

Energy and the Environment: The Impact of Our Energy Use



Energy Revealed Backgrounder

For millions of years, the Earth's atmosphere has been in a delicate balance. It has allowed millions of plant and animal species to thrive and evolve. Over the last 200 years, however, human activities, and especially those that involve burning coal, oil, and natural gas, have upset that balance by creating greenhouse gas pollution. Our extreme energy use has harmed the Earth and its ecosystems.

Scientists are learning more all the time about greenhouse gases and the way they lead to climate change. Their findings show us what an important difference we can make when we reduce our ecological footprints.

This backgrounder explains what an ecological footprint is and why it is important. It also raises the topic of energy ethics.

What Is an Ecological Footprint?

Your ecological footprint is an estimate of how much productive land and water it takes to support the way you live.

An ecological footprint estimates the human demand on nature. It is measured in hectares of land and can be calculated for individuals, families, cities and even countries.

An ecological footprint is sometimes also called an *environmental footprint* or an *eco-footprint*.

Whatever you prefer to call it, a **large** footprint

makes a large demand on the Earth, its ecosystems, and its natural resources, while a small footprint demands much less from the Earth. It's like the difference between stomping through a flowerbed in big heavy boots and tiptoeing through the tulips in bare feet.

How Is an Ecological Footprint Calculated?

"Add up the land it takes to grow your food, collect your water, produce the materials for the building you live in, the clothing you wear and all the other things you use or consume... add it all up, and that's your ecological footprint. You measure your ecological footprint in land. It's expressed in acres or better yet in hectares. One hectare is 100 x 100 square meters. An acre is about 4047 square meters, so a hectare measures about two-and-a-half acres."

—Base Camp Earth

Calculating your ecological footprint, or the footprint of your entire household is fairly complicated because it must consider so many aspects of your lifestyle. There are several websites that will do the calculation for you. They require information from you in four different categories of consumption: food, shelter, goods, and services, as well as transportation and other carbon consumption.

Food.

How often do you eat animal-based products such as meat, fish, and dairy? How often is the food you eat

processed, packaged and/or imported? Your ecological footprint will include an estimate of how much land it takes to grow, package, and transport the food you eat.

Shelter.

What is the size of your home? What type of home is it? Your ecological footprint will consider the amount of land required for the materials used to build and heat your home and the land it is built upon.

Goods and Services.

How much stuff do you buy? How much waste do you produce? Your ecological footprint will include an estimate of how much land it takes to create the products you buy as well as how much it takes to deal with everything you throw away.

Transportation and other Carbon Consumption.

How often do you travel by car? By public transit, motorbike, bicycle, plane, on foot? Your ecological footprint will include an estimate of the amount of carbon dioxide (CO₂) you produce for transportation and other activities

Why Is Carbon Dioxide So Important?

Carbon dioxide (CO₂) is the most famous of the greenhouse gases and for good reason. CO₂ itself isn't a problem for the Earth. We, humans, exhale it with every breath. The problem is the huge amount of CO₂ that we are emitting into the Earth's atmosphere.

We create CO₂ and other greenhouse gases when we produce and use many forms of energy, especially non-renewable energies such as coal, oil, and natural gas. Making an average car, for example, creates more than five tonnes of CO₂. Of course, burning crude oil to drive the car creates even more.

In 1750, before the industrial revolution when people started to use fossil fuels in large amounts, the concentration of CO₂ in the Earth's atmosphere was about 280 parts per million (ppm). By 2019, the concentration of CO₂ had risen to 409.8 ppm. Meeting the world's growing energy demand is putting more and more CO₂ into the Earth's

atmosphere. People are now creating far more CO₂ than the Earth can handle. As a result, CO₂ lingers in the Earth's atmosphere adding to what is known as the **greenhouse effect**. The increase in CO₂ and other greenhouse gas emissions are the main cause of climate change.

Scientists around the world are measuring greenhouse gas pollution and the impact that climate change is having on the Earth. They report that because of the increase in greenhouse gases, we are seeing:

- an increase in the average surface temperature of the Earth
- melting sea ice and glaciers
- rising sea levels
- shifting and disappearing ecosystems and species
- more extreme weather events such as storms, floods, and droughts

A Note on Greenhouse Gases

Greenhouse gases, also called GHGs, are essential to life on Earth. We could not live on this planet without them. GHGs are made up of water vapour, carbon dioxide (CO₂), methane and other gases.

These gases are called greenhouse gases because they have a greenhouse effect. GHGs act as a layer of insulation for the planet. They reduce the amount of heat that is lost into space. Without GHGs, the average temperature on Earth would be too cold to support life forms. Although GHGs make up only a small part of the atmosphere's gases, they play a vital role in controlling the Earth's temperature.

Over the last hundred years, greenhouse gas pollution has raised the average surface temperature of the Earth by 0.7 degrees Celsius. 0.7 degrees Celsius may not sound like much but think about the way you feel when you have a fever. Like the human body, the Earth is in a careful balance and very sensitive to any change in temperature.

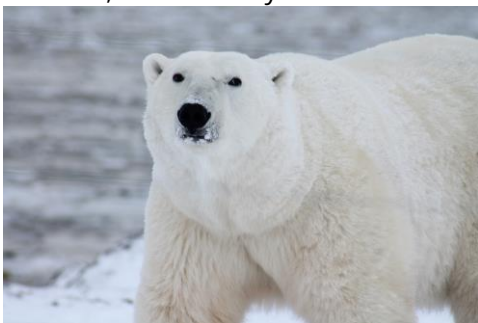
What We Know About Climate Change

“Climate change is a shift in long-term average weather patterns, which can include changes in temperature and in precipitation amounts. The international scientific community agrees that there has been a significant change in global climate in recent years, particularly in the polar areas, due largely to the burning of fossil fuels for transportation and industrial processes. These activities emit greenhouse gases that trap heat in the atmosphere.”

Canada's climate is changing too: temperatures are rising, particularly in the Arctic, where permafrost is thawing and the ocean's ice cover is shrinking. Even greater changes are expected in the future, including a continued rise in temperatures, shifts in rainfall patterns, and increases in certain types of hazardous weather, such as heavy spring rains and heatwaves. As a cold northern country, Canada will be one of the most greatly affected countries in the world.”

— Environment Canada

As the increase in greenhouse gas emissions alters the Earth's ecosystems, many frogs and other species are now becoming extinct. Frogs are also threatened by deforestation, especially in tropical areas where forests are destroyed for logging and agriculture. About half of the mature rainforests in the world, about 750–800 million hectares of the original 1.5–1.6 million hectares, have already fallen.

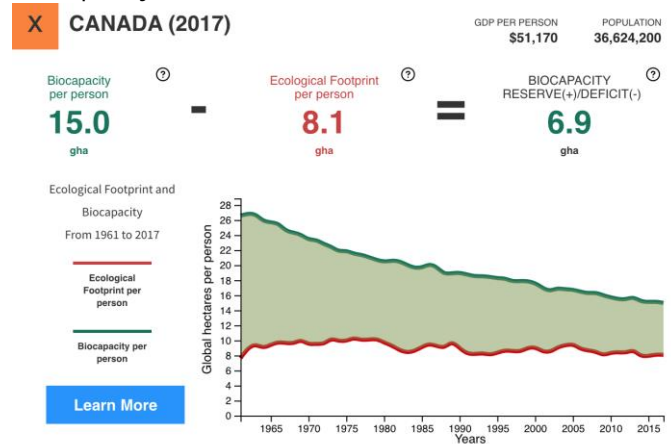


A new study tells us that polar bears in the arctic will go extinct by 2100 as global warming continues to melt Arctic Sea ice. They are also likely to experience reproductive failure by 2040, which will result in major decreases in polar bears mating and producing offspring to maintain their populations.

In Canada, as in so many other countries, our ecological footprints have been growing.

Biocapacity, a term that refers to the land's ability to support and sustain our lifestyles, has been shrinking. Figure 1 shows those trends over the last 56 years.

Figure 1. Canadian Ecological Footprint and Biocapacity Per Person, 1961–2017



Source: Global Footprint Network, 2021.

The average Canadian's ecological footprint has steadily grown, while the Earth's biocapacity has steadily shrunk. This relationship with the Earth is not sustainable. Humans cannot keep living the way they live and expect the planet to be able to take it.

Did You Know?

To support their current lifestyle, in 2014, the average Canadian needs 8.28 hectares of productive earth. Based on the number of people around the world and the Earth's biocapacity, nature can provide and sustain less than two hectares of land for every person in the world. If everyone lived like people in North America, we would need about four more planets.

What About Your Footprint?

When our behaviour is harming others, other species, future generations, the planet itself, it raises the question of ethics. Ethics is the study of how people decide what behaviour is right for them and what is wrong. It looks at the values people hold and the choices they make to live out those values.

Ethics raises the kinds of questions that people ask not once or twice, but many times during their lives:

- What does it mean to be a good person?
- What does it mean to lead a good life?
- To live a good life, how do you treat other people, especially those who have less than you do?
- What are the qualities you would expect to see in someone who is a good role model?

Our life experiences help us think about and consider our values and ethics. They change over time as a result. Right now, we are seeing a shift in society's ethics around energy use. Not very long ago, people did not give much thought to their energy use or the environment. They valued convenience and comfort without thinking much at all about the impact that their convenience and comfort were having on the Earth, but times are changing. The more we learn about the Earth and its ecosystems, and the better we understand the impact that our energy use is having on the environment, the more people have had to confront new ethical dilemmas, new places to try to sort out right from wrong. Energy ethics raises difficult question such as:

- How does a good person treat the Earth and its ecosystems?
- What does it mean to lead a good life on this planet?
- To live a good life, how much energy do you use knowing that your energy use creates more CO₂ and other greenhouse gas pollution?
- What kind of ecological footprint would your role model leave on this Earth?

Answers to these questions do not come easily. Ethical questions make us think about our values, and they lead us to make hard choices. They challenge us to live each day in ways that honour our own view of what is right and fair and good.

People have many reasons for conserving energy and choosing renewable energy sources over non-renewable energy sources.

What about you? What are your reasons? What do you value? What actions follow from your values? What actions do not?

Values That Shape Our Energy Ethics

- ✓ the love of nature
- ✓ respect and appreciation for all that the Earth gives us
- ✓ concern for the lives of future generations
- ✓ the desire to preserve the Earth's natural resources and its ecosystems
- ✓ concern about human health
- ✓ the love of animals
- ✓ the desire to be frugal and resourceful, not wasteful
- ✓ concern for the common good
- ✓ the desire to take no more than our share

Will We Tread More Lightly?

As people's values have changed, they are making different choices. Canadians are finding all kinds of ways to reduce their energy use every day. Organizations are conserving energy as well, sometimes because their ethics have changed, sometimes because they must follow new laws and standards that are now in place to better protect the environment. Through technological advances, society is discovering ways to hold onto the old values of convenience and comfort while also holding environmentally friendly values such as resourcefulness, respect for the planet, and the love of nature.

The facts about carbon dioxide, greenhouse gases and our national ecological footprint can be upsetting. But the changes we are already seeing are very encouraging. Thanks to youth leaders, we have seen many families and entire schools reduce their greenhouse gas pollution. Towns, cities, and whole regions are also making changes. More and more people are becoming aware of the impact that they have on the environment, and they are taking real steps to make a smaller ecological footprint.