



SCIENCE SPOTLIGHT



Warm Homes, Cold Places: Staying Cozy with Less Energy



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Canada

Ingenium 



Origin Story: The Energy Transition

Every day, we consume energy. It is essential for our daily lives! Without energy, there would be no cars, heating, light, or video games. Some of our energy comes from fossil fuels like coal, oil, and natural gas. Unfortunately, using fossil fuels for energy has released a lot of greenhouse gases into the atmosphere. This has caused our Earth to warm up, which is a serious problem. Global warming melts ice caps, creates deserts, and causes extreme weather like hurricanes, floods, and fires.

One of the main tools Canada (and the world!) uses to prevent further global warming is the energy transition. The energy transition means moving away from energy sources that hurt the environment. Sources such as fossil fuels would be replaced by more eco-friendly energy sources. These include nuclear energy, and renewables like hydroelectricity (from water), wind, or solar.

The energy transition also means questioning HOW we use our energy. Using less energy is an essential part of the energy transition. If we are more energy efficient, we can use less energy while still enjoying all the same things we do now. We can be energy efficient by making lifestyle choices such as turning off lights when we are not using them. We can also use technology to make our buildings and communities more energy efficient.

Kugaaruk, Nunavut, Canada by Northern Pix licensed under CC BY 2.0



Bringing It Home: Energy Efficiency

Nearly two-thirds of the energy used in Canadian homes is for heating and cooling. This is a basic need for people in Canada – especially because of our cold winters and hot summers! We heat our homes using different energy sources including electricity, natural gas, diesel oil, propane, and burning wood.

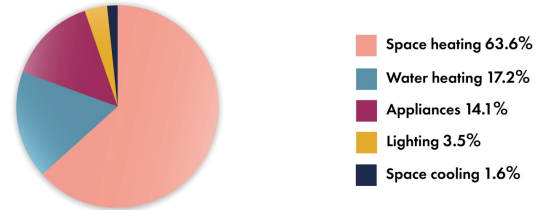


Figure 1. Distribution of residential energy use in Canada 2019 (<https://natural-resources.canada.ca/energy-efficiency/products/heating-equipment-for-residential-use/13740>)

Different homes need different amounts of energy to stay warm. It depends on how cold it is outside, how big the house is, how many people live there, and how the home is built. A thermally efficient home uses less energy to stay just as warm.

How do you make a home energy efficient? New building and heating technologies are allowing us to build more energy-efficient buildings.

1. Efficient heating systems. In most buildings, there is a system to create heat and a way of moving that heat around. This might be a furnace and a system of ducts to heat and carry hot air. New technologies are creating more efficient heating systems. Less energy is used to create the heat and less heat is wasted as it moves around. Small computers connected to these systems can make sure that heat is going to the right places at the right times, which adds to the efficiency.
2. Efficient building envelopes. The building envelope is anything that keeps the inside of the building separate from the outside. This includes the roof, the walls, the windows, and the foundation. If you have a leaky home, the energy you use to heat or cool your home escapes to the outside. This means the systems use more energy to keep it at the temperature you want! A thermally efficient building envelope means that there are no leaks, and your home can use less energy.

New buildings can be built with newer, more thermally efficient heating systems and building envelopes. Older homes can do renovations to upgrade parts of the home to be more efficient. For example, installing an efficient furnace or new windows.

Indigenous Clean Energy Energy Transition in Indigenous Communities

Indigenous Clean Energy works with Indigenous communities to help them build a better energy future. They have a program called “Bringing It Home” that supports communities in making homes more energy efficient. Bringing It Home helps communities build skills in home maintenance, conservation, and energy efficiency. This helps communities make changes so their homes can be healthy, affordable, comfortable, and respect the Indigenous culture. This makes homes better for the Earth and for the people living in them!

Bringing It Home Fishing Lake Métis Settlement

Bringing It Home, Fishing Lake Métis Settlement, and other partners worked together to develop plans for a **net-zero** energy home. When a building is **net-zero**, it means it creates as much energy as it uses. Heating, cooling, and electricity can be powered using only the energy the building makes. The energy often comes from solar panels on the rooftop.



Architect's rendering of the net-zero triplex that will be built in Fishing Lake. Photo courtesy of David T Fortin Architect



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In Indigenous culture, it is normal for different generations of families to live in the same house. This means that grandparents, parents, and children might all live together. It is a great way for traditional knowledge to be passed on. The plan for the Fishing Lake home is to build a triplex that lets families and elders live together! The home that is in the middle will be for the Elders and a family will live on either side of them. Indigenous traditional way of life has always been to take care of the land, the Earth, and the energy around us. These teachings can work together with new technologies to help keep a healthy Earth, for both current and future generations.

Time for **GENACTION!**

Try This at Home: Be an Energy Detective

Be an 'energy detective' and investigate where heat is lost in a building in your community. Use this guided exploration to check windows, doors, walls, and fans. Your results will show ways to reduce heat loss and be more thermally efficient in the buildings you use!

This activity was developed by Indigenous Clean Energy and can be found in their [BIH Energy Investigation activity](#).

Climate Action: Keeping Your Home Warm with Less Energy!

Have a conversation with the adults in your life about energy in your home or community buildings. What sort of energy does the building use to keep warm? How much of the building's energy gets used on heating? Does it change in the summer and winter? What changes could everyone make to keep buildings warm while using less energy?

• Small changes in behaviour can have big impacts. Closing windows and doors tightly and closing curtains at night time can make a difference.

- Small renovations to the buildings you use can help make them more efficient. You could suggest installing window film or weather stripping (or try installing them yourself!).
- Encourage adults in your life to read about [the Canada Greener Homes initiative](#). This program could help pay for larger retrofits to make homes more energy-efficient.

Meet Our Local Science Hero Alex Ittimangnaq

Alex Ittimangnaq is Inuk, and was born and raised in Kugaaruk, Nunavut. Formerly Pelly Bay, Northwest Territories, population of 900+. He is employed by the Hamlet of Kugaaruk, their municipal government. His job title is Community Economic Development Officer (CEDO). Before he worked as CEDO, he worked with Community Justice. There he worked with at-risk youth and developed programs for them. Before that, he worked at the local school in different capacities.



He is very committed to his community and he loves to see his people and community move forward. He is an active volunteer, the lead organizer and founder of their local hockey league, and a coach for youth basketball.

Climate Change

Past, Present, and Future

Earth is the only planet in the solar system known to support life. What makes our home so special? Earth has an atmosphere, a layer of gases between our planet and space. Some of these gases, like carbon dioxide, are called **greenhouse gases**. They are crucial parts of our atmosphere; they trap in the heat of the sun, similar to how heat is trapped in a greenhouse, or in a car on a hot day. This process, called the **greenhouse effect**, keeps Earth's temperature warm enough for living things to thrive.

The sun's rays hit our round, tilted planet unevenly. This uneven heating of Earth's surface leads to differences in temperature, which drives weather patterns. We call the patterns in temperature and weather over long periods of time **climate**. Different parts of the world have vastly different climates; it depends on how much heat they receive, as well as what landscape features are nearby. Water, mountains, ocean currents, and forests all impact our climate. In turn, living things around the world have adapted to the climate they live in.

Something, though, is changing. Over the past two hundred years, humans have been burning fossil fuels, such as coal and oil, to make energy to power our daily lives. Fossil fuels are made from decomposed plant matter and microscopic life millions of years old. This matter is full of carbon, and, burning it releases, or emits, billions of tonnes of **carbon dioxide** gas into the atmosphere every year. When too much carbon dioxide is emitted, the delicate balance of greenhouse gases maintaining

Earth's climate is upset. More and more heat is trapped, causing the planet to warm. Weather patterns change, water levels rise, storms get worse.

Climate has changed many times throughout Earth's history, from ice ages to periods much hotter than today. So why is this time any different? Scientists agree on two things. One, temperatures are rising faster than they ever have in documented climate history. Two, this climate change is driven by human activities, due primarily to greenhouse gas emissions. Climate change is already impacting people's ways of life all over the world. Powerful storms, droughts, forest fires, and floods are threatening people's access to food, water, and safe homes.

The most important step we can take to prevent serious climate change is to reduce greenhouse gas emissions. Incredibly brave and caring people around the world are finding new ways to reduce emissions and make our communities climate resilient every single day. And you can join them! These Science Spotlights are here to help us learn more about climate change and how you can take action.

Our Commitment to the Decolonization of Science

Institutions of GenAction initiative respect and affirm the inherent and Treaty Rights of all Indigenous Peoples across what we now know as Canada. We give thanks to the Indigenous Peoples who care for this land since time immemorial and pay respect to their traditions and ways of knowing. We acknowledge their many contributions to innovations in Science, Technology, Engineering, and Mathematics, past and present, and are committed to deepening engagement and collaborating with Indigenous Peoples as partners in order to advance truth and reconciliation and the decolonization of science.

