

PART III

Researching climate change

Suggested classes: Science, English Language Arts

Length of time: Two 50-70 minute blocks

Objective

In this lesson, students will:

- Argue the best actions to take to mitigate future climate change and reduce one's carbon footprint
- Evaluate appropriate source material for an informative and argumentative text
- Develop critical thinking and media literacy skills through research
- Explain a climate change topic to their classmates using effective communication

Materials

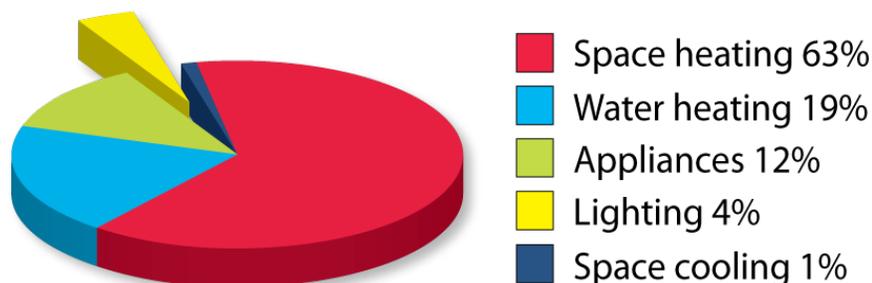
- Computer access (with internet)
- Headphones
- Pen and paper
- Peer evaluation sheet
- Research notes template (optional)
- Captioned **To What Degree?** sample images
- Climate actions scorecard

Evaluation

- Group discussion arguing for the best climate change strategies (Formative)
- Research notes and primary source interpretation (Formative)
- Presentation and write up on a climate change topic: peer, self, teacher (Summative)

Impact of our actions

It may come as a surprise that some of the most common actions we tell students to do in order to be more energy efficient and pollute less do not have as large of an impact as we think. The ‘low-hanging fruit’ of shutting off lights or switching to LED bulbs is a beginning action. However, if lighting in the average Canadian home only makes up for 4% of energy use, the impact this switch has is minimal in comparison to larger changes to efficiency in heating and cooling water and air inside of your house.¹



The higher-impact items on our list may need to be unpacked more with your students as they are often bigger picture than individual students can accomplish themselves. For example, if you live in a province that has more non-renewable resources used in the power grid, making the switch to clean energy sources—either by a power utility or generating your own electricity with solar panels—will make a much bigger difference. Preventing heat loss through basement and roof insulation will help prevent energy-intensive winter heating from being wasted.

The climate change mitigation action of having fewer children may be a controversial idea with your students. It can also be a reminder to them that each person’s total carbon footprint is substantial when added up. Students may not feel like it is a reasonable or viable solution. The author of the originating study factored in the total emissions emissions per person living to an average of 80 years, divided in half as they are one parent, and accounting for a smaller ratio of all of a child’s descendants (e.g. a quarter for the grandchild, and an eighth of a great-grandchild).²

By the end of this activity, students should begin to connect to the most important actions they can take to reduce greenhouse gas emissions and their carbon footprint, at home and at school. While smaller steps—such as shutting off lights when not in use—are still important to take and good habits to form, students should be reminded of the larger impact actions they can work towards and advocate for.

(The data for this activity has been adapted and collaborated from actions outlined from Change Habits for Climate: Your Guide to a Sustainable Lifestyle (The City of Edmonton), Drawdown—The Most Comprehensive Plan Ever Proposed to Reverse Global Warming (Paul Hawken), and “The Climate Mitigation Gap: Education and Government Recommendations Miss the Most Effective Individual Actions” (Seth Wynes & Kimberly A. Nicholas)

¹ <https://www.nrcan.gc.ca/energy/products/categories/lighting/13730>

² <http://iopscience.iop.org/article/10.1088/1748-9326/aa7541>

RESEARCHING A CLIMATE CHANGE STORY

Students will now be asked to do some further research on some of the stories that have been showcased in the excerpts of the photo exhibition, **To What Degree? Canada in a Changing Climate**.

In the last class, they had to think of captions and words to associate with images from the photo exhibit. In this class, students will delve deeper into the climate change stories and issues behind these photos. Explain to the students that by the end of their research, they will be asked to present to their peers on what they learned and will interpret the picture for their classmates.

Challenge your students to think beyond the image to explain the greater story of adaptation and/or mitigation that the story is referring to.

Decide on evaluation criteria as you see fit, in consultation with your students. Some example criteria to use might be:

- Topic is clearly connected and engaging
- Clearly shows they researched more about the topic
- Provides connections to climate change
- Teaches their classmates about individual or group actions to adapt to or mitigate climate change, as applicable
- Connects the topic to actions mentioned in the Venn diagram discussed earlier

Presentations to their classmates in the groups should take three to four minutes each, with some questions and discussion afterwards.

In the development of the original photo exhibition, research was done by museum interpreters to lay out the larger story first, and then source pictures that connect visually to that broader story. You may want your students to hone their research skills at first by conducting some primary research without extra support. However, we have also curated some examples of source material from media sites, government agencies and departments, and other organizations.

Randomly assign students one of the 10 images from the photo exhibition. Or, ask them to further research the image they created a caption for in the last class.

STARTING POINTS FOR CLIMATE CHANGE RESEARCH

The following table is a list of online articles, interviews, and videos to help students begin exploring the topics related to the photo panels.

We have included a mix of videos and articles, and most of the videos can be found on our YouTube playlist at: <https://www.youtube.com/user/LetsTalkEnergy>

ELECTRIC VEHICLES	COOL ROOFS
<p>“Myths busted!” (Energy Exchange): http://www.energy-exchange.net/myths-busted/</p> <p>“Global village” (Energy Exchange): http://www.energy-exchange.net/lesson-low-emissions-transportation/</p> <p>“Why buy an electric vehicle?” (Natural Resources Canada): https://www.nrcan.gc.ca/energy/efficiency/transportation/19198</p> <p>“Electric cars will come of age in 2018” (The Economist): https://www.youtube.com/watch?v=zGFb6CcG0DA</p>	<p>“Up on the roof, green takes root” (The Globe and Mail): https://www.theglobeandmail.com/report-on-business/industry-news/property-report/up-on-the-roof-green-takes-root/article4435768/</p> <p>“Urban heat islands: Consumer, killer” (White Roof Project): http://www.whiteroofproject.org/how-we-can-curb-climate-change</p> <p>“Five of Canada’s most innovative green roofs” (Canadian Geographic): https://www.canadiangeographic.ca/article/five-canadas-most-innovative-green-roofs</p> <p>“Exploring biodiversity on Canada’s largest green roof” (University of British Columbia): https://www.youtube.com/watch?v=vNsTf_c9Vpc</p> <p>“Green Roof Growth” (CBC): https://www.youtube.com/watch?v=2HxSvjMDOgl</p> <p>“Weighing the Benefits of Green Roofs” (The Wall Street Journal): https://www.youtube.com/watch?v=mMjxvw5bOhk</p> <p>“One Drop: Why We Need Green Infrastructure” (American Rivers): https://www.youtube.com/watch?v=vMalfLsfOc</p>
HEAVY-DUTY AERODYNAMICS	URBAN FORESTS
<p>“Wind tunnel shows big rigs should be shaped like boats” (The Ottawa Citizen): http://ottawacitizen.com/news/local-news/wind-tunnel-shows-big-rigs-should-be-shaped-like-boats</p> <p>“Big Rigs, Big Oil Savings” (Union of Concerned Scientists): https://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_vehicles/Truck-Technology-Factsheet.pdf</p> <p>“Driving down freight emissions” (Pembina Institute): http://www.pembina.org/blog/driving-down-freight-emissions</p> <p>“NASA Wind Tunnel Used to Test Truck Fuel Efficiency” (Space Library): https://www.youtube.com/watch?v=uE_OVUL6B08</p> <p>“NRC Wind Tunnel” (CTV Ottawa): https://www.youtube.com/watch?v=4-YWGuL3hKU</p>	<p>“What is Green Infrastructure?” (Environmental Protection Agency): https://www.epa.gov/green-infrastructure/what-green-infrastructure</p>

“Four Challenges We Must Overcome to Preserve Canada’s Urban Forests” (Huffington Post): https://www.huffingtonpost.ca/michael-rosen2/4-challenges-we-must-overcome-to-preserve-canadas-urban-forests_a_23223313/

“International Day of Forests 2018: Forests and sustainable cities” (Food and Agriculture Organization of the United Nations): <https://www.youtube.com/watch?v=ucXz3EqzRLo>

TOP PREDATORS ADAPT

“Killer whales hunting seals on ice – behind the scenes in Antarctica” (BBC Earth): <https://www.youtube.com/watch?v=g1VEwsl4SIY>

“Polar bears scavenging more orca-killed bowhead whales: study” (CTV): <https://www.ctvnews.ca/sci-tech/polar-bears-scavenging-more-orca-killed-bowhead-whales-study-1.3194560>

“Polar bears face yet another threat to their survival: sharks” (International Business Times): <https://www.ibtimes.co.uk/polar-bears-face-yet-another-threat-their-survival-sharks-1597095>

“Killer whales moving in in polar bears territory” (Winnipeg Free Press): <https://www.winnipegfreepress.com/canada/killer-whales-moving-in-on-polar-bears-territory-138382094.html>

WHAT’S THE BEEF?

“Eating Less Meat Will Reduce Earth’s Heat” (Huffington Post): https://www.huffingtonpost.ca/david-suzuki/eating-less-meat-climate-change_b_10012978.html

“Vegetarian vs. carnivore: What’s better for the environment?” (Weather Network): <https://www.theweathernetwork.com/news/articles/vegetarian-or-carnivore-whats-better-for-the-environment/87869>

“Is a vegetarian diet really more environmentally friendly than eating meat?” (CNN): <https://www.cnn.com/2017/02/06/health/vegetarian-diet-conversation/index.html>

“The other inconvenient truth” (TedTalk): https://www.ted.com/talks/jonathan_foley_the_other_inconvenient_truth

WILDLAND FIRE: FRIEND AND FOE

“Climate change” (Natural Resources Canada): <http://www.nrcan.gc.ca/forests/video/13557>

“Forests – Climate change: Adaptation” (Natural Resources Canada): <http://www.nrcan.gc.ca/forests/climate-change/adaptation/13099>

ALL-SEASON ARCTIC HIGHWAY

“The road to Tuktoyaktuk” (CBC): https://www.youtube.com/watch?v=vbj_IQaDvya

“Melting permafrost: A sign of climate change?” (Australian Broadcasting Corporation): <http://education.abc.net.au/home#!/media/524675/melting-permafrost-a-sign-of-climate-change->

“Inuvik to Tuktoyaktuk road finally connects Canada from sea to sea to sea” (Toronto Star): <https://www.thestar.com/news/insight/2017/11/18/inuvik-to-tuktoyaktuk-road-finally-connects-canada-from-sea-to-sea-to-sea.html>

SPREADING TICK HABITAT

“Climate Watch Shorts: Why ticks are moving north” (TVO): <https://tvo.org/video/programs/climate-watch-shorts/climate-watch-shorts-why-ticks-are-moving-north>

“More ticks means an increase of Lyme disease across Canada – thanks to climate change” (Global News): <https://globalnews.ca/news/3472203/more-ticks-means-an-increase-of-lyme-disease-across-canada-thanks-to-climate-change/>

JIGSAW SHARING

Group students with different exhibition photos so everyone will be learning about something different (four to six students recommended). Hand out copies of the peer evaluation sheets and review together as a class.

On the sheet for each presenter, the last question should be done as a group. You may want students to complete the peer evaluation part after they have done the last question together. Ask students to try and see if the topic can connect to any of the climate change adaptation or mitigation actions/strategies they went over using the Venn diagram a few classes before. Bring up to display as necessary, or the original infographic from *Canadian Geographic* (available at: <https://energy.techno-science.ca/doc/content/adaptation%20and%20mitigation.pdf>)

Evaluate group discussions as needed.

Allow the class to go through their presentations, and then debrief. Were there any questions the presenter was unable to answer? (You may want to write them down and do some searching for the next class.) If time allows, you may also want to review what climate change adaptation/mitigation strategies they think their topic may connect to. Remember to collect peer evaluation forms.