SCOUT MEETING SCHEDULE : Week 3

Theme: Renewable Energy

Date:

Time	*Activity*	*Program Details*	*Leader Responsible*
10 mins	Gathering Activity Home Energy Audit Review		
20 mins	Opening Ceremony Black-Out (after ceremony)		
15 mins	Game Renewable Energy Tag		
60 mins	Theme Activity Wind Energy Model		
10 mins.	Patrol/Troop Meeting Plan for field trip		
5 mins	Closing Ceremony		
15 mins	Leader Discussion Time		

Meeting Notes:

SCOUT MEETING SCHEDULE
CLIMATE CHANGE: WEEK 3
Theme: Renewable Energy

Introduction: Much of the blame for climate change is our over dependence on fossil fuels, particularly coal and oil. While we will always have some dependency on these fuels, we would be wise to try adding some cleaner, renewable sources of energy to meet our growing demand for energy. Renewable energy refers to energy that is created from sources that do not get used up; solar heat, the wind, wave, stream or tidal action, and the heat from within the earth's crust. Energy can also be created by chemical reactions (hydrogen is created from splitting water molecules) or waste products (methane from landfills can be burned rather than lost into the air).

Objective: To teach Scouts what renewable energy is, how it is generated and how it helps to reduce air pollution and climate change.

GATHERING ACTIVITY

Home Energy Audit Review

In patrols, Scouts review the results of their Home Energy Audits.

OPENING CEREMONY

During or right after the opening ceremony, have a leader switch off the main lights in the meeting hall. Be prepared with flashlights so there will be some light.

Discussion:

What causes blackouts (i.e. malfunction in the energy generating station or lack of energy)? What would cause us to "run out" of energy (too high a demand from energy users such as houses, industry, offices or an under supply of fuel)? What kinds of energy don't ever run out (those based on renewable resources such as wind, solar, geothermal, water/wave)?

GAME

Renewable Energy Tag

Objective:

To test Scouts' knowledge about renewable energy in a fun way. It can be played in a large room or outside.

Equipment:

- Set of True and False questions (see page 5).

Instructions:

1. Arrange Scouts into two teams (named "True" and "False"). Line the teams opposite each other approximately one to two metres apart. Fifteen metres behind each team is a "safety zone."
2. Explain that a leader will read out a question regarding renewable energy to test their knowledge. The answer will either be True or False.
3. If the answer is true, the "False" team races to their safety zone. The "True" team chases them. Anyone who is caught before reaching the safety zone joins the other team. If the answer is false, the opposite happens.
4. Continue until all the questions have been asked or all the Scouts belong to one team.

THEME ACTIVITY
Wind Energy Model and Experiment

Objective:

To test a variety of materials and designs to determine which combination creates the best functioning wind turbine.

Equipment:

A variety of materials including:

- Glue, tape, stapler, string, straight pins, thumbtacks
- Bamboo skewers, chopsticks, wood or plastic stir sticks, plastic straws, or flexible wire
- Tag board, paper, fabric pieces, plastic sheeting
- Metal or plastic washers
- Red markers/crayons and scissors
- Electric fan
- Watch with a second hand
- Metre stick or metre length of string
- Pens/pencils and paper
- Pictures or samples of types of turbines (pinwheel, pictures from the Internet, etc.).

Instructions:

Open with discussion: How does wind create energy? What are the main parts of a wind turbine? How does it operate? Brainstorm on what would happen if blades were longer/shorter. A different shape? At a different angle? How would more/less blades affect the turbine? (For more information on wind turbines, see: http://www.bchydro.com/rx_files/community/community2354.pdf).

Challenge Scouts to use whatever materials they choose to create a functioning wind turbine based on the above discussion.

Once completed, test the wind turbines in pairs using the following procedure:

1. Colour one blade tip with the red marker or some other defining feature.
2. Place the electric fan on the edge of a table.
3. Measure a distance of one metre from the fan and mark that place on the floor.
4. At that spot, hold the wind turbine one metre from the ground.
5. Turn on the fan (at middle speed if possible).
6. Once the turbine is spinning, one Scout counts off ten seconds while the second Scout counts how many times the red tip passes the top point within that time.
7. Record the modeller's name and number of passes on a sheet of paper.
8. The modeller can now modify the design and test it again. The best design will be the wind turbine that is able to rotate the most time in ten seconds – while still staying in one piece!
9. Allow Scouts to conduct a similar test outside using natural wind.

Discussion:

Which turbine performed the best? Why did it perform the best? What things caused the wind turbine to turn faster? Slower? What other things did Scouts learn about wind turbine design during the experiment? What was the difference in performance between using the fan and using natural wind?

Adapted from: *Grant and Littlejohn (2001) Teaching About Climate Change: Cool Schools Tackle Global Warming*. *Green Teacher magazine*. Canada: New Society Publishers. p. 26.

PATROL/TROOP MEETING

Objective:

Review the following extra activities and select the projects most interesting to the Scouts to do during a field trip. Will it be:

- solar cooking,
- measuring the hydroelectric potential of a stream or
- tour of an alternate energy source
  - small hydroelectric facility,
  - wind farm,
  - biomass plant,
  - solar manufacturer,
  - fuel cell manufacturer, or
  - tidal/ocean energy plant?

THEME ACTIVITY

Simple Model to Demonstrate how Hydropower Works (15-20 minutes)

Build a model waterwheel that demonstrates how water can generate enough energy to lift an object. Instructions can be found at: http://www.pplweb.com/community/files/Hydro-Unit4.pdf.

FIELD TRIP IDEAS

Technology Tours

Take a tour of a small hydroelectric facility, wind farm, biomass plant, solar manufacturer, fuel cell manufacturer, or tidal/ocean energy plant. Alternatively, invite a representative to come to your meeting to demonstrate their technology. For locations of renewable energy companies near you, visit:

Solar: http://www.cansia.ca/members.html

Wind: http://www.canwea.ca/IndustryDirectory.html

Biomass and renewable fuels: http://www.greenfuels.org/links.html#crfa

Fuel cells: http://www.fuelcellscanada.ca/memberlist.html

Renewable Energy Tag True or False Questions

1. Energy can be made from garbage dumps.
   TRUE: Garbage dumps – or landfills – produce methane, which is a greenhouse gas. Methane is very flammable and can be burned as a clean fuel.
2. Grain, woodchips and sawdust can all be used to make fuel for cars.
   TRUE: This type of fuel is called "ethanol" and is for sale blended with gasoline at some gas stations.
3. A wind farm is a place where wind turbines are built.
   FALSE: A wind farm is a group of wind turbines placed together to generate energy from wind. Canada has several wind farms.
4. In the future, cars might be powered by water.
   TRUE: A new fuel, called hydrogen, is being developed that splits molecules in water to create energy.
5. Right now, Canada makes 50% of its energy from renewable sources like wind, the sun, ocean waves, and water flowing through streams.
   FALSE: Canada depends on fossil fuels for 83% of its energy. Fossil fuels are the main contributor to global warming and climate change.
6. Humans use as much energy every year as the sun generates in one hour.
   TRUE: The sun is a powerful energy source that we are trying to use better as an energy source.
7. Canada uses the most energy per person of any country in the world.
   FALSE: Canada is the third largest energy user in the world.
8. Renewable energy reduces air pollution and greenhouse gases.
   TRUE: Because they do not burn dirty fuels, renewable energies are much cleaner and more environmentally friendly than gas, coal or oil.
9. Renewable energy is cheaper to produce than fossil fuels which must be dug from the ground.
   FALSE: Renewable energy is more expensive to produce right now, because the technology needed to produce it is new and expensive to make.
10. One day, all of our energy will be made from renewable sources.
    FALSE: We will probably never be able to meet all of our energy needs by clean, renewable energy. But, we can increase how much energy is produced by renewable sources.
11. You can cook a meal by using the sun's energy.
    TRUE: If you build a solar cooker, the sun's rays will create enough heat to cook your meal.
12. "Human power" is the most renewable energy there is.
    TRUE: Using your own power to get around makes the least impact on the environment. And it's free.

EXTRA PROGRAM ACTIVITIES

THEME ACTIVITY

Solar Cooker

This is a good morning activity for camp. While food is cooking, Scouts can be involved in other activities, periodically checking the angle of their cookers over the course of about 3 hours.

Time: approx. 1 hour to build (additional time required for cooking)

Equipment:

- Two cardboard boxes per cooker, one small enough to fit inside the other leaving a gap of 5 to 7 cm between the boxes. The inner box should be approx. 48 cm x 58 cm x 20 cm.
- A flat piece of cardboard 20 cm longer and wider than largest box.
- Glass or plexiglass about 50 cm x 60 cm. Glass should be slightly bigger than the smallest box.
- A thin black metal tray or cardboard painted black to fit inside the smaller box.
- Newspaper
- 2.5 to 3 metres of heavy-duty aluminum foil
- Masking tape or water based glue
- Dark cooking pots with lids.

Instructions:

Open with discussion: What is the sun made out of (i.e. a mixture of hydrogen and helium gases that create heat through chemical reactions)? What kind of energy does the sun create for us on earth (heat, which also can be turned into electricity)? How can that heat energy be used/trapped (through glass, dark objects absorb energy, shiny objects like foil can reflect energy to a specific location)? What ways have we found to trap the sun's energy (windows, greenhouses, solar water heaters, solar panels to convert into electricity, etc.)?

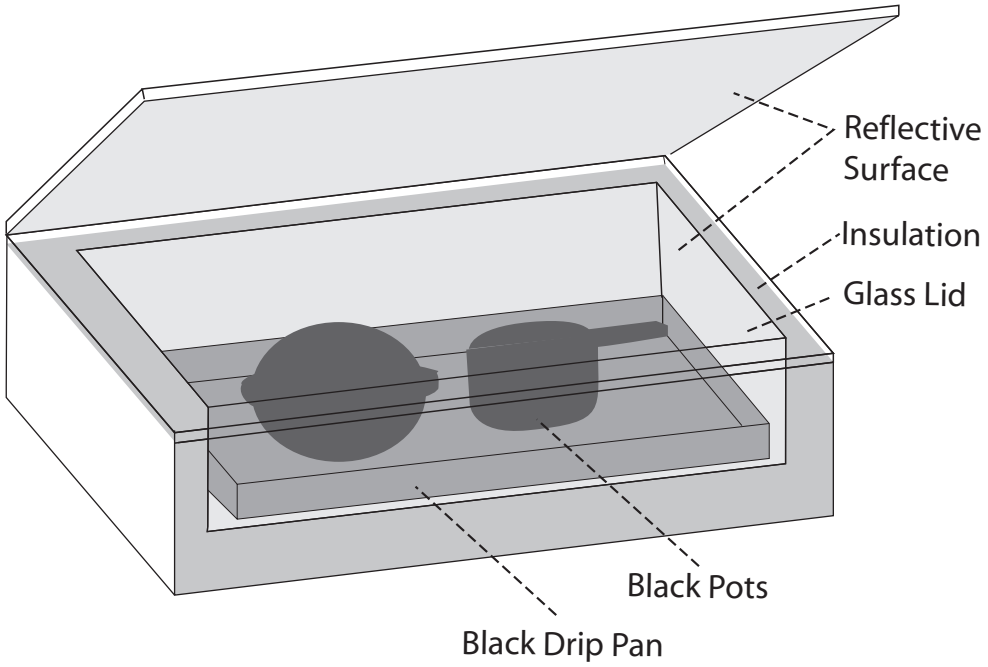
Advise Scouts of these very important safety tips before beginning construction:

- Never look directly at the sun
- Never look directly at any really bright areas in the cooker – wear sunglasses if necessary.

To build the solar cooker:

1. Cover the following surfaces with foil, shiny side up, using masking tape or water-based glue: the inside and outside of the small box, the inside of the large box, one side of the flat piece of cardboard.
2. Place the small box inside the larger box and stuff crumpled newspaper or other non-toxic insulating material snugly between the two boxes.
3. Centre the flat piece of cardboard, foil side down, on top of the assembled boxes. Fold down the 10 cm of cardboard that hangs over the edges, make cuts at the corners and fold and glue the edges. In the top of the lid, cut three sides of a rectangle to create a reflective flap and an opening slightly smaller than the glass.
4. Fit the glass over the small inner box so there are no large air leaks. If using plexiglass, turn the lid upside down and glue or tape plexiglass to the inner side of the lid to form a lid with a "window".

5. Place the thin black metal tray or black painted cardboard on the inside bottom of the smaller box. Make a prop to hold up the reflective flap on the lid using a coat hanger or stick. The solar cooker is now completed. (See diagram.)
6. Place the box outside on a dry surface that will be sunny for several hours (beginning cooking by mid-morning is best). Put food in covered black pots and place the pots toward the back of the cooker. Food that can be cooked includes: soup, cookies, pudding, hot dogs, porridge, nachos, etc.
7. Fit the lid snugly on the cooker. Face the box so that the lid reflector faces the sun in late morning or early afternoon, and position the reflector so that it shines light into the inner box. You may need to tip the cooker a little to catch the most sunlight.



Discussion:

Which solar cookers performed best? Why did they perform the best? What food cooked best in the cookers? What food cooked slower? What adjustments could be made to enhance the performance of the cookers? Do lightweight or heavyweight pots or cans work better? How often does the cooker need to be refocused to catch maximum light? What other things did Scouts learn about solar power and cooking using the sun's energy?

Adapted from: *Grant and Littlejohn (2001) Teaching About Climate Change: Cool Schools Tackle Global Warming*. *Green Teacher magazine*. Canada: New Society Publishers. p. 26.

Advanced solar cooker (approx. 2-3 hours)

Build a functioning solar cooker by following the instructions found at: http://www.re-energy.ca/t-i_solarheatbuild-2.shtml. This may best be done in patrols or individually by Scouts at home.

FIELD TRIP IDEAS

Stream Flow Experiment

This activity could be combined with a stream clean-up or other nature awareness activities. Ensure sufficient adult supervision is available. All participants should be wearing proper clothing, including rubber boots. Do not conduct this experiment on a very cold day or during high run-off times such as spring.

Equipment:

(per pair of Scouts)

- One metre stick
- Rope approximately ten metres long
- Plastic ribbon (such as orange tagging ribbon)
- A brightly coloured floating object such as a painted stick
- Watch with a second hand
- Pens/pencils and stream flow worksheet (see page 9).

Instructions:

(per pair of Scouts)

Open with discussion: Who has seen a hydroelectric dam? What does it look like? How does it generate electricity? (The force of the water being released from the reservoir through the dam spins the blades of a turbine. The turbine is connected to a generator that produces electricity. After passing through the turbine, the water re-enters the river on the downstream side of the dam.) What is different between using dammed water to generate electricity compared to using running stream water? What are the benefits (smaller, non polluting, can provide energy to isolated communities)? Drawbacks (diverts water that can harm fish and rivers, building the generator can disturb streamside environment, only small amounts of energy can be produced, seasonal water flows can reduce energy able to be produced, ice and floating debris can block them in the winter)?

Review safety and environmental precautions and practices for working around streams before commencing experiments.

Follow these steps to conduct the experiment:

1. Explain that flowing water can be used to produce electricity. However, it does not make sense to build a hydroelectricity generator on a stream with low flow. It is necessary to test the flow of the stream and calculate its potential to generate electricity before building a generator.
2. Scatter Scouts in pairs down the length of the stream, or (even better) locate them at different streams in order to compare results.
3. Have Scouts follow the instructions on the Stream Flow Worksheet (see page 9).

Discussion:

If the average home uses one kilowatt, how many houses could this stream provide for? What characteristics about the stream would need to be different for the hydroelectric potential to increase? Are there any environmental considerations/concerns with using this stream for hydroelectricity?

Adapted from: *BC Hydro, Powering our Future: Green energy options*.
http://www.bchydro.com/rx_files/community/community2283.pdf

Stream Flow Worksheet

1. Approximate the width of the stream. Tie a ribbon every metre along a rope. Stretch the rope, if possible, from one side of the stream to the other. Count the number of ribbons to measure the width of the rope.

   Stream width = _____

2 Using a metre stick, find the deepest part of the stream. Read the depth from the bottom of the stream to the top of the water.

   Stream depth = _____

3. Mark a starting point and place the brightly coloured object in the stream at this point. Using the watch, count ten seconds and mark the point that the floating object reached within this timeframe. Retrieve the floating object. Using the rope measured with ribbons, measure how many metres the object floated in ten seconds.

   Distance object travelled = _____

4. Calculate the speed at which the water is moving by dividing the distance by 10 seconds:

   distance: _____ ÷ 10 = _____speed

5. Calculate the cross-section of the stream by multiplying stream depth by stream width and dividing by two:

   (Depth of stream x width of stream) ÷ 2 = _____ cross-section

6. Now calculate water flow by multiplying the value for the cross section with the value for speed.

   _____ x _____= _____

   cross section | speed | water flow

7. The amount of hydroelectricity that the stream can generate (or the hydroelectric potential) is approximately equal to water flow times the vertical drop between the point that the stream enters the generator and the point where it leaves the system (this is called the "head") times 7.85. For this exercise, we'll estimate that the head is 1 metre.

   _____ x 1 x 7.85 = _____

   water flow | head | hydroelectric potential (kilowatts)

8. Besides flow rate and potential, Scouts should also note any environmental disturbances that building a generator on this stream could produce. Does the stream flow through a fragile ecosystem? What species find habitat in this area? Would they be disturbed by the presence of a generator? Is the river wide enough to allow fish and water to pass around the generator?