



# CARE PACKAGE

AN ENERGY EFFICIENCY &  
STEWARDSHIP ACTION PACKAGE

## TEACHER'S GUIDE



SUPPORTED BY



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# INTRODUCTION

## ***YOU HAVE JUST RECEIVED A CARE PACKAGE.***

This package contains a number of simple items and ideas that can help make exciting changes for our schools and our environment. Share this package with your students and discover easy ways to **decrease greenhouse gas emissions and increase their knowledge about energy and climate change**. With this CARE package you can help your students learn about environmental stewardship and become stewards themselves!

## **TEACHER TIPS**

The CARE Package is the ultimate show and tell package designed to be used in a variety of classrooms, school situations and grade levels where the instructor would like to explore topics related to environmental stewardship.

### **As a teacher you may choose to:**

- Present the information to your students.
- Have the students research and present the information to their fellow classmates.
- Have students educate other classes or staff as part of their stewardship activities.
- Complete some of the activities on **page 13** of this booklet.

We hope you have a blast exploring your **CARE Package** and learning about **energy efficiency, climate change, and environmental stewardship!**





# ENERGY STEWARDSHIP BACKGROUND

## WHAT IS ENVIRONMENTAL STEWARDSHIP?

**CARE** is  
Cooperation,  
Action,  
Responsibility, &  
Education

Environmental stewardship means that you actively **CARE** for the environment and our natural resources.

### **Stewardship takes COOPERATION**

While it is important for each of us as individuals to be good stewards of the environment the collective benefits of working together can produce tremendous results!

### **Stewardship takes ACTION**

We must go beyond talking and become actively engaged in activities that promote environmental stewardship. After you decide how to change the way you consume our natural resources, you must implement that change.

### **Stewardship takes RESPONSIBILITY**

You are accountable for your own actions and your own decisions. When you decide that you are responsible for the conservation of our environment, you are becoming an environmental steward.

### **Stewardship takes EDUCATION**

Often the best way to solve a problem is to first learn more about it. Understanding environmental issues and concerns is the first step toward practicing stewardship.

# ENERGY STEWARDSHIP BACKGROUND

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## WHY SHOULD WE PRACTICE ENVIRONMENTAL STEWARDSHIP?

### TO DECREASE THE USE OF OUR NATURAL RESOURCES!

*“By the age of 6 months, the average Canadian has consumed an equivalent amount of resources as an average person in the developing world consumes in a lifetime.”*

*-Recycling Council of Ontario*

A natural resource is something from the natural environment that we use to meet our everyday wants and needs. Non-renewable resources are those that cannot be replaced in a human's lifetime (*e.g. fossil fuels such as: coal, oil, and gas*). Renewable resources are those that can naturally replace themselves within a human lifetime. (*e.g. wind energy, solar energy, hydro, biomass, etc*)

### TO MINIMIZE OUR ENVIRONMENTAL FOOTPRINT!

*“8.3 billion metric tonnes of plastic has been generated across the world since the 1950's. Most of this was generated in the last ten years, and only 23% has been recycled.”*

*-Waste Reduction Week in Canada*

As the human population continues to grow so do demands placed on our environment. By reducing the use of our natural resources we can help lessen these demands on the earth's ecosystems. Environmental stewardship requires an understanding of the relationship between our wants and needs and the planet's ability to provide them and cope with the waste produced.

### TO DECREASE THE IMPACTS OF CLIMATE CHANGE!

*“Renewable energy sources currently provide only about 18% of Canada's total primary energy supply.”*

*-Natural Resources Canada*

Many human activities including the burning of fossil fuels can result in an increase in the concentration of greenhouse gases (*GHGs*) found in the earth's atmosphere. GHGs help to trap some of the earth's heat energy, maintaining a stable climate. An increase in the concentration of GHGs in the atmosphere can cause the earth's climate to change resulting in varying weather patterns across the globe.

### TO SAVE MONEY!

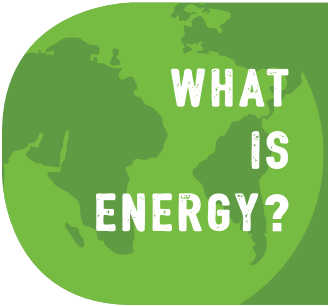
*“If every Canadian household replaced one standard 60-watt incandescent light bulb with a 20-watt compact fluorescent light bulb we could prevent 400,000 tonnes of greenhouse gases entering the atmosphere (same as removing 66,000 cars from the road) and save \$73 million each year in energy costs.”*

*-Environment Canada*

Being energy efficient means using less energy to accomplish the same service; for example converting all your lights to LED bulbs. Energy conservation means using less energy altogether; for example shutting off the lights when they are not in use. Both energy efficiency and energy conservation are important ways to be an environmental steward and save money!



# ENERGY STEWARDSHIP BACKGROUND



## WHAT IS ENERGY?

**ENERGY** is the ability to do work, and it exists either stored (*potential energy*) or working (*kinetic energy*). We use various forms of energy each day including electrical, chemical, heat and light energy. These sources of energy help us cook our food, drive our cars, heat our homes and light our way. Energy can come from either renewable or non-renewable sources.

## WHY DO WE NEED TO REDUCE THE AMOUNT OF ENERGY WE ARE CONSUMING?

Many human activities — heating our home, transportation, generation of electricity — involve the combustion or burning of fossil fuels. When fossil fuels are burned they produce **GREENHOUSE GASES** (GHGs) such as carbon dioxide. While the earth requires certain levels of greenhouse gases to trap some of the heat energy from the sun, increased concentrations of GHGs can have impacts on our climate, altering long term weather patterns including temperature and precipitation levels. This is called **CLIMATE CHANGE**.

### ***It takes energy to make energy!***

It takes energy to develop and produce our natural resources so they can be made useful. Conserving energy not only reduces the amount of GHGs we release but also the GHGs released through the development of these natural resources.

We must also consider that we have a limited amount of the natural resources available to produce much of our energy. Reducing our energy use and using alternative and sustainable forms of energy will help ensure that there is energy available for future generations.

# ENERGY STEWARDSHIP BACKGROUNDER

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## **WHERE DOES ALBERTA'S ELECTRICITY COME FROM?**

Much of Alberta's electricity is produced using fossil fuels like coal and natural gas. Coal or natural gas is burned to heat water and create steam. This steam is then used to drive an electrical generator. Alberta's electricity also comes from renewable energy sources including hydroelectric dams and wind farms.

Alberta's Climate Leadership Plan aims to remove the GHG's from coal-fired electricity generation by 2030. Coal-fired plants will be phased out and replaced by renewable energy and natural gas-fired electricity. By shifting the energy sources used to generate electricity in this province Alberta is taking a big step towards reducing greenhouse production.

## **RETHINK** energy use with the four Rs: **REDUCE, REUSE, RECYCLE, RETROFIT**

As consumers, we may not realize the impact of our actions on the environment. Large amounts of energy and natural resources go into the manufacturing of products and their packaging. Often we throw items away after using them only once, including the plastic bag that we brought the item home in. The good news is that we can practice easy activities to minimize the amount of waste we produce. First, we can reduce the amount of waste we produce

by not accumulating it in the first place. For example, we can use a refillable water bottle. We can reuse many items that we already have or make them available to others for reuse. We can recycle many of the items that cannot be used again: much of our paper, plastics, cans and glass can be transformed, creating new products. Finally, by retrofitting our homes and schools we can ensure we are utilizing the energy efficient technologies.



# THIS CARE PACKAGE CONTAINS 28 ITEMS



Items with this symbol beside it can be used to complete your very own **Energy Audit** (see the *Energy Audit* activity in the *Classroom Activities* tab)

**THAT CAN BE USED IN THE HOME AND CLASSROOM TO SAVE ENERGY, HELP OFFSET THE IMPACTS OF CLIMATE CHANGE, REDUCE WASTE, AND SAVE MONEY!**

Each item in the CARE Package has a number assigned to it. Use the lists below to help you identify what it is and how it promotes environmental stewardship.

## 1. ENERGY CONSERVATION WHEEL

This educational wheel is a fun way to help spread the message about energy conservation. Spin the wheel for quick facts and tips about energy, appliances, and insulation. **Topics include:** On The Road, In The Marketplace, Year-round at Home, Yard and Garden, Workshop, and Vacationing.

**Tip:** Use this wheel on **Talk-energy Tuesday** or **Storytelling Saturday** for the weekly sustainability challenge!

## 2. SHOWER TIMER

Save water, save energy, and save time. A shower timer is a simple and effective tool to help you shorten your showers and conserve water while also reducing your greenhouse gas emissions created through heating the water. When the sand runs out, it's time to get out!


**Tip:** Use this shower time on **Five Minute Friday** as part of the weekly sustainability challenge.

## 3. LED (LIGHT EMITTING DIODE) BULB & NIGHTLIGHT

An LED light bulb can last up to 100,000 hours compared to 8,000 for a CFL (compact fluorescent light) bulb, or 1,000 for an incandescent bulb. That is an average of 12 hours of light per day for 12 years! The light output of individual LEDs is small compared to CFL bulbs, so multiple diodes are often grouped together into one bulb. LEDs do not contain mercury like CFL bulbs, therefore, disposal is less of an environmental concern.

# CARE PACKAGE DETAILED ITEM LIST

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 **4.**  
**WATER FLOW  
RATE BAG**

We all know that we shouldn't leave the water running when we brush our teeth, but just how much water are we losing down the drain? Flow rate bags measure the volume of water running out of the tap or shower head. Use this reusable bag to find out how much more water and money could be saved by upgrading your water fixtures or changing behaviour around water use.

**5.**  
**RECYCLED  
NEWSPAPER  
PENCIL**

Ever wonder what newspapers are turned into after being recycled? One of the many possible products is this pencil made with post-consumer recycled newspapers. Fewer resources are needed to create new products when recycled materials are used.

**6.**  
**TIRE  
GAUGE**

Under-inflated tires cause automobiles to use significantly more fuel than tires with correct pressure. A simple tire gauge will let you know if your tires are under-inflated. Checking them once a week is a great way to keep on top of extra fuel consumption. Using a tire gauge will help your tires last longer and driving will be safer too!

**7.**  
**RECHARGEABLE  
BATTERIES**

Using rechargeable batteries saves the resources and energy that go into producing disposable batteries. All batteries contain harmful chemicals that can pollute the environment when they enter our landfills and should be disposed of at your local eco-station.

 **8.**  
**FURNACE  
FILTER  
WHISTLE**

Dust and dirt in a furnace filter can restrict air flow, which forces your furnace to work harder and use more energy to heat or cool your home. A furnace filter whistle makes a sound when a filter is 50% clogged, so it lets you know when it's time to replace the filter.

 **9.**  
**LEAK  
DETECTION  
TABLETS**

A toilet leak can be a big problem. A 'running' toilet can waste up to 200,000 litres of water per year! That's enough to fill a swimming pool! Large leaks are often visible or audible, but these leak detection tablets can help you to find smaller, harder to find leaks.

# CARE PACKAGE DETAILED ITEM LIST

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## 10. EFFICIENT SHOWER HEAD

Low-flow showerheads help to reduce the amount of water used when you take a shower without reducing the water pressure. Since the demand for hot water is lessened, the amount of energy used to heat water is reduced. This results in lower CO2 emissions and a cheaper energy bill every month!

## 11. SUSTAINABILITY CHALLENGE MAGNET

Finding new ways to be involved with environmental stewardship can be a lot of fun. Challenge yourself to try something new, or keep working hard at something you already do by participating in these daily sustainability challenges! Just stick this magnet on your whiteboard at school to encourage stewardship inside and outside the classroom.

## 12. MINI SOLAR PANEL

Sunlight is a source of renewable energy and can be a great alternative to energy sources that emit greenhouse gases. The photovoltaic cells in this 2V miniature solar panel can convert sunlight directly into electricity. You could use the panel to charge a battery or directly power your own small solar device! Check out the Energy Efficiency Alberta website for more information about solar energy.

## 13. FRIDGE THERMOMETER CARD

There's no doubt that refrigerators are one of the most useful appliances, but unfortunately they are also one of the highest consumers of electricity. You can save food, energy, and money by keeping your fridge at its "goldilocks temperature"—the one that's just right! Simply place or hang this card in the refrigerator and read the thermo-plastic strip to determine if an adjustment needs to be made.

## 14. K-CUP REUSABLE PODS

Did you know that Canadians use 2.8 million coffee pods every single day!? Unfortunately, most of these end up in the landfill after just one use! Instead of buying coffee pods, you can use your favourite fair-trade ground coffee beans to fill up these reusable pods which fit with many popular coffee pod machines. Reusable items like this save precious landfill space and, equally important, we can save natural resources and materials it would take to make a new product.

## 15. RECYCLED CARDBOARD BINDER

Next time you do your back-to-school shopping, consider buying recycled cardboard binders instead of plastic ones. These are great for personalizing with your own artwork and doodles, but they are also great because they reduce the amount of energy and resources required to make a plastic binder. When your cardboard binder reaches the end of its lifespan, just remove the metal clips and compost it!

# CARE PACKAGE DETAILED ITEM LIST

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 **16.**  
**ENERGY  
MONITOR**

Phantom power is the current running through appliances even when they are turned off. This power monitor is a device that determines the energy consumption for any appliance that plugs into a standard wall socket. With this knowledge, you can make better energy decisions in your home by finding out which machines use the most power so you can choose to plug these appliances in only when they are needed.

**17.**  
**MESH  
PRODUCE  
BAG**

These mesh bags are a replacement for the smaller plastic bags found in grocery stores. Plastic bags usually end up in the landfill, or even worse, the ocean. They contribute to the 8 million metric tonnes of plastic that enters our oceans every year! If fewer plastic produce bags are created, energy is saved in their production, fossil fuel use decreases, and fewer greenhouse gases are emitted.

**18.**  
**NO JUNK  
MAIL  
STICKER**

Did you know that approximately 30 million trees are cut down each year just for unaddressed mail? It is estimated that 450 pieces of unaddressed mail arrive in your mailbox each year! Make a big difference in reducing your waste and conserving Canadian forests.

**19.**  
**BIODEGRADABLE  
CUTLERY**

At your next picnic or party, try using biodegradable cutlery if bringing your own metal kitchen cutlery isn't possible. Once you're finished, they can be put into your compost and will break down in a matter of months. Compare this to plastic cutlery, which can remain in a landfill for hundreds of years. This biodegradable cutlery is made from wood, which is a renewable natural resource

**20.**  
**CLOTHES  
PEG**

Drying clothes in a machine uses a lot of energy in your house. The best way to reduce energy used by a clothes dryer is to not use it at all. Take advantage of our dry Alberta climate and hang your clothes to dry instead! You'll save energy and money on your electricity bill!

**21.**  
**MILKWEED  
SEED**

Monarch butterflies depend on milkweed species for their habitat and their food sources. With increasing temperatures related to climate change, milkweed abundance is declining across the monarch range. The World Wildlife Federation (WWF) suggests that climate-informed monarch conservation should include restoring and increasing the extent of habitat with appropriate milkweed species and nectar sources. In Alberta, we can take action by planting native milkweed species and reducing our use of pesticides and herbicides in our gardens!

# CARE PACKAGE DETAILED ITEM LIST

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## 22. STAINLESS STEEL DRINKING STRAW

Every day 57 million plastic straws are used by Canadians and then tossed into the garbage! That's enough straws to fill 5,289 large school buses PER YEAR! Take action by choosing to use a metal straw like this one that can be used over and over again. If you forget your metal straw, consider going without one instead.

## 23. PEDOMETER

Today, many people drive their cars to destinations that are just a short distance away, especially when it's cold outside. While this can be warmer and faster, exhaust emissions contribute greenhouse gases to the atmosphere. Measuring the distance you walk each day, or counting the number of steps you take with a simple pedometer can be a fun and motivating way to get back into the habit of walking more often, and reducing your personal carbon footprint.

**Tip:** *Many smartphones have a built-in app that can do this as well!*

## 24. BIODEGRADABLE® PET WASTE BAGS

Leaving pet waste on the ground can be an environmental hazard, but using a plastic bag to dispose of waste is not the ecological choice our environment needs. These bags are made with a renewable vegetable material that allows them to naturally break down in the environment, and serves as food to be consumed by micro-organisms. Biodegradable bags are one solution to plastic pollution!

## 25. REUSABLE FOOD WRAP

Abeego® food wrap is "the Beeswax Wrap that Breathes". It is made from hemp and cotton organic cloth that is coated with a beeswax, tree resin, and organic jojoba oil mixture. It wraps around your food and protects it from air and moisture. It is better for the environment because you can reuse it instead of using disposable plastic wrap, sandwich bags, or tin foil. When it's reached the end of its lifespan, you can even compost it!

**Tip:** *You can make your own reusable food wrap using cotton and beeswax.*

## 26. INFRARED THERMOMETER

Finding air or heat escaping from around doors, windows, baseboards, and electrical outlets can require some detective work. This infrared thermometer is a simple way to check for air and heat escaping from buildings. The bigger the difference between the inside and outside temperature, the easier it is to detect heat leaks. If you find a crack or hole that's letting heat escape, seal it up with caulk or weather-stripping.

**Tip:** *Use the rechargeable battery provided to power your infrared thermometer*

## 27. FAUCET AERATOR

Faucet aerators are a simple device that saves both water and energy! Aerators mix air into the water directly at the tap so you use less water and create a consistent flow regardless of available water pressure.

# CARE PACKAGE DETAILED ITEM LIST

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## 28. OUTLET INSULATORS

Behind every electrical outlet, there is some empty space. From this empty space, cold air can work its way from behind the wall and into the room - meaning our furnaces need to work harder (and use more energy) to keep rooms warm. These simple foam insulators install behind the plastic outlet cover and keep this cold air out of the room, saving energy!

## WHERE CAN I FIND REPLACEMENT MATERIALS FROM THE CARE PACKAGE?

### ENERGY CONSERVATION MATERIALS

*New Resources Group*

[www.nrgideas.com](http://www.nrgideas.com)

### SHOWY MILKWEED SEEDS

*Wild about Flowers Native Plant Nursery*

[www.wildaboutflowers.ca](http://www.wildaboutflowers.ca)

### NO JUNK MAIL STICKERS

*Green Calgary*

[www.greencalgary.org/ecostore/](http://www.greencalgary.org/ecostore/)

### LED BULBS AND SHOWERHEADS

*Energy Efficiency Alberta*

[www.encyalberta.ca](http://www.encyalberta.ca)



*Special thanks to ENMAX for donating the energy monitors in the CARE Package.*





# CLASSROOM ACTIVITIES

**THIS IS A LIST OF 15 SIMPLE ACTIVITIES YOU CAN DO IN YOUR CLASSROOM AND SCHOOL WITH INSPIRATION FROM YOUR CARE PACKAGE.**

**Have fun learning about and practicing environmental stewardship!**

## 1. INTRODUCE YOUR CLASS TO THE CARE PACKAGE ITEMS

There are a lot of ways to explore the items from the package with your class. You could have a poster scavenger hunt where students have to find each CARE package item on the poster of the house included in this package. You could divide your class into groups and give each one a few items to consider, or pass the items around to start a discussion about the benefits of environmental stewardship and how these items relate. Consider making a commitment as a class to do at least one thing to reduce consumption of natural resources on a regular basis.

## 2. CONDUCT AN ENERGY AUDIT

An energy audit is an investigation that tells us where, when, why and how energy is being used. Energy audits can be done in our homes, schools, or any building that uses energy. Using information from the audit, you can find ways to improve energy efficiency, save money, and reduce greenhouse gas emissions.

If you see this symbol (⚡) beside an item from the CARE package, you know it's an item that will help you to assess whether your home or school is energy efficient. If you find areas where energy efficiency can be improved, there are small changes you can make that will have a big impact!

*See the Energy Audit worksheets on [page 17](#)*

## 3. RECOGNIZE A STEWARDSHIP CHAMPION OR ENERGY INNOVATOR AT YOUR SCHOOL

Recognizing environmental stewards in your school and local community is important! We can all learn from someone else's good ideas and environmentally friendly practices. When other people recognize and celebrate these efforts, it helps to build a culture of stewardship in the school!

# CLASSROOM ACTIVITIES

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## 4. CELEBRATE GLOBALLY RECOGNIZED ENVIRONMENTAL DAYS BY TAKING ACTION

Environmental days such as Earth Day, World Water Day, or Environment Week are important dates for recognizing environmental issues, the successes we've had in resolving them, and the challenges we may face along the way! It can be a lot of fun to celebrate these dates, raise awareness in your community, and take action on a current or local issue. Mark your calendar with the globally recognized Environmental Days listed in our Stewardship Calendar found on [page 35](#).

## 5. HOST AN ENERGY EXPO AT YOUR SCHOOL

An energy expo can take on many different forms. This could be an event to increase energy literacy at your school by exploring technologies, innovations, and action projects happening around the world; it could also be an event to showcase student projects and stewardship efforts at your own school. Invite other schools, parents, or local community members.

## 6. START OR BUILD A WORM BIN IN YOUR CLASSROOM

Vermicomposting is the process of composting using various worm species to break down organics. Educate students about food waste and composting by creating a vermicompost for your classroom. Vermicast or worm castings are great fertilizer for gardens and houseplants. Not sure if you're ready for these class pets? If you live in the Calgary area, you can try your hand at vermiculture by renting a worm bin for your classroom from Green Calgary: [www.greencalgary.org/green-kids/worms/](http://www.greencalgary.org/green-kids/worms/)

## 7. GET YOUR CLASS TO COMPLETE THE WEEKLY SUSTAINABILITY CHALLENGE

Stick the stewardship challenge magnet on your whiteboard to encourage a culture of stewardship and energy efficiency at your school. Getting students to start thinking about how these actions could conserve energy is a great place to start!

## 8. ORGANIZE A "CLOTHING SWAP"

The average person throws away 37 kilograms of textiles each year, and 95% of those clothes could be reused or recycled. Globally, textiles waste has increased dramatically due to the rise in clothing consumption and production. This trend is often called "fast fashion". Host a clothing swap event at your school to educate consumers about "fast fashion" and microplastics. Donate remaining clothing items to local shelters/women in need.

## 9. MAKE REUSABLE GROCERY BAGS OUT OF YOUR FAVOURITE OLD T-SHIRTS

One billion single-use plastic bags are handed out every year in Canada. Give new life to an old shirt and reduce the consumption of natural resources! Watch a video tutorial at: [www.howcast.com/videos/500580](http://www.howcast.com/videos/500580)

## 10. WITH YOUR STUDENTS, READ ABOUT CORN PLASTIC

Find out how corn plastic is made at [www.science.howstuffworks.com/corn-plastic.html](http://www.science.howstuffworks.com/corn-plastic.html) then make your own corn plastic! It is easy to do and requires only simple household ingredients. For older students also read the article at [www.smithsonianmag.com/science-nature/plastic.html](http://www.smithsonianmag.com/science-nature/plastic.html) and have a discussion about the issues raised by the author.

## 11. HOLD A “ZERO-WASTE” CHALLENGE FOR YOUR SCHOOL

For one week, see which classroom can produce the least amount of waste. This will encourage recycling and bringing lunches to school in reuseable/washable containers.

## 12. MAKE A SOLAR-POWERED DEVICE

The mini solar panel included in your CARE package can be used to power any number of handmade solar devices. With just a few more items and your imagination, anything is possible! Check out some of these cool projects for inspiration: <https://diy.org/skills/solarengineer/challenges/406/create-a-solar-powered-device>

## 13. BECOME A “PLASTIC PICASSO”

Have students save and bring in small pieces of plastic from their daily lives. This could include plastic from packaging, bottle caps, straws, arts and crafts scraps, etc. Once you have enough materials gathered, you're ready to create Picasso-like portraits using plastic that would otherwise end up in the landfill.

## 14. READ ABOUT 4D PRINTING AND ITS POTENTIAL USES

By now most of us have heard about 3D printing and it's amazing applications. Well, just when you thought technology couldn't get any more innovative, there is now 4D printing! Essentially, 4D printing is when a 3D printed object transforms itself into another structure over time. Introducing an environmental stimuli such as a change in temperature, light, or moisture levels, triggers the object to change shape. Read this article about 4D printing with your class and discuss the benefits and implications of this technology and how it could help to conserve energy in our world.

[www.sculpteo.com/blog/2017/10/25/4d-printing-a-technology-coming-from-the-future/](http://www.sculpteo.com/blog/2017/10/25/4d-printing-a-technology-coming-from-the-future/)

## 15. INVITE STUDENTS TO BUILD THEIR OWN CARE PACKAGE

Many of the products in our package can be found at local stores or online for reasonable prices. Flip to [page 12](#) for information about finding items from this CARE package.





# ENERGY AUDIT

**LOOK UP, LOOK DOWN,  
CONSERVE ENERGY ALL AROUND!**

Use this energy audit in your school to understand where, when, why, and how energy is being used. Completing an energy audit will help you find areas where your energy efficiency can be improved.

This energy audit is divided into **7** sections: **windows, furnace, refrigerator, outlets & electronics, light bulbs, toilets**, and **taps**. You can divide your students into a few groups and have them each assess a different section, or each group can complete the whole audit.

**Have fun completing your energy investigation!**

## CARE PACKAGE MATERIALS TO HELP YOUR INVESTIGATION:

#4 - FLOW RATE BAG

#8 - FURNACE FILTER WHISTLE

#9 - TOILET LEAK DETECTION DYE-TABLETS

#13 - FRIDGE THERMOMETER CARD

#16 - POWER MONITOR

#27 - INFRARED THERMOMETER

*\*Some of the activities in this audit require permission from the school administration and custodial staff.  
Ensure your whole school team is on board before you begin!*



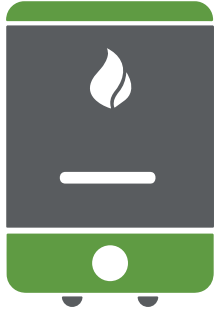
# ENERGY AUDIT WINDOWS

**HEAT GAIN AND HEAT LOSS THROUGH WINDOWS ARE RESPONSIBLE FOR ABOUT 25% OF RESIDENTIAL HEATING AND COOLING ENERGY USE.**

Answer these simple questions to get a better understanding of how the windows in your classroom can help or hinder your energy conservation efforts.

<i>Look around your classroom, how many windows do you see?</i>	
<i>How many layers of glass do your windows have 1, 2 or 3?</i>	
<i>Feel closely by the edges of the window. Is there a draft or cold spots where the outside air is coming in? (Try using your infrared thermometer)</i>	
<i>Which direction do the windows face in your classroom? (North, South, East, West)</i>	

In winter, when the sun appears low in the southern sky, west and east facing windows only get a few hours of sunlight and will likely lose more heat than they gain. Windows that face south, however, allow a lot of welcomed warmth to enter a building during cold winter months. Instead of turning the dial on your thermostat, ensure your windows are properly sealed and adjust your curtains or blinds to help regulate the temperature.



# ENERGY AUDIT FURNACE

**A CLEAN FILTER IS IMPORTANT TO THE OPERATION AND EFFICIENCY OF YOUR HVAC SYSTEM. CLEANING EVERY 2-3 MONTHS WILL ENSURE YOUR AIR FILTER OPERATES AT PEAK EFFICIENCY.**

You can use the (#8) **FURNACE FILTER WHISTLE** to test if your furnace filter needs to be replaced. When attached to a furnace filter, air will begin to flow through the whistle. Gradually, as particles collect in the opening, the whistle will begin to sound. This whistle sound lets you know it is time to change your furnace filter.

**Note:** Many schools do not have furnaces, rather they have boilers. If this is the case, consider having a student volunteer to take the whistle home and digitally record the results from their furnace!

## INSTRUCTIONS

1. Put the filter whistle part A through the filter.
2. Make sure that the whistle is at least 4 inches from the top and side of the filter. Orient according to the air flow.
3. Snap part B on to part A on the back of the filter. You're done!
4. The whistle will begin to sound when the filter is about 80% clogged.
5. When the time comes to replace your filter, make sure that you remove the whistle, wash it with warm soap and water, and then install it in the new filter.



# ENERGY AUDIT REFRIGERATOR

**HOW MANY REFRIGERATORS ARE IN YOUR SCHOOL?** (Think about school kitchens, staff rooms, CTS and science labs) **DID YOU KNOW THAT HAVING YOUR FRIDGE/FREEZER SET JUST 6 DEGREES CELSIUS TOO COLD WILL CAUSE IT TO USE 25% MORE ENERGY EVERY MONTH?**

Use the (#13) **FRIDGE THERMOMETER CARD** to find out if these refrigerators are running at their “goldilocks temperature”- the one that’s just right! This will save energy and keep your food at a safe temperature.

## INSTRUCTIONS

1. Place or hang the card in the refrigerator
2. Read the thermo-plastic strip to determine if an adjustment needs to be made.
3. Check every 3-4 months to ensure your fridge is working efficiently.

### Is your fridge really old?

An ENERGY STAR certified fridge uses 10% less energy, on average, than a standard model. Fridges that have earned the ENERGY STAR Most Efficient designation are the best of the best – they’ll save you more energy than standard models. Saving energy saves money and reduces your carbon footprint!





# ENERGY AUDIT OUTLETS & ELECTRONICS

<i>Look around your classroom. How many electrical outlets do you count?</i>	
<i>How many outlets are being used in the classroom?</i>	
<i>How many computers are in your classroom? Does your class remember to shut them down before everyone goes home?</i>	
<i>What other electronics are in your classroom?</i>	

Did you find that you have a lot of computers or other electronics plugged into outlets?

You can conserve energy by assigning one student the role of “**ENERGY OFFICER**” each week. Their job is to ensure items are unplugged every day before bedtime.







**TEST 3**  
**APPLIANCES THAT**  
**USE ELECTRICITY**  
**WITH THE (#16)**  
**POWER MONITOR**

Name of item	KWh when turned <u>OFF</u>	KWh when turned <u>ON</u>



# ENERGY AUDIT LIGHT BULBS

Circle the kind of light bulbs you have in your classroom!

					
<b>Incandescent bulbs</b>	<b>Compact Fluorescent (CFL) bulbs</b>	<b>Light emitting diode (LED) bulbs</b>	<b>Halogen bulb</b>	<b>Fluorescent tubes</b>	<b>Light emitting diode (LED) tubes</b>
60 watts	13 watts	<b>8 watts</b>	50 watts	32 watts	<b>16 watts</b>
800 Lumens	800 Lumens	<b>800 Lumens</b>	1200 Lumens	2800 Lumens	<b>2000 Lumens</b>
1000 hours	3000 hours	<b>25,000 hours</b>	2000 hours	20,000 hours	<b>50,000 hours</b>

What is a "lumen"? - A lumen is measure of brightness from a light source.

Using the numbers from the chart beside, calculate how much energy is used by the lights in your classroom each day.

<b>A</b>	<i>How much energy (watts) do the light bulbs you see use?</i>	
<b>B</b>	<i>How many light bulbs are there in total?</i>	
<b>C</b>	<i>How many hours each day are the lights turned on? (estimating is okay!)</i>	

Use the equation  
**A x B x C = daily energy used**

Answer: \_\_\_\_\_watts/hour



# ENERGY AUDIT TOILETS

**MANY OLDER TOILETS CAN LEAK CLEAN WATER FROM THE TANK INTO THE TOILET BOWL. THIS MEANS THAT THE TOILET IS “RUNNING” ALL DAY LONG!**

Use the (#9) **TOILET LEAK DETECTION TABLETS** (or a few drops of food colouring) to conduct a simple leak test. If your student washrooms have tankless toilets, get permission to check the infirmary or staff washroom.

## **INSTRUCTIONS**

1. Remove the tank cover.
2. Drop a dye tablet (or 4-5 drops of food colouring) into the water tank.
3. Wait 5 minutes

**If the dyed water shows up in the toilet bowl without flushing, you’ve got a leak!** Check the flapper valve in the toilet tank; it may need to be cleaned or replaced. Make sure to inform the maintenance staff of all detected leaks.



# ENERGY AUDIT TAPS

**FLOW DESCRIBES THE MOVEMENT OF A FLUID AND IS A MEASUREMENT OF VOLUME OVER TIME.**

You can use the (#4) **WATER FLOW RATE BAG** to find the volume of water your school's faucets use every minute.

## **INSTRUCTIONS**

1. Turn on the faucet and adjust the flow to your normal use.
2. Hold the bag open under the faucet for exactly 5 seconds *(use a stopwatch for accuracy)*
3. Read the measurement on the bag in LPM *(litres per minute)*
4. Empty the bag and repeat the test to confirm your results.

*\*Put the collected water to good use- water plants or use it for washing.*

**The recommended flow rate for bathroom and kitchen faucets is 5.7 LPM.**

If your faucet is flowing at a rate much higher than this, consider installing a faucet aerator. Aerators work by mixing the flowing water with air. The water pressure stays the same, but the amount of water used is reduced. When you use less hot water, you're also using less energy to heat that water.

*Visit [insideeducation.ca](http://insideeducation.ca) and check out our WISE kit (Water Innovation and Stewardship Education) Teacher's Guide for more water audit activities!*



# ENERGY AUDIT QUESTIONS

***FOLLOW UP  
QUESTIONS  
TO ASK YOUR  
STUDENTS  
AFTER THE  
ENERGY  
INVESTIGATION!***

- List three tips you have learned to help conserve energy in your school.
- Were you surprised by any parts of the energy audit? Why or why not?
- Why is it so important to save energy?
- What is your definition of energy stewardship?
- If you could decide which natural resources we should use to create our electricity, which ones would you choose? Why?
- Do you think we can live without fossil fuels? Why or why not?
- Do you think it's a good idea for Alberta to stop using fossil fuels by the end of the century? Explain your answer.
- Most of the world's power still comes from burning carbon. Do you think we can substantially decarbonize without negatively impacting the economy?
- What will you do to practice energy stewardship in your community?
- Can you think of any ways that your family is already conserving energy?





## WEBSITES FOR TEACHERS

# USEFUL WEBSITES AND APPS

### [www.encyalberta.ca](http://www.encyalberta.ca)

Visit the Energy Efficiency Alberta webpage to learn about the various programs, rebates, technology and tools available to all Albertans to help them reduce emissions.

### [www.resources4rethinking.ca](http://www.resources4rethinking.ca)

Find thousands of quality resources such as lesson plans, books, videos, and other materials that explore the environmental, social, and economic dimensions of important issues and events unfolding in our world today.

### [www.lsf-lst.ca](http://www.lsf-lst.ca)

Learning for a Sustainable Future aims to integrate sustainability education into Canada's education system. Find resources for students and teachers and information about various projects and collaborative initiatives to promote sustainable communities.

### [www.epcor.ca](http://www.epcor.ca)

Discover tips on how to conserve energy and water in your home. Use Epcor's online guides, suggestions, and calculators to see where you can cut down your costs... and cut down your resource consumption.

### [www.ec.gc.ca](http://www.ec.gc.ca)

Environment and Climate Change Canada gives specific tips on what you can do at home to conserve energy, water and electricity. Learn how to create less waste in your daily life.

### [www.greenlearning.ca](http://www.greenlearning.ca)

This website, designed and maintained by the Pembina Institute, is full of environmental educational resources and activities that are linked to the Alberta curriculum.

# USEFUL WEBSITES AND APPS

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## WEBSITES FOR STUDENTS



### [www.storyofstuff.org](http://www.storyofstuff.org)

This is an American website, but it tells an interesting story from where “stuff” begins, to where it ultimately ends. It’s a 20 minute animated short film, and the notes and fact sheets are included on the website.

### <http://kids.nationalgeographic.com/games/action/recycle-roundup/>

A great game for students to understand what can and cannot be recycled.

### [www.kidsforsavingearth.org](http://www.kidsforsavingearth.org)

This website offers tips and information on environmental concerns. Be sure to check out the *Programs* area on the site, where you can choose a program that suits your interests to do one small thing to help the planet.

### [www.wonderville.org](http://www.wonderville.org)

This website has resources for both students and teachers. It makes learning STEM concepts fun for students with games such as *Solar Energy Defenders* or *Waste Avengers*.

### <http://kids.saveonenergy.ca/en/index.html>

Here students will find tips, facts, games, and videos about electricity and saving energy. They can even find out what kind of “electric personality” they have by taking a quick survey.

## APPS FOR STUDENTS



### [JouleBug](#)

This app turns learning about energy efficiency into a game. The app includes easy-to-understand Impact Stats, Bonuses, How-To Videos, and Helpful Links. Link up with friends by sharing how you’re making a difference and following what they’re up to in the Feed

### [Energy Cost Calculator](#)

An easy to use app to calculate the cost of energy. Enter in estimated consumption, hours of use per day and cost per Watt or Kilowatt and determine how much you are paying in energy costs.





# ENERGY STEWARDSHIP AND CLIMATE CHANGE TERMINOLOGY

## **WE HEAR ABOUT CLIMATE CHANGE A LOT.**

It's all around us— in the news, on social media, and in the classroom. Use this list of words and concepts to help you and your students understand some of the climate change terminology and join the conversation!

## **A**

### **Alberta's Climate Leadership Plan (CLP)**

Alberta's plan to take action on climate change and protect the province's health, environment and economy.

### **Alternative Energy**

Generating energy in ways that do not use non-renewable resources or cause harm to the environment. *E.g. geothermal, wind, or solar energy*

## **B**

### **Biodiversity**

The variety of life on Earth.

### **Biofuels**

Combustible fuels created from biomass.

### **Biomass**

Organic material used to produce bioenergy. This material can come in a gaseous, liquid, or solid state, but is most often found in the form of living or recently living plants and biological wastes from industrial, agricultural, and home use. *E.g. wood pellets, ethanol, waste from crop plants, municipal solid waste.*

## C

### **Carbon Credit**

Equal to one tonne of carbon dioxide.

### **Carbon Footprint**

The amount of carbon dioxide (*and other carbon compounds*) emitted due to the consumption of fossil fuels by a particular person or group of people.

### **Carbon Levy**

Tax money collected from all transportation and heating fuels that emit greenhouse gases when burned. *E.g. propane, diesel, gasoline, and natural gas.* The levy was implemented to encourage Albertans to reduce carbon pollution from their cars and homes. Money collected from this levy will pay for provincial initiatives that reduce emissions and support our change to a lower carbon economy.

### **Carbon Neutral**

This term refers to having a net-zero carbon footprint, or neutral carbon emissions.

### **Carbon Offsetting**

This is when an emission of carbon dioxide or another greenhouse gas is reduced in order to compensate for emissions made elsewhere in the atmosphere.

### **Carbon Sink**

Any natural system that can suck up and remove carbon dioxide from the atmosphere. Forests, oceans, and soil are all examples of carbon sinks.

### **Circular Economy**

An economy where resources are kept in use for as long as possible. Chlorofluorocarbons (*CFC's*): Any of a class of compounds of carbon, hydrogen, chlorine, and fluorine- typically gases used in refrigerants and aerosol propellants. They are harmful to the ozone layer.

### **Climate**

The weather conditions of an area in general, or over a long period of time.

### **Climate Change**

A change in global or regional climate patterns often attributed to increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

### **Coral Bleaching**

A process where coral colonies lose their colour when they expel the microscopic algae that live with them in symbiosis. This can be caused by warm water temperatures.

## D

### **Deforestation**

Removal of a forest or stand of trees where the land is then converted to a non-forest use.

### **Desertification**

The process by which fertile land becomes desert, usually as a result of drought, deforestation, or inappropriate agriculture.

## E

### **Emissions**

The production and discharge gas or radiation.

### **Energy**

The ability to do work.

### **Energy Conservation**

Using less energy altogether.

*E.g. unplugging electrical devices when they are not in use.*

### **Energy Efficient**

Using less energy to accomplish the same service.

*E.g. Using LED light bulbs in your home instead of incandescent light bulbs.*

### **Energy Use Intensity (EUI)**

The energy use per square foot at a property.

## F

### **Fast Fashion**

The reproduction of fashionable clothes at high speed and low cost.

### **Fossil Fuel**

A natural fuel such as coal or gas, formed in the geological past from the remains of living organisms.

## G

### **Geothermal Energy**

Thermal energy generated and stored in the Earth.

### **Global Warming**

The gradual rise in the earth's atmospheric temperature caused by high levels of carbon dioxide and other gases.

### **Greenhouse Effect**

The problem caused by increased amounts of greenhouse gases in the air. These gases trap the heat from the sun, and cause a gradual rise in the temperature of the Earth's atmosphere.

### **Greenhouse Gas (GHG)**

A gas that contributes to the greenhouse effect by absorbing infrared radiation. *E.g. carbon dioxide, methane, chlorofluorocarbons.*

### **Greenwashing**

The use of marketing to portray an organization's products, activities or policies as environmentally friendly when they are not.

## I

### **Idling**

Running a vehicle's engine when the vehicle is not in motion.

### **Industrial Revolution**

A period of major industrialization that took place during the late 1700s and early 1800s. It is estimated that humans have increased atmospheric carbon dioxide concentration by more than a third since the Industrial Revolution began.

## L

### **Localvore**

A person interested in eating food that is locally produced, not moved long distances to market.

## M

### **Methane**

A colorless, odorless flammable gas that is the main component of natural gas.

### **Microplastics**

Extremely small pieces of plastic debris in the environment resulting from the disposal and breakdown of consumer products and industrial waste.

## N

### **Natural Gas**

Flammable gas, consisting largely of methane and other hydrocarbons, occurring naturally underground (*often in association with petroleum*) and used as fuel.

### **Natural Resource**

Something from the natural environment that we use to meet our everyday wants and needs. *E.g. water, coal, iron, air, fruit.*

### **Non-Renewable Energy**

Sources of energy that cannot be replaced in a human's lifetime. Once we use it up, it's gone! *E.g. Coal, oil, natural gas, nuclear.*

## O

### **Ocean Acidification**

Significant changes to the chemistry of the ocean. It occurs when carbon dioxide gas is absorbed by the ocean and reacts with seawater to produce acid.

### **Ozone Layer**

A layer in the Earth's stratosphere that contains a high concentration of ozone. This layer absorbs most of the ultraviolet radiation reaching the earth from the sun.

## P

### **Phantom Power**

The current of electricity running through appliances even when they are turned off.

## R

### **Reforestation**

The process of replanting an area with trees.

### **Renewable Energy**

Sources of energy that can naturally replace themselves within a human lifetime. *E.g. Wind, geothermal, water, biomass, solar.*

### **Retrofitting**

Adding a part, accessory, or component to something that it did not have when it was first manufactured.

# TERMINOLOGY

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## S

### **Solar Energy**

Energy from the Sun in the form of radiant light and heat, harnessed using ever-evolving technologies.

### **Sustainable**

Able to be maintained at a certain rate or level.

### **Stewardship**

The job of supervising or taking care of something.

## U

### **Urban Heat Island (UHI)**

An urban area that is significantly warmer than its surrounding rural areas due to human activities.

## V

### **Vermiculture**

The cultivation of worms for use in composting.

## W

### **Watershed**

An area of land that drains water into a body of water such as a stream, river, lake, wetland, or ocean.

### **Weather**

The state of the atmosphere at a particular time and place.

### **Wind Energy**

The process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power.

## REFERENCES

- Alberta Beverage Container Recycling Corporation* ([www.abcrc.com](http://www.abcrc.com))  
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*Climate Kids* ([www.climatekids.nasa.gov](http://www.climatekids.nasa.gov))  
*Energy Efficiency Alberta* ([www.encyalberta.ca](http://www.encyalberta.ca))  
*Environment and Climate Change Canada* ([www.ec.gc.ca](http://www.ec.gc.ca))  
*Government of Alberta, Environment and Natural Resources* ([www.alberta.ca](http://www.alberta.ca))  
*Government of Canada, Energy* ([www.canada.ca/en/services/environment/energy](http://www.canada.ca/en/services/environment/energy))  
*Land Stewardship Centre* ([www.landstewardship.org](http://www.landstewardship.org))  
*Natural Resources Canada* ([www.nrcan.gc.ca](http://www.nrcan.gc.ca))  
*Statistics Canada* ([www.statcan.gc.ca](http://www.statcan.gc.ca))  
*Recycling Council of Ontario* ([www.rco.on.ca](http://www.rco.on.ca))  
*Waste Reduction Week in Canada* ([www.wrwcana.com](http://www.wrwcana.com))

# STEWARDSHIP CALENDAR

**FEBRUARY** 02 | World Wetlands Day

**MARCH** 03 | World Wildlife Day  
08 | Solar Appreciation Day Second Friday of March  
18 | Global Recycling Day  
21 | International Day of Forests  
22 | World Water Day

**APRIL** 22 | Earth Day

**MAY** **Bike to work/school MONTH**  
**Bike to work/school DAY** (*varies in cities*)  
22 | International Day for Biological Diversity

**JUNE** 05 | World Environment Day  
08 | World Oceans Day  
15 | Global Wind Day

**SEPTEMBER** 21 | Zero Emissions Day

**OCTOBER** 05 | Energy Efficiency Day  
15-21 | Waste Reduction Week Canada  
24 | International Day of Climate Action