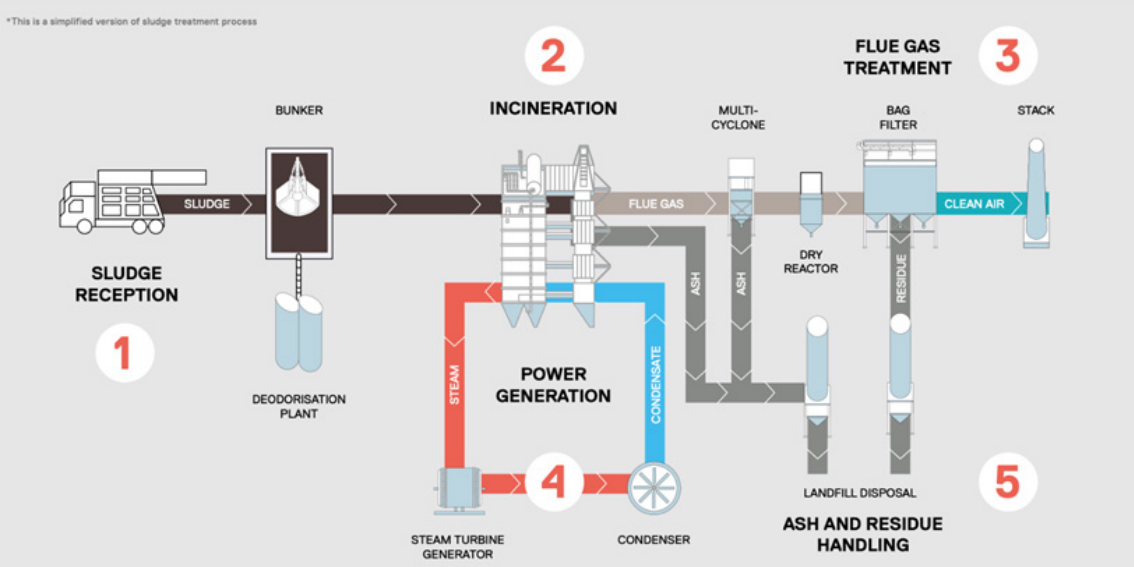
   The incinerator acts like a boiler with a large number of water pipes surrounding its walls. The heat energy generated by the incineration process boils the water to produce steam, which then passes through a turbine to generate electricity. Steam condenses and becomes water again. It will then return to the incinerator to repeat the power generation process

5. **Ash and residue treatment: Significant volume reduction of sludge by up to 90%**

   Inert ash and residues collected after the incineration and flue gas treatment processes are temporarily stored in silos. They are then tested to ensure full compliance with the treatment standards before sending to the adjacent West New Territories Landfill for disposal. By reducing the original sludge volume by up to 90%, the facility achieves a substantial decline on landfill loading

6. **Total water treatment: Self-sufficient in water supply with fresh water and recycled water**

   An advanced desalination plant is used to purify seawater drawing from the nearby Deep Bay to provide potable and process water, while rainwater is collected for non-potable use. The facility achieves "zero effluent discharge" through the deployment of a compact wastewater treatment system that allows all wastewater to be collected, treated and reused on-site for irrigation, flushing and cleansing purposes



Name

Student Worksheet

1 **What was the most profound experience during the visit? (30-50 words)**

2 **What have I learnt? (30-50 words)**

3 **Briefly describe the "waste-to-energy" process adopted at T·PARK. (30-50 words)**

Visit to Waste Electrical and Electronic Equipment Processing and Recycling Facility (WEEE·PARK)

Objectives

1. To introduce WEEE·PARK which is a Waste Electrical and Electronic Equipment (WEEE) treatment and recycling facility
2. To recognise the importance of proper disposal of waste electrical and electronic equipment for the environment and human health
3. To learn about the operational process of recycling waste electrical and electronic equipment and apply the concept of "waste-to-energy" in handling different types of waste to reduce environmental impacts
4. To encourage students to explore and practise environmental towards a sustainable living style, collectively constructing a green future

Activity Arrangements

Preparation

- Teacher can make an online reservation or call 2290 9500 to book a visit one month in advance
- Teacher can prepare a list of participants with contact information, an activity schedule, and activity details, including transportation arrangements, pick-up and dismiss time, and rundown of activity, etc.
- Before the visit, teacher can notify students and parents about the purposes and requirements of the activity through school notice, and remind students to bring stationeries, water bottles, sunscreen, and insect repellent
- Teacher can prepare relevant learning materials, such as information about WEEE·PARK

Requirements

- Students should respect the guidelines and instructions provided by WEEE·PARK docents and staff
- Students should pay attention to safety, follow the safety guidelines set by WEEE·PARK and tour schedules
- Students should actively participate in activities, ask questions, and share opinions
- Students should wear appropriate clothing and bring a jacket or rain gear according to the weather conditions

Activity flow

- Students should gather at the school in the morning and take shuttle bus to WEEE·PARK
- Upon arrival at WEEE·PARK, students are given a brief introduction and then a guided tour

Visit to Waste Electrical and Electronic Equipment Processing and Recycling Facility (WEEE·PARK)

Activity Arrangements	• Students visit the Exhibition Corridor, Unloading Bay, Buffer Storage, Processing Hall, and Dashboard Area • After the guided tour, teacher should wrap up the activity with a Q&A session at the end of the guided tour **Conclusion** • Teacher can conduct a short discussion after the activity for students to share their thoughts on the WEEE·PARK visit and the knowledge acquired in the visit • Teacher can guide students to apply the environmental and sustainable development knowledge gained during the visit to their daily lives, e.g. maximise the lifespan of electronic products
Time	**One lesson:** Preparation before the activity (distribution of notices, activity briefings, and collection of reply slips) **Half day:** Visit to WEEE·PARK **One lesson:** Conclusion and discussion after the activity
Materials	• School Notice • Activity Details List • Introduction of WEEE·PARK • Student Worksheet
Remarks	1. Visits to WEEE·PARK must be booked in advance and applications must be submitted at least 7 to 90 days before the scheduled visit date. Visitors will be notified of the programme arrangements by email within 3-5 working days 2. Reservations are required to visit WEEE·PARK, and guided tours are available for a specific time slot, usually 1 hour 3. Reservations are not transferable once accepted 4. Please notify WEEE·PARK by email no less than 1 working day prior to the date of visit if you wish to change or cancel your reservation, late cancellations will be treated as no-shows 5. Visitors must arrive at WEEE·PARK on time. Visitors arriving 30 minutes or more after the scheduled time will be considered absent

Visit to Waste Electrical and Electronic Equipment Processing and Recycling Facility (WEEE·PARK)

Remarks	6. Visitors are required to arrange their own transport to and from WEEE·PARK. 1 coach parking space and a limited number of private car parking spaces are available at WEEE·PARK for visitors' application. Visitors are required to provide their car registration number to the Museum for registration at least 3 working days prior to the date of visit, otherwise the application will not be accepted 7. Photography, video recording, or any other form of recording is strictly prohibited in any area of WEEE·PARK without prior written approval 8. WEEE·PARK does not have a restaurant or snack vending machines. Visitors are advised to bring their own drinking water

"Recources Circulation in Hong Kong" Extended Activity 4:

School Notice

XXX Primary School

Activity Notice on P.6 General Studies Visit to WEEE·PARK

Dear Parents / Guardians,

To comply with the curriculum of General Studies of Primary 6, a visit to WEEE·PARK will be arranged for Primary 6 students. The details are as follows:

Date	:	XX XX 20XX (X)
Venue	:	WEEE·PARK (Lots P2-P4 of EcoPark, 133 Lung Mun Road, Tuen Mun Area 38)
Visiting hours	:	9:30 a.m. – 1:30 p.m.
Transportation	:	Shuttle bus
Teacher-in-charge	:	Mr. / Miss XXX
Remarks	:	1. Students are required to wear school sports uniform 2. The visit will be led by the General Studies teachers 3. Students should bring along student worksheet and stationeries

Students are required to participate in this activity in order to comply with the curriculum of their study. If there are any special circumstances, please discuss with the General Studies teacher. Parents are required to fill in the Reply Slip and submit it to the General Studies Teacher by XX XX (X). If you have any enquiry, please contact Mr. / Miss XXX at XXXX XXXX.

Yours sincerely,

Mr. / Miss XXX

Principal

XX XX 20XX

---------- Reply Slip ---------- (Parents please keep the above notice for reference)

Reply Slip for Activity Notice on P.6 General Studies Visit to WEEE·PARK

To whom it may concern:

I agree to allow my child to attend the visit to WEEE·PARK and have acknowledged the arrangements.

Student's Name: _____

Class: _____ ( )

Parent / Guardian's Name: _____

Parent / Guardian's Contact No.: _____

Parent / Guardian's Signature: _____

(Please sign with a ball pen)

XX XX 20XX

“Resources Circulation in Hong Kong” Extended Activity 4: Activity Details List

P.6 General Studies Visit to WEEE·PARK		
Date: XX XX 20XX (X)		**Time: 09:30-13:30**
Venue: WEEE·PARK (Lots P2-P4 of EcoPark, 133 Lung Mun Road, Tuen Mun Area 38)		
Time	**Events**	**Materials**
09:30-09:40	• Roll Call	Student List
09:40-10:40	• Take shuttle bus to WEEE·PARK	/
10:45-12:00	• Guided Tour	/
12:00-12:30	• Conclusion	Student Worksheet
12:30-13:30	• Return to school by shuttle bus	/

P.6 General Studies Visit to WEEE·PARK Student List

Teacher-in-charge: Mr. / Miss XXX

No.	Student no.	Student’s name	Gender	Parent / Guardian's contact no.	Attendance
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					

Introduction of WEEE·PARK

What is WEEE·PARK?

WEEE·PARK is a state-of-the-art Waste Electrical and Electronic Equipment (WEEE) treatment and recycling facility located on a 3-hectare site in EcoPark, Tuen Mun. It signifies Hong Kong SAR Government's commitment towards sustainable use of resources and provides an essential infrastructure in support of the implementation of the producer responsibility scheme on WEEE (WPRS). WEEE·PARK is designed to treat 30 000 tonnes of regulated WEEE annually.

Features of WEEE·PARK

Green architecture	The facility adopts different green building features, including a rainwater harvesting system, a solar water heating system, and green architectural design to maximise the use of natural lighting and ventilation. In addition, WEEE·PARK has a green coverage ratio of 30 percent, and has achieved BEAM Plus Gold rating.
Smart recycling	Apart from the main facility located in the EcoPark in Tuen Mun, WEEE·PARK is expanding its collection network in the territory and has established 5 regional collection centres. With a smart tracking and reporting system, the network provides logistics supports to facilitate the fleet in the collection of regulated WEEE disposed of by members of the public across Hong Kong.
Cherishing resources and care for the community	Equipped with a refurbishment workshop, WEEE·PARK diverts serviceable electrical appliances received for repair into refurbished items for further donation to families in need, promoting a loving and caring community while going green.

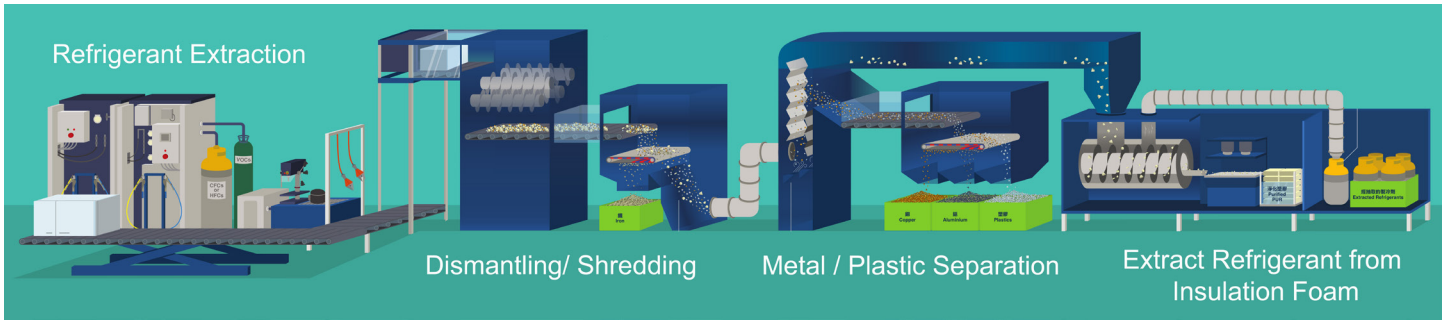
Introduction of WEEE·PARK

Treatment processing of WEEE·PARK

There are four processing lines:

Line 1 (Refrigerators, tumble dryers and dehumidifiers processing):

Refrigerants (CFC or HFC) are extracted from refrigerators, tumble dryers or dehumidifiers for proper disposal. The refrigerators are then dismantled in an inert atmosphere whereby potentially flammable insulation will be extracted safely and metal and plastic components will be separated. The tumble dryers and dehumidifiers are then transferred to other processing lines for further material separation



Line 2 (Air-conditioners processing):

Refrigerants (CFC or HFC) are extracted from air-conditioners for proper disposal. The air-conditioners are then transferred to Line 3 for further material separation

Introduction of WEEE·PARK

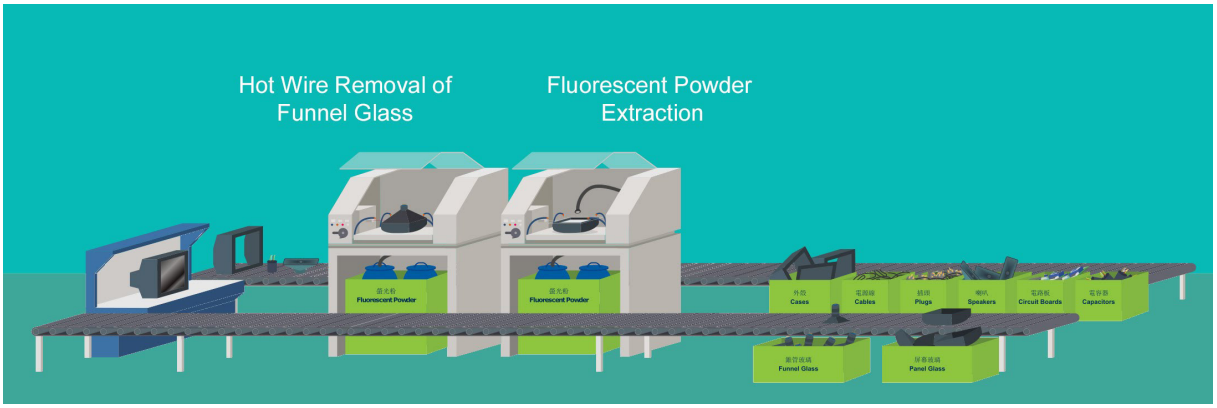
Treatment processing of WEEE·PARK

Line 3 (Dismantling and material sorting):

Computers, printers, scanners, washing machines, tumble dryers and dehumidifiers (transferred from Line 1), air-conditioners (transferred from Line 2), as well as televisions and monitors (after detoxification in Line 4) are dismantled, shredded and sorted into secondary materials, such as steel, copper, aluminium, and plastics

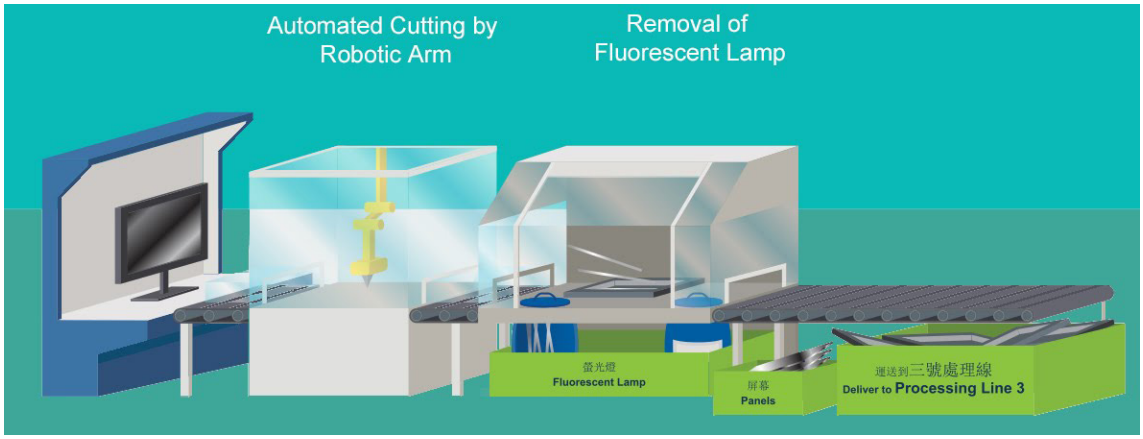
Line 4 (CRT detoxification):

CRT (Cathode Ray Tube) screens are dismantled using hot wire in order to separate the lead containing funnel glass and to extract the fluorescent powder for proper disposal



Processing line 4 (Flat screen detoxification):

Flat screens are cut open automatically using robotic arm and the mercury containing fluorescent lamps are removed for proper disposal. The remaining parts are transferred to Line 3 for further dismantling



Resources Circulation in Hong Kong | Extended Activity 4

Name

Student Worksheet

1 What was the most profound experience during the visit? (30-50 words)

2 What have I learnt? (30-50 words)

3 Suggest two ways to reduce the disposal of waste electrical and electronic equipment. (30-50 words)

Primary 6

Supplementary Information

1. Common types of recyclables in Hong Kong

Recyclables	Recycling Steps	Examples of recyclables	Examples of non-recyclables
Paper	Tear off plastic tape and book covers made of composite materials (e.g. with plastic film), remove non-paper materials (such as paper clips, staples, etc.) and keep the paper dry before recycling	Newspaper, office paper, corrugated fiberboard (cardboard), textbooks, supplementary exercise books, school notes, used books	Thermal paper receipts, tissue wrap, baking paper, tracing papers, tissue, paper wipes
Plastics	Rinse and empty before recycling	Various types of beverage plastic bottles, personal care plastic bottles, cleansing liquid bottles, plastic bags, plastic tableware, plastic containers, plastic packaging materials, CDs/DVDs & cases, expanded polystyrene	Rubber / latex (e.g. slippers / flip-flops, balloons), silicon (e.g. collapsible food containers), plastic products with metals (e.g. suitcase), other composite materials (e.g. chips bags and instant noodles packaging bags with aluminium interior coatings, toothpaste tube, toothbrush, play clay, plastic tape, etc.), X-ray plastic films, video and cassette tapes
Metals	Rinse and empty before recycling	Tin cans, aluminium cans, and other metals (e.g. milk powder cans, Poon Choi containers, metal bread tongs, aluminium foil, etc.)	Compressed gas cylinders / aerosol cans, chemical containers, dangerous and sharp items (e.g. chopper)
Glass bottles	Rinse and empty before recycling	Beverage bottles, food and sauce bottles	Glass containers of chemicals, glass cooking and dining wares, mirrors, tempered glass, window glass, other glass construction materials, and non-glass materials (e.g. ceramics, crystals, etc.)
Regulated electrical equipment (REE)	Keep the item clean and tidy, organise cables, make an appointment with the Government's recycling service operator for a free door-to-door collection service by calling the hotline	Regulated electrical equipment (REE), including air-conditioners, refrigerators, washing machines, tumble dryers, dehumidifiers, televisions, computers, printers, scanners and monitors	Appliances exceeding the specified capacity limits

1. Common types of recyclables in Hong Kong

Recyclables	Recycling Steps	Examples of recyclables	Examples of non-recyclables
Small electrical appliances	Keep the item clean and tidy, organise cables	General small household electrical appliances (e.g. electric fans, coffee machines, vacuum cleaners, hair dryers, microwave ovens, etc.) Other types of small electrical appliances (e.g. Bluetooth headphones, digital dictionaries, computer hard disks, game consoles, mobile / landline phones, USB cables, power cables and power strips / extension units, etc.) Lamp sets	electrical appliances for clinical use and personal care devices (e.g. electric shavers) (Note: If the small household appliances do not pose hygiene and disease transmission risks, for example, electric toothbrushes with brush heads removed, GREEN@COMMUNITY and downstream recyclers could still accept and recycle the items.)
Rechargeable batteries	Cover the battery terminals with masking tape before recycling	Portable rechargeable batteries, such as Li-ion, NiMH and Ni-Cd contained in household equipment like mobile phones and notebook / tablets	Primary batteries (e.g. alkaline, zinc carbon, button cells, etc.), lead acid batteries and vehicle batteries
Fluorescent lamps and tubes	Reuse the packaging of new lamps to place the used lamps before depositing them in the collection box for recycling	Spent mercury-containing lamps generated from household, including compact fluorescent lamps, fluorescent lamps (straight tubes and other shapes), and high-intensity discharge (HID) lamps	Incandescent lamps
Beverage cartons	Remove non-beverage carton materials, rinse the recyclables and empty the content before recycling	Milk cartons, aluminium foil cartons, etc.	Oil-stained aluminium foil boxes that are difficult to clean (e.g., chip container)
Food waste	Remove non-food waste, drain liquid	Raw, cooked, leftover or spoiled food, including wheat & grains, fruits & vegetables, meat and residues etc.	Watery food, non-food waste materials, etc.

Source: Hong Kong Waste Reduction Website

2. Reduce waste at source and clean recycling

Reduce waste at source: Avoid the use of disposable items and use items that are reusable / recyclables instead, minimise unnecessary packaging by selecting products with minimal packaging. For example:

- Support shop naked
- Bring your own cup when purchasing takeaway drinks
- Bring your own reusable shopping bags when shopping
- Choose electronic receipts and e-statements
- Consider renting equipment and buying second-hand items (e.g. books) instead of purchasing brand new products

Clean recycling: Citizens should pre-separate and practice clean recycling before recycling. Examples are as follows:

- Tear off plastic tape and remove non-paper materials (e.g. staples or paper clips) before recycling paper
- Rinse and empty before recycling beverage bottles
- Rinse and empty before recycling metals
- Remove straws and plastic wrappings, cut a corner and rinse the beverage cartons, and flatten them before recycling beverage cartons

3. Waste management infrastructure facilities waste-to-energy / waste-to-resources in Hong Kong

T • PARK **(Sludge Treatment Facility)**	Adopts advanced incineration technology to treat up to 2 000 tonnes of sewage sludge from sewage treatment works each day
WEEE • PARK **(Waste Electrical and Electronic Equipment (WEEE) Treatment and Recycling Facility)**	Treats up to 30 000 tonnes of Waste Electrical and Electronic Equipment (Regulated Electrical Equipment) annually, turning them into valuable secondary raw materials
O • PARK1 **(Organic Resources Recovery Centre Phase 1)**	Adopts anaerobic digestion technology that can convert 200 tonnes of food waste into electricity each day
O • PARK2 **(Organic Resources Recovery Centre Phase 2)**	Adopts anaerobic digestion technology that can convert 300 tonnes of food waste into electricity each day
Y • PARK **(Yard Waste Recycling Centre)**	Equips with plant and equipment to screen, sort and treat the yard waste for transforming into various useful materials such as compost. Some wood materials will also be provided to relevant industries to support their operations
I • PARK **(Integrated waste management facilities)** **(Anticipated to commence operation by 2025)**	Adopts advanced incineration technology to treat 3 000 tonnes of municipal solid waste each day