

## Lesson Plan

### Inspiring Change – at home and at school



#### In a Nutshell:

Students review the causes and effects of greenhouse gases, and then look at energy use and conservation practices in their homes and at school. This lesson includes three activities: a home energy audit, a transportation campaign, and an investigation in the school. Each of these activities offers students the opportunity to develop a plan to conserve energy and/or reduce emissions.



#### Goal:

To increase awareness of energy consumption and greenhouse gas emissions.



#### Background Learning:

**Teachers** should be familiar with the basic science of climate change, potential impacts, and possible solutions as reviewed in:

- High School Backgrounder #2: The Greenhouse Effect
- High School Backgrounder #3: Greenhouse Gases
- Intermediate Backgrounder #2: Impacts: A Changing World
- Intermediate Backgrounder #3: Solutions: We Can All Help!

**Teachers** may want to check out some of the sources we drew upon in developing this lesson:

- Government of Canada Website – <http://www.climatechange.gc.ca>
- SEEDS Foundation – <http://www.greenschools.ca/seeds/>
- The Northern Climate Change Project – <http://www.taiga.net>

**Grade Level:** 1–7

**Subjects:** Science, Social Studies, Mathematics, English Language Arts, Visual Arts

**Enrichment:** Social Studies, Science

**Time:** One to two hours per activity

**Setting:** Classroom, home, school

**Materials:** Student handouts

**Skills:** Analyzing, problem solving, cooperation, interviewing

**Key Vocabulary:** Audit, greenhouse gases, emissions, consumption



- Climate Change Are You Doing Your Bit? Teacher's Kit Government of Canada
- Educational Services, Environment and Local Government; P.O. Box 6000, Fredericton, NB: <http://www.gnb.ca/0009/0355/0012/index-e.asp>

**Intermediate level students** should be familiar with the basic science of climate change as reviewed in:

- Intermediate Backgrounder #1: Basics: A lot of Hot Air
- Intermediate Backgrounder #2: Impacts: A Changing World

## Learning Outcomes:

Visit the website and click on the icon for your territory to review the learning outcomes that are addressed by this lesson.



Nunavut



NWT



Yukon



## Introduction to Lesson Plan:

This lesson has been divided into three activities: a home energy audit, a transportation campaign, and a school action plan. Teachers may choose to do any or all of the activities.

If the students have not done any activities about climate change, greenhouse gases, or energy consumption, review the basics with them, as outlined in Intermediate Backgrounders #1–2. You might find it helpful to refer to High School Backgrounders #2 and 3, and Intermediate Backgrounder #3 in your preparation for the lesson. For intermediate level students, you may choose to make copies of the Intermediate Backgrounders for the students to read themselves.

Once students have a basic understanding of the causes of climate change as outlined in Intermediate Backgrounder #1, you might ask them to brainstorm what things may be affected by climate change and why this would be of concern to us. If students need some guidance, you might put some key words on the board, such as ice, water, land, animals and plants. Lead students to a general understanding of the



effects and to the conclusion that we can help the environment by making responsible choices.

Download and make copies of the backgrounders and student handouts needed for the activity(s) you're planning to do.



## Activity:

### Activity One: Home Energy Audit

1. In this activity students will look at the use of energy in their homes and ways that they can conserve energy. Have students brainstorm and make a list of what things in their home use energy. The teacher could then ask the students to classify these things as heaters (oven), motors (blender), or neither (radio). Which group do they think tends to be the energy hog?
2. Share some of the energy saving devices available (refer to the student handout for the audit attached to this lesson) and explain how these help to reduce the amount of energy used in the home.
3. There are two student handouts for this activity: an explanatory letter for parents, and a sample of a home energy audit. You may wish to change or adapt them to reflect your community situation. Have students take home the letter and "Home Energy Audit" form and complete the audit with their parents. Give the students a date to return the audits to school for the next part of the lesson.
4. When the Home Energy Audits have been returned to school, divide the students into groups and have them list their top five energy wasters and their top five energy helpers, which can then be collated into a class summary.
5. Have the groups list their ideas on ways to reduce the energy consumption and to make a reduction plan.
6. Each student can write an action plan for his/her family or make a poster about an energy saving tip. These tips can be put together to make an Energy Saving Booklet that each student could take home to share with their family. Another possibility would be to have each student work with their family to come up with an action plan that the student describes and submits in writing or pictures. Plans could include: actions, time frames for completion, and who is responsible.



## Activity Two: Transportation Campaign

1. In this activity, students will learn about vehicle emissions and how we can reduce the production of greenhouse gases by our choices. Students will create a campaign to help the people in their community understand and make those choices.
2. Have a question and answer period with the students about car pollution. Depending on their grade and what they've already covered, guide them toward the understanding of the facts listed below.



### Transportation Facts:

- When we drive cars and other vehicles with engines, pollution is released into the air from the exhaust pipe. Sometimes we can see or smell the fumes. These fumes are “emissions”, because they are emitted or sent into the air.
- Vehicle emissions contain carbon dioxide, the second most common greenhouse gas. It has no color or smell. Scientists believe that carbon dioxide is the main cause of climate change.
- Vehicles create carbon dioxide because they burn fuel (gas or diesel). The more fuel that is burned, the more carbon dioxide that is released into the air.
- There are over 15 million cars, trucks and other vehicles driving around our country – that’s a lot of fuel being burned!
- Ten seconds of idling uses more fuel than restarting your engine (idling = leaving your engine on when you’re not driving, just waiting for somebody or something).
- Idling causes unnecessary emissions and is not better for the engine (like many people believe).
- One busload of passengers takes 40 vehicles off the road, saving 70 thousand litres of fuel.
- Vehicles with smaller engines produce fewer emissions.
- Carpooling reduces the number of vehicles on the road and therefore reduces emissions.
- Walking or biking eliminates the production of greenhouse gases.



3. Have students create a campaign to reduce vehicle emissions in their community. Ideas for a campaign might include:
  - Writing letters to parents and friends
  - Putting up posters for students and staff in the school (encouraging them to walk, bike, carpool, or take the bus)
  - Making a sign for the school parking lot (about idling)
  - Putting up posters in community areas (public library, etc.)
  - Making notices for their parents to post in their workplaces
  - Creating educational stories, poems, or dramas to share with others
  - Learning about electric and solar powered cars
  - A survey of the number and types of vehicles bringing students and staff to school
4. Teachers may wish to contact another northern community class or a class in a more populated southern community such as Vancouver to see if they would be interested in completing the activity together. Ideas and accomplishments could be shared through the student exchange portion of the website.

### Activity Three: Reducing Energy Consumption at School

1. In this activity, students will be looking at ways a school can reduce its' energy consumption. They will be identifying current practices at the school as well as identifying new ways to conserve. Students will also look at ways to monitor the school's energy consumption and how they can help in this area. Begin with a brainstorming session where the students list ways that they see the school conserving energy. List questions the students may have about energy conservation in the school as well. For example, what types of light bulbs are being used?
2. Next, send groups of students off to check with a variety of people in the school to find out about energy saving methods being used. They may wish to talk to the principal, the secretaries, the custodians, the recycling club members, and so on. Once the students have regrouped, have them share the information that they gathered.
3. Ask students how they can help to reinforce the energy saving methods in the school or if they have ideas for new ways of conserving that are not being currently used by the school.
4. Have students form an Energy Watch Team to assist with the reduction of energy consumption. (Action plans could include: actions, time frames for completion, and who is responsible.)



5. As an Energy Watch Team, the students may participate in a number of activities:

- A “Bright Ideas Squad” could be on the lookout for energy waste and could write up proposals for new energy reduction plans and present these to the administration.
- A “Light Patrol” could make “Switch Off” reminders for the light switches around the school. This group could take responsibility for turning off lights that are not in use around the school.
- A “Heat Patrol” could monitor the classroom thermostats and report any severe fluctuations.
- A “Drip Catchers Group” could make posters for the water source areas reminding people about conservation. They could also check for leaky taps or other water wastage and report their finds to the administration.
- A “Teaching Group” could prepare a presentation on how we can conserve energy at school and at home. They could construct models out of recycled cardboard to demonstrate their ideas. Other presentations could discuss the use of solar power and wind. This group may wish to investigate local energy conservation practices, such as wind turbines or solar panel uses.



### Handouts:

Visit the website and click on the icon for the complete set of handouts that support this lesson:

- Student Handout #1: Home Energy Audit Parent Letter
- Student Handout #2: Home Energy Audit



## Student Web-Exchange:

On the student web-exchange, students could challenge other classes to do the Home Energy Audit and share their ideas for conserving energy at home. Photos of posters may also be included.

Students doing the Transportation Campaign could pair up with a class in another community and share their ideas and accomplishments in writing and with photos.

Students could post their school action plan and some photos of their efforts around their school. (Please note: parental permission must be obtained before posting student photos.)

Visit the website and click on the icon for information on how to post material.



## Evaluation:

**Activity One:** Students can submit their completed Home Energy Audit along with a written summary, action plan, or pictures of how they will help conserve energy at home. Students may also be evaluated on group cooperation, contributing to the discussion and on their knowledge of the causes and effects of greenhouse gases, how climate change will affect their community, and so on.

**Activity Two:** Students can be evaluated on their understanding of vehicle emissions and how they contribute to global warming, as well as their contribution to the campaign – posters, letters, poems, stories, dramas, collection and display of data (if a survey is done).

**Activity Three:** Students can be evaluated on their contribution to the school action plan (group cooperation, letters, presentation of staff interview results, posters, written/oral summaries of their findings as a member of the Energy Watch Team, teaching projects, etc).



### More Information:

[www.globalwarming.org](http://www.globalwarming.org)

[www.climatechange.gc.ca](http://www.climatechange.gc.ca)

[www.cln.org/themes/globalwarming](http://www.cln.org/themes/globalwarming)

[www.globe.gov](http://www.globe.gov)

[www.taiga.net](http://www.taiga.net) (the Northern Climate Change Project)



## Enrichment Ideas:

### Social Studies/Science:

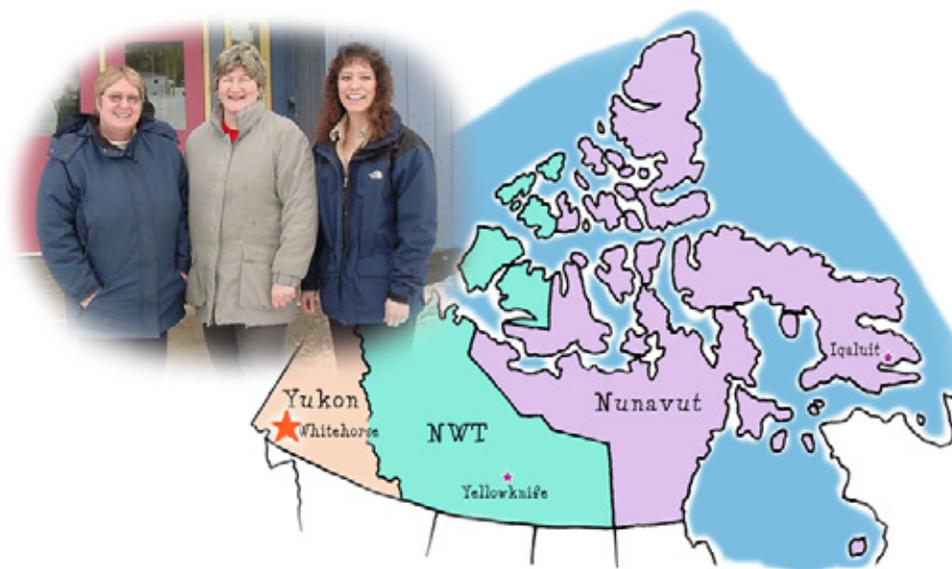
**Field Trip:** Take students out to visit a power (or solar power) station, electric company, or wind turbine.



## About the Author:

Rantin' Raven is an educational consulting company established by three elementary teachers from Whitehorse, Yukon Territory. We are Catherine Hines, Ellen Johnson, and Lorrie Peterson and together we have over 50 years of experience working with children. Our company has self-published material specifically geared for Math and Language Arts. We have also produced cross-curriculum units, educational kits, and programs for various organizations. We have made presentations and conducted workshops for Whitehorse schools, parent groups, and at the Yukon Teacher's Association Conference.

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# Student Handout

## Student Handout #1

### Home Energy Audit Parent Letter

Dear Parents and Guardians,

In our class, we have been discussing how our energy consumption produces greenhouse gases. Greenhouse gases trap heat within the atmosphere that can lead to climate change and have a significant affect on all forms of life. While warmer temperatures may seem appealing, they can have negative effects such as severe weather, coastal and river flooding, melting of permafrost, and drought. Animal habitats are also affected by the climate changes that are occurring.

The students have been asked to complete an energy audit to determine areas of energy use and conservation within the home. Please help your child to complete this audit and return it to school by \_\_\_\_\_.

We encourage you to discuss energy use in your home and to talk about how different energy saving devices work. Please feel free to add other ways that your family conserves energy. If you are interested in learning more about greenhouse gases and their effects on our environment, here are some good resources:

[www.climatechange.gc.ca](http://www.climatechange.gc.ca)

[www.globe.gov](http://www.globe.gov)

[www.coolclimate.org](http://www.coolclimate.org)

[www.epa.gov/globalwarming/kids/index.html](http://www.epa.gov/globalwarming/kids/index.html)



# Student Handout

## Student Handout #2 Home Energy Audit

Name \_\_\_\_\_ Date \_\_\_\_\_

| Questions   | Always/<br>Mostly | Sometimes/<br>Usually | Never/<br>Rarely |
|---|-------------------|-----------------------|------------------|
| We use fluorescent light bulbs.   |                   |                       |                  |
| We turn off the lights when we leave a room.  |                   |                       |                  |
| We turn off computers, televisions, radios, games, etc... when they are not being used.           |                   |                       |                  |
| We turn the surge protector off when the computer is not in use.                                  |                   |                       |                  |
| We use rechargeable batteries.  |                   |                       |                  |
| We turn down the thermostat at night or when we are not at home.                                  |                   |                       |                  |
| We use the curtains to control the room temperature.  |                   |                       |                  |
| We use energy-saving settings on our refrigerator, dishwasher, washing machine and clothes dryer. |                   |                       |                  |
| We have energy saving appliances (dryers, etc...)   |                   |                       |                  |
| When possible we hang clothes to dry.   |                   |                       |                  |
| We run appliances only when they are full.  |                   |                       |                  |
| We use manual appliances rather than all electric (e.g. push mower, cheese graters, can opener)   |                   |                       |                  |
| We use a microwave or toaster oven for cooking small amounts.                                     |                   |                       |                  |
| Our water heater temperature is set low (close to 120F)   |                   |                       |                  |
| The water heater has an insulating blanket.   |                   |                       |                  |



| Questions   | Always/<br>Mostly | Sometimes/<br>Usually | Never/<br>Rarely |
|---|-------------------|-----------------------|------------------|
| We have a low-flow showerhead.                                |                   |                       |                  |
| We take short rather than long showers.                       |                   |                       |                  |
| We have faucet aerators.                                      |                   |                       |                  |
| The faucets are in working order (no drips or leaks).         |                   |                       |                  |
| We have insulated hot water pipes and ducts.                  |                   |                       |                  |
| Our windows and doors are well sealed.                        |                   |                       |                  |
| We have good insulation in the attic.                         |                   |                       |                  |
| The fireplace damper is closed when there isn't a fire going. |                   |                       |                  |
| We maintain the furnace on a regular basis.                   |                   |                       |                  |

**Please add other ways that your family conserves energy at home:**

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