CLIMATE CHANGE LESSON PLAN – Outdoor version

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 CO_2 and other greenhouse gases
- Actions that reduce greenhouse gases

Time

This activity will take 30 – 45 minutes, and allows time for a relay, and discussion of climate change and actions we can take.

Materials

- 28 large outdoor energy action cards (included – print and place in plastic sleeves so they can be put on the ground in any weather).
- Understanding climate change sketch (included for reference)
- Portable white board, markers, and eraser (optional)
- 40 business sized energy action cards are included for classroom reference and are formatted for printing doubled-sided.

Procedure

Before the lesson, show students the **climate change video** (12 minutes) located online at **environmentalsociety.ca** under the Resources tab. Instead you may 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**.

Outdoors:

- On the whiteboard – briefly review the climate change science. Use the sketch on page 5 for reference.
- Ask "what do we do every day that contributes to greenhouse gas emissions (GHG's)?" For example - driving, heating our homes, using electricity, large industry, eating meat. Prompt, if needed – what do we do that uses fossil fuels like gas, natural gas, and coal?
- Show students 1 action card and explain what it means. For example – *I bike to school*.
    - Demonstrate how to say: $kgCO_{2e}$/yr ("kilograms of carbon dioxide equivalent per year").
    - All of the card information is based on Saskatchewan energy, water, waste, transportation, etc. emissions data. If instead of driving to school, you ride a bike, then you will have reduced greenhouse gases by 110$kgCO_{2e}$/yr.
    - Ask – Are any of you able to ride a bike or walk to school? What do you like about it? Are some of you not able to bike or walk to school? What are some of the reasons that make it hard for you to bike to school?
- **Relay:**
    - Divide students into a few groups. Spread the action cards out on the ground, away from where the students are standing.
    - 1 student from each group runs to pick up an action card, reads it, and decides if they think the action is easy to do, or hard to do.
    - They run to the teacher (action is hard) or one other designated person, i.e., educational assistant or student (action is easy), and explain their choice.
    - The next member of the team runs for a card, until all the cards have been picked up.
    - The team with the most cards "wins".

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

  - Each student should now have one or two cards. Ask all people with a "water" card to make a group. Have one or two read their cards out loud and talk about the actions using some of the notes and evaluating ideas 1-4.
  - As time permits have students with an electricity card, waste card, food card, or transportation card gather and talk about one or two of them **or**
  - Ask students to share a card that surprised them, they have a question about, or has a very significant GHG saving.

  1. 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. 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" CO_2 and "breathe out" O_2, 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?

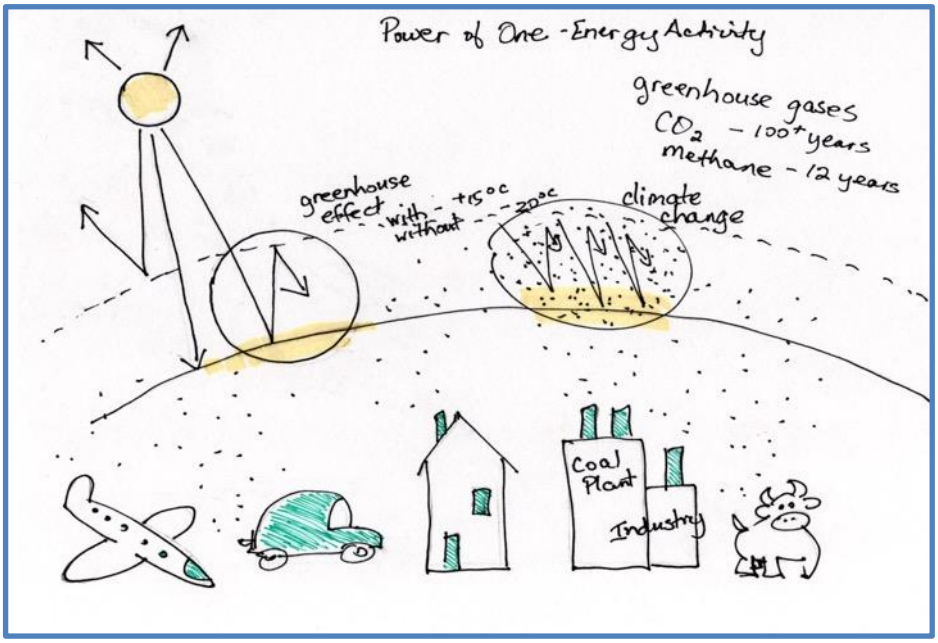
- **Water cards:**
  - What is the connection between water and greenhouse gas emissions? Why does using water produce GHG's? It is mostly about how the water is treated, and how it gets to our homes. All of the pumping, filtering, etc., uses lots of energy.
  - Any card that talks about using hot water, 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 1litre 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.
  - 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.

- **(Outdoors or back in classroom?) Let's take 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 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 could estimate the greenhouse gas reductions they are making with their actions.

Understanding climate change sketch

Notes: Did you watch the climate change video? Here is a brief summary:



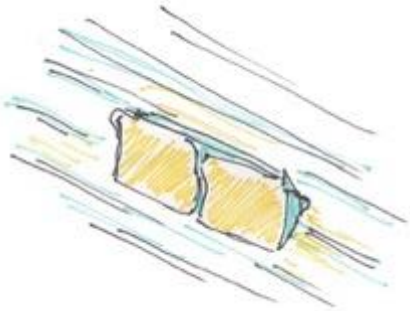
- We have our sun and our earth.
- Our earth has an atmosphere made up of gasses, including some greenhouse gasses.
- Energy from the sun comes to earth, some of this energy reflects off the atmosphere, and back into space.
- The rest comes through the atmosphere and hits the earth.
- Some of that energy heats up the earth, and some of it is captured by the greenhouse gasses in the atmosphere and stays in the atmosphere.
- Capturing this heat or energy is called "the Greenhouse Effect". It is a very good thing. It is what keeps our planet at temperatures we can live in. Overall, the average temperature of our planet is 15°C. Without the greenhouse effect, the average temperature would be about -25°C.
- But we've been adding more greenhouse gasses to the atmosphere. So more of the sun's energy is being captured in our atmosphere, making the earth and atmosphere warmer.

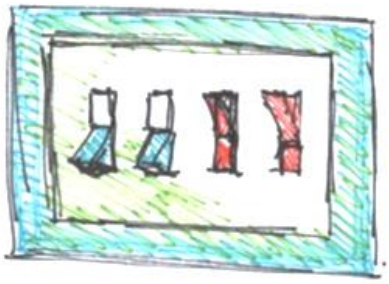
This warming of the earth and atmosphere is called "global warming". The impact of global warming is not that it will be a bit warmer everywhere, every day. Really, it is changing our weather patterns, and weather systems. It is creating Climate Change.

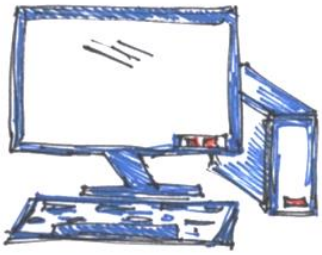
Curriculum Connections

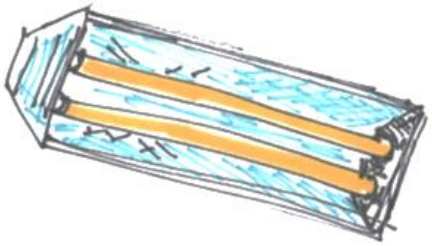
Grade 4 Earth and Space Science: RM4.2 Assess how human uses of rocks and minerals impact self, society, and the environment.
Grade 5 Social Studies: DR5.2 Assess the impact of the environment on the lives of people living in Canada. **RW5.1** Explain the importance of sustainable management of the environment 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.

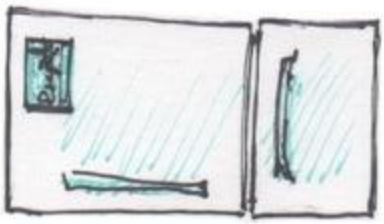
Switched my whole house to LED lights **Saved 1117 $kgCO_{2e}$/year** **Equivalent to planting 56 trees** Saved **2234 kWh/year**, compared to using incandescent lights for the same time period.	**Switched the gym lights to LED and installed occupancy sensors** **Saved 6120 $kgCO_{2e}$/year** **Equivalent to planting 306 trees** Saved **12,240 kWh/year**, by replacing 400W metal halide with 120W LED, and reducing use by 5 hours/day.
Our school turns off lights when not needed **Saved 4380 $kgCO_{2e}$/year** **Equivalent to planting 219 trees** Saved **8760 kWh/year**, compared to using T8 fluorescent lighting an extra 4 hours per day.	**Our school had a lights-out day** **Saved 20 $kgCO_{2e}$/year** **Equivalent to planting 1 tree** Saved **42 kWh/year**, by turning out lights in 10 classrooms for a full day.
Our school upgraded T8 to LED T8 lighting **Saved 1680 $kgCO_{2e}$/year** **Equivalent to planting 84 trees** Saved **3360 kWh/year**, by upgrading 100 fixtures.	**I set up sleep settings on my computer** **Saved 60 $kgCO_{2e}$/year** **Equivalent to planting 3 trees** Saved **128 kWh/year**, compared to leaving it on for 10 hours/day.
I switched to a laptop computer **Saved 80 $kgCO_{2e}$/year** **Equivalent to planting 4 trees** Saved **157 kWh/year**, compared to using a desktop computer.	**My family replaced our 1991 fridge with a 2018 ENERGY STAR® qualified fridge** **Saved 273 $kgCO_{2e}$/year** **Equivalent to planting 14 trees** Saved **545 kWh/year**, and **$84/year**.
My family recycled our 1985 fridge **Saved 970 $kgCO_{2e}$/year** **Equivalent to planting 49 trees** Saved **1932 kWh/year,** and **$312/year.**	**I have an Xbox® free day each week** **Saved 10 $kgCO_{2e}$/year** **Equivalent to planting 1 tree** Saved **17 kWh/year**, by not playing Xbox one day per week.

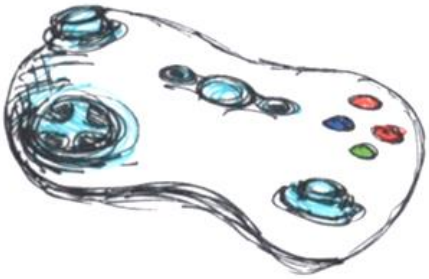


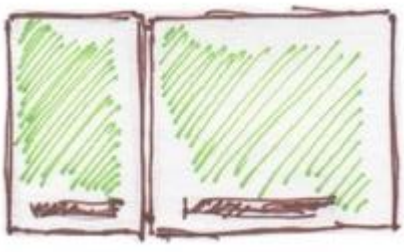




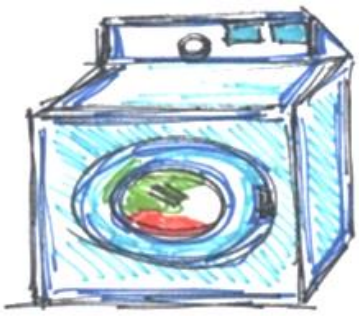
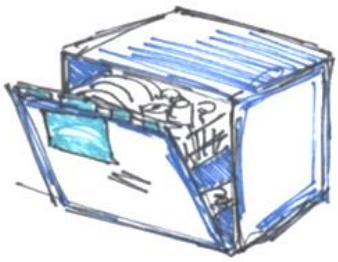
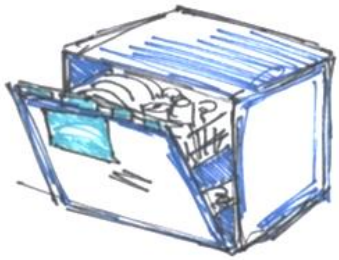








My family hangs clothes to dry **Saved 440 kgCO_{2e}/year** **Equivalent to planting 22 trees** Saved **876 kWh/year**, compared to using an electric dryer.	**My family has a new heat pump clothes dryer** **Saved 100 kgCO_{2e}/year** **Equivalent to planting 5 trees** Saved **198 kWh/year**, compared to an inefficient new dryer.
My family has an ENERGY STAR® dishwasher **Saved 540 kgCO_{2e}/year** **Equivalent to planting 27 trees** Saved **827 kWh/year**, compared to a 1990 dishwasher.	**My family lets the dishes air dry** **Saved 220 kgCO_{2e}/year** **Equivalent to planting 11 trees** Saved **438 kWh/year**, compared to using the heat dry cycle on the dishwasher.
I walk to school **Saved 110 kgCO_{2e}/year** **Equivalent to planting 6 trees** Saved **45 litres of gas/year**, compared to driving to school.	**I turn the heat down at night** **Saved 370 kgCO_{2e}/year** **Equivalent to planting 19 trees** Saved **7 gigajoules/year**, by turning the heat down 5°C overnight.
I turn the heat down when no one is home **Saved 220 kgCO_{2e}/year** **Equivalent to planting 11 trees** Saved **4 gigajoules/year**, by turning the heat down 3°C during the day.	**I fixed a leaking toilet** **Saved 30 kgCO_{2e}/year** **Equivalent to planting 2 trees** Saved **73,000 litres/year**, based on 200 litres/day leaking.
We installed a low flow showerhead **Saved 20 kgCO_{2e}/year** **Equivalent to planting 1 tree** Saved **37,000 litres/year**, by switching to a 6 litre/minute showerhead.	**I fixed a dripping tap** **Saved 2 kgCO_{2e}/year** **Equivalent to planting 0 trees** Saved **5000 litres/year**, and if it was the hot water tap I would have saved even more.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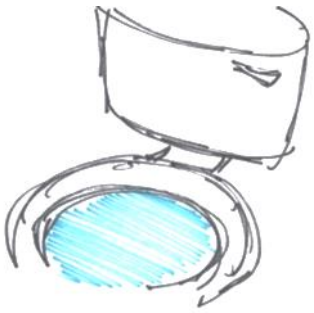
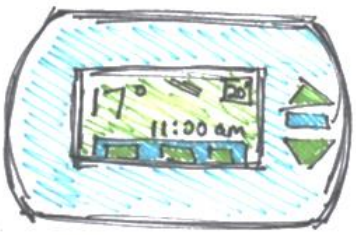
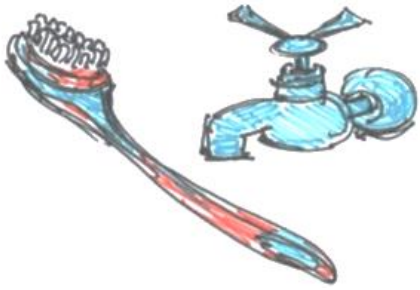
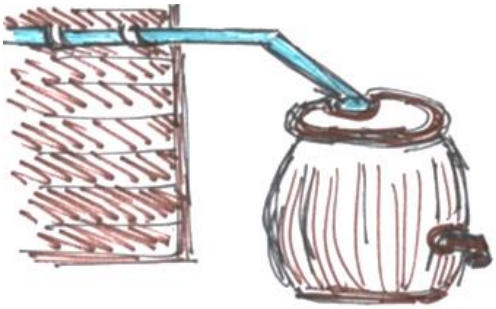
	 17° 11:00 am
	

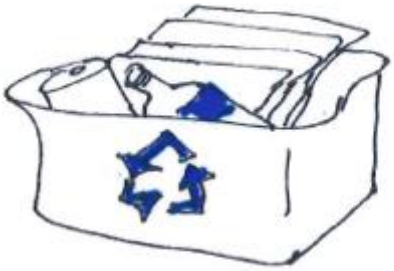
My family planted drought tolerant plants **Saved 20 $kgCO_{2e}$/year** **Equivalent to planting 1 tree** Saved **48,000 litres/year**, by not watering a 10m by 10m area.	**All my classmates turn off the tap while brushing our teeth** **Saved 180 $kgCO_{2e}$/year** **Equivalent to planting 9 trees**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



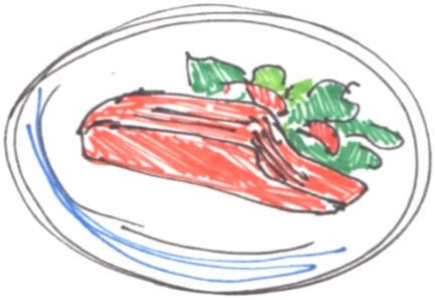


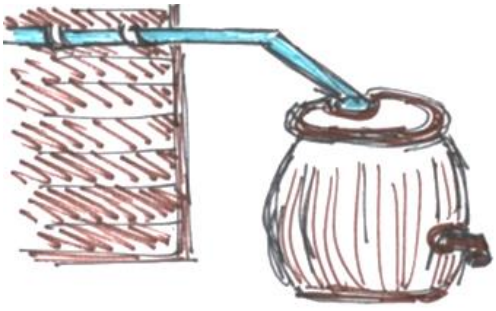

Compost
Here

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




SCHOOL BUS





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