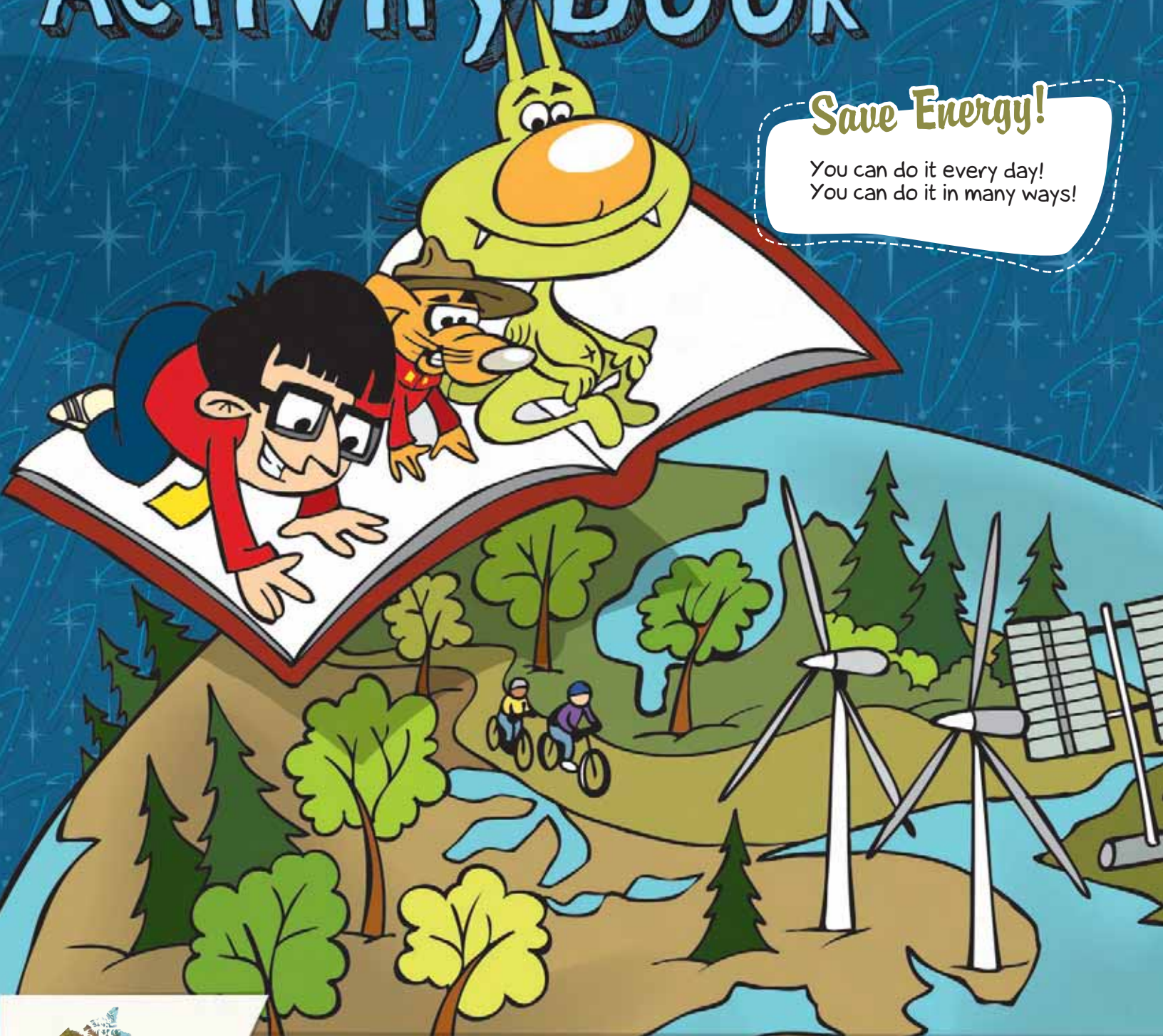




Energy and the Environment Activity Book

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.*

To obtain additional copies of this or other free publications
on energy efficiency, please contact:

Energy Publications
Office of Energy Efficiency
Natural Resources Canada
c/o St. Joseph Communications
Order Processing Unit
1165 Kenaston Street
PO Box 9809 Station T
Ottawa ON K1G 6S1
Tel.: 1-800-387-2000 (toll-free)
Fax: 613-740-3114
TTY: 613-996-4397 (teletype for the hearing impaired)

Aussi disponible en français sous le titre :
Cahier d'activités sur l'énergie et l'environnement

© Her Majesty the Queen in Right of Canada, 2008

Cat. No. M4-70/2008E (Print)
ISBN 978-1-100-11212-1

Cat. No. M4-70/2008E-PDF (On-line)
ISBN 978-1-100-11213-8



Recycled paper






Table of Contents

FOREWORD

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

KIDS' CLUB RESOURCES 2

THANK YOU TO OUR PARTNERS 2

TEACHING NOTES AND LEARNING ACTIVITIES

1 Energy Basics "Check the box" exercise 3

2 All About Energy Crossword Puzzle 5

3 Green Audit "Green Behaviour" Chart 7

4 Water and Energy Matching Puzzle 9

5 Lighting and Energy Class Discussion and Homework 11

6 Can You Spell Energy Efficiency? Text and Errors 13

7 Energy Efficiency Brainstorming Activity 15

8 Conserve Energy Crossword Puzzle 17

9 It All Adds Up Math Skills 19

10 Renewable Energy Class Presentation 21

GLOSSARY OF TERMS 23

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 *purrr*etty!
- 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.

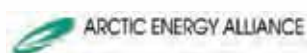
Energy and the Environment Activity Book

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

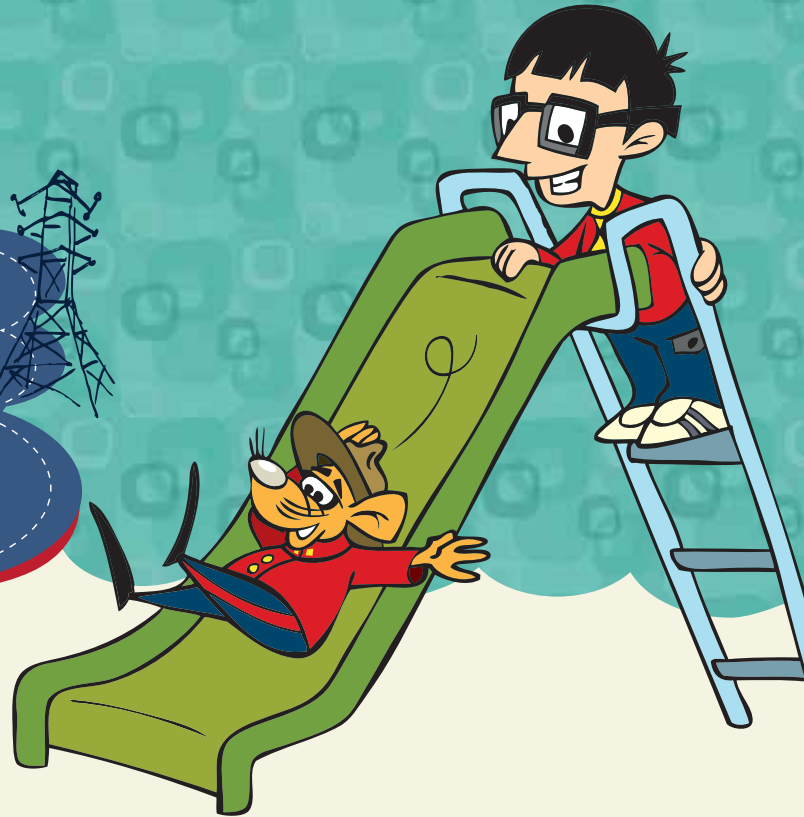
Thank you to our partners!



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!

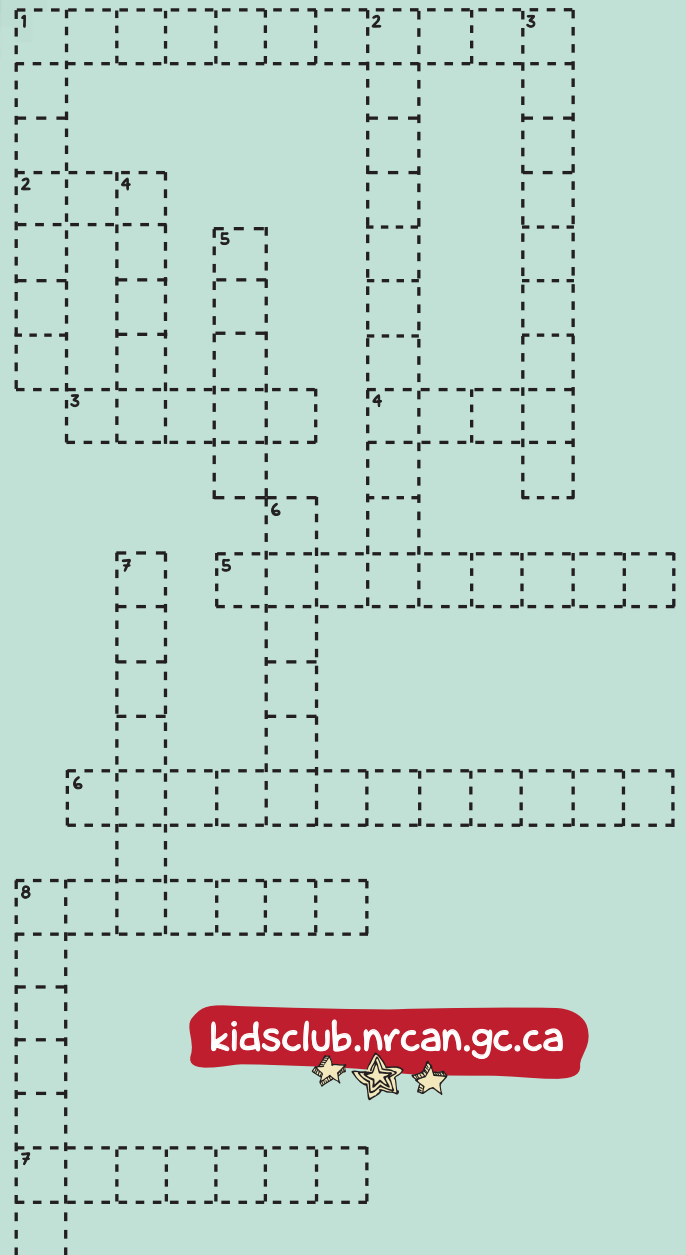


Across

- 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)



kidsclub.nrcan.gc.ca



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!

kidsclub.nrcan.gc.ca

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)



Lighting and Energy

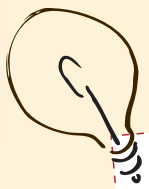
Fun Fact!

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!

kidsclub.nrcan.gc.ca



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

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...

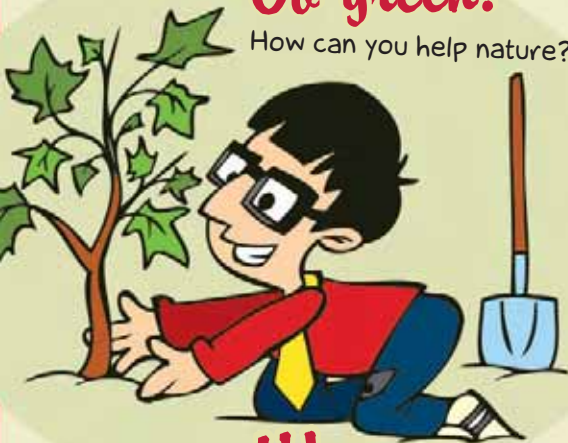
Fun Fact!

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?

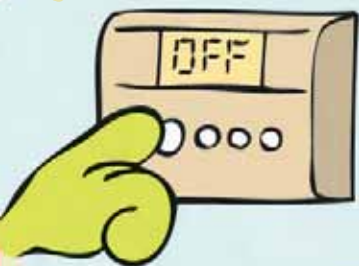


Drive smart!

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



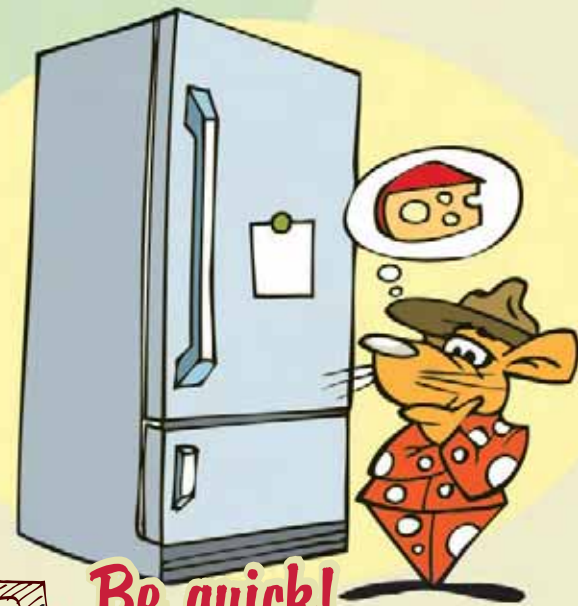
Turn it off!



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.

kidsclub.nrcan.gc.ca



Conserve Energy



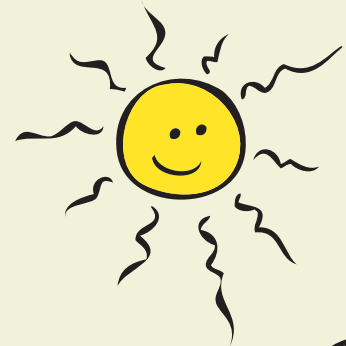
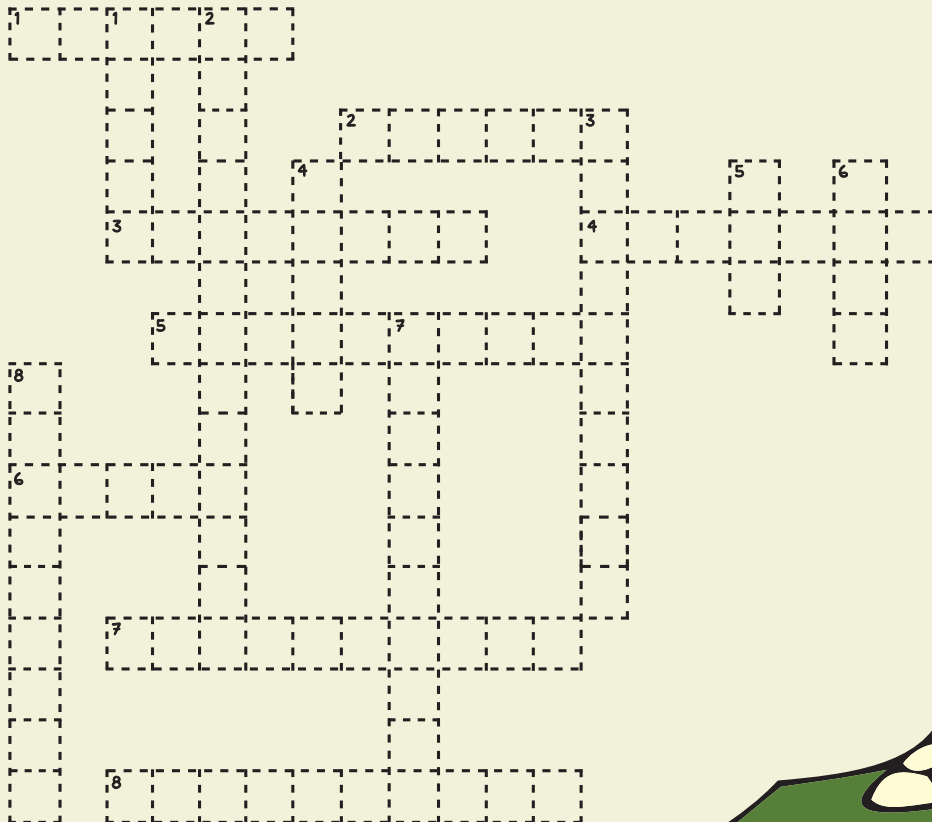
Now that you have talked about energy and energy conservation in class, put yourself to the test and see how much you know.

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

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

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

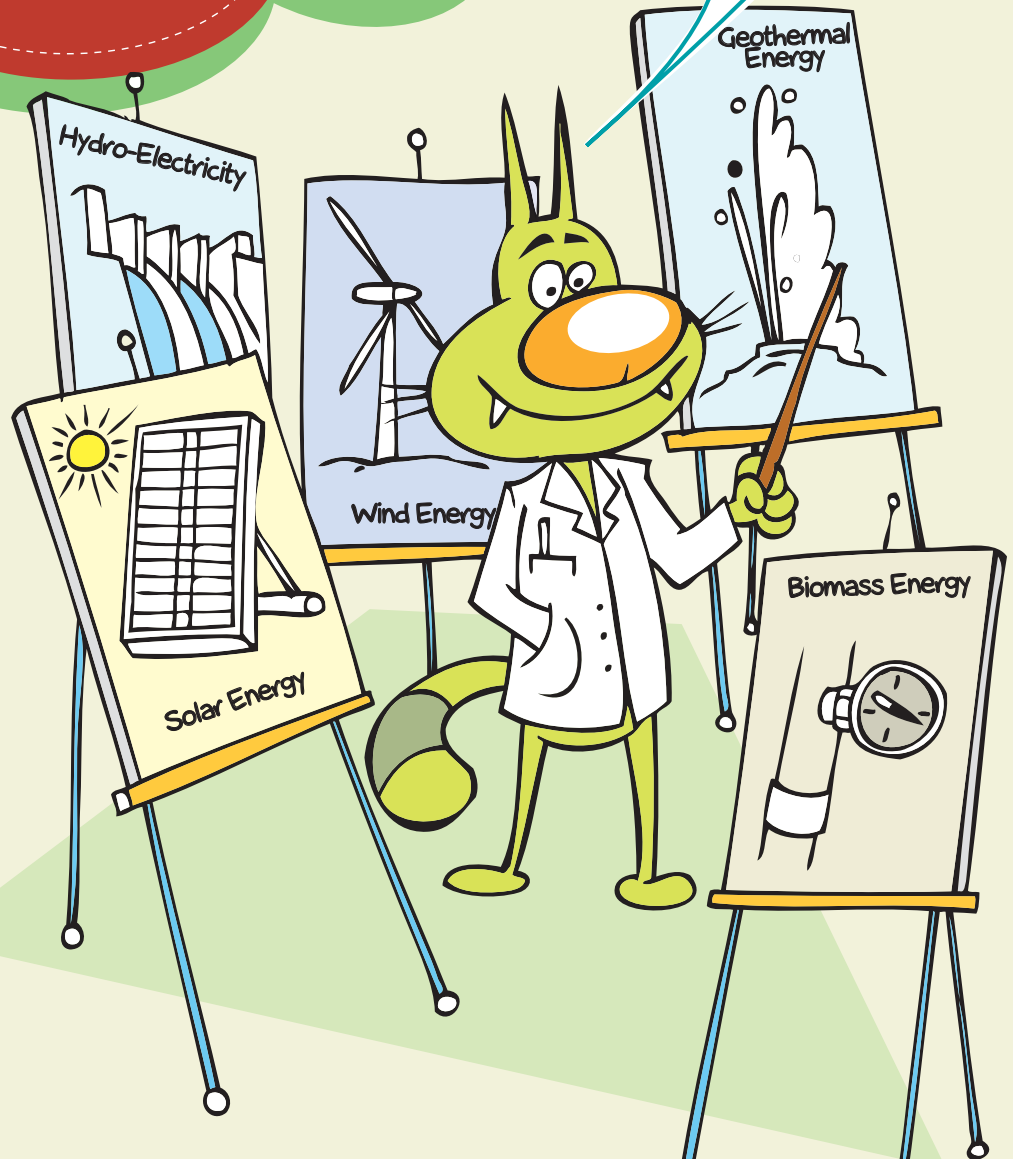
- ★ Decide which of the five energy sources you would like to talk about.

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.

kidsclub.nrcan.gc.ca

