Rural Classrooms with Global Vision

Climate Change and Renewable Energy

What is Climate Change?

"The most significant environmental problem the world has ever faced" ~ Environment Canada

Climate change is a change in the "average weather" that a given region experiences. Average weather includes all the features we associate with the weather such as temperature, wind patterns and precipitation. When we speak of climate change on a global scale, we are referring to changes in the climate of the Earth as a whole. The rate and magnitude of global climate changes over the long-term have many serious implications for our environment, our economy and the way we live for years to come.

What causes climate change?

Gases such as carbon dioxide, methane and nitrous oxide are "heat trapping" gases that act like a greenhouse to keep the Earth warm enough to sustain life. The burning of fossil fuels and other human activities, however, are dramatically increasing the atmospheric concentration of these gases. This is magnifying the greenhouse effect, and the result is climate change.

Burning fossil fuels, such as coal, oil, and natural gas releases the most greenhouse gases and is therefore the primary cause of climate change. Other human activities such as deforestation, landfills and intensive agriculture also add to these concentrations of greenhouse gases.

Learning Outcomes

1. Demonstrate understanding of sustainable development and its implications for the environment;
2. Demonstrate understanding of issues related to the use of technology in a local and global context;
3. Locate, evaluate, adapt, create and share information using a variety of sources and technologies.

Curriculum Entry Points: Grade 9 & 10 Compulsory Technology Courses; Grade 11 Electronics; Grade 11 Resource Education; Grade 11 & 12 Environmental Sciences; Grade 11 & 12 Elective Technology Courses.

There is a direct link between energy consumption and climate change. 85% of the world's primary energy comes from burning fossil fuels—the main culprit in climate change. So, one of the most important ways to reduce our impact on the climate is to reduce our energy consumption.

Nearly everything we do requires using energy – and as North Americans, we use a lot of energy. In order to drive our cars and trucks, keep our industries humming and make our homes more comfortable, we consume more energy per person than anywhere else in the world. Where does all this energy come from? It comes primarily from burning fossil fuels – a non-renewable, greenhouse gas emitting form of energy.

So to effectively tackle the climate change problem, we need to make a shift towards renewable, low-emission sources of energy like wind, solar and hydropower. As we make the transition, we not only protect our climate, we also open the doors to exciting new jobs and economic opportunities.

What are the cleaner options to fossil fuels?

In the North American context, it is generally agreed that the best options available right now for cleaner energy generation are wind, micro-hydro and solar power.

New sources of energy is not the whole solution though - since 1970, improvements in energy efficiency and energy conservation have stretched existing energy sources further than all new forms of energy production (both renewable and non-renewable) combined. This means that, turning down your heat, investing in better insulation, and even changing your bulbs and your old appliances for more efficient ones can make a difference. Canadians have pocketed billions of dollars in savings on their energy bills, and have avoided air pollution as a result. There is still a long way to go—but the positive side, is that it is possible to cut Canada's emissions by almost half by 2030 if each of us makes a commitment to conserve energy and use cleaner technologies.

Climate Change is happening...

The debate within the scientific community has shifted, from the question of **whether or not** humans are causing change in global climate, to a discussion of **how serious** the impacts will be. By all indications the results will severely change the course of ecosystems and human societies around the world in the decades to come.

Enhanced droughts, floods, heat waves and air pollution are wreaking havoc in many parts of the world. Years of drought in Rajasthan, India is devastating local food and water supply; this situation is mirrored at home in the Canadian prairie where staple grain crops failed this past summer causing wheat prices to go up as the Bread Basket runs dry. As climate change progresses, extreme events such as these will become far more common.

Climate change is caused by the emission of greenhouse gases, most of which are generated by burning fossil fuels (coal, oil and natural gas) and deforestation. Industrialized nations have produced almost all of the greenhouse gases now present in the atmosphere during the past two centuries, and their emissions continue to grow.

It is possible to stabilize the climate by acting now to reduce greenhouse gas emissions. The Kyoto Protocol defines emission reduction targets and flexibility mechanisms by which the targets can be met. It is the only such document available to the international community and represents five years of negotiations.

What is the Kyoto Protocol?

In 1997, 180 nations met in Kyoto, Japan to discuss Climate Change. The Kyoto Protocol was the final document produced. In this document, 38 industrialized countries agreed to reduce their greenhouse gas emissions by an average of 5.2% of 1990 levels by 2008 to 2012. The purpose of this agreement is to help prevent Climate Change.

But a country will only be legally bound by Kyoto once it has formally ratified the Protocol and the Protocol has entered into force. Kyoto will enter into force once enough industrialized countries accounting for 55% of world emissions ratify.

BEYOND KYOTO:

Kyoto is just the first step to making the far bigger global emission reductions that scientist say are needed to prevent dangerous climate change.

The **David Suzuki Foundation** states that:

"Nations with visions are shifting to cleaner, more efficient energy systems. As they do, they reduce atmospheric pollution and the risks of climate change, while increasing their competitive edge in the global economy. For instance, investments in energy efficiency have been found to produce four times as many jobs than equivalent spending in new supplies of conventional energy."

Furthermore, the **Rocky Mountain Institute** has stated that:

"It doesn't even matter whether global warming is happening or not, because the most effective climate protection measures are things we should be doing for economic reasons anyhow."

Canada ratifies the Kyoto Protocol

On December 10, 2002, the government of Canada voted to ratify the Kyoto Protocol on global warming.

This historic move represents a critical turning point in protecting the environment. Canadians can look forward to a future with innovative energy technologies and actions that promote a stable climate and cleaner air.

It is now critical to back the adoption of Kyoto with action. The solutions are already available: phasing out coal plants, expanding renewable energy sources and public transit, and creating new

What does this mean for Canada?

Canada has now agreed to reduce our overall greenhouse gas emissions by 6% from 1990 levels by some point between 2008 and 2012. Keeping the 'business as usual' scenario, Canada will need a total 20-25% reduction in current emissions by 2010. This means changes in transportation, industrial activities, energy production, and in attitudes and lifestyles of Canadians. It also means supporting programs in developing countries that would see the use of clean energy.

The picture beside shows a woman solar engineer in India with the solar panels and solar lanterns she will help install in schools and community buildings in her community.

Suggested Class Activities / Discussion Questions

1. Learn how electricity generation and our electricity use contribute to global warming and greenhouse effect.
2. Have a class 'efficiency show and tell'. Ask every student to research new energy efficiency products and try to find the most efficient consumer choice of cars, refrigerators, ovens, light bulbs, stereos and computers.
3. Learn how renewable energy technologies can reduce climate change. Look on the web and list all the companies that are selling solar, dynamo, wind-powered or micro hydro products. Are there any based in the Maritimes?
4. Do 5 things in your home that can reduce your use of electricity. As a class compare everyone's home electricity bill from the month before and the month you start your '5 things' campaign!
5. As a class, write letters to NB Power and your local politicians (MLA, Mayor, MP, Town council) asking them to supporting clean and renewable energy technologies. Perhaps you can ask them to donate a solar panel to hook up an 'off the grid' computer in your school!

Get familiar with the link between energy generation and climate change:

Fossil fuel: non-renewable energy sources that come from fossilized plants and animals and cannot be replenished; examples: coal, oil, natural gas

Non-renewable energy resource: source of energy that cannot be replenished naturally or takes millions of years to make; examples: fossil fuels such as coal, oil, natural gas, and nuclear fuel (uranium) .

Renewable energy resource: source of energy that is virtually inexhaustible and is naturally and quickly replenished; examples: solar, wind, hydropower (water), geothermal, and biomass

carbon dioxide (CO_2): a colourless, odourless non-poisonous gas normally present in air. It is vital to plants that absorb it from the air.

global warming: a theory that global temperatures are rising as a result of "greenhouse gases" that become trapped in the lower atmosphere

greenhouse effect: excessive build-up of carbon dioxide in the atmosphere resulting in trapped heat.

Some ideas for what you can do?

- Improve your environmental citizenship! Environmental citizenship involves voluntarily taking responsible environmental action. Learn about the issues and think about what you can do in your home, school, and community.

- Organize a "Pollution Free Day" at your school and get students and teachers to bike or walk to school; bring reusable containers for their lunch and any other neat ideas to reduce pollution locally.

- Watts Up! Watts are the units used to measure power. You can find out how much energy is being used in your home, classroom, and school.
  Most appliances and even light bulbs will list their wattage. Write down all the watts of all the things that use energy in your room then beside each write down how many hours you use each item. Then multiply the Power (in watts) by the Time (in hours) and divide all by 1000 (which transforms watts into kilowatts) and voilà! You now will know the amount of kilowatt hours used by anything from your computer to your outside light.
  By changing your light bulbs to energy saver light bulbs you can save energy and money. By doing these calculations in your home and your school you can show your parents and principals how much they can save on their energy bill and at the same time become more responsible energy users!

Where to find More Information

Conservation Council of New Brunswick: **www.web.net/~ccnb**

Go to the "What's Hot" link on their page and find a paper called "Kyoto and Beyond". This gives practical ways that Canada can not only meet its Kyoto target but go beyond to a 50% reduction in emissions using technology that is all currently available. Also find out how New Brunswick's new Energy Bill may soon allow home owners and small industry to sell green energy (like solar or wind power) back to the electricity grid.

Environment Canada Climate Change Website at **www.ec.gc.ca/climate**

Bilingual site with general climate change information as well as the Canadian government's commitments to Kyoto and Canada's Action Plan on Climate Change.

The David Suzuki Foundation: **www.davidsuzuki.org/Climate_Change**

A great place to find up to date information on the Kyoto Protocol, the science behind Climate Change and its impacts; as well a comprehensive list of practical solutions to reduce emissions and energy use.

The Pembina Institute: **http://www.pembina.org/climate_change.asp**

The Pembina Institute was started in 1986 by six concerned high school teachers in response to the Lodgepole sour gas blowout, which killed two people and fouled the air in central Alberta for weeks. They have worked to improve safety standards and forever change the awareness and manner in which oil and gas companies conduct business. This is a good site for teaching resources on climate change and information on cleaner solutions for people, communities and industry.

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