

‘Go Green on Lamma Island’ Programme

Set 2

Aims of the Programme:

- To promote a low carbon lifestyle in students, and to develop their knowledge, skills and positive values and attitudes that enable them to make well-informed decisions and take action for the creation of sustainable environment.

Students’ prior knowledge:

- S3: - the types of renewable energy.
- the measures to conserve the environment in Hong Kong, and the sustainable farming methods.
- S4: - the causes and effects of climate change and the related measures taken locally, nationally and globally to combat climate change.
- S5: - the causes and impact of global warming and the strategies used to cope with global warming.

After the programme, students are able to:

- understand the causes and effects of greenhouse gases emission in Hong Kong.
- discuss how different measures help combat climate change.
- evaluate the measures taken to combat climate change on Lamma Island.
- recognise the importance of having low carbon lifestyle.
- be willing to take action to combat climate change in their daily life.

Rundown:

9:10 – 9:35	Take ferry to Yung Shue Wan at Central (Aboard at 9:10 am at Central Pier No.4*)
9:35 - 9:45	Introduction / Briefing at Yung Shue Wan Ferry Pier
9:45 - 10:20	Survey in the collection points for recyclable materials and visit Lamma Corner at Yung Shue Wan Main Street. Staff of Lamma Corner introduces closed loop recycling, upcycling and waste problems on Lamma Island
10:20 - 10:35	Briefing: Activity on Eco-shopping
10:35 - 10:50	Student presentation and debriefing at Yung Shue Wan playground
10:50 - 11:25	Walk and visit a local farm
11:25 - 11:35	Walk to Lamma Power Station Beach
11:35 - 12:05	Discuss whether fuel mix alone can combat climate change
12:05 - 12:20	Walk to Lamma Winds
12:20 - 13:20	Study the exhibition board and conduct a role play to discuss whether renewable energy should be further developed in Hong Kong
13:20 - 13:30	Walk to Hung Shing Yeh Beach
13:30 - 14:20	Lunch
14:20 - 14:50	Hike to the Hung Shing Yeh Beach Tree Planting Site
14:50 - 15:20	Hiking and study a home farm
15:20 - 15:50	Hike to the mudflat and study the impact of climate change on mudflat. Teachers’ conclusion and post-trip activity
15:50 - 16:05	Walk to Sok Kwu Wan Ferry Pier
16:05	Take ferry to Central

*Weekdays/Weekend Schedule

'Go Green on Lamma Island' Programme (Pre-trip Activities)

Time	Teaching strategy and content	Notes / Resources
30 mins	<p>Pre-trip Activity:</p> <ol style="list-style-type: none"> 1. Teacher asks students to divide into groups. 2. Teacher asks students to complete the pre-trip activities. 3. Teacher consolidates the learning points of Q.1-4. 4. Teacher briefs students about the questions that need to be addressed in the field trip and introduces the tasks to be done. 	<p>Students can go to the following website of NASA to explore the following:</p> <ul style="list-style-type: none"> • Image of change of land: • Climate time machine <p>(http://climate.nasa.gov/resources/education/)</p>

Field Trip Activities on Lamma Island (Pre-trip Tasks)

Time	Teaching strategy and content	Notes / Resources
	<p>Pre-trip Tasks:</p> <ol style="list-style-type: none"> 1. Teacher asks students to complete the following pre-trip tasks before the field trip. • P.3: Search information about closed loop recycling. Draw the logo and explain the three processes involved. • P.8: Search information about the components of power station and write the letters in the space provided. • P.11: Collect the data of wind turbine at night (after 9:30pm) from the website of HK Electric. Teacher should draw students' attention to the remarks that the units of cumulative electricity generated and amount of CO₂ saved shown on HK Electric's website are different from those shown at the tower base of the wind turbine. 	Relevant websites are provided in the worksheets.

Stop 1: Yung Shue Wan Main Street

Objectives:

At the end of the activity, students should be able to:

- understand the waste problems and the waste management on Lamma Island.
- recognise that ‘reduce’ and ‘reuse’ are the most effective ways to combat climate change.
- make informed decision on the choice of products and food to reduce carbon emission.

Time	Teaching strategy and content
9:35 -10:50 (75 mins)	<ol style="list-style-type: none">1. Teacher briefs students on the tasks to be completed.2. Teacher asks students to complete Q.1-6 of Part 1 and consolidates the learning points. Teacher may use the following questions to guide students to answer Q.4. and Q.6 :<ul style="list-style-type: none">• What items are collected for recycling?• Are the recycling collection points accessible?• Are the recycling collection points enough for the public?3. Teacher guides students to visit “Lamma Corner” (92A Yung Shue Wan Main Street). Staff of ‘Lamma Corner’ briefs students on closed loop recycling, upcycling and explain factors contributing to the waste problems on Lamma Island. Teacher asks students to complete Part 2 Q.1.4. Teacher checks answers of pre-trip task with students and asks students to complete Part 2 Q.2(a) -3. Upon completion, teacher consolidates the learning points.5. Teacher asks students to go to one of the green shops and complete Part 3 Q.1-3. Teacher reminds students to study the label of food/drink (e.g. nature and type of food, lists of ingredients, the origin of production and packaging materials, etc.) and use the concept of carbon footprint in making the purchase decision.6. Teacher asks students to present their answers. Teacher gives feedback to students' presentation and consolidates the learning points.

Points to note:

- Lamma Corner is a shop where ‘environmentally friendly’ products, such as upcycled, recycled and second-hand products are sold to promote the concept of environmental sustainability.
- Teacher is advised to contact Lamma Corner in advance through Eco-Education & Resources Centre (生態教育及資源中心) (Tel: 2697 2029) for arranging briefing for students. The official opening hours of the Centre are from 10am to 6pm.
- Teacher can discuss with the staff of Lamma Corner about the content of the briefing to be delivered. Fee will be charged if the briefing lasts for more than 30 minutes.
- The opening hours of the green shops at Yung Shue Wan Main Street:

	<p>1. Corner 84 Mon, Tue, Thu, Fri & Sat: 7am – 7pm Sun: 8am – 7pm Wed: Closed</p> <p>2. Just Green Mon-Fri: 12nn-8pm Sat-Sun: 10am-9pm</p> <ul style="list-style-type: none"> • The shops can accommodate around 10-15 people.
	<p>Teacher's conclusion:</p> <ol style="list-style-type: none"> 1. Teacher may ask students the factors contributing to the waste problems on Lamma Island and whether these factors are applicable to their living areas. 2. The disposal and treatment of waste can produce greenhouse gases (GHGs) emissions, which contribute to climate change. The most significant GHG gas produced from waste is methane. It is released during the decomposition of organic matter in landfills. Waste prevention and recycling help address climate change by reducing the amount of greenhouse gas emissions and saving energy. 3. Unlike plastic, paper and metal, there are relatively fewer collection points for glass in Hong Kong. Although the glass can be recycled for production of concrete paving blocks, it is not widely used in various public works projects in Hong Kong. Compared to the paving blocks made of the sand from river bed, the price of those recycled products are not attractive due to its high collection, transportation and manufacturing cost. (Information from the exhibition board about Pilot Community Recycling Programme in Islands District at Yung Shue Wan Main Street and EPD, HKSARG) website:https://www.wastereduction.gov.hk/sites/default/files/wr_glass.pdf 4. Plastics are by-products of petroleum. It is widely used because of its low cost. However, plastic is harmful to our living environment. A plastic water bottle takes at least 450 years for decomposition. Moreover, the water resources used in the production of plastic bottles is more than the water contained in the plastic bottles. Therefore, less plastic bottled water should be bought to conserve the water resources and protect the environment. 5. A carbon footprint is defined as "the total set of greenhouse gas emissions caused by an individual, event, organisation, product expressed as carbon dioxide (CO₂) equivalent". The most common way to reduce the carbon footprint of humans is to "Reduce, Reuse, Recycle". Besides, upcycling (creative reuse) is one of the ways to transform waste materials into value-added products of better quality and thus reduce the burden on the landfill. <p>❖ Teacher's reference on carbon footprint: http://timeforchange.org/what-is-a-carbon-footprint-definition</p> <p>Each of the following activities add 1 kg of CO₂ to your personal carbon footprint:</p>

- Travel by public transportation (train or bus) a distance of 10 to 12 km (6.5 to 7 miles)
 - Drive with your car a distance of 6 km or 3.75 miles (assuming 7.3 litres petrol per 100 km or 39 mpg)
 - Fly with a plane a distance of 2.2 km or 1.375 miles.
 - Operate your computer for 32 hours (60 Watt consumption assumed)
 - Production of 5 plastic bags
 - Production of 2 plastic bottles
 - Production of 1/3 of an American cheeseburger
(Figure may vary due to the weight of the plastic bag and whether the energy used for production is taken into account.)
6. As ordinary consumers, we could influence the loop mainly at the “purchasing” process. In fact, we can only partly be involved in the “collecting” process and unfortunately could not be involved in the “manufacturing” process. Even if we take responsible action to put items into corresponding recycling bins/collection points, the collected items are not 100% guaranteed to be collected and channelled for re-manufacturing for various reasons. The majority of items, especially plastic collected in the recycling bins will end up in landfill. Therefore, “putting items in recycling bin/collection points doesn’t necessarily mean they enter the loop of recycling automatically”, i.e. collecting recyclable items is not equal to doing recycling. To combat climate change, “Reduce” and “Reuse” are always the first step to take before considering “recycling”.
7. Every little step of changing our behaviour helps reduce carbon footprints. In addition to buying more locally-produced/product produced from the adjacent areas and less packaging products, we can think innovatively about different ways (reduce air travel and energy consumption, etc) to have a more environmentally friendly lifestyle.

Stop 2: A Local Farm

Objectives:

At the end of the activity, students should be able to:

- understand how the crops can be grown organically for the benefits of the environment.
- make informed decision on the choice of food to combat climate change.

Time	Teaching strategy and content
10:50 -11:25 (35 mins)	<ol style="list-style-type: none">1. Teacher asks students to conduct a survey in the farm and complete Q.1-2 and then Q.3. Consolidates the learning points of Q.1-2 and Q.3 respectively upon students' completion.2. Teacher's conclusion:<ul style="list-style-type: none">• The way of operation of this farm, e.g. growing crops without using chemical fertilisers and machines can reduce carbon emissions.• Production of meat consumes a lot of energy and water. Raising cattle and other livestock add lots of methane to the atmosphere. Thus, GHG can be reduced by choosing a diet with more vegetables and less meat.• Our behaviour, decision and choice of lifestyle will affect the environment. A low carbon living can have a positive impact on the environment.

Stop 3: Viewing at Lamma Power Station from Lamma Power Station Beach

Objectives:

At the end of the activity, students should be able to:

- understand that the burning of fossil fuels for electricity is the largest source of greenhouse gas emissions from human activities.
- understand that the use of fuel mix alone cannot help minimise climate change.

Time	Teaching strategy and content
11:25 -12:05 (40 mins)	<ol style="list-style-type: none">1. Teacher asks students to view Lamma Power Station from Lamma Power Station Beach and checks answers of pre-trip task with students. Teacher can browse the following website for information about Lamma Power Station: https://www.hkelectric.com/en/MediaResources/Documents/LPS_2014.pdf2. Teacher's introduction: Fossil fuels are formed over millions of years, from the remains of dead animals or plants. During photosynthesis, plants absorb carbon dioxide from the air to produce their own food. Carbon dioxide will be released back into the atmosphere through cellular respiration. Sometimes, plants or animals with carbon trapped in their body get buried before decaying. After millions of years, they turn into fossil fuels containing carbon under great heat and pressure. The carbon dioxide is then released back into the atmosphere through combustion. This leads to adverse climate change.3. Teacher asks students to complete Q.1-2. Teacher may use the following questions to guide students to answer Q.1<ul style="list-style-type: none">• Is the Power Station near the coast?• Is the Power Station Sheltered by hills?• Is the Power Station near the residential areas?4. Teacher consolidates the learning points. Teacher discusses with students on whether the use of natural gas can help combat climate change. Teacher may link these learning points to the greenhouse emissions reduction target agreed in the Paris Agreement.5. Teacher's conclusion:<ul style="list-style-type: none">• Carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) are greenhouse gases (GHG). They trap heat in the atmosphere and intensify greenhouse effect, causing global warming.• The Earth is getting warmer because people are adding GHG to the atmosphere. In Hong Kong, electricity generation from the burning of fossil fuel is the biggest contributor to GHG emissions. The situation is getting worse due to rapid population and economic growth.• Hong Kong will continue to phase down coal for electricity generation, use more natural gas and increase non-fossil fuel sources. This will enable Hong Kong to reduce carbon emissions significantly in the medium term, representing a very major commitment. While the power companies as public utilities should strive to be energy efficient, it is always useful to emphasise the overall importance of not

wasting energy for the benefit of the present and future generations and protecting the earth.

(Source:

https://www.climateready.gov.hk/files/report/en/HK_Climate_Action_Plan_2030+_booklet_Eng.pdf)

Stop 4: Lamma Winds

Objectives:

At the end of the activity, students should be able to:

- understand that the development of renewable energy is one of the ways to reduce carbon emission for combating climate change.
- know the advantages and disadvantages of different types of renewable energy.
- understand that climate change can be mitigated through saving energy.

Time	Teaching strategy and content
12:05 -13:20 (75 mins)	<ol style="list-style-type: none">1. Teacher guides students to visit Lamma Winds.2. Teacher's introduction:<ul style="list-style-type: none">• This is the Hong Kong's first wind turbine. It began operating on 23 Feb 2006. Teacher may encourage students who have visited wind farm(s) of other region(s) to share their experience.3. Teacher may introduce the environmental initiatives incorporated into the station design. For example, furnace bottom ash, one of the major solid by-products of burning coal and a rich source of nutrients for plant life, has been used to plant shrubs and trees. Also, pulverised fuel ash was mixed with concrete to make paving blocks for the station. Precast concrete pipes were recycled and used as stands for display boards, while solar-powered luminaries have been installed for lighting purposes. Reference: https://www.hkelectric.com/en/MediaResources/Documents/LammaWinds.pdf4. Teacher asks students to complete Q.1-4 of Part 1 in groups. As students are asked to record the data in Q.1 before the field trip from the website of HK Electric, it is easier for them to find out the relationship between wind speed and power output when they visit this site. For Q.3, the role and the task of each group should be briefed in advance. After students complete their presentation of Q.3, teacher may draw students' attention to the fact that different parties in the community may have different views on the development of renewable energy.5. Teacher asks students to complete Part 2 Q.1 and consolidates the learning points.

Points to note:

- Lamma Winds is occasionally closed for maintenance. Please contact HK Electric (Tel: 2843 3209) in advance to ensure that it is open on the date of the field trip.
Opening hours: 7am-6pm (daily)
- Guided visits to Lamma Power Station and Lamma Winds can be arranged through HK Electric. The visit to both sites will take about 3 hours respectively. Teacher can browse the following website for more information:
<https://www.hkelectric.com/en/our-operations/electricity-generation/application-for-visit-to-hk-electric>

	<p>6. Teacher's conclusion:</p> <ul style="list-style-type: none"> • Although fuel mix can produce less carbon dioxide during energy generation, it is not the most effective way to combat climate change. Wind turbine seems not workable in Hong Kong, whereas it is successfully developed and operated in some countries such as Scotland. The wind farm in Scotland meets over half of Scotland's electricity needs. Under strong wind, its production can fulfill all of electricity needs for a day. • Our behaviour, decision and choice of lifestyle affect the demand and the supply of electricity and in turn the amount of carbon emissions. To combat climate change, we can reduce energy consumption and improve energy efficiency, such as using energy-saving bulbs and energy-efficient appliances at home (Grade 1 products are most efficient). In addition, changing the way of travelling is also an effective way of reducing carbon emission. In conclusion, adopting low-carbon lifestyle will reduce GHG emission.
13:20 – 14:20 (60 mins)	Walk to the Hung Shing Yeh Beach and lunch

Stop 5: Hung Shing Yeh Beach Tree Planting Site

Objectives:

At the end of the activity, students should be able to:

- understand that different types of trees remove carbon dioxide from the air at different rates in Hong Kong.
- understand and appreciate the importance of greenery in reducing carbon footprint.

Time	Teaching strategy and content
14:20 -14:50 (30 mins)	<p>1. Teacher's introduction:</p> <p>There are two tree-planting sites on Lamma Island. This site is Hung Shing Yeh Beach Tree Planting Site. It is jointly established by HK Electric Company and the Conservancy Association to enhance ecological value and promote sustainable development. Another site is Pak Kok Tree Planting Site.</p> <p>2. Teacher asks students to read the interpretative plate and complete Q.1- 2.</p> <p>For Q.1, teacher may ask students to point to the exotic species and explain the two tree species.</p> <ul style="list-style-type: none">• Exotic tree species can survive even on infertile or destroyed land and grow rapidly.• Native tree species can provide food and habitat for local animals. <p>For Q.2, teacher may use the following question to stimulate students' thinking:</p> <ul style="list-style-type: none">• Carbon dioxide can be absorbed significantly and rapidly by the trees on this site. What is your view on this statement? Why? <p>(Suggested Answer: Trees and plants help absorb carbon dioxide and release oxygen. However, as the area of this site and the number of trees are relatively small, carbon dioxide cannot be significantly reduced.)</p> <p>3. Teacher guides students to study the figure of carbon cycle and asks students to complete Q.3.</p> <p>4. Teacher consolidates the learning points.</p> <p>5. Teacher's conclusion:</p> <ul style="list-style-type: none">• Trees and plants help absorb carbon dioxide and release oxygen. An acre of mature trees can capture 2.6 tonnes of carbon dioxide per year. When forests are cut and burnt for farming or development, most of the carbon dioxide is released back to atmosphere. Fewer trees means less carbon dioxide can be naturally removed. This leads to the increase in global temperature. Trees can reduce energy use for heating by blocking winter winds, while shade from trees reduces the needs of air-conditioning. In this regard, participation in tree planting activities can therefore help reduce climate

change.

- Although trees have a significant effect on relieving climate change, it is difficult for the government or NGOs to plant trees in a large scale as its cost is very high. The more effective way is to reduce the use of paper in our daily lives.

Stop 6: The Home Farm

Objectives:

At the end of the activity, students should be able to:

- understand that eating home-grown crops and buying local food can reduce carbon footprint.
- make informed decision on the choice of food to combat climate change.
- realise that some solutions to global warming may not be feasible in some regions or countries.

Time	Teaching strategy and content
14:50 -15:20 (30 mins)	<p>1. Teacher's introduction:</p> <ul style="list-style-type: none">• Home farm is a part of a large country estate that is farmed by the landowner or an employed farm manager but it is rarely found in Hong Kong.• Teacher asks students to complete Q.1-5 and consolidates the learning points. <p>2. Teacher's conclusion:</p> <ul style="list-style-type: none">• Local food or food grown at home can help reduce global warming because it requires less fossil fuels to transport and thus reduces greenhouse gas emissions.• Therefore, think twice before you choose the food. Buying fresh local food can consume less energy and cause less pollution. Choose a diet with more vegetables and less meat, and buy organic food can also help to improve the environment. (Certified organic standards do not permit the use of toxic chemicals in farming and require responsible management of healthy soil and biodiversity).• Growing crops at home is a way to reduce carbon emission but there are limitations.• From this activity and the activity at Lamma Winds, it is concluded that some solutions to combating global climate change may not be feasible in some regions or countries. For example, it may not be suitable for developing certain kinds of renewable energy or developing home farm for self-consumption in some regions or countries.

Stop 7: Mudflat

Objectives:

At the end of the activity, students should be able to:

- understand the adverse impact of climate change on living organisms and ecosystems.
- help relieve the climate change by adopting a more environmentally friendly lifestyle.

Time	Teaching strategy and content
15:20 - 15:50 (30 mins)	<ol style="list-style-type: none">Teacher's introduction: Mudflats are also known as tidal flats. They are coastal wetlands that are formed when mud is deposited by tides or rivers.Teacher asks students to complete Q.1-5.Teacher consolidates the learning points.Teacher's conclusion: Global temperature increase has caused the polar ice to melt and in turn led to the rise in sea level. The rise in water level can lead to loss of habitat for some living organisms.Teacher may conclude the field trip by asking students to make their own reflection on their living habits and encourage them to adopt a more environmentally friendly lifestyle.Teacher asks students to discuss Q.1-2 with their group members and consolidates the learning points.Teacher asks students to complete worksheets in the post-trip activity. Teacher may discuss with students about 'Carbon Trading' which is the practice of buying and selling the right to produce carbon dioxide emissions, so that people, countries or companies who use a lot of fuel and electricity can buy rights from those that do not use so much. It is a market-based tool to limit greenhouse gases emission.
15:50 – 16:05 (15 mins)	Walk to the Sok Kwu Wan Ferry Pier and take ferry to Central (Aboard at 16:05)