



CLIMATE CHANGE LESSON PLAN

Power of One: Climate change and taking action

Background and concepts

The Power of One activity provides a simple, visual overview of what climate change is and how it is happening, including how our everyday actions contribute. Individual action cards using Saskatchewan-based energy information provide examples of ways we can reduce our greenhouse gas emissions.

- Climate change science
- Saskatchewan sources of CO₂ and other greenhouse gases
- Actions that reduce greenhouse gases

Time

This activity will take 20 minutes to an hour, if in depth discussion of both climate change and the impact of individual actions is included.

Materials

- Energy cards (attached – print double sided)
- Understanding Climate Change Sketch (attached for reference)
- White board, markers, and eraser

Procedure

Using the script below, and the attached sketch as a guide, draw on the white board as you talk, and ask students for their comments as you go. Alternatively, as pre-teaching show students the [climate change video](#) (12 minutes) located online at environmentalsociety.ca under the Resources tab. You may instead choose to show the climate change slide show and use the script to guide your discussion. Both the slideshow and the script can be found [here](#).

Energy Cards

Print one set of the attached cards for each class. Cards are formatted to print double sided, so that the illustration will be on the back of the action and energy information. Printed on cardstock, the cards can be reused.



Explanation for whiteboard drawing

“Most of you will have heard about climate change or the term *global warming*. We are going to talk a bit about what it is, how our everyday actions are connected, and how we can help.

- **We have a sun, and we have the earth.** Draw the sun and edge of earth below. **The earth has an atmosphere.** Draw a dotted line above the earth edge.
- **The sun’s rays shine out. Some hit the earth, and some go off into space.** Draw one ray going into space, and one touching earth.
- **Some of the rays hit our atmosphere and reflect or radiate back out into space.** Or you may ask, “**What happens to the rays when they hit our atmosphere?**” Draw a ray bouncing back out into space.
- **Some of the rays come through our atmosphere and hit the earth’s surface and warm it.** Draw a ray touching earth and draw warming lines.
- **Some of that heat radiates back out into space.** Draw it going back to space.
- **Some of those rays are captured by the greenhouse gases (GHGs) in our atmosphere, consequently keeping that warmth near the earth.** Draw dots to represent the GHG’s. Show the ray stopping at the edge of the atmosphere and radiating back to earth. **This is called *The Greenhouse Effect*.** Ask the students, “**Do you think the greenhouse effect is a good thing?**” **It is necessary to us keeping the average temperature around the earth about 15° C. Without the greenhouse effect, the average temperature of our world would be about -20° C. The problem we have created is we have added so many GHG’s,** (draw more dots, and more lines at the earth edge to show warming) **mostly in the form of carbon dioxide – or CO₂ – that we are warming the planet up too much. It is like we used to have a sweater on our planet to keep us warm and now we have a winter jacket.**
- Ask the students, “**What are we doing, or what happens daily that contributes to those greenhouse gases?**” You may need to prompt some of the answers with drawings, but as they answer, draw the actions. **We heat our homes, drive cars, industries like SaskPower burn coal and gas to generate electricity, or other Saskatchewan industries burn gas, and we eat cows who create methane.** As you draw these things on the whiteboard, make lots of GHG “dots” coming from each thing.
- Students may name natural sources of GHG’s (E.g. forest fires, volcano eruptions). Draw those in as well.
- As well as carbon dioxide (CO₂), students may name other greenhouse gases like methane (CH₄), nitrous oxide (N₂O), ozone (O₃) and water vapour (H₂O). CO₂ stays in the atmosphere for over 100 years. Methane, while it only stays in the atmosphere for about 12 years, is a much more potent greenhouse gas.



- Hand out one of the cards to each student. **Let's look at your cards. We will take turns reading out what is on your card. Read the action on the card, and how much CO_{2e} it saves. It says KgCO_{2e}/yr. You read that as “kilograms of carbon dioxide equivalent per year”.** Read one out as an example. The information on the cards explains how each calculation was made and may also include the amount of waste saved from landfill, or the amount of water saved. With younger students, reading the first action line and the amount of CO_{2e} reduced may be enough. The “e” in CO_{2e} means “equivalent”. There are many greenhouse gases, and each has a different potency, but we can say that they have a carbon dioxide equivalence, or CO_{2e}.
- As students read out their cards, talk about some of the actions using the discussion questions, and notes below, explaining how they help to reduce CO_{2e} emissions. Erase some of the dots each time, erasing more or less depending on how much the action saves.

Discussion questions, evaluating the actions, and notes about the cards:

1. On the board, list which of these actions would be easy to do right now, or you already do them. Discuss a few and talk about how to make those behaviours more common.
2. List which of these actions would be harder or more challenging to do. Discuss a few and talk about ways to make it more likely that we would do those things (E.g., bike or walk to school if they had a safe route, or a place to put their skateboard).
3. What is the connection between planting trees and reducing GHG's? Trees “breathe in” CO₂ and “breathe out” O₂, taking carbon out of the air.
4. Is the action a behaviour or a technology change? E.g., Lighting – Behaviour is turning lights out when we don't need them. Technology is using energy efficient light bulbs.
5. Success is a continuum. E.g., We are trying to take shorter showers, not give up showering altogether. ☺ Can we move in a direction that conserves energy, or water, reduces waste, etc.? (have them place themselves on an imaginary line where one spot represents 5-minute showers, and another spot represents 15-minute showers, where would they be? Then talk about how you might move yourself closer to where you want to be. This works for many of the actions, not just showering).
6. **The power of one:** Use an example of one of the cards to say – so what if you do this action, and everyone in your class does it, and everyone in your school does it, and all of Saskatchewan does it? How does the power of one person doing something, or multiple people doing things help to reduce GHG's?



- **Water cards:**
 - What is the connection between water and greenhouse gas emissions? Why does using water produce GHG's? It is mostly about how the water is treated, and how it gets to our homes. All of the pumping, filtering, etc., uses lots of energy.
 - Any card that talks about using hot water, uses energy to heat the water as well.
 - Highlight the amount of water, like the thousands of litres on some cards, and talk a bit about how much that is – e.g., how much water does your water bottle hold? (usually 1 litre or less)
- **Energy cards:**
 - Many of them relate to reducing electricity use. You can see that some of them are way more significant than others.
 - The comparison to the number of trees planted shows how some actions are really good at reducing CO_{2e} (turning out unnecessary lights at school every day = 35 trees), compared to others (having a "lights out" day = 0.2 trees).
 - School lighting card: T8's are the long tube lights - kind of the typical fluorescent lighting in a classroom. (using about 30 watts each) New schools, or schools that are upgrading lighting, will have LED lights, which use about ½ of the electricity of the T8's, at about 17 watts each.
 - Some of them are about reducing heat energy. We might talk about programmable thermostats that you can use to help you remember to turn down the heat.
- **Waste cards:**
 - Reducing waste from going to the landfill reduces GHG emissions by reducing methane production in the landfill, again a potent GHG. Methane is produced by anaerobic decomposition of organic materials like food and yard waste. Composting can be tricky at school, although many do it if they have outdoor spaces and gardens. Would it be easy or hard for your school to compost – think about how you would collect the waste each day, who would dump it and rinse the containers, who would look after the outdoor bin, etc.?
- **Food cards:**
 - These cards are about "eating less meat". Reducing meat is also a methane reducing action, because cows produce lots of methane.
 - The three sisters are an Indigenous traditional food and way of planting. The sisters are corn, beans and squash(pumpkin). The First Nations people grew them together because the corn grew tall and strong, the beans used the corn stalk as support and fertilized the soil with nitrogen, and the pumpkin spread out all over the ground, keeping weeds down, and keeping in moisture. The "sisters" also provide a really healthy balance of proteins and nutrients.



- Eating less meat doesn't have to mean eating no meat, just a little less. Ask students to tell you what their favourite meatless meal is.
- **Transportation cards:**
 - These cards highlight active transportation, like walking or biking to school, or reducing vehicle idling.

Taking action:

Choose an action(s) that you can plan to do and do on a regular basis. What are some examples of actions you could do?

- Create a group chart or have each student record actions they take each day for a set period of time. Using the information on the cards, or one of the [related SES audits](#) students can estimate or calculate the greenhouse gas reductions they are making with their actions.



Curriculum Connections

Grade 4 Earth and Space Science: RM4.2 Assess how human uses of rocks and minerals impact self, society, and the environment.

Grade 5 Social Studies: DR5.2 Assess the impact of the environment on the lives of people living in Canada. **RW5.1** Explain the importance of sustainable management of the environment to Canada's future. **RW5.2** Hypothesize about economic changes that Canada may experience in the future.

Grade 6 Science: EL6.1 Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts. **Social Studies: RW6.1** Examine and analyze factors that contribute to quality of life, including material and non-material factors. **RW6.2** Contribute to initiating and guiding change in local and global communities regarding environmental, social, and economic sustainability.

Grade 7 Social Studies: IN7.2 Examine the effects of globalization on the lives of people in Canada and in circumpolar and Pacific Rim countries. **RW7.2** Investigate the influence of resources upon economic conditions of people in circumpolar and Pacific Rim countries. **RW7.3** Assess the ecological stewardship of economies of Canada and the circumpolar and Pacific Rim countries.

Grade 8 Social Studies: RW8.1 Analyze the social and environmental consequences of living in the Canadian mixed market economy based on consumerism. **RW8.2** Assess the implications of personal consumer choices. **RW8.3** Critique the approaches of Canada and Canadians to environmental stewardship and sustainability. **Health Education: USC8.6** Examine the concept of sustainability from many perspectives, and develop an understanding of its implications for the well-being of self, others and the environment.

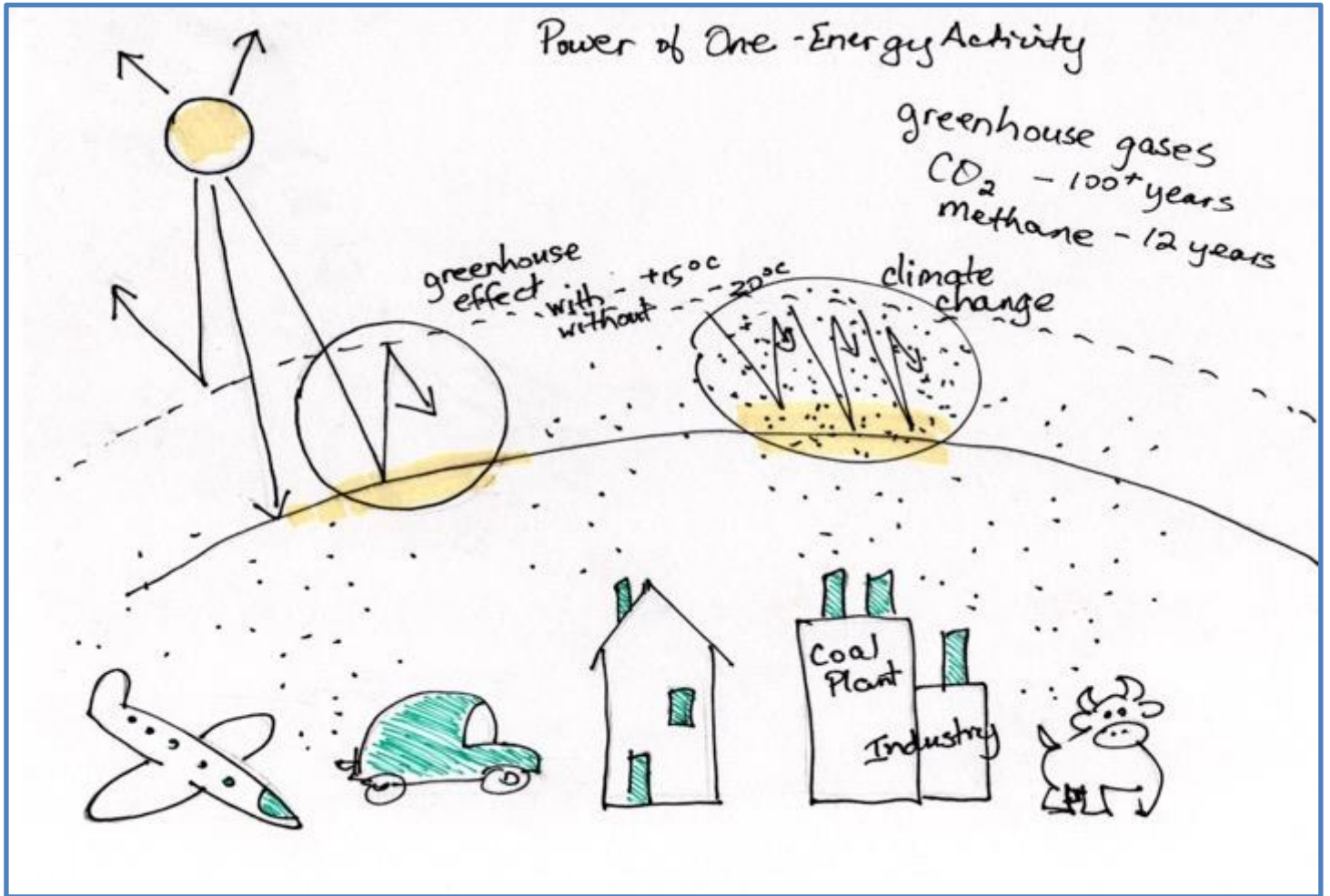
Grade 9 Science: CE9.3 Assess operating principles, costs, and efficiencies of devices that produce or use electrical energy. **CE9.4** Critique impacts of past, current, and possible future methods of small and large scale electrical energy production and distribution in Saskatchewan.

Grade 10 Science: SCI10-CD1 Assess the consequences of human actions on the local, regional, and global climate and the sustainability of ecosystems. **SCI10-CD2** Investigate factors that influence Earth's climate system, including the role of the natural greenhouse effect.

Environmental Science 20: ES20-SDS1 Create and carry out a plan to explore one or more topics of personal interest relevant to Environmental Science 20 in depth. **ES20-AS1** Assess the impact of human activities on indoor and outdoor air quality and the need for regulations and mitigating technologies to minimize risks to human health. **ES20-AS2** Analyze the production, reliability and uses of geoscience data to investigate the effects of a changing climate on society and the environment.



Understanding Climate Change Sketch

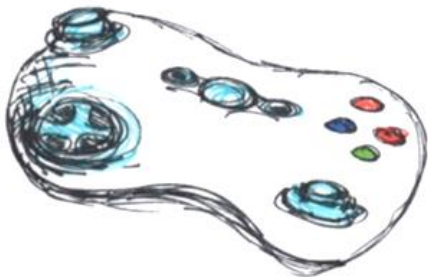
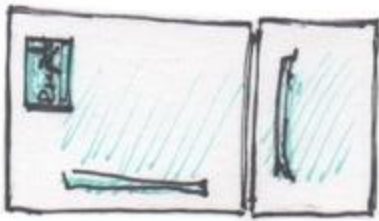
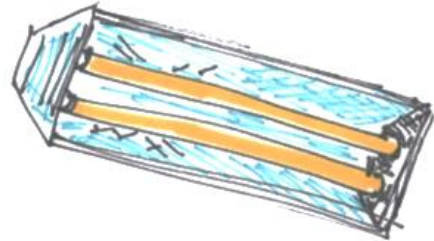
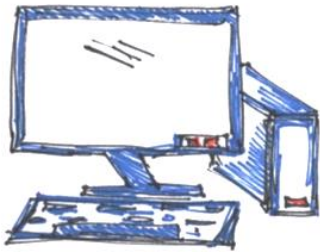
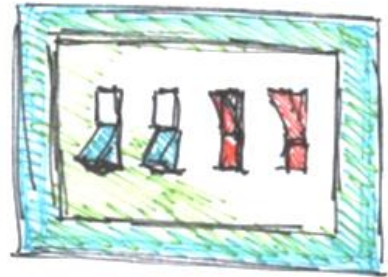
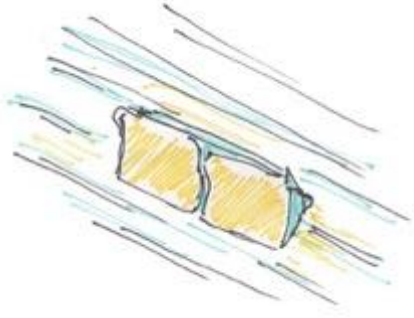




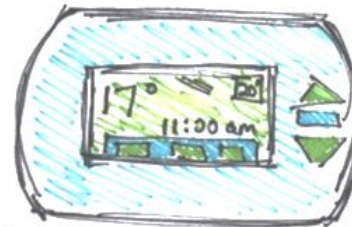
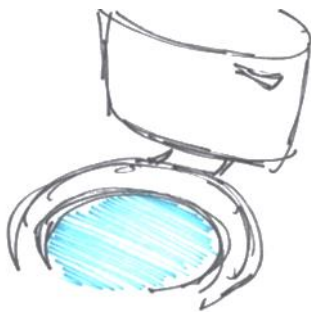
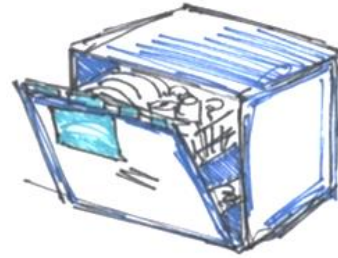
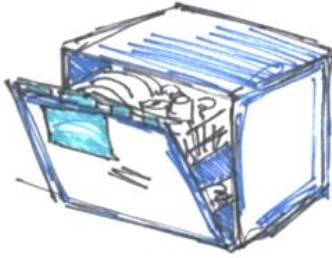
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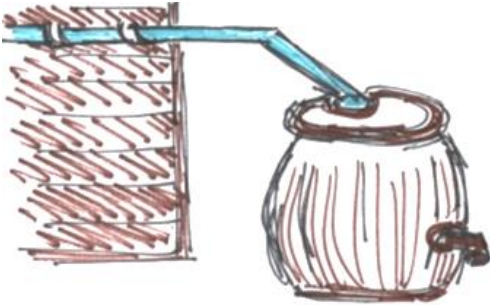
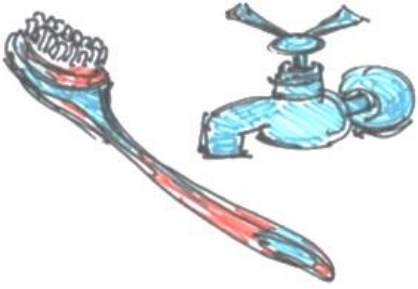
<p>Switched my whole house to LED lights</p> <p>Saved 1120 kgCO_{2e}/year Equivalent to planting 56 trees</p> <p>Saved 2234 kWh/year, compared to using incandescent lights for the same time period.</p>	<p>Switched the gym lights to LED and installed occupancy sensors</p> <p>Saved 6120 kgCO_{2e}/year Equivalent to planting 306 trees</p> <p>Saved 12,240 kWh/year, by replacing 400W metal halide with 120W LED, and reducing use by 5 hours/day.</p>
<p>Our school turns off lights when not needed</p> <p>Saved 4380 kgCO_{2e}/year Equivalent to planting 219 trees</p> <p>Saved 8760 kWh/year, compared to using T8 fluorescent lighting an extra 4 hours per day.</p>	<p>Our school had a lights-out day</p> <p>Saved 20 kgCO_{2e}/year Equivalent to planting 1 tree</p> <p>Saved 42 kWh/year, by turning out lights in 10 classrooms for a full day.</p>
<p>Our school upgraded T8 to LED T8 lighting</p> <p>Saved 1680 kgCO_{2e}/year Equivalent to planting 84 trees</p> <p>Saved 3360 kWh/year, by upgrading 100 fixtures.</p>	<p>I set up sleep settings on my computer</p> <p>Saved 60 kgCO_{2e}/year Equivalent to planting 3 trees</p> <p>Saved 128 kWh/year, compared to leaving it on for 10 hours/day.</p>
<p>I switched to a laptop computer</p> <p>Saved 80 kgCO_{2e}/year Equivalent to planting 4 trees</p> <p>Saved 157 kWh/year, compared to using a desktop computer.</p>	<p>My family replaced our 1991 fridge with a 2018 ENERGY STAR® qualified fridge</p> <p>Saved 270 kgCO_{2e}/year Equivalent to planting 14 trees</p> <p>Saved 545 kWh/year, and \$84/year.</p>
<p>My family recycled our 1985 fridge</p> <p>Saved 970 kgCO_{2e}/year Equivalent to planting 49 trees</p> <p>Saved 1932 kWh/year, and \$312/year.</p>	<p>I have an Xbox® free day each week</p> <p>Saved 10 kgCO_{2e}/year Equivalent to planting 1 tree</p> <p>Saved 17 kWh/year, by not playing Xbox one day per week.</p>



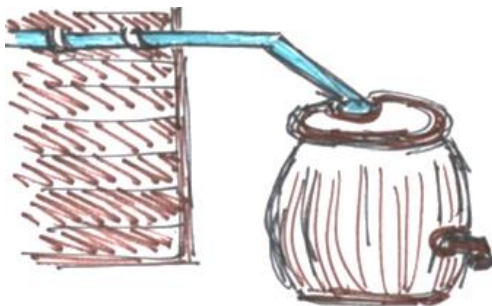
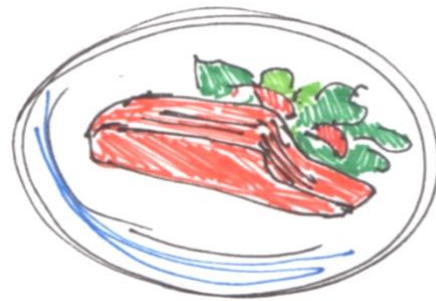
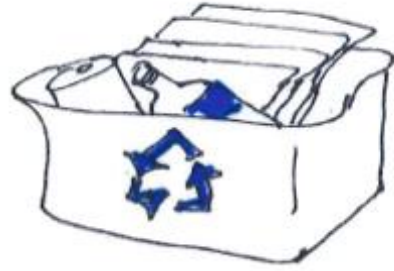
<p>My family hangs clothes to dry</p> <p>Saved 440 kgCO_{2e}/year Equivalent to planting 22 trees</p> <p>Saved 876 kWh/year, compared to using an electric dryer.</p>	<p>My family has a new heat pump clothes dryer</p> <p>Saved 100 kgCO_{2e}/year Equivalent to planting 5 trees</p> <p>Saved 198 kWh/year, compared to an inefficient new dryer.</p>
<p>My family has an ENERGY STAR® dishwasher</p> <p>Saved 540 kgCO_{2e}/year Equivalent to planting 27 trees</p> <p>Saved 827 kWh/year, compared to a 1990 dishwasher.</p>	<p>My family lets the dishes air dry</p> <p>Saved 220 kgCO_{2e}/year Equivalent to planting 11 trees</p> <p>Saved 438 kWh/year, compared to using the heat dry cycle on the dishwasher.</p>
<p>I walk to school</p> <p>Saved 110 kgCO_{2e}/year Equivalent to planting 6 trees</p> <p>Saved 45 litres of gas/year, compared to driving to school.</p>	<p>I turn the heat down at night</p> <p>Saved 370 kgCO_{2e}/year Equivalent to planting 19 trees</p> <p>Saved 7 gigajoules/year, by turning the heat down 5°C overnight.</p>
<p>I turn the heat down when no one is home</p> <p>Saved 220 kgCO_{2e}/year Equivalent to planting 11 trees</p> <p>Saved 4 gigajoules/year, by turning the heat down 3°C during the day.</p>	<p>I fixed a leaking toilet</p> <p>Saved 30 kgCO_{2e}/year Equivalent to planting 2 trees</p> <p>Saved 73,000 litres/year, based on 200 litres/day leaking.</p>
<p>We installed a low flow showerhead</p> <p>Saved 20 kgCO_{2e}/year Equivalent to planting 1 trees</p> <p>Saved 37,000 litres/year, by switching to a 6 litre/minute showerhead.</p>	<p>I fixed a dripping tap</p> <p>Saved 2 kgCO_{2e}/year Equivalent to planting 0 trees</p> <p>Saved 5000 litres/year, and if it was the hot water tap I would have saved even more.</p>



<p>My family planted drought tolerant plants</p> <p>Saved 20 kgCO_{2e}/year Equivalent to planting 1 trees</p> <p>Saved 48,000 litres/year, by not watering a 10m by 10m area.</p>	<p>All my classmates turn off the tap while brushing our teeth</p> <p>Saved 180 kgCO_{2e}/year Equivalent to planting 9 trees</p> <p>Saved 413,000 litres/year, compared to keeping the tap running while we brush.</p>
<p>I bike to school</p> <p>Saved 110 kgCO_{2e}/year Equivalent to planting 6 trees</p> <p>Saved 45 litres of gas/year, compared to driving to school.</p>	<p>20 parents quit idling at our school</p> <p>Saved 1440 kgCO_{2e}/year Equivalent to planting 72 trees</p> <p>Saved 600 litres of gas/year, compared to each vehicle idling 10 minutes/day.</p>
<p>My family started composting at home</p> <p>Saved 380 kgCO_{2e}/year Equivalent to planting 19 trees</p> <p>Saved 376 kg/year of waste, compared to throwing our organic waste in the garbage.</p>	<p>My family started using a rain barrel</p> <p>Saved 0 kgCO_{2e}/year Equivalent to planting 0 trees</p> <p>Saved 1000 litres/year, compared to using tap water in the garden.</p>
<p>My family cut our phantom load in half</p> <p>Saved 180 kgCO_{2e}/year Equivalent to planting 9 trees</p> <p>Saved 350 kWh/year, compared to the average household.</p>	<p>Our school recycles pop cans</p> <p>Saved 800 kgCO_{2e}/year Equivalent to planting 40 trees</p> <p>And we earned \$330/year, by recycling 3300 cans/year.</p>
<p>Our school recycles plastic bottles</p> <p>Saved 90 kgCO_{2e}/year Equivalent to planting 5 trees</p> <p>And we earned \$150/year, by recycling 1500 bottles/year.</p>	<p>Our school composts lunchroom waste</p> <p>Saved 990 kgCO_{2e}/year Equivalent to planting 50 trees</p> <p>Saved 985 kg of garbage/year, reducing landfill emissions.</p>



<p>Our school recycles paper, plastic, and metal Saved 1 kgCO_{2e}/year Equivalent to planting 0 trees</p> <p>Reduced landfill emissions and saved 985 kg of garbage/year.</p>	<p>Our class uses refillable water bottles</p> <p>Saved 50 kgCO_{2e}/year Equivalent to planting 3 trees</p> <p>Saved 591 bottles/year, compared to three students using bottled water.</p>
<p>My family replaces one meal of beef with one meal of lentils</p> <p>Saved 680 kgCO_{2e}/year Equivalent to planting 34 trees</p> <p>Based on 1 meal/week and 0.5kg of beef or lentils.</p>	<p>I snack on yogurt instead of cheese</p> <p>Saved 110 kgCO_{2e}/year Equivalent to planting 6 trees</p> <p>Based on 100g snack size 3x/week.</p>
<p>My family eats salmon instead of lamb</p> <p>Saved 270 kgCO_{2e}/year Equivalent to planting 14 trees</p> <p>Based on 20 times per year and 0.5kg of salmon or lamb.</p>	<p>5 buses quit idling at our school</p> <p>Saved 380 kgCO_{2e}/year Equivalent to planting 19 trees</p> <p>Saved 158 litres of diesel/year, compared to each bus idling 10 minutes/day.</p>
<p>My family replaces one meal of beef with Three Sisters Soup</p> <p>Saved 650 kgCO_{2e}/year Equivalent to planting 33 trees</p> <p>Based on 1 meal/week and 0.5kg of beef or beans.</p>	<p>We changed 5 light bulbs to LED</p> <p>Saved 280 kgCO_{2e}/year Equivalent to planting 14 trees</p> <p>Saved 558 kWh/year by switching 60W incandescent lamps to LED. Saved \$8/month.</p>
<p>We built a composter at the community centre</p> <p>Saved 1300 kgCO_{2e}/year Equivalent to planting 65 trees</p> <p>Saved 1300 kg/year of waste, compared to throwing organic waste in the garbage.</p>	<p>The community garden started using a rain barrel</p> <p>Saved 0 kgCO_{2e}/year Equivalent to planting 0 trees</p> <p>Saved 1000 litres/year, compared to using tap water in the garden.</p>



<p>My family takes the bus</p> <p>Saved 4270 kgCO_{2e}/year Equivalent to planting 214 trees</p> <p>Also saved 1780 litres of gas/yr.</p> <p>Compared to owning and driving a 4-door car, averaging 8.9 litres/100km.</p>	<p>We planted drought tolerant prairie grasses at school</p> <p>Saved 20 kgCO_{2e}/year Equivalent to planting 1 tree</p> <p>Saved 48,000 litres/year, by not watering a 10m by 10m area.</p>

