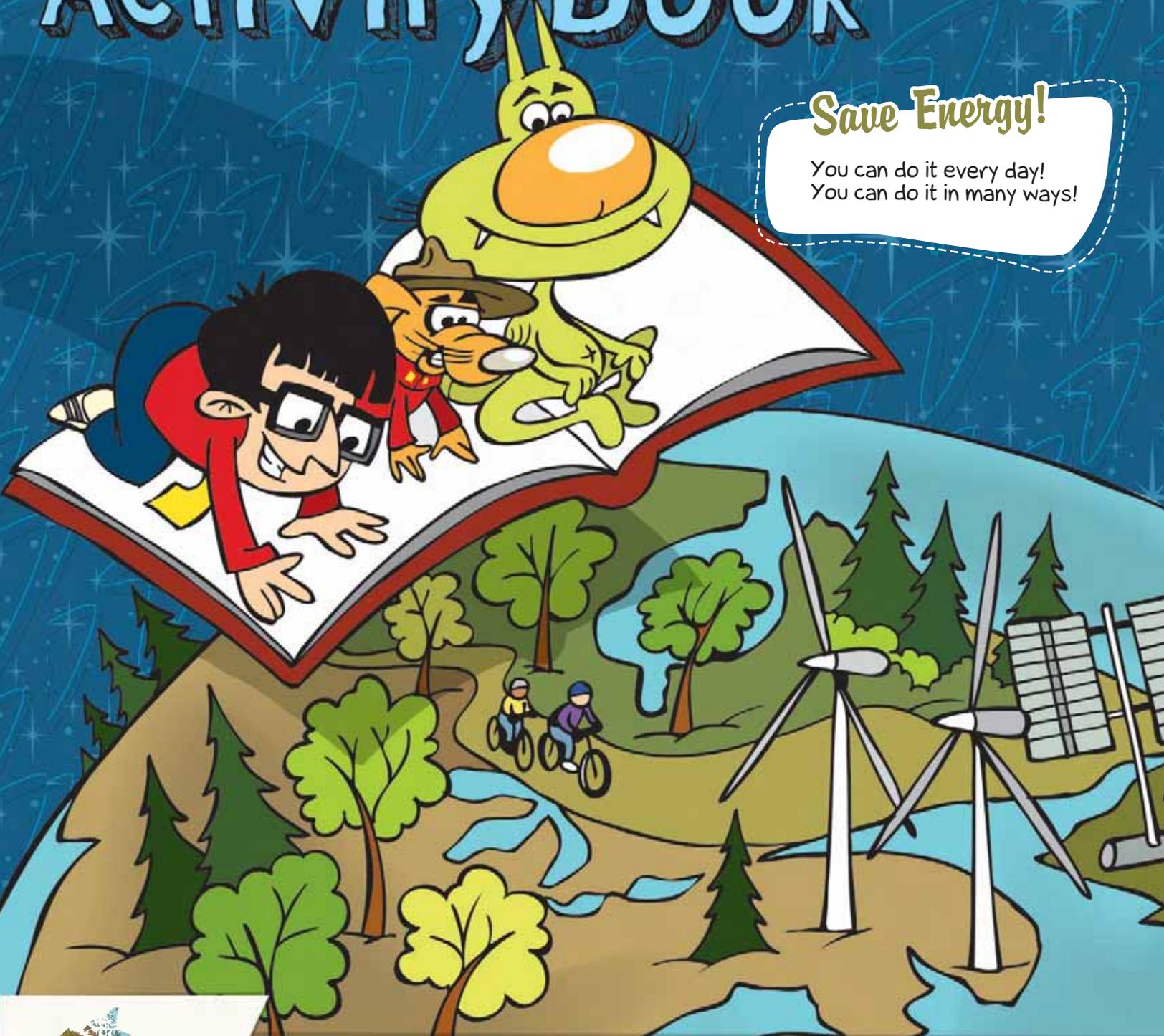




Energy and the Environment Activity Book

Save Energy!

You can do it every day!
You can do it in many ways!



Canada

Natural Resources Canada's Office of Energy Efficiency
*Leading Canadians to Energy Efficiency at Home, at Work
and on the Road.*

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Meet NRCat. He will introduce you to the topic of energy and the environment. 1

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SURVEY *Self-Mailer*



Using Less, Living Better!

Hi Kids – and Teachers, too!

I'm NRCat – The Natural Resources Canada Cat – your friendly, fuzzy, furry, funny, fashionable, frugal, fantastic, favourite feline guide to saving energy and the environment! Why a cat? Well, we're practically famous for using the least energy we can while living a fabulous life! Did you know a cat can sleep 18 hours a day if its tummy is full? *Purrr-rrr-rrr.*

But, there's no time to rest when it comes to energy choices and the environment! For the past century or so, human societies have been growing and developing so fast that Mother Nature is stressed out! The clues are pretty clear – even to me!

- 1 Humans are quickly using up some favourite natural resources, like oil and gas, that are limited in quantity. That's like me eating all the chicken chunks in my dish and leaving the broccoli bits behind. Yummy today, but what about next week?
- 2 Making and using energy have some side effects that mess up the environment. I don't want to go into detail, but can I just say: "kitty litter?" Not purrretty!
- 3 Most important, the explosion in energy use is so-oo-oo powerful that it is changing the climate on Earth – even while we watch. I love to sleep in the sun, but lately I've been getting sunburns along with my z-z-z-z-s!

So, what can we (OK: you humans) do about all this (because, frankly, we cats have to rely on you in this matter...)? Well, that's why I developed this Activity Book – to help you learn about ways to conserve energy and the environment.

Use less: Live better!



NRCAT
Mascot (and Cool Cat!)
Natural Resources Canada



Kids' Club Resources

The *Energy and the Environment Kids' Club* offers teachers and students three linked tools for learning about energy conservation. Each tool engages students in different ways.

National Art Contest

Our annual national art contest brings out the beautiful best in students. Their images and messages of energy conservation are simply inspiring. This year, winners from each province and territory are featured on a classroom poster. For details and the winning pictures, visit our Web site.

The Web Site

Have fun learning with the special teaching assistants on our Web site. NRCat, Inspector Joules and Simon have great games, activities and cartoons goin' on. Explore the club tree house; play detective on energy mysteries; and click on some cool links.

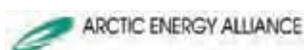
Energy and the Environment Activity Book

This book is a practical hands-on workbook designed for students aged 6 to 13. The content features energy conservation and energy efficiency as key paths to smarter energy choices.

- ★ There are 10 sets of Teaching Notes and Learning Activities in the book. Use, photocopy and adapt these exercises to meet the needs of your students.
- ★ Look in the glossary for handy definitions and key concepts related to energy conservation.
- ★ Help improve the book. Fill out the attached survey card or contact us at our Web site.

kidsclub.nrcan.gc.ca

Thank you to our partners!



Teaching Notes

Energy Basics

"Check the box" exercise

Instruction

Energy is the basic force of life. Big and small, energy drives and shapes our world and our daily lives. Use the Key Points and Learning Activity to reinforce understanding of energy basics.

Key Points

Energy can be defined simply: it is the capacity or ability to take action, to do work. The word energy comes from the ancient Greek word *energos*, which means active or working.

Energy comes in many forms: light, sound, wind, solar, thermal, chemical and nuclear; and very familiar fossil fuels like oil, gas and coal; and electrical energy like hydro (water) power. Today, due to concern about climate change, there is great emphasis on renewable energies like wind and solar. It is important to note that to use energy we very often change one form of energy into another: for example, wind power into electricity.

In addition to forms of energy, there are two basic types of energy: potential (stored) energy and kinetic (active) energy. We continually shift between these types of energy in our daily lives. This is as simple as sitting at a desk (potential energy) and then standing and walking away (kinetic). A rollercoaster ride illustrates this dynamic relationship: the potential energy that exists in that pause at the top of the track is transformed and spent as kinetic energy on the way down.

Answer Key

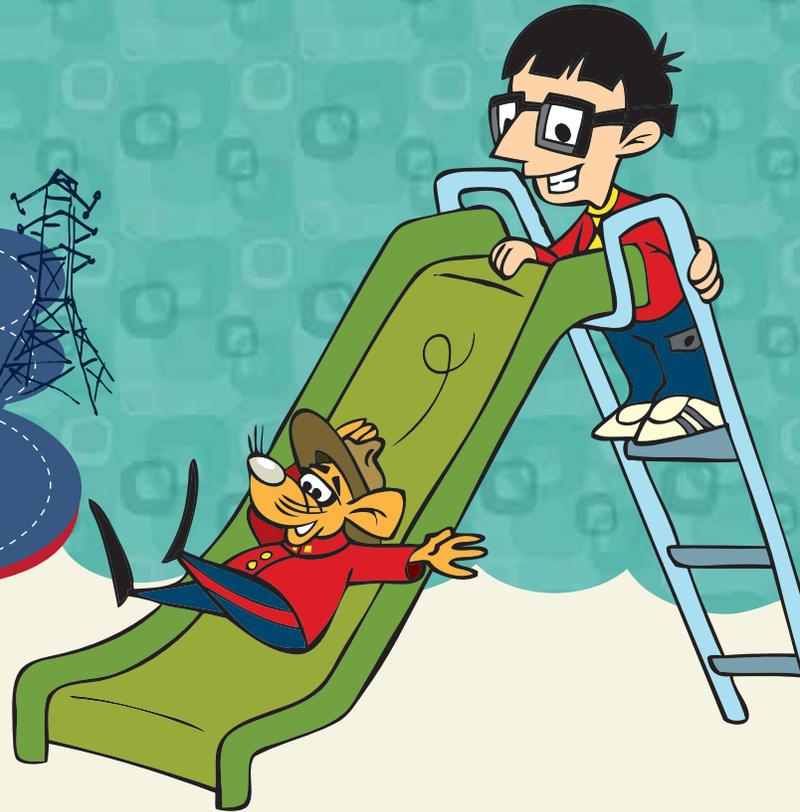
Identify whether the items below represent potential or kinetic energy.

	Potential	Kinetic
Wind turning a windmill's blade	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A lake backed up behind a dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A seam of coal deep in the earth	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A boy standing on top of a slide	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A girl zipping down a slide	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sun shining on a line of laundry (Remember: sunlight is a wave.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Broccoli waiting on your dinner plate	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A rollercoaster ride (Remember: it includes both types of energy!)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Energy Basics

Fun Fact!

Did you know that you can make energy change forms but you can't make it disappear? Think about a campfire: the energy stored in the wood is changed into heat, light and smoke.



Basics

Energy is all around us; we use it every day. How do you picture energy? Playing soccer or dancing? Studying? What about waterfalls and thunderstorms? And broccoli? *Broccoli?!!*

Energy is, basically, the power to make things happen. It is the power to work and play. Energy comes in many forms – like sunshine, electricity and heat – and from many sources – like the sun, waterfalls, and oil and gas.

Did you know energy has two basic types?

1 Potential energy is stored energy. Food, like broccoli, is stored energy that your body turns into running and thinking. A battery is stored energy that powers computer games and cell phones.

2 Kinetic energy is active energy. This involves movement or motion – like playing soccer, dancing and washing dishes. Waterfalls have kinetic energy because the water is moving.

Challenge yourself!

Identify whether the items below represent potential or kinetic energy.

	Potential	Kinetic
Wind turning a windmill's blade	<input type="checkbox"/>	<input type="checkbox"/>
A lake backed up behind a dam	<input type="checkbox"/>	<input type="checkbox"/>
A seam of coal deep in the earth	<input type="checkbox"/>	<input type="checkbox"/>
A boy standing on top of a slide	<input type="checkbox"/>	<input type="checkbox"/>
A girl zipping down a slide	<input type="checkbox"/>	<input type="checkbox"/>
Sun shining on a line of laundry	<input type="checkbox"/>	<input type="checkbox"/>
Broccoli waiting on your dinner plate	<input type="checkbox"/>	<input type="checkbox"/>
A rollercoaster ride	<input type="checkbox"/>	<input type="checkbox"/>





All About Energy

Are you puzzled about energy conservation? Try your hand at this challenging crossword!

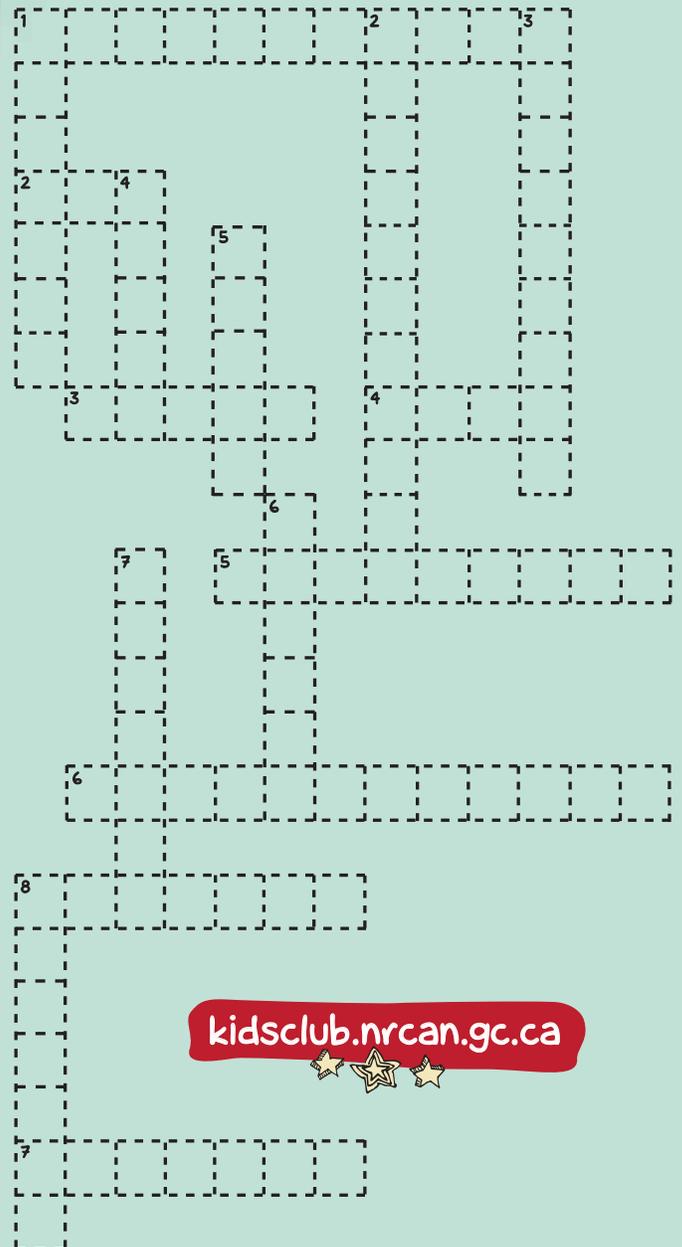


Across

- 1 This instrument measures temperature in degrees. (11)
- 2 Take the ___ (instead of a car) with your friends. (3)
- 3 These familiar green giants absorb greenhouse gases. You can help by planting more. (5)
- 4 This fossil fuel is a black rock we burn to make electricity. (4)
- 5 By _____ instead of using the garbage, you help save energy and conserve our natural resources. (9)
- 6 It describes our efforts to use less energy. Think opposite of waste! (12)
- 7 This car fuel is made from plants. (7)
- 8 The temperature scale used in Canada. (7)

Down

- 1 A machine that turns flowing water or blowing wind into electricity. (7)
- 2 It powers the television, computer, refrigerator and much more! (11)
- 3 Name for energy sources that cannot be used up. (9)
- 4 Sunshine gives us this kind of energy. (5)
- 5 Colour associated with behaviours that protect the environment. (5)
- 6 Energy-saving motto: _____, reuse, recycle! (6)
- 7 When people arrange to drive together, they _____. (7)
- 8 Save energy: hang your _____ outdoors to dry! (7)



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Green Audit

"Green Behaviour" Chart

Instruction

How green are you?

Have students use the chart presented on the activity page to track their "green behaviour" for a week. At the end of the week, students can discuss taking action to save energy and the environment. Repeat the activity once or twice during the year so students/classes can improve their green scores.

Key Points

Changing behaviour is an important part of making smarter energy choices. Even a small change, like turning off the lights when you leave a room, can make a big difference when everyone does it.

Answer Key

Help students add up their points for the week to see how green they are!

Light Green

1-30 points

You are off to a good start! Our daily actions really matter because together they really add up. Keep up the good work!

Medium Green

31-69 points

You are well on your way to green living! You are making a positive difference. Can you do more?

Deep Green

70 or more

You think green and act green pretty much every day. Fantastic! You can inspire your family and friends by your example. Be a green leader!

Green Audit



Make every week a Green Week! It all adds up!

How green are you?



It's Green Week for your class. Use this chart to track your daily efforts to conserve energy. Give yourself one point in the daily box for each activity that you complete. Record additional points for repeating activities. For example, if you turn the lights off three times in one day, give yourself three points in the daily box.

What I did during Green Week

- 1 Turned off the lights when leaving a room.
- 2 Let my hair air dry instead of blow dry.
- 3 Turned off the tap while brushing my teeth.
- 4 Turned off the television as soon as I finished watching a show.
- 5 Walked, biked or took the bus to school.
- 6 Decided what I wanted before opening the refrigerator door.
- 7 Played outside with friends instead of on the computer.
- 8 Had a fast shower instead of a big bath, using less water.
- 9 Used the microwave instead of the oven.
- 10 Re-used paper for school and home projects.

Mon	Tue	Wed	Thu	Fri	Sat	Sun

My total

Class total



Now add your points for the week and ask your teacher how **GREEN** you are!

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Water and Energy Matching Puzzle

Instruction

Water is one of our most important natural resources. Students are asked to match a variety of household activities to the amount of water they typically use. They will gain a better understanding of our dependence on fresh water and why it is important to conserve.

Key Points

The big picture...

Canada is a vast country with three ocean coastlines (Atlantic, Pacific and Arctic) and a lot of freshwater lakes and rivers.

Water is one of our most important natural resources. We need to drink it daily to stay alive. We also use water for cooking, cleaning and, of course, splashing and swimming – and for making skating rinks in winter! Water is vital to our economy, too – from growing food to running factories. We also turn the energy of moving water – like Niagara Falls – into hydroelectric power.

Like electricity, we expect to have good, clean water at the turn of the tap. It has to travel to us and, after we use it, water is treated and returned to its source—usually nearby rivers or lakes. All of this activity takes energy.

Saving water means saving energy. The less water you use, the less energy is used to pump, treat, distribute and recover it.

Answer Key

Tub bath

57 to 95 litres

Hand washing

8 litres (with tap running)

Automatic dishwashing

40 litres

5-minute shower

38 litres

Brushing teeth

10 litres (with tap running)

Toilet flush

13 to 19 litres

Clothes washing machine

225 litres



Water and Energy



How much water do you use?

You may be surprised! Match each activity to the number of litres of water you think it would use.

Fun Fact!

In Canada, here's how we use water inside our homes:

- ★ 35 percent for bathing and showering;
- ★ 30 percent for the toilet;
- ★ 20 percent for laundry;
- ★ 10 percent for kitchen and drinking;
- ★ 5 percent for cleaning.

More than 50 percent of the water used on lawns and gardens is wasted—it evaporates or runs off. Think about it!



Tub bath



Hand washing



Clothes washing machine

5-minute shower

Brushing teeth



Automatic dishwashing

Water, water everywhere – but we rarely give it a thought! Canadians expect to have clean, safe water at the turn of a tap, and that is usually the case. Think of the last time you ran out of water!

Climate change, pollution and environmental stress are making us more concerned about water conservation, especially fresh water. We are beginning to realize what a very valuable natural resource clean fresh water is.



Toilet flush

8 litres (with tap running)

225 litres

38 litres

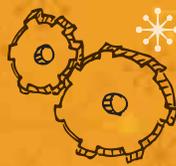
13 to 19 litres

57 to 95 litres

40 litres

10 litres (with tap running)





Energy and Lighting

Class Discussion and Homework

Instruction

This text describes the efficiency of various types of light bulbs (incandescent versus fluorescent). Following a brief discussion of the various types of bulbs, students are asked to calculate the light bulb use at home. Then, a discussion about lighting use will help them understand that every bulb counts!

Key Points

Inequality among bulbs

Watts the difference?

The wattage rating listed on light bulb packaging is a measure of the power used rather than of light output. Different types of bulbs, such as compact fluorescent and halogen, deliver the same light output as incandescent bulbs but use two-thirds less energy.

Choosing energy-efficient light bulbs makes a difference. We use less energy and create fewer greenhouse gas emissions that accumulate in our atmosphere and contribute to climate change.



Incandescents

Traditional incandescent bulbs convert approximately only 10 percent of the electricity they use into light – the remaining 90 percent is converted into heat.



Fluorescents

Fluorescent lights are common in offices and institutions like schools and hospitals. Their use in homes is mostly limited to kitchens because of their cool light, long bulbs and special ballast connections.



Compact Fluorescents

Compact fluorescents, commonly known as CFLs, are becoming more and more popular in Canada. These bulbs are more expensive to purchase but last much longer and use much less energy, producing significant savings over the life of the bulb.

Classroom Discussion

What we can do...

We all can take steps to reduce the energy we use for lighting and, when we do, we'll be helping to limit climate change too.

- ★ Use natural light from windows when we can (but remember to close the blinds on hot days to keep the heat out).
- ★ Turn lights off when we are not using them and when we leave a room.
- ★ Encourage our parents to use more efficient light bulbs.
- ★ Encourage our parents to put timers or motion detectors on outdoor lights so they come on only when needed.

Lighting and Energy

Fun Fact!

Replacing just one 60-watt incandescent light bulb with a 20-watt compact fluorescent in every house across Canada—that's more than 12 million houses—would save the same amount of greenhouse gas emissions as taking more than 66 000 cars off the road.

Be bright about lights!

Not all light bulbs are created equal. Some waste a lot of energy, while others are very efficient.

Now that you have talked about the various types of light bulbs, your mission is to count the number of each type of light bulb at your home. Don't forget the basement (if you have one) and outside lights too!



Incandescents

The oldest type of light bulb; a heated filament inside glows to emit light.

Fluorecents



The tube contains an inert gas (such as argon) that glows when the bulb is charged with electricity.

Compact fluorescents

A compact fluorescent light bulb fits the same socket as a regular incandescent bulb.



Who turns the lights off in your classroom?

Create a sign-up sheet and each week a different person can volunteer to make sure the lights are out when the students are!

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Can you Spell Energy Efficiency? Text and Errors

Instruction

Students read text, identify words containing spelling errors and write the correction in the space provided.



Key Points

Energy conservation is a concept for all ages. Choosing behaviours to reduce energy use – such as putting on a sweater instead of turning up the heat and remembering to switch off lights and equipment when they are not in use – can begin early and last a lifetime.



Answer Key

Spelling Mistakes:

- 1 efficiency
- 2 sweater
- 3 fluorescent
- 4 solar
- 5 alternative
- 6 computer
- 7 biofuels
- 8 previously
- 9 reduce
- 10 recycle



Can you Spell Energy Efficiency?

Read the text below and identify the spelling error in each sentence that relates to saving energy. Circle the words that are misspelled and then write them correctly in the space provided below.

Saving energy is as easy as A-B-C!



1 Energy efficeincy means using less energy to get the results you want.

.....

2 Put on a sweater if you are cold instead of turning up the heat.

.....

3 Use energy-saving compact floresent light bulbs at home.

.....

4 Make use of soler energy by letting the sun inside in winter and blocking it out in summer.

.....

5 Take alternitive transportation to school – bus, bicycle, scooter, walk!

.....

6 Play outdoors with a soccer ball rather than indoors on the computer.

.....

7 Biofules are made from renewable plant sources like cereal crops or trees.

.....

8 Use previosly owned stuff! It's good for the environment – and your piggy bank – to use and enjoy goods that are not brand new.

.....

9 Reduse your use of energy by turning off lights when you leave the room.

.....

10 Reuse and rescycle as much as you can.

.....





Energy Efficiency Brainstorming Activity

Answer Key

Here are some possible answers:

Instruction

This is a fun cooperative or team exercise. Have students make lists of energy-saving tips that apply at home, at school and on the road. Encourage them to let the ideas fly!

Key Points

Every day, we use lots of energy and make decisions that affect the environment and our climate. Energy efficiency helps us slow down climate change – and that's good for our health, the environment and our future.

Turn it off!

- ★ Turn down the air conditioner; it's summer so it's OK to be a little warm!
- ★ Hang your laundry outside instead of using the dryer.
- ★ Don't start the dishwasher until it's full!

Be quick!

- ★ Decide what you want before you open the fridge door.
- ★ Take a fast shower.
- ★ Use the microwave instead of the oven.

Go green!

- ★ Ask your parents if you can plant a tree in your yard.
- ★ Make sure to bring your lunch in recyclable containers; the less you throw out, the better!
- ★ Start composting. It's great for the garden.

Drive smart!

- ★ Use your bike or take the bus!
- ★ If your vehicle is stopped for more than 60 seconds (except in traffic), remind your parents to turn off the engine.
- ★ In summer, open the windows instead of using the air conditioner and your family will save gas.

Energy Efficiency

How bright is your light bulb?

Think of as many tips as you can to save energy! Use your brain! Use your friend's brain! Work with your team to come up with easy tips that can make a difference daily in saving energy and the environment.

Here are some ideas to get you started...

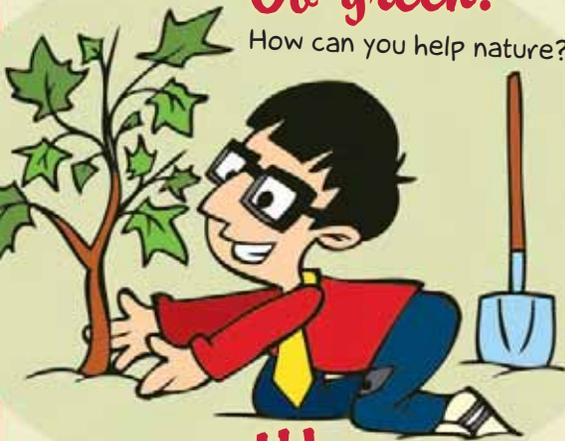
Fun Fact!

As a rule of thumb, if your car is stopped for more than 60 seconds, except in traffic, turn off the engine.



Go green!

How can you help nature?

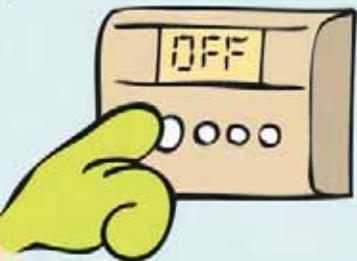


Drive smart!

Even though you do not drive, what can you do to help reduce the amount of fuel your family uses?



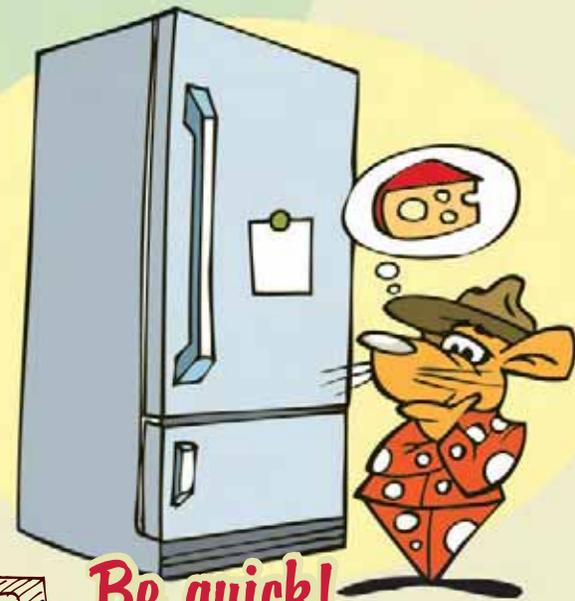
Turn it off!



Think about things in your house that use electricity. Can you use less?

Saving energy saves money.

Saving energy reduces greenhouse gas emissions. Greenhouse gas emissions contribute to climate change.



Be quick!

Sometimes your actions can affect electricity use.

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Conserve Energy Crossword Puzzle

Instruction

This clever crossword puzzle can test what students know about energy conservation.

Key Points

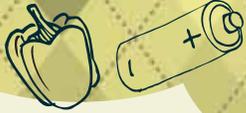
Canada is a big consumer of natural resources, including energy. There are some good reasons for this – across most of the country we have very cold winters and very hot summers. And energy-dependent industries are a big part of our economy.

In recent years, we've become more aware of the impact that energy use is having on our climate. What can we do with this knowledge? Act – by changing behaviour, adopting more energy-efficient technologies and taking advantage of renewable energy sources.

Answer Key

1 H Y B R I D										
A	N									
T	C	2 I D L I N G					3			
H	A	4 T				R		5 F	6 C	
3 S U N L I G H T						4 E T H A N O L				
	D	R				E		N	L	
	5 P E D E S T R I A N								D	
8 P	S	S	H			P				
A	C		E			O				
6 C L O S E				R		W				
K	N		M			E				
A	T		O			R				
G	7 D I S H W A S H E R									
I			T							
N			A							
G	8 C O M P O S T I N G									

Conserve Energy



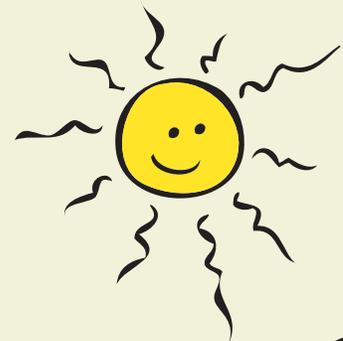
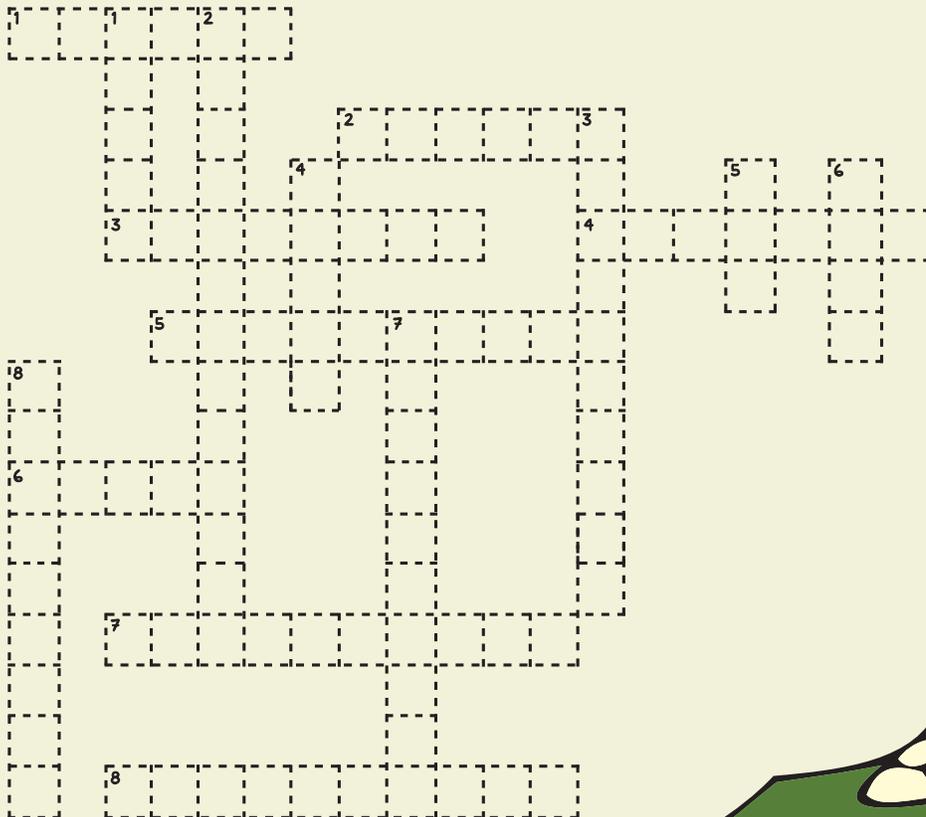
Now that you have talked about energy and energy conservation in class, put yourself to the test and see how much you know.

Across

- 1 _____ vehicles switch between two types of energy. (6)
- 2 When a car is running but not moving, it is _____. (6)
- 3 It is the natural source of all our heat and light. (3)
- 4 Liquid fuel made from plants. (7)
- 5 What is another name for a person walking? (10)
- 6 _____ the blinds and curtains during hot summer days to help keep the house cool. (5)
- 7 Run this appliance only when it's full! (10)
- 8 When you turn food scraps into fertilizer you are _____. (10)

Down

- 1 Taking big _____ uses more water than taking a quick shower. (5)
- 2 These traditional light bulbs use lots of energy. (13)
- 3 A "colourful" name for renewable energy. (10)
- 4 If these are properly inflated, vehicles use less fuel. (5)
- 5 A _____ is a cheap way to stay cool. (3)
- 6 Do laundry in _____ water to save energy. (4)
- 7 Use an extra blanket and turn down the _____ at bedtime. (10)
- 8 When shopping, try to buy things with less _____, they use less paper and wrappings of all kinds. (9)





If All Adds Up Math Skills

Instruction

Solving these problems will test math skills as well as knowledge of energy and the environment.

Key Points

Every time we drive to work, use water in our homes or do anything else that uses energy from fossil fuels, we are creating greenhouse gas emissions that contribute to climate change. Every step we take to conserve – no matter how small – incrementally makes a difference and helps protect our environment.



Answer Key



1

a) Each day: $(3 \times 40) + 75 = 195$ litres
Each week: $195 \times 7 = 1365$ litres

b) Each day: $75 - 40 = 35$ litres
Each week: $35 \times 7 = 245$ litres

2

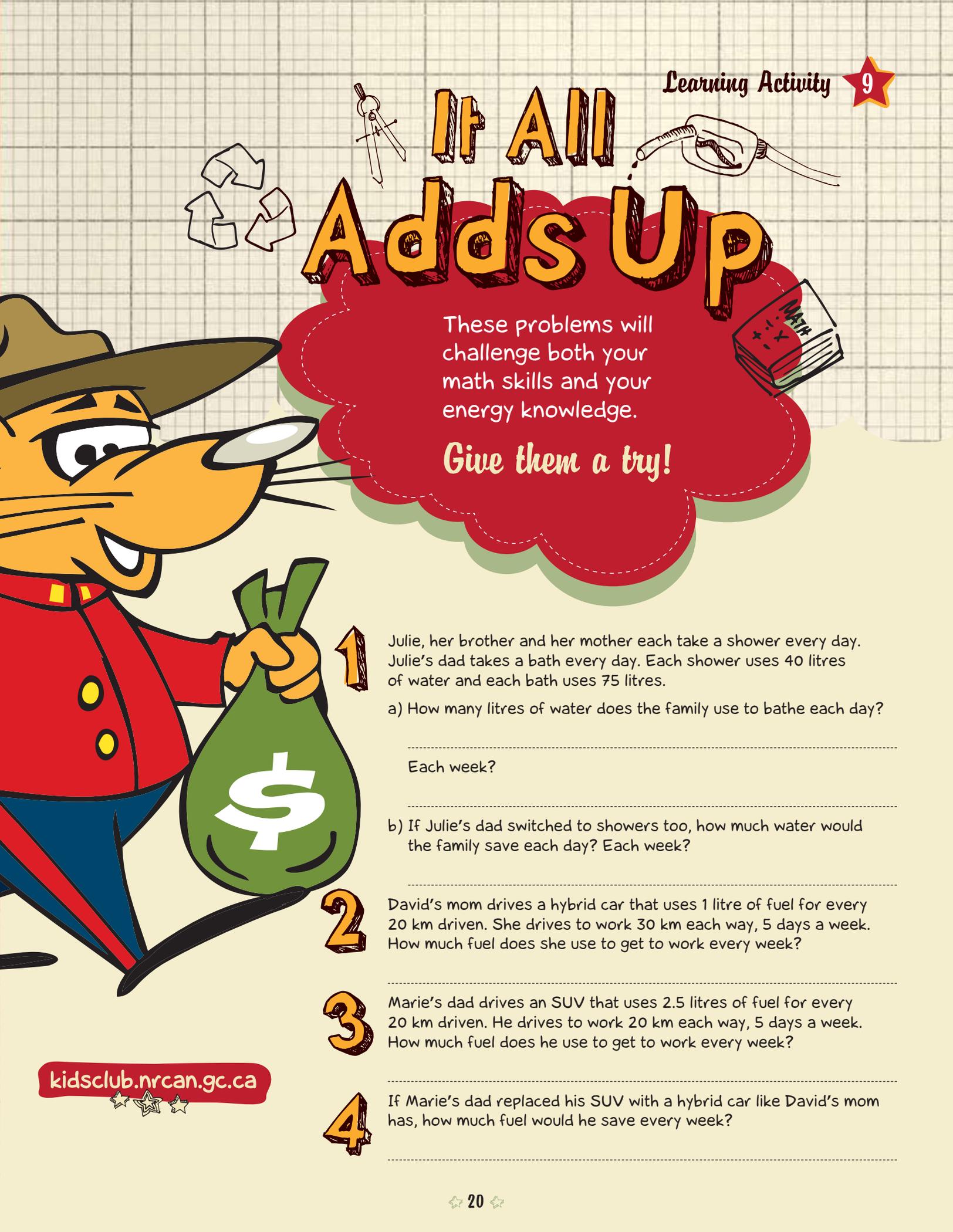
Every week David's mom uses:
 $(30 + 30) \times 5 = 300$ km
 $300 \times \frac{1}{20} = 15$ litres

3

Every week Marie's dad uses:
 $(20 + 20) \times 5 = 200$ km
 $200 \times \frac{2.5}{20} = 25$ litres

4

Every week Marie's dad would save:
 $200 \times \frac{1}{20} = 10$ litres
 25 litres - 10 litres = 15 litres



If All Adds Up

These problems will challenge both your math skills and your energy knowledge.

Give them a try!

1

Julie, her brother and her mother each take a shower every day. Julie's dad takes a bath every day. Each shower uses 40 litres of water and each bath uses 75 litres.

a) How many litres of water does the family use to bathe each day?

.....
Each week?

b) If Julie's dad switched to showers too, how much water would the family save each day? Each week?

2

David's mom drives a hybrid car that uses 1 litre of fuel for every 20 km driven. She drives to work 30 km each way, 5 days a week. How much fuel does she use to get to work every week?

3

Marie's dad drives an SUV that uses 2.5 litres of fuel for every 20 km driven. He drives to work 20 km each way, 5 days a week. How much fuel does he use to get to work every week?

4

If Marie's dad replaced his SUV with a hybrid car like David's mom has, how much fuel would he save every week?





Renewable Energy

Class Presentation

Instruction

Renewable resources are a very important part of saving energy and the environment. Each student will make a presentation about one of the five following forms of renewable energy so that the class learns more about these precious resources.

A brief discussion of each renewable energy source will help students decide which subject they would like to present.



Key Points

Framing the discussion...

Renewable energy resources are readily available (like sunshine) or are naturally replenished (like rivers) or can be replenished (biomass crops or planting trees). These energy sources are very important to energy conservation.

Hydro-electricity

"Hydro" means water-generated electricity: it accounts for more than 60 percent of electricity used in Canada.

Geothermal energy

Geothermal energy comes straight from the Earth – a volcano is an extreme example of geothermal energy being released.

Solar energy

We can capture solar energy in two main ways. An example of passive solar energy is opening curtains in winter to let the sun shine in and help heat the air. An example of active solar energy is using solar panels to make electricity, as with a solar-powered calculator.

Wind energy

Wind is energy on the move. Today we use modern windmills to capture this free, clean, renewable energy.

Biomass energy

Biomass energy comes from plants and other organic materials, such as wood, wood by-products, grasses and corn, oilseed crops, agricultural and crop wastes.

See the "Glossary of Terms" for more complete definitions.



Activity Answer Key

Use your own marking scheme to grade the presentations.



Renewable Energy

Basics

Renewable energy resources are replenished about as fast as they are used. By renewable, we mean solar energy, wind energy, hydro-electric power, geothermal energy and biomass energy. These energy sources are very important to energy conservation.

Now that your class has talked a bit about each of the five types of renewable energy, it is time to prepare a presentation that you will make to the class.

First

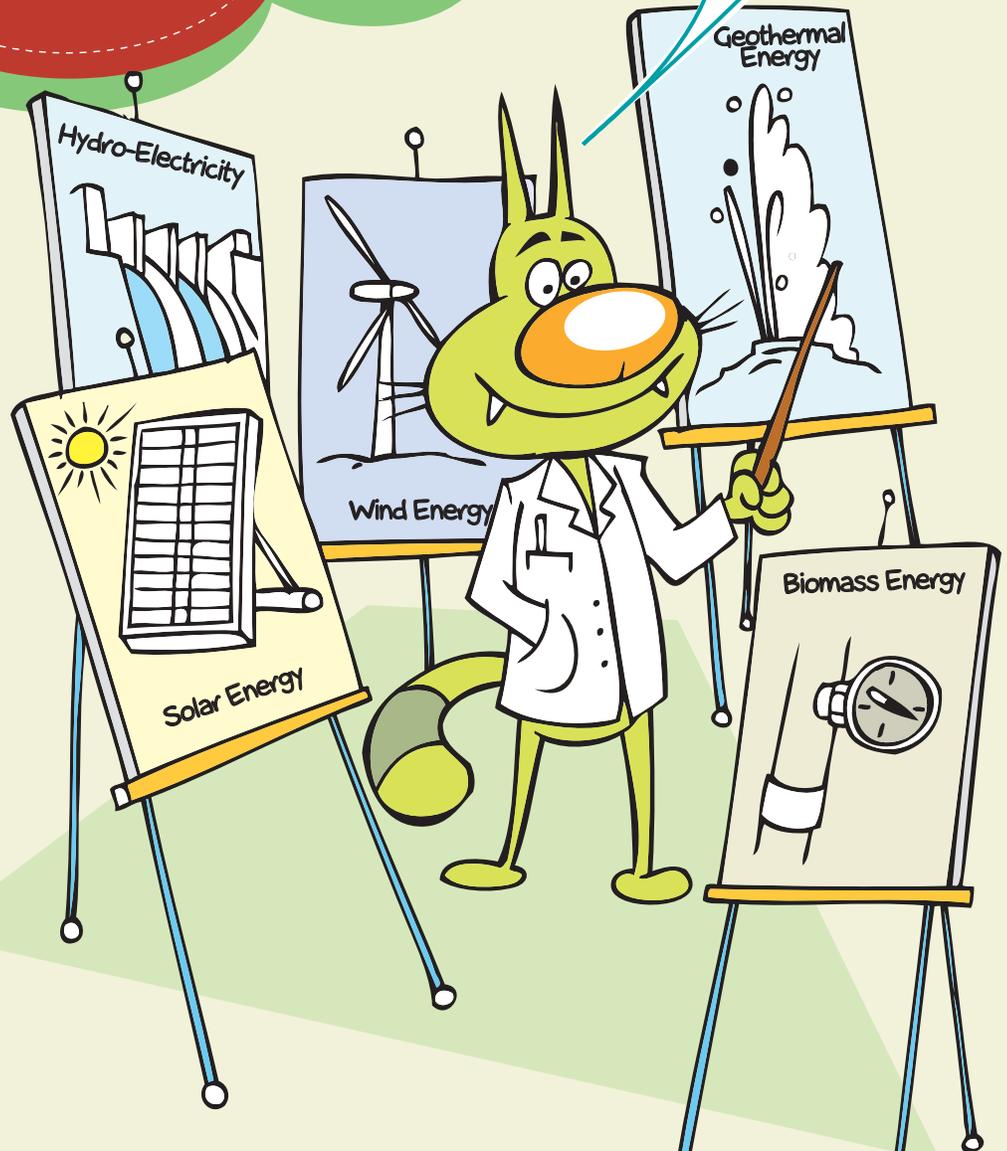
- ★ Decide which of the five energy sources you would like to talk about.

Then

- ★ Find a picture of the energy source or an object that is powered by the energy source.
- ★ Prepare a definition of the energy source.
- ★ Identify two things that you can do to use this type of renewable energy more efficiently.

Looking for inspiration?

- ★ Maybe the NRCat can help! Visit www.canren.gc.ca.
- ★ Ask your teacher for a copy of the Energy and the Environment glossary – it has definitions of each energy source.
- ★ The Internet has lots of information about renewable resources.



Glossary of Terms



Biomass Energy

(renewable energy)

Biomass energy comes from plants and other organic materials, such as wood, wood by-products, grasses, corn, oilseed crops and agricultural and crop wastes. These resources – known as feedstock – can be burned to produce heat or converted to fuel like ethanol through biological or chemical processes. When biomass is burned, technologies can be used to limit emissions.

Climate Change

Climate change is the change in average weather over time and over a region. It includes changes in temperature, wind patterns and precipitation. Today climate change is a serious issue because it is taking place quite quickly and on a global scale. Human activity – especially the burning of fossil fuels for energy over the past 150 years – is an important cause.

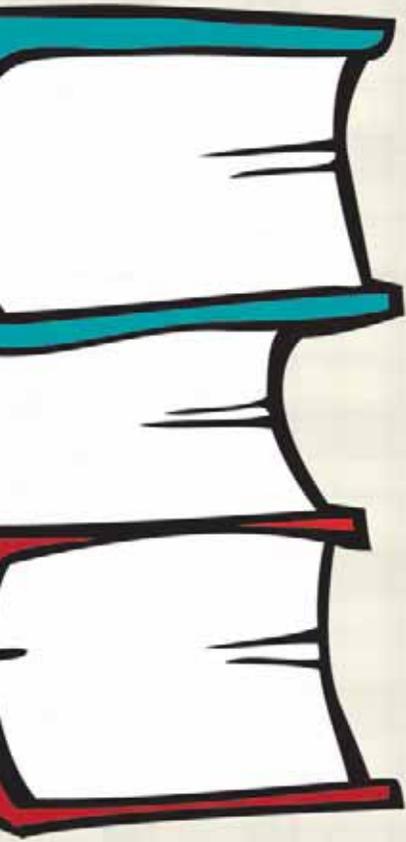
Energy Efficiency

Energy efficiency means doing the same work while using less energy. Another way to look at it is to get more usefulness out of energy by losing less as waste. For example, newer small cars generally use less fuel and release fewer harmful emissions. Energy efficiency is a key principle in energy conservation and reducing greenhouse gas emissions. Energy efficiency is achieved in three key ways: developing alternative sources of energy, especially renewable energies; creating new or improved technologies, like hybrid cars; and changing our behaviours, from simple actions like turning off lights to major undertakings such as regulating industry.

Geothermal Energy

(renewable energy)

Geothermal energy comes straight from the Earth – for example, in the form of volcanoes and hot springs. Canada does not have much energy of this active type. But we can take advantage of passive geothermal energy, which is simply the sun's heat absorbed by the earth. In Canada, the ground is warmer than the air in winter and cooler than the air in summer. So, we can use pumps to draw warmth from the ground in winter to heat buildings and draw coolness in summer.



Global Warming

Current climate change is often referred to as "global warming." It means that the average temperature on Earth is getting significantly warmer – with many serious impacts. These include melting polar ice, rising sea levels and increases in severe weather. Human activity – especially the burning of fossil fuels for energy over the past 150 years – has pumped so much greenhouse gas into the atmosphere that this "safety blanket" is keeping in a lot more heat than in the past.

Greenhouse Effect

Greenhouses are designed to capture and concentrate the sun's heat in order to grow plants that would not survive outside. Similarly, the Earth's atmosphere acts like a blanket that keeps just the right amount of the sun's heat in to support life on our planet. This is called the "greenhouse effect." It is greenhouse gases in the atmosphere (water vapour, methane, ozone, nitrous oxide and, especially, gases carbon dioxide) that absorb and hold the sun's heat.

Hydro-electricity (renewable energy)

Moving water is moving energy. It is very powerful and can drive a turbine to generate electricity. (Think Niagara Falls!) Have you experienced the energy of moving water in a waterfall, a river or the ocean? "Hydro" means water-generated electricity: it accounts for more than 60 percent of electricity used in Canada. Electricity can also be made from other sources. "Clean" electricity comes from renewable sources such as wind, low-impact hydro, geothermal and ocean energy.

Joule

The international unit of measure for energy. A joule is the energy produced by a power of one watt flowing for one second. That's why our energy detective is named Inspector Joules!

Renewable Energy

Renewable energy comes from sources that are freely available (such as sunshine) or that are replenished naturally (like rivers) or can be replenished (like biomass crops) about as fast as we use them. The main types of renewable energy are biomass, geothermal, hydro-electricity, solar and wind.

Solar Energy (renewable energy)

The Sun is our ultimate source of energy. It continuously radiates the light that supports life on Earth. We can take advantage of solar energy in two main ways. Passive solar energy means doing something as simple as opening the curtains in your bedroom in winter to let the sun shine in and help heat the air. Active solar energy typically means using solar panels to make electricity. Solar panels have photovoltaic cells – fancy word that means using light (photo) to create power (volts). A solar-powered calculator is a common example of this.

Wind Energy (renewable energy)

Wind is energy on the move. Humans have used windmills – towers with propellers, blades or sails – for almost 2000 years to capture this free, clean, renewable energy. A turbine is the machine that turns the wind (flowing air) into electricity. Windmills today are often grouped together on wind farms.



December 2008

Please grade us on:

	A	B	C	D	Comments (especially if we get a C or D)
Overall Book	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Teaching Notes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Learning Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
In particular, are they:					
easy for students to understand?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
interesting for students?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
useful in delivering the lesson?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Classroom Poster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

How many of the 10 activities did you use? 1-3 4-7 8-10

What are the book's best features?

What would you change?

The activities are appropriate for Grades: 1-3 4-6 7-8



Fold here

Fold here

About You

Name

What Grade(s) do you teach?

Municipality

Province/Territory

E-mail (optional)

Thank you for your participation! Just drop your response in the mailbox!
All personal information collected will be protected in accordance with the federal *Privacy Act*.

This is the first edition of our *Energy and the Environment Activity Book*. We'd like to hear your comments.





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