

division 1 (grades 1 - 3) conservation lesson plans

Lesson 1

An Introduction to Energy and Energy Conservation

CURRICULUM LINKS

Social Studies

Grade 1

Citizenship: Belonging and Connecting

Students will:

1.1.2 value the groups and communities to which they belong:

- appreciate how their actions might affect other people and how the actions of others might affect them (C)
- assume responsibility for their individual choices and actions (CC, I)

1.1.4 determine what makes their communities thrive by exploring and reflecting upon the following questions for inquiry:

- How does caring for the natural environment contribute to the well being of our community? (C, LPP)

Grade 2

Communities in Canada

Students will:

2.1.1 appreciate the physical and human geography of the communities studied:

- demonstrate care and concern for the environment (C, ER, LPP)

Grade 3

Global Citizenship

Students will:

3.2.2 explore the concept of global citizenship by reflecting upon the following questions for inquiry:

- What are some environmental concerns that Canada and communities around the world share? (ER, GC)
- In what ways can individuals and groups contribute to positive change in the world? (C, GC, PADM)

VOCABULARY

- **Energy** - the ability to make something happen
- **Electricity** - the energy we need to make equipment work
- **Environment** - all the things around us that help us live
- **Pollution** - garbage, waste or human-made chemicals in our air, land or water
- **Fossil Fuels** - gasoline, oil, natural gas, coal and other fuels that we get from the ground. They were created millions of years ago when plants and animals became buried under ground. The pressure and heat from being buried changed the plants and animals into many of the fuels we use today to run our cars and machines and heat our homes.

INTRODUCTION

Most of the energy on the earth's surface comes from the sun. In nature, the sun's energy affects both living and non-living things. The sun is crucial to our survival. It constantly warms the earth and the sea, giving us a habitable climate to live in. It makes the winds blow, and the rains fall. It also gives energy to all living things. The sun gives plants energy to grow and make food. People and animals then get their energy from eating plants and other animals. The energy from our food lets us grow, move and do work. Many people in the world use plant energy (e.g. wood) for cooking and to keep warm. When people cut down trees for wood to burn in their fireplaces, the energy stored in the wood changes form – and becomes heat!

It may seem surprising to realize that the electrical energy we need to run the devices we use each day – computers and lights – originated with the sun. The sun evaporates water from lakes and oceans. When it rains, some of the water falls on higher ground. Due to gravity, the water flows. Hydroelectric energy comes from the energy of this moving water. Our coal-produced electricity comes from fossil fuels whose concentrated energy is that of the sun stored in plants buried millions of years ago. Cars, too, run on a fossil fuel called gasoline. This is made from petroleum that, like coal, is derived from fossilized plants long buried and compressed into fuel under the ground.

Controlling the energy we use is very important because it allows us to use energy only when we need it. We control lights and other electrical devices manually with switches to turn them on and off. If we did not use a switch to control the electrical energy it would be wasted. Just as we can stop the flow of water running through a hose by closing the nozzle, we can stop the flow of electrical energy to our lights with a switch, or to our computer monitor with the “on/off” button.

There are many ways to conserve energy. When it is bright outside, enough light may enter our homes or buildings so that we can turn off lights inside to conserve energy. Before leaving schools we shut computer monitors off or put them to sleep.

When we save energy we help create a healthier environment for people, plants and animals. We also save fuel (resources) and money.

ACTIVATING ACTIVITIES

1. Ask the students to stand in a circle and make their favorite movement for 30 seconds, without leaving their spot in the circle. Ask students, “where did you get the energy to do this movement?” Let the class come up with several suggestions. They will probably answer with food. Continue to brainstorm! You can then ask students where their food gets energy. “What makes vegetables grow? It is the sun!” Summarize that the energy that the sun gives to plants is in your food, and after eating it becomes a part of you! Let the class think of other things that the sun does, such as providing warmth and daytime light.

Next, ask students what makes their TV work. Does the TV need food or sun like people and plants? TVs and other things need a different kind of energy called electricity. In Alberta, we get most of our electricity from burning coal. Ask students what happens when we burn something like wood at a campfire. “Burning something can make a lot of smoke. Sometimes this can get in our eyes and make them water or make us cough. This is called pollution. This can also be true when we burn coal to make electricity. But if we use less energy, we will make less pollution.

2. Do a school walk-about. Make a list of all the things you find that use electricity. You can find things that have plugs, such as a computer or a fan. You can also find things that have switches, like the lights, or a stove. Extend this activity to home. Ask the students to go home and make a list of all the items that use electricity or energy at home. Which items are used the most? Which items are used the least?
3. Gather images of clean air and polluted air. Ask students to identify the differences in the samples and brainstorm possible causes of pollution. What can we do to reduce air pollution? Next, ask students to think about what happens to humans, plants, and animals that breath unclean or polluted air.

ACQUIRING ACTIVITIES

1. Ask groups of students to create a pollution poster. Find examples of unclean air from digital images or pictures from a magazine. These images may be smog, smoke stacks, car exhaust or forest fires. In a gallery walk, students identify the substances that cause pollution and suggest ways to reduce or eliminate it to provide clean air for humans, plants, and animals.
2. Read one, or more, of the following books with your students:

Why Should I Save Energy? (Paperback), Jen Green, Feb. 2005, Publisher: Barron’s Educational Series, ISBN-10: 0764131567

Let’s Save Energy!, Sara E. Nelson, Dec. 2006, Publisher: Pebble Books, ISBN-10: 0736863214

After reading, have a classroom discussion on why it is important to save energy.

APPLYING ACTIVITIES

1. Using a computer drawing program or art supplies, ask students to create a before and after illustration of air pollution. Ensure that students explain ways of reducing the illustrated example of pollution and describe why clean air is important for humans, plants, and animals.
2. As a class, brainstorm ways to reduce energy use and air pollution at school. Some ideas may be: turn off the lights when we don't need them, turn off the computer when we are done, walk to school instead of getting a ride, close the doors quickly when it's cold outside. Post the list in the classroom as a reminder. Ask students what they can do to reduce energy use and air pollution at home? Have them make a list while at home in the evening. Is the list different from the school list? Students may want to write a letter to their families to tell them how to save energy at home.
3. Print copies of the *Calendar Club Activity Booklet* from Natural Resources Canada, Office of Energy Efficiency at www.oeec.nrcan.gc.ca/calendarclub/activity
4. Order a class set of *Up in the Air* activity booklet from Alberta Environment. This activity book is intended to introduce children, ages 6-9, to the air around them, what the atmosphere means to them, and what children and their families can do to reduce negative impacts on the atmosphere. Call 780-427-2700 to order a class set.
5. This is also a good time for students, or the entire class, to make a *One Simple Act* commitment. See Step #2 in the Teacher's Guide for more information about this activity. The simple act suitable for this lesson is:

I will turn off the lights when I don't need them.

REFERENCES

Office of Energy Efficiency, *Calendar Club Lesson Plans*, 2009.

Lesson 2

An Introduction to Waste and Waste Reduction

CURRICULUM LINKS

Social Studies

Grade 1

Citizenship: Belonging and Connecting

Students will:

1.1.2 value the groups and communities to which they belong:

- appreciate how their actions might affect other people and how the actions of others might affect them (C)
- assume responsibility for their individual choices and actions (CC, I)

1.1.4 determine what makes their communities thrive by exploring and reflecting upon the following questions for inquiry:

- How does caring for the natural environment contribute to the well being of our community? (C, LPP)

Grade 2

Communities in Canada

Students will:

2.1.1 appreciate the physical and human geography of the communities studied:

- demonstrate care and concern for the environment (C, ER, LPP)

Grade 3

Global Citizenship

Students will:

3.2.2 explore the concept of global citizenship by reflecting upon the following questions for inquiry:

- What are some environmental concerns that Canada and communities around the world share? (ER, GC)
- In what ways can individuals and groups contribute to positive change in the world? (C, GC, PADM)

VOCABULARY

- **Waste** – the part that is left over that we don't use
- **Garbage** – it is the stuff we throw away
- **Landfill** – a large area of land where we put our garbage
- **Reduce** – use less of something
- **Reuse** – use something more than once
- **Recycle** – make something into a new object (product)
- **Composting** – a process that turns kitchen waste, like banana peels and apple cores, into a soil-like fertilizer for plants.

INTRODUCTION

If there is one thing we all have in common, it is waste. Every industry, business and household produces it. How we deal with waste varies from person to person, city to city and country to country, but it is an issue that cannot be ignored.

For many years, with cheap resources and disposal sites easy to locate, it was easier and cheaper to dispose of wastes than to do anything else with them. Many landfills, where most of our wastes end up, are quickly reaching their capacity. The NIMBY syndrome (Not In My Back Yard), concerns about local environmental conditions and steadily rising costs make replacing landfills very difficult.

In Alberta, many of the 'dumps' of the past have been replaced with engineered landfills to minimize their impact on the environment. If wastes are not disposed of properly, they can be a source of pollution to groundwater when buried or to the air when burned. Soil can be harmed directly when toxic or hazardous waste is disposed improperly.

A common belief is that garbage buried in landfills is **biodegrading** or **decomposing**. For the first 15 years in the life of a landfill, about 25 per cent of organic materials, such as food and yard waste, does decompose. Other trash, however, retains its original weight, volume and form for at least 40 years. Some materials can remain almost unchanged for hundreds of years.

There will always be a need for disposal in some form. Still, we can minimize the need for disposal by reducing the amount of waste generated in the first place. We can reuse materials again and again and separate out no longer usable materials for recycling. This is known as the 3Rs – **Reduce, Reuse, and Recycle**.

Reduce

Studies have shown that 25 per cent of wastes can be diverted from landfills through changes in consumer behaviour. This does not mean having to do without things you need, but it does mean taking the time to shop wisely and think about packaging.

Reuse

There are many ways to reuse items, cut costs and reduce the burden on the environment. From refillable containers to used clothing or furniture, the list is seemingly endless.

Recycle

Recycling involves much more than sorting wastes and preparing them for collection. It is a complex process that in the end transforms materials into new and usable products.

Composting

Composting is a process that turns kitchen, leaf and yard waste into a humus-like material called compost. Compost is a soil conditioner and a growing medium. In nature, organic materials such as leaves, grass and other plant material naturally decompose or break down to become humus. Humus is the top organic layer of soil. Composting can be done inside using a vermicomposter or outside using a backyard composter.

ACTIVATING ACTIVITIES

1. Write the word **garbage** in the middle of the chalkboard, white board or a flip chart. They can list words that are similar like trash, waste or litter. Ask the students what the word, garbage, means. Write down all of their ideas in a word splash or mind map. Students may say that garbage is things that can go into a garbage can or can be thrown away. Leave this information visible for the discussion.
2. Ask the students to guess how much garbage they (their family and the classroom) make(s) in one day or one week. You can use the general term, “bags of garbage,” to indicate amount. Write down a number that they come up with for the classroom – we will use this number later on to see if their estimate matches the actual garbage. This question can be followed or supplemented with the question, “what kinds of things do you throw into the garbage?” Keep a list of all the students’ ideas. This list will also be used later to show items that can be recycled, reused or composted.

ACQUIRING ACTIVITIES

1. Discuss how some food products have their own natural packaging that protects the part people eat. Bring in examples of items that have natural packaging (such as bananas, unshelled nuts, or oranges) and others have human-made packaging (such as pop, juice boxes or granola bars). Discuss how nature's packaging can be used in compost, which returns materials to the earth. Then, discuss how most human-made packaging can be recycled or reused.

2. Read one or more, of the following books with your students:

Where Does Garbage Go (Paperback), by Paul Showers, Dec. 1993, Publisher: Programs And Genres, ISBN-10: 0064451143

Too Much Garbage (Hardcover), by Fulvio Testa, May 2001, Publisher: North-South Books, ISBN-10: 0735814511

The Three R's: Reuse, Reduce, Recycle (Paperback), by Nuria Roca, Feb. 2007, Publisher: Barron's Educational Series, ISBN-10: 0764135813

Why Should I Recycle? (Paperback), by Jen Green, Feb. 2005, Publisher: Barron's Educational Series, ISBN-10: 0764131559

Discuss the book with your students and find out what they learned about garbage, recycling, or composting. Ask, why is it important to recycle?

3. Go back to the list of things that students throw into the garbage. Can any of those items be reused, recycled, or composted? Make a three column chart:

Can Be Reused	Can Be Recycled	Can Be Composted
Pop bottles	Milk containers	Banana peel
Paper used on one side	Newspapers	Apple core

APPLYING ACTIVITIES

1. Go back to the number of bags of garbage that students thought their classroom made in one week. Before you begin any waste-reduction activities, collect the classroom trash for a day or a week. Be sure to get cooperation from the custodians or your collection may disappear!

Once collected, find out the actual number of garbage bags that the classroom produced. Is it more, less or the same as they thought? Using a plastic tarp, rubber gloves and aprons, have students sort through the trash. Identify items that can be reused, recycled, or composted.

2. Have students research ways to reduce their waste. Try using the following search engines for kids:

Ask Jeeves for Kids: www.askforkids.com,
 Yahoo! Kids: www.yahooligans.com,
 or Kids Click!: www.kidsclick.org.

Try out the following student-friendly websites:

www.kidsforsavingearth.org
www.encorp.ca/returnit/
www.ecokids.ca
www.kids.nationalgeographic.com

Students can discuss their ideas in pairs or record ideas in their science journals. Students can also find ways of reuse an item (such as a milk jug) or helping the classroom to recycle.

Here are some ideas for reusing, composting and recycling at school:

- Use tube socks to collect plastic bags; donate them to local food banks or homeless shelters.
- Bring in clothes that no longer fit and donate them to a charity.
- Make a rainbow for the school's front hall from recycled materials to correspond with the colours of rainbow. Chicken wire is used to hold material in place.
- Paper revolution – use both sides of paper or posters before recycling. Make scratch pads from paper used on one side only and deliver to teachers for use in the classrooms.
- Create junk monsters from recycled materials. Use aluminum cans to create a globe or other structural art. Make a tin man or robot from aluminum cans or pails.
- Cut plastic pop bottles in half and use as planters for seeds.
- Hold a book exchange or book sale.
- Hold a used toy exchange or sale.
- Make it easy to comply. Place recycle bins next to garbage cans so it's "one stop" disposal.
- Have a recycle race or competition. Prepare a garbage can or bag with a mixture of recyclables and refuse. Have teams of students and teachers complete to sort the refuse. Provide rubber gloves!
- Consult with your custodian to identify other areas in waste management for your school.
- Start vermicomposting in the classroom. Read *Vermicomposting to Reduce Kitchen Waste* at:
www.environment.gov.ab.ca/info/library/8130.pdf

3. Order a classroom set of the activity booklet, *Waste Watchers* from Alberta Environment. This activity booklet was developed to introduce children to the 4Rs – Reduce, Reuse, Recycle and Recover. *Waste Watchers* educates students about waste minimization and hazardous waste. Visit www.environment.alberta.ca/926.html or call 780-427-2700 to order a class set.
4. This is also a good time for students, or the entire class, to make a *One Simple Act* commitment. See Step #2 in the Teacher's Guide for more information about this activity. These simple acts are suitable for this lesson:

I will reuse and recycle paper.

I will recycle my drink containers.

I will compost my fruit and vegetable scraps.

REFERENCES

Alberta Environment, *Backyard Composting to Reduce Organic Waste*, 2009.

Alberta Environment, *Vermicomposting to Reduce Kitchen Waste*, 2009.

Alberta Environment, *Focus On: Waste Reduction*, 2001.

EarthCARE Canada, *Beyond the Blue Box*, 2005

Lesson 3

An Introduction to Water and Water Conservation

CURRICULUM LINKS

Social Studies

Grade 1

Citizenship: Belonging and Connecting

Students will:

1.1.2 value the groups and communities to which they belong:

- appreciate how their actions might affect other people and how the actions of others might affect them (C)
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1.1.4 determine what makes their communities thrive by exploring and reflecting upon the following questions for inquiry:

- How does caring for the natural environment contribute to the well being of our community? (C, LPP)

Grade 2

Communities in Canada

Students will:

2.1.1 appreciate the physical and human geography of the communities studied:

- demonstrate care and concern for the environment (C, ER, LPP)

Grade 3

Global Citizenship

Students will:

3.2.2 explore the concept of global citizenship by reflecting upon the following questions for inquiry:

- What are some environmental concerns that Canada and communities around the world share? (ER, GC)
- In what ways can individuals and groups contribute to positive change in the world? (C, GC, PADM)

Science

Grade 1

Topic E: Needs of Plants and Animals

Students will:

3. Identify ways in which living things are valued; e.g., as part of a community of living things; as sources of food, clothing or shelter.

Grade 2

Topic A: Exploring Liquids

Students will:

8. Recognize that water is a component of many materials and of living things.
9. Recognize human responsibilities for maintaining clean supplies of water, and identify actions that are taken to ensure that water supplies are safe.

INTRODUCTION

Of all the water in the world, 97.5 per cent is salt water. The remaining 2.5 per cent is fresh but a significant amount is tied up in the polar ice caps. This leaves about 1 per cent of the world's water supply available to meet the fresh water demands of all living things. Some parts of the world experience floods, other parts are drought-ridden. Access to good quality water is not equally shared throughout the globe.

Even in Canada, which has the largest per capita water supply in the world, water shortages can be experienced. Most Canadians live within 200 kilometres of the American border, yet a significant portion of our water is found in northern Canada. In Alberta, 80 per cent of our water supply lies in the northern half of the province while 80 per cent of the water demand comes from the south. Locally, as well as globally, the difference in available water supply is a common theme that helps drive the need for conserving water.

The **water cycle** continuously revitalizes the Earth's fresh water supplies. This supply has been constant for millions of years. What changes, is the demand for water by an increasing world population and the accompanying industrial, municipal and agricultural demands.

At present, Alberta is fortunate to have sufficient water supplies to meet our needs. Still, we have to consider the growing demand for water with the increases in our population and economy. We also have to be concerned about factors such as water pollution, which can affect the amount and quality available for our use. We also recognize that water is required to sustain healthy ecosystems and we must take these uses into account when looking at available supplies.

Economically, it makes sense to conserve water. Not only do we have to think about using our existing supplies wisely; we also have to consider costs. Water is getting more expensive. It's costing us more to supply, to treat, to dispose of, and to treat again. The energy required to meet these demands is enormous and this can lead to other environmental issues such as climate change. Studies have shown that our household water use could be reduced by 50 per cent without significantly changing our lifestyle.

Water conservation makes sense and it saves money for individual families in rural and urban areas, for industries, and communities. Consider the case of a leaking faucet in your home. The drip is irritating but you may assume it really isn't wasting much water. In reality, a dripping faucet leaking one drop per second can amount to 25 litres per day and to more than 10,000 litres per year. That's enough water to wash more than 65 loads of clothing; take 140 five minute showers, or wash 40 cars. Imagine one leaking faucet in every home near you and it's easy to see why fixing a leak quickly makes sense and saves cents. Another example is that a small toilet leak can cost you \$30.00 per month. A simple repair could save you \$360.00 a year!

ACTIVATING ACTIVITIES

1. Have your students brainstorm all the ways that we use water in a day. This can be anything from brushing teeth and filling up water bottles, to swimming and laundry. Ask students to write down (or draw) each idea onto a separate piece of scrap paper. Have students, a few at a time, bring forward their ideas and tape or tack them to a flip chart or bulletin board.

Once you have everyone's words or pictures up, ask students to put these "water uses" into categories. They can come up with their own, or you can use categories like: cooking, cleaning, drinking, recreation, etc. Ask students to sort the words and pictures into the new categories.

Next, ask students to review the categories and see if there are some areas where we may use a lot of water. Do we waste water while cleaning our bodies? Do we run the tap while brushing our teeth or leave the tap running while we soap our hands? Draw a blue water drop beside each "water use" that uses a lot of water.

2. Ask students to brainstorm all the living things on earth that require water to survive. The students can list anything from a cactus to a fish. Make sure to include people in your list. Next, ask the students what would happen if we ran out of water or if it became too dirty to drink. What would happen to fish, plants, and us? Who should receive the water that is left or clean?

If we look at a map of the earth or at a globe, we can see that the earth has lots of water. But much of that water, about 97.5 per cent is oceans and it is too salty to drink. Our planet has a small amount of fresh, clean drinking water and we need to share it – with plants, animals and people.

ACQUIRING ACTIVITIES

1. Ask students to research ways to conserve water and reduce water usage. Try using the following search engines for kids:

Ask Jeeves for Kids: www.askforkids.com,
Yahoo! Kids: www.yahooligans.com,
or Kids Click!: www.kidsclick.org.

Try out the following student-friendly websites:

www.kidsforsavingearth.org

www.ecokids.ca

kids.nationalgeographic.com/

Students can discuss their results and record key ideas in their science journals.

Here are some ideas for saving water at school:

- Turn taps off while soaping and after washing hands.
- Check for drips and leaks. Ask your teacher or custodian to fix leaking taps or toilets as soon as possible.
- Wash paint brushes in a bucket or ice cream container instead of under a running tap.
- Bring a water bottle to school and keep refilling it rather than using the fountain. At the end of the day, any left-over water can be poured in plants or on the garden.
- Start a 'Water Saving' club. Members of the team can monitor leaking taps, design posters on water saving tips, and tell friends about their achievements.

- Using concept mapping, have students identify several personal uses of water, how water may be wasted during that use, and ways in which the amount of water used may be reduced (e.g., **Use**-brushing teeth, **Waste**-leaving tap running, **Reduce**-turn off the tap).
- Read one, or more, of the following books with your students:

Why Should I Save Water? (Paperback), by Jen Green, Feb. 2005, Publisher: Barron's Educational Series, ISBN-10: 0764131575

A Drop of Water (Hardcover), by Gordon Morrison, Sep. 2006, Publisher: Houghton Mifflin Books for Children, ISBN-10: 0618585575

Let's Save Water!, by Sara E. Nelson, Dec. 2006, Publisher: Pebble Books, ISBN-10: 0736863222

Ask the students about their favourite parts of the book and what they learned. Why is it important to save water and to use water wisely?

APPLYING ACTIVITIES

- Ask students to compose a “saving water” message with suggestions to reduce water use. They can turn these messages into P.A. announcements, posters for around school or emails to parents or peers.
- Order the activity booklet, *Enviro Kids Celebrate the Environment* from Alberta Environment. In this book, students learn, through many activities, about the different parts of the environment – land, air, water and waste. Visit www.environment.alberta.ca/926.html or call 780-427-2700 to order a class set.
- This is also a good time for students, or the entire class, to make a *One Simple Act* commitment. See Step #2 in the Teacher's Guide for more information about this activity. The simple act suitable for this lesson is:

I will be a water saver.

REFERENCES

Alberta Environment, Focus On: Water Conservation, 2002.

division 2 (grades 4 - 6) conservation lesson plans

Lesson 1

An Introduction to Energy and Energy Conservation

CURRICULUM LINKS

Social Studies

Grade 4

Alberta: A Sense of the Land

Students will:

4.1.1 value Alberta's physical geography and natural environment:

- demonstrate care and concern for the environment through their choices and actions (LPP)

4.1.4 analyze how Albertans interact with their environment by exploring and reflecting upon the following questions and issues:

- How are natural resources used by Albertans (i.e., agriculture, oil and natural gas, forests, coal)? (ER, LPP)

Grade 4

Alberta: Celebrations and Challenges

Students will:

4.3.1 appreciate the factors contributing to quality of life in Alberta:

- value and respect their relationships with the environment (C, ER, LPP)

Grade 5

Physical Geography of People

Students will:

5.1.1 value Canada's physical geography and natural environment:

- demonstrate care and concern for the environment through their choices and actions (GC, LPP)

Science

Grade 5

Topic E: Weather Watch

Students will:

12. Recognize that human actions can affect climate, and identify human actions that have been linked to the greenhouse effect.

VOCABULARY

- **Renewable energy** – sources of energy, such as wind, wood, hydroelectric and solar power, that when used wisely will last forever.
- **Non-renewable energy** – sources of energy, such as fossil fuels, that when used up are gone forever.

INTRODUCTION

Non-renewable fossil fuels are the dominant form of energy consumed in Canada. The combustion of fossil fuels emits greenhouse gases, such as carbon dioxide and nitrous oxide, which accumulate in the atmosphere and contribute to climate change. Pollutants such as sulphur dioxide and nitrogen oxides are also by-products of fossil fuel combustion and are primary contributors to acid rain and poor air quality. The transportation sector is one of the largest consumers of energy and is extremely dependent on fossil fuels in particular. Fossil fuel spills, waste heat, and habitat destruction associated with mining and damming pose a risk to wildlife and contribute to changes in biodiversity.

Canada ranks as the world's sixth largest user of primary energy. This high level of use can be attributed to vast travel distances, a cold climate, an energy-intensive industrial base, relatively low energy prices, and a high standard of living. Energy use of this magnitude has a significant impact on the environment. The combustion of fossil fuels, the most widely used forms of energy, releases gases and chemicals that contribute to acid rain, poor air quality, and climate change. Oil spills, blow-outs, and unsustainable mining practices can damage ecosystems. The depletion of known fossil fuel reserves requires continued exploration and mining, with the potential for the invasion and disruption of remote ecosystems. Other forms of energy also pose risks to the environment. Nuclear energy production has few emissions, although waste heat can significantly disturb aquatic ecosystems. Radioactive waste continues to be harmful for thousands of years, so its safe storage remains an environmental concern. Hydroelectric power is a cleaner form of energy; however, dams built to generate electricity alter natural river courses and silting patterns, flood habitat, affect fish spawning, and can change the chemical balance of a lake or river. Renewable energy sources such as solar and wind power are available but make up only a fraction of the energy consumed in Canada.

ACTIVATING ACTIVITIES

1. Ask the students, what is energy? They will probably say that it makes things go or work. Next, on the board or in students' notebooks, ask them to brainstorm a list of all different kinds of energy. They should list things like coal, oil, gas, wind, sun, batteries, propane, natural gas and hydroelectricity. Now, ask the students which of these items are non-renewable (this means when these sources of energy are gone, they are gone forever) and renewable (this means that they cannot be used up if they are used wisely). If the students are working in their notebooks, have them circle the non-renewable energy sources with one colour and the renewable energy with another colour.

Now, ask the students what will happen when we run out of the non-renewable energy sources. Once these forms of energy are gone, they are gone forever. This means that we need to conserve them, so that we can continue to use them for as long as possible.

2. Using the computer, ask students to find out what kind of energy we use in Alberta. Is it renewable or non-renewable? What are the benefits of our local energy supplies? What are some things we can do to ensure we have local energy supplies for a long time into the future? Try using the following search engines for kids:

Ask Jeeves for Kids: www.askforkids.com,
Yahoo! Kids: www.yahooligans.com,
or Kids Click!: www.kidsclick.org.

Your students can visit Alberta's ERCB KidZone: www.kidzone.ercb.ca. You can download energy backgrounders from EnerAction at www.greenlearning.ca. The Pembina Institute's Green Learning website requires a name and password to download lesson plans and backgrounders.

3. Research the effects of air pollution on humans, animals and plants. What causes air pollution? What kinds of things can we do to prevent air pollution? Try using the following search engines for kids:

Ask Jeeves for Kids: www.askforkids.com,
Yahoo! Kids: www.yahooligans.com,
or Kids Click!: www.kidsclick.org.

The City of Pickering Eco-Kids website has some excellent air pollution and air quality links:
www.cityofpickering.com/standard/kids/eco-kids/air.html

ACQUIRING ACTIVITIES

1. Ask groups of students to create a pollution poster. Find examples of unclean air from digital images or pictures from a magazine. Examples of images may include smog, smoke stacks, car exhaust, and/or forest fires. In a gallery walk, students identify the substances that cause pollution and suggest ways to reduce or eliminate it to provide clean air for humans, plants, and animals.
2. Ask students to make a list of all the things they can do to save energy and reduce air pollution. Here are some ideas for saving energy at home and at school:
 - Turn off unneeded lights even when leaving a room for a short time.
 - Keep the outside door open for short periods of time in cold and hot weather.
 - Unplug seldom used appliances to reduce standby power use (also known as "phantom power").
 - Shut off electrical equipment in the evening when leaving school.
 - Use a microwave as much as possible instead of a conventional oven or stove.
 - Turn off lights, computers and other appliances when not in use.
 - Purchase appliances and office equipment with the ENERGY STAR® label.
 - Only use electric appliances when you need them.

- Use compact fluorescent light bulbs to save money and energy.
 - Plant trees to shade a home or a window at school.
 - Shade outside air conditioning units with trees or other means.
 - Use an energy efficient or electric lawnmower instead of a gas-powered one.
 - Use cold water instead of warm or hot water when possible.
 - Walk or ride a bike instead of driving, whenever possible.
 - Start a “school pool” and take lots of students to school in one vehicle.
 - Keep vehicle tires properly inflated.
 - Take one fewer car trip each week.
 - Strive to be idle-free.
 - Buy food grown locally.
3. Ask students to write a story about a world that had only renewable energy. What would we see in our neighbourhoods and cities? What would the air smell like? What kinds of transportation would we use? Would our houses and schools look different?

You can use the following story prompt:

“It seems like only yesterday that we ran out of fossil fuels. We all thought it would be too hard to change our ways. Now, our planet is better than ever. Today when I woke up, I heard the sound of...”

APPLYING ACTIVITIES

1. Using a computer drawing program or art supplies, ask students to create a before and after illustration of air pollution. Ensure that students explain ways of reducing the illustrated example of pollution and describe why clean air is important for humans, plants, and animals.

Submit digital versions of your students’ artwork to *One Simple Act*. Their ideas, designs and creativity can be a showcase for other classrooms. Find out more about sharing your success at www.onesimpleact.alberta.ca and go to the Schools section.

2. As a class, brainstorm ways to reduce energy use. Post the list in the classroom as a reminder. Ask students what they can do to reduce energy use and air pollution at home? Have them make a list while at home in the evening. Is the list different from the school list? Students may want to write a letter to their families to tell them how to save energy at home.
3. Print copies of the Calendar Club Activity Booklet from Natural Resources Canada, Office of Energy Efficiency at www.oeenrcan.gc.ca/calendarclub/activity
4. This is also a good time for students, or the entire class, to make a *One Simple Act* commitment. See Step #2 in the Teacher’s Guide for more information about this activity. These simple acts are suitable for this lesson:

I will use active or green transportation at least one a week.

I will turn off the computer and other electronics when I am not using them.

I will remind my parents and other drivers to be idle-free in the school zone.

REFERENCES

Environment Canada. Canada’s National Environmental Indicator Series 2003 - Energy Consumption, 2003.

Lesson 2

An Introduction to Waste and Waste Reduction

CURRICULUM LINKS

Social Studies

Grade 4

Alberta: A Sense of the Land

Students will:

4.1.1 value Alberta's physical geography and natural environment:

- demonstrate care and concern for the environment through their choices and actions (LPP)

4.1.4 analyze how Albertans interact with their environment by exploring and reflecting upon the following questions and issues:

- How are natural resources used by Albertans (i.e., agriculture, oil and natural gas, forests, coal)? (ER, LPP)

Grade 4

Alberta: Celebrations and Challenges

Students will:

4.3.1 appreciate the factors contributing to quality of life in Alberta:

- value and respect their relationships with the environment (C, ER, LPP)

Grade 5

Physical Geography of People

Students will:

5.1.1 value Canada's physical geography and natural environment:

- demonstrate care and concern for the environment through their choices and actions (GC, LPP)

Science

Grade 4

Topic A – Waste in Our World

Students will:

2. Identify and classify wastes that result from human activity.
3. Describe alternative methods of disposal, and identify possible advantages and disadvantages of each.
4. Distinguish between wastes that are readily biodegradable and those that are not.
5. Compare different kinds of packaging, and infer the relative advantages and disadvantages of that packaging. In evaluating different forms of packaging, students should demonstrate the ability to consider a consumer perspective as well as an environmental perspective.
6. Identify methods of waste disposal currently used within the local community.
8. Identify alternative materials and processes that may decrease the amount of waste produced; e.g., reducing wastage of food, using both sides of a sheet of paper.
9. Identify ways in which materials can be reused or recycled, including examples of things that the student has done.
11. Identify actions that individuals and groups can take to minimize the production of wastes, to recycle or reuse wastes and to ensure the safe handling and disposal of wastes.
12. Develop and implement a plan to reduce waste, and monitor what happens over a period of time.

Grade 6

Trees and Forests

Students will:

9. Identify human actions that enhance or threaten the existence of forests.

INTRODUCTION

If there is one thing we all have in common, it is waste. Every industry, business and household produces it. How we deal with waste varies from person to person, city to city and country to country, but it is an issue that cannot be ignored.

For many years, with cheap resources and disposal sites easy to locate, it was easier and cheaper to dispose of wastes than to do anything else with them. Many landfills, where most of our wastes end up, are quickly reaching their capacity. The NIMBY syndrome (Not In My Back Yard), concerns about local environmental conditions and steadily rising costs make replacing landfills very difficult.

In Alberta, many of the 'dumps' of the past have been replaced with engineered landfills to minimize their impact on the environment. If wastes are not disposed of properly, they can be a source of pollution to surface and groundwater when buried or to the air when burned. Soil can be harmed directly when toxic or hazardous waste is disposed improperly.

A common belief is that garbage buried in landfills is **biodegrading** or **decomposing**. For the first 15 years in the life of a landfill, about 25 per cent of organic materials, such as food and yard waste, does decompose. Other trash, however, retains its original weight, volume and form for at least 40 years. Some materials can remain almost unchanged for hundreds of years.

We can minimize the need for disposal by reducing the amount of waste generated in the first place. We can reuse materials again and again and separate out no longer usable materials for recycling. This is known as the 3Rs - **Reduce**, **Reuse**, and **Recycle**.

Reduce

Studies have shown that 25 per cent of wastes can be diverted from landfills through changes in consumer behaviour. This does not mean having to do without things you need, but it does mean taking the time to shop wisely and think about packaging.

Reuse

There are many ways to reuse items, cut costs and reduce the burden on the environment. From refillable containers to used clothing or furniture, the list is seemingly endless.

Recycle

Recycling involves much more than sorting wastes and preparing them for collection. It is a complex process that in the end transforms materials into new and usable products.

Composting

Composting is a process that turns kitchen, leaf and yard waste into a humus-like material called compost. Compost is a soil conditioner and a growing medium. In nature, organic materials such as leaves, grass and other plant material naturally decompose or break down to become humus. Humus is the top organic layer of soil. Composting can be done inside using a vermicomposter (composting with special worms) and outdoors using a backyard composter.

ACTIVATING ACTIVITIES

1. Write the word **garbage** in the middle of the chalkboard, white board or a flip chart. They can list words that are similar like trash, waste or litter. Ask the students what the word, garbage, means. Write down all of their ideas in a word splash or mind map. Students may say that garbage is things that can go into a garbage can or can be thrown away. Leave this information visible for the discussion.
2. Ask the students to guess how much garbage they (their family and the classroom) make(s) in one day or one week. You can use the general term, “bags of garbage,” to indicate amount. Write down a number that they come up with for the classroom – we will use this number later on to see if their estimate matches the actual garbage. This question can be followed or supplemented with the question, “what kinds of things do you throw into the garbage?” Keep a list of all the students’ ideas. This list will also be used later to show items that can be recycled, reused or composted.
2. Have students use the computer to research the end use of the items they recycle. What do pop bottles become? What can newspapers be turned into? Have each student or group of students research a different recyclable item. Try using the following search engines for kids: Ask Jeeves for Kids: www.askforkids.com, Yahoo! Kids: www.yahooligans.com, or Kids Click!: www.kidsclick.org. Visit the Alberta Beverage Container Recycling Corporation website (www.abcrc.com) and go to “Follow that container” or print out the PDF, “The Life Cycle of Containers,” to find out what happens once the recycling leaves your classroom.
3. Have students use the computer to learn more about the history of waste using an interactive online resource called “A Century of Waste”. www.environment.gov.ab.ca/edu/activities/century/ae.html

ACQUIRING ACTIVITIES

1. Go back to the number of bags of garbage that students thought their classroom made in one week. Before you begin any waste-reduction activities, collect the classroom trash for a day or a week. Be sure to get cooperation from the custodians or your collection may disappear!

Once collected, find out the actual number of garbage bags that the classroom produced. Is it more, less or the same as they thought? Using a plastic tarp, rubber gloves and aprons, have students sort through the trash. Identify items that can be reused, recycled, or composted.

Make a three column chart:

Can Be Reused	Can Be Recycled	Can Be Composted
Pop bottles	Milk containers	Banana peel
Paper used on one side	Newspapers	Apple core

APPLYING ACTIVITIES

- Using print and electronic resources, students research ways to reduce their waste. Students can discuss their ideas in pairs or record ideas in their science journals. Students can also find ways of reuse an item (such as a milk jug) or helping the classroom to recycle.

Here are some ideas for reusing and recycling at school:

- Use tube socks to collect plastic bags; donate them to local food banks or homeless shelters.
- Bring in clothes that no longer fit – donate them to a charity.
- Make a rainbow for the school’s front hall made from recycled materials to correspond with the colours of rainbow. Chicken wire is used to hold material in place.
- Paper revolution – use both sides of paper or posters before recycling. Make scratch pads from paper used on one side only and deliver to teachers for use in the classrooms.
- Create junk monsters from recycled materials. Use aluminum cans to create a globe or other structural art. Make a tin man or robot from aluminum cans or pails.
- Cut plastic pop bottles in half and use as planters for seeds.
- Hold a book exchange or book sale.
- Hold a used toy exchange or sale.
- Make it easy to comply. Place recycle bins next to garbage cans so it’s “one stop’ disposal.
- Have a recycle race or competition. Prepare a garbage can or bag with a mixture of recyclables and refuse. Have teams of students and teachers complete to sort the refuse. Provide rubber gloves.
- Consult with your custodian to identify other areas in waste management for your school.

- Start a classroom vermicomposter or an outdoor composter. Find out more information by downloading these two Alberta Environment brochures:

Backyard Composting to Reduce Organic Waste:

www.environment.gov.ab.ca/info/library/8129.pdf

Vermicomposting to Reduce Kitchen Waste

www.environment.gov.ab.ca/info/library/8130.pdf

Celebrate Waste Reduction Week the third week of October by participating in the Triple Stars Waste Reduction Challenge. www.recycle.ab.ca/wrw

- This is also a good time for students, or the entire class, to make a *One Simple Act* commitment. See Step #2 in the Teacher’s Guide for more information about this activity. These simple acts are suitable for this lesson:

I will pack a waste-free lunch.

I will recycle my drink containers.

I will compost my fruit and vegetable scraps.

REFERENCES

Alberta Environment, [Backyard Composting to Reduce Organic Waste](#), 2009.

Alberta Environment, [Vermicomposting to Reduce Kitchen Waste](#), 2009.

Alberta Environment, [Focus On: Waste Reduction](#), 2001.

EarthCARE Canada, [Beyond the Blue Box](#), 2005

Lesson 3

An Introduction to Water and Water Conservation

CURRICULUM LINKS

Social Studies

Grade 4

Alberta: A Sense of the Land

Students will:

4.1.1 value Alberta's physical geography and natural environment:

- demonstrate care and concern for the environment through their choices and actions (LPP)

4.1.4 analyze how Albertans interact with their environment by exploring and reflecting upon the following questions and issues:

- How are natural resources used by Albertans (i.e., agriculture, oil and natural gas, forests, coal)? (ER, LPP)

Grade 4

Alberta: Celebrations and Challenges

Students will:

4.3.1 appreciate the factors contributing to quality of life in Alberta:

- value and respect their relationships with the environment (C, ER, LPP)

Grade 5

Physical Geography of People

Students will:

5.1.1 value Canada's physical geography and natural environment:

- demonstrate care and concern for the environment through their choices and actions (GC, LPP)

INTRODUCTION

Of all the water in the world, 97.5 per cent is salt water. The remaining 2.5 per cent is fresh but a significant amount is tied up in the polar ice caps. This leaves about 1 per cent of the world's water supply available to meet the fresh water demands of all living things. Some parts of the world experience floods, other parts are drought-ridden. Access to good quality water is not equally shared throughout the globe.

Even in Canada, which has the largest per capita water supply in the world, water shortages can be experienced. Most Canadians live within 200 kilometres of the American border, yet a significant portion of our water is found in northern Canada. In Alberta, 80 per cent of our water supply lies in the northern half of the province while 80 per cent of the water demand comes from the south. Locally, as well as globally, the difference in available water supply is a common theme that helps drive the need for conserving water.

The **water cycle** continuously revitalizes the Earth's fresh water supplies. This supply has been constant for millions of years. What changes, is the demand for water by an increasing world population and the accompanying industrial, municipal and agricultural demands.

At present, Alberta is fortunate to have sufficient water supplies to meet our needs. Still, we have to consider the growing demand for water with the increases in our population and economy. We also have to be concerned about factors such as water pollution, which can affect the amount and quality available for our use. We also recognize that water is required to sustain healthy ecosystems and we must take these uses into account when looking at available supplies.

Economically, it makes sense to conserve water. Not only do we have to think about using our existing supplies wisely; we also have to consider costs. Water is getting more expensive. It's costing us more to supply, to treat, to dispose of, and to treat again. The energy required to meet these demands is enormous and this can lead to other environmental issues such as climate change. Studies have shown that our household water use could be reduced by 50 per cent without significantly changing our lifestyle.

Water conservation makes sense and it saves money for individual families in rural and urban areas, for industries, and communities. Consider the case of a leaking faucet in your home. The drip is irritating but you may assume it really isn't wasting much water. In reality, a dripping faucet leaking one drop per second can amount to 25 litres per day and to more than 10,000 litres per year. That's enough water to wash more than 65 loads of clothing; take 140 five minute showers, or wash 40 cars. Imagine one leaking faucet in every home near you and it's easy to see why fixing a leak quickly makes sense and saves cents. Another example is that a small toilet leak can cost you \$30.00 per month. A simple repair could save you \$360.00 a year!

ACTIVATING ACTIVITIES

1. Have your students brainstorm all the ways that we use water in a day. This can be anything from brushing teeth and filling up water bottles, to swimming and laundry. Ask students to write down (or draw) each idea onto a separate piece of scrap paper. Have students, a few at a time, bring forward their ideas and tape or tack them to a flip chart or bulletin board.

Once you have everyone's words or pictures up, ask students to put these "water uses" into categories. They can come up with their own, or you can use categories like: cooking, cleaning, drinking, recreation, etc. Ask students to sort the words and pictures into the new categories.

Next, ask students to review the categories and see if there are some areas where we may use a lot of water. Do we waste water while cleaning our bodies? Do we run the tap while brushing our teeth or leave the tap running while we soap our hands? Draw a blue water drop beside each "water use" that uses a lot of water.

2. Ask students to brainstorm all the living things on earth that require water to survive. The students can list anything from a cactus to a fish. Make sure to include people in your list. Next, ask the students what would happen if we ran out of water or if it became too dirty to drink. What would happen to fish, plants, and us? Who should receive the water that is left or clean? If we look at a map of the earth or at a globe, we can see that the earth has lots of water. But much of that water, about 97.5 per cent is oceans and it is too salty to drink. Our planet has a small amount of fresh, clean drinking water and we need to share it – with plants, animals and people.

3. Complete the following experiment to show that, while the planet is about 70 per cent water, we don't have much drinking water.

You need:

- 4 L milk jug
- 100 ml graduated cylinder or measuring cup
- Eye dropper
- Water

Fill a 4 L milk jug with water. Tell students that this represents all the water on the entire planet. Ask students to guess how much water in that milk jug represents drinking water for humans. After a few guesses, pour 80 mL into the cylinder or measuring cup. 80 mL is all that remains once we remove the ocean water - it is too salty to drink. Now, of this 80 mL, how much is available for human drinking water? After a few guesses, dump out all but 20 mL.

Most of our fresh water is frozen in the ice caps at the north and south poles. We can't drink that frozen water. Of the 20 mL that remains, ask students how much of this water is available for drinking. After a few guesses, use the eye dropper to remove 4 drops. This represents all the fresh, potable water on earth. Some of the 20 mL of water is polluted or too deep underground for our wells to reach. Therefore, we only have about 4 drops of water for all the people on the planet!

Brainstorm with students about how to reuse the 4L of water that you used for this experiment? Water plants? Fill an aquarium?

ACQUIRING ACTIVITIES

1. Ask students to research ways to conserve water and reduce water usage. Try using the following search engines for kids: Ask Jeeves for Kids: www.askforkids.com, Yahoo! Kids: www.yahooligans.com, or Kids Click!: www.kidsclick.org. Students can discuss their results and record key ideas in their science journals. Students can also visit Earth Day Canada's EcoKids website at www.ecokids.ca. Under the section called, "homework help," there is a big section on water conservation.

Here are some ideas for saving water at school:

- Turn taps off while soaping and after washing hands.
 - Check for drips and leaks. Ask your teacher or custodian to fix leaking taps or toilets as soon as possible.
 - Wash paint brushes in a bucket or ice cream container instead of under a running tap.
 - Bring a water bottle to school and keep refilling it rather than using the fountain. At the end of the day, any left-over water can be poured in plants or on the garden.
 - Start a 'Water Saving' club. Members of the team can monitor leaking taps, design posters on water saving tips, and tell friends about their achievements.
2. Using concept mapping, students identify several personal uses of water, how water may be wasted during that use, and ways in which the amount of water used may be reduced (e.g., **Use**-brushing teeth, **Waste**-leaving tap running, **Reduce**-turn off the tap).
 3. Ask students to find out where the drinking water in their community or home comes from. Is it from surface or ground water? Is their water from a private well or a community water supply?

APPLYING ACTIVITIES

1. Ask students to compose a "saving water" message with suggestions to reduce water use. They can turn these messages into P.A. announcements, posters for around school or emails to parents or peers.
2. Participate in **Minister for a Day**. This is an annual part of Alberta Environment's wetland education program that supports Grade 5 teachers and students. Students are required to apply their learning about wetlands and provide their ideas on environmental priorities. They share their ideas for motivating Albertans to change their behavior and inspire stewardship of Alberta wetlands.
www.environment.gov.ab.ca/edu/mftd
3. Participate in **Alberta Water Quality Awareness (AWQA) Day**. This is a province-wide program focused on increasing people's awareness and understanding of water quality and watershed health, through hands-on water quality testing. AWQA Day participants are given free water quality test kits and encouraged to go outside and explore the health of their local waterways.
www.awqa.ca.
4. This is also a good time for students, or the entire class, to make a *One Simple Act* commitment. See Step #2 in the Teacher's Guide for more information about this activity. The simple act suitable for this lesson is:

I will turn off the taps while I soap my hands.

REFERENCES

Alberta Environment, Focus On: Water Conservation, 2002.

