Sustainable Transport
In Hong Kong

Teaching Pack
(Upper Primary)

Civic Exchange

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CONTENTS

Lesson Outline
Lesson Plan: First 40 Minute Lesson
Lesson Plan: Second 40 Minute Lesson/Follow-Up Activity
Worksheet A
Worksheet B
Worksheet C
Guidelines for Creating a Solar Car
Useful Website Addresses
LESSON OUTLINE (Upper Primary)

**Topic:** Sustainable Transport in Hong Kong

**Target:** Upper Primary (P4 – P6)

**Period:** Two 40-minute lessons

**Subject:** General Studies

Links to the following areas of the curriculum for General Studies:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Theme</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary 4</td>
<td>Our Environment Our Resources</td>
<td>The Environment and I</td>
</tr>
<tr>
<td>Primary 5</td>
<td>Life in the City</td>
<td>Natural Resources, Air</td>
</tr>
<tr>
<td>Primary 5</td>
<td>Life in the City</td>
<td>Physical environment, Technology and Culture</td>
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<tr>
<td>Primary 6</td>
<td>Environment and Living</td>
<td>Pollution Prevention and Conservation of the Environment</td>
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**Cross-curricular Links:** English Language, Maths.

**Learning Objectives:**

**Knowledge (K)**

After the lesson students should be able to:

1. Identify costs of transport
2. Understand links between transport choices, the environment and our health
3. Understand links between transport and energy use
4. Propose solutions to transport problems
5. Appreciate some of the ways science and technological advancements have influenced our life.
6. Recognise the potential of alternative energy sources
Skills (S)

After the lesson students should develop the following skills:

1. Communication of ideas
2. Creativity
3. Critical Thinking
4. Problem Solving
5. Collaboration
6. Civil rights and responsibility

Personal and Social Values/Attitudes (PV)

After the lesson students should be able to develop the following values/attitudes:

1. Caring and Concern
2. Responsibility
3. Respect for the Environment
4. Self reflection
5. Participation
6. Creativity and inventiveness

Advance Preparation – First 40 minute lesson

For a class of 40 students you will need:

1. 40 pamphlets on Sustainable Transport (available for collection from Civic Exchange)
2. A Copy of the CD-ROM PowerPoint presentation (available from Civic Exchange)
3. A computer or laptop computer which is able to run PowerPoint
4. A projector on which to project the PowerPoint presentation.
5. 40 photocopies of worksheets A, B and C
Advance Preparation – Second 40 minute lesson; Creation of Solar Cars

In the week prior to the class the children will need to work as a team of 3 to collect various recycled materials with which to create the solar car.

1. For the chassis or car body: milk carton, cardboard, cardboard box, polystyrene lunch box, plastic bottle, aluminium can, kitchen roll holder etc.
2. For the wheels: cardboard, foam, aluminium can, cotton reels, old toy wheels
3. For the axle: satay sticks, pencil
4. To create traction on the wheels: rubber bands, ‘Elastoplast’
5. For bearings: straws, bolts

The school will need to purchase one solar car kit per group of three students who will work as a team.

Vocabulary

congestion    contribute    convenience    emissions
energy efficient    external    internal    journey
licensing    maintain    pedestrians    pollution
renewable energy    sustainable    tax    transport
# Lesson Plan (Upper Primary) First 40 minute lesson

<table>
<thead>
<tr>
<th>Teaching Point Timing</th>
<th>Student's Activity</th>
<th>Teacher's Activity</th>
<th>Resources</th>
<th>Objectives Check</th>
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</thead>
</table>
| **Motivation** 15 minutes | Active listening:  
- Listen to the presentation and be prepared to answer questions on each section.  
- Ask questions for greater clarity. | Hand out one pamphlet to each student.  
Conduct the PowerPoint Presentation  
Ask students to think about the following issues while watching the PowerPoint presentation:  
- What factors affect people’s transport choices?  
- What are Internal Costs?  
- What are External Costs?  
- Why should I be concerned about transport?  
Stop the PowerPoint presentation at appropriate intervals and ask the students questions to enable them to verbally summarise the information given. | Pamphlet  
PowerPoint presentation | K: 1,2,3,6  
S: 3, 6  
PV: 1,3,4 |
<table>
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<tbody>
<tr>
<td><strong>Reducing Pollution</strong></td>
<td>Students discuss with their partner which vehicles make the most/least roadside air pollution.</td>
<td>Split class into pairs and hand out worksheet A</td>
<td>40 photocopies of Worksheet A</td>
<td>K: 1,2 S: 1,3,5 PV: 1,4,5</td>
</tr>
<tr>
<td><strong>Timing</strong> 10 minutes</td>
<td>Students Complete Worksheet A.</td>
<td>Hand out worksheet B</td>
<td>40 photocopies of Worksheet B</td>
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<td>Teaching Point Timing</td>
<td>Student’s Activity</td>
<td>Teacher’s Activity</td>
<td>Resources</td>
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<td>Making transport systems less polluting.</td>
<td>Active listening.</td>
<td>Explain that electric vehicles produce the least <em>roadside</em> pollution as they receive their energy from electric cables. Electricity generation does produce pollution at power stations (especially CO2). We will look at ways to reduce this pollution in the next lesson. How can we encourage people to take more environmentally friendly transport? A Hub and Spoke transport network makes it easy for people to access the least polluting (in terms of roadside emissions) form of transport – the train. Have students look at the hub-and-spoke diagram in the centre page. Hand out worksheets on the hub-and-spoke transport network. Ask students to make their own hub-and-spoke diagram using the most eco-friendly transport.</td>
<td>Worksheet C</td>
<td>K: 2,3 S: 1,2,4 PV: 6</td>
</tr>
<tr>
<td>Summary</td>
<td>Feedback ideas to encourage people to use environmentally friendlier transport.</td>
<td>Ask the class for suggestions as to how we can encourage people to walk, cycle or take the train.</td>
<td></td>
<td>K: 4 S: 1,3,4 PV: 1,2,5</td>
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<td><strong>Creating a vehicle that uses an alternative energy source</strong>&lt;br&gt;15 Minutes</td>
<td>Active Listening</td>
<td>Divide students into groups of 3.&lt;br&gt;Explain how solar car kits work. Explain that they are delicate systems and the students must take care of them.&lt;br&gt;Explain the main components of their car:&lt;br&gt;• The chassis or body of the car&lt;br&gt;• The wheels&lt;br&gt;• The axis or pole to support the wheels&lt;br&gt;• Bearings to make the wheels move more smoothly&lt;br&gt;Demonstrate the construction of a solar car (using guidelines attached).</td>
<td>• Recycled materials to form parts of the car&lt;br&gt;• Solar Car Kit&lt;br&gt;• Sticky tape&lt;br&gt;• Glue&lt;br&gt;• Scissors</td>
<td>K: 3,5,6&lt;br&gt;S: 2,4,5&lt;br&gt;<strong>PV</strong>: 5,6</td>
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<td><strong>Building a Model Solar Car</strong>&lt;br&gt;25 minutes</td>
<td>Work in groups to assemble solar car from the solar car kit provided and the recycled materials they have collected.</td>
<td>Hand out guidelines on the construction of a solar car.&lt;br&gt;Hand out solar kits – one per group of 3 students.&lt;br&gt;Working in their groups of 3, students assemble a solar car.</td>
<td>• Recycled materials to form parts of the car&lt;br&gt;• Solar Car Kit&lt;br&gt;• Sticky tape&lt;br&gt;• Glue&lt;br&gt;• Scissors</td>
<td>K: 3,5,6&lt;br&gt;S: 2,4,5&lt;br&gt;<strong>PV</strong>: 5,6</td>
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<td><strong>Enter Inter-School Solar Car Competition 2004</strong></td>
<td>OPTIONAL: Students can work on their car after lesson time and prepare it for entry into the Inter-School Solar Car Competition co-organised by Civic Exchange to take place in November 2004</td>
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<tr>
<td></td>
<td>• Solar Car</td>
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</table>
### FOLLOW-UP ACTIVITIES

<table>
<thead>
<tr>
<th>Teaching Point Timing</th>
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<tr>
<td><strong>Design Skills</strong></td>
<td>Refine the design of their group solar car so that it moves as fast as possible.</td>
<td>Arrange an in-school solar car race. Select a site paying careful attention to the passage of the sun on the site and the evenness of the surface.</td>
<td>A hard surface for the race Consistent sunlight (no shade) Chalk to draw lanes Stopwatches</td>
<td></td>
</tr>
<tr>
<td><strong>Sustainable Transport Plan – Futures Visioning</strong></td>
<td>Draw a map of route to school Draw themselves getting to school on sustainable transport.</td>
<td>Have the children draw a map showing their route to school (the map can take any form). Now ask them to imagine that they are taking the most sustainable form of transport possible to school. Have them draw themselves taking that form of transport to school. (this could be trains, trams, trolley buses, solar cars, hydrogen cars, bicycles etc).</td>
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**Worksheet A - Primary**

Which form of transport makes the most roadside air pollution?

Number the boxes from 1 to 8. Number 1 makes the most air pollution, number 8 makes the least air pollution.

<table>
<thead>
<tr>
<th>Car</th>
<th>Taxi</th>
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</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Car Image" /></td>
<td><img src="image2.png" alt="Taxi Image" /></td>
</tr>
<tr>
<td>Double-Decker Bus</td>
<td>Mini Bus</td>
</tr>
<tr>
<td><img src="image3.png" alt="Double-Decker Bus Image" /></td>
<td><img src="image4.png" alt="Mini Bus Image" /></td>
</tr>
<tr>
<td>Lorry</td>
<td>Van</td>
</tr>
<tr>
<td><img src="image5.png" alt="Lorry Image" /></td>
<td><img src="image6.png" alt="Van Image" /></td>
</tr>
<tr>
<td>MTR and KCR</td>
<td>Tram</td>
</tr>
<tr>
<td><img src="image7.png" alt="MTR and KCR Image" /></td>
<td><img src="image8.png" alt="Tram Image" /></td>
</tr>
</tbody>
</table>
Worksheet B - Primary

Which form of transport makes the most roadside noise pollution?
Number the boxes from 1 to 8. Number 1 makes the most noise pollution, number 8 makes the least noise pollution.

- Car
- Taxi
- Double-Decker Bus
- Mini Bus
- Lorry
- Van
- MTR and KCR
- Tram
Guidelines for Creating a Solar Car

1. Attach the axle bearings (axle holders) to the chassis (main body of the car). You want the holders to be parallel and running straight ahead.

2. Select an axle and two wheels. Insert the axle into the bearings. Add the tubing (in-line shaft retainers that keep the wheel from rubbing against the body) onto each end of the axle.

3. Add the wheels to the axle.

4. Take the other axle and two wheels and repeat step 2 and 3.

5. Create traction on the back wheels by wrapping Elastoplast or cloth around them.

6. Use the elastic band as a drive band and loop this around one of the back wheels and the motor pulley. Position the motor on the chassis so that the elastic band is not too tight and not too loose and attach with glue or tape.

7. Attach the solar panel.
Useful Website Addresses

Hong Kong

Hong Kong NGOs

Civic Exchange
www.civic-exchange.org
Hong Kong Photovoltaic Consortium
http://thegreenroom.arch.hku.hk/index.htm

Hong Kong Government

Education & Manpower Bureau: http://resources.emb.gov.hk/envir-ed/e_index.htm
Environmental Protection Department: www.epd.gov.hk
Transport Department: www.info.gov.hk/td/
Environmental Campaign Committee: www.ecc.org.hk/ebody.htm

Business Environment Council: www.bec.org.hk
Taiwan Environmental Protection Agency: www.epa.gov.tw
The Conservancy Association: www.conservancy.org.hk
Friends of the Earth Hong Kong: www.foe.org.hk/
Greenpeace China: www.gpchina.org/
Green Power: www.greenpower.org.hk
Hong Kong Marine Conservation Society: www.hkmcs.org
Hong Kong Sustainable Communications Assoc: www.hksca.org
Worldwide Fund for Nature: www.wwf.org.hk

International

Young Transnet: www.youngtransnet.org.uk/main/home.htm
Sustrans: www.saferoutestoschools.org.uk/index.php
EPA Office of Transportation and Air Quality: www.epa.gov/OMSWWW/
US Environmental Protection Agency: www.epa.gov
Natural Resources Defense Council: www.nrdc.org/air/pollution/default.asp
Explorer's Club: www.epa.gov/kids/ask.htm

If students have an environmental question, they can visit this Web site--sponsored by the Environmental Protection Agency--and have their questions answered within 15 days.

Sustainable Energy

Centre for Sustainable Energy: www.cse.org.uk/
Energy Sources: www.darvill.clara.net/altenerg/index.htm
Hydro Power: www.fwee.org/education.html
Solar Power:
www.sunwindsolar.com/a_scripts/n_lessons.php
www.energyquest.ca.gov/projects/#solar

Photovoltaic Energy demonstration

Research

Children’s Attitudes to Sustainable Transport: www.scotland.gov.uk/library5/transport/cast-00.asp