Zero-Emission Vehicles & Low-Carbon Driving

The Environmental Impacts of Driving

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Transportation and the Greenhouse Effect

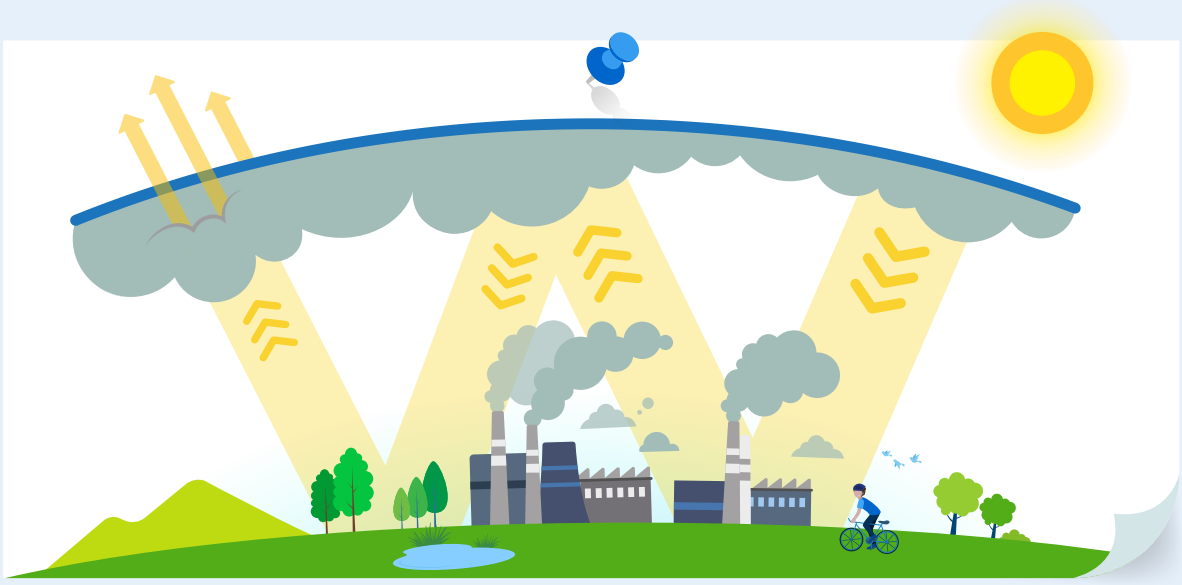
Transportation is currently responsible for approximately 25% of Canada's total greenhouse gas emissions and within the total transportation emissions, cars and light trucks account for almost 50%.[1] This is mainly due to the use of internal combustion engine vehicles (ICEVs) that burn fossil fuels (gasoline or diesel) to run the motor.

Unfortunately, the burning of fossil fuels results in the release of greenhouse gases, which are released through the tailpipe of a vehicle. These tailpipe emissions are harmful to the environment and to human health.

Helpful keywords!

Fossil fuels are sources of non-renewable energy that come from the breakdown of dead plants and animals that lived millions of years ago. They can be found in the Earth's crust and include oil, natural gas, or coal, which can be burned for energy. Fossil fuels are relatively abundant, easy and safe to store and transport, and have high energy densities - this has historically made them a popular energy source choice for transportation services.

Greenhouse gases (GHGs) are gases in the Earth's atmosphere that trap heat from the sun and in turn cause the planet to warm. This event can be referred to as the **greenhouse effect**. The greenhouse effect is not only important but necessary to a degree for humans to live on Earth; without it the world would be frozen and inhabitable. However, more recently humans have been increasing the atmospheric levels of GHGs drastically by activities such as burning **fossil fuels**, cutting down forests, and intensively farming livestock.



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1. Zero Emission Infrastructure Program. Natural Resources Canada.

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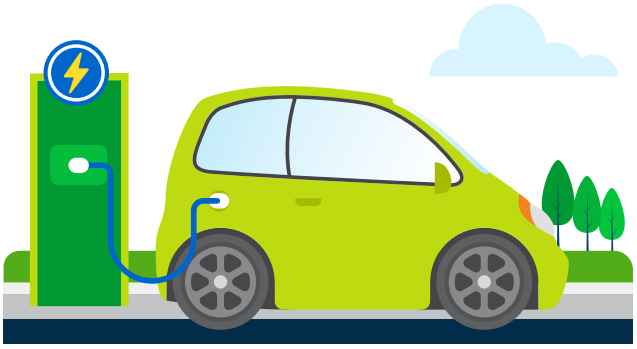
Zero-Emission Vehicles



In an effort to reduce the greenhouse gas emissions released within the transportation sector, many have started focusing on **zero-emission vehicles (ZEV)**. ZEVs are vehicles that use electrical energy to power the motor, which allows them to operate without producing any air pollutants.

The degree to which greenhouse gas emissions are reduced depends on the type of zero-emission vehicle used and also the source of energy used to power the ZEV. While zero-emission vehicles may not emit greenhouse gases during operation, GHGs may be emitted during the production of the electricity or hydrogen that powers the ZEV. If powered by renewable and clean energy sources, the impact of ZEVs reducing greenhouse gas emissions and air pollution is greater.

The illustration below outlines the degree to which Canadian drivers can reduce their greenhouse gas emissions by driving a zero-emission vehicle instead of an internal combustion engine vehicle. Please note that the values provided are an approximation and will vary depending on vehicle type.

Alberta

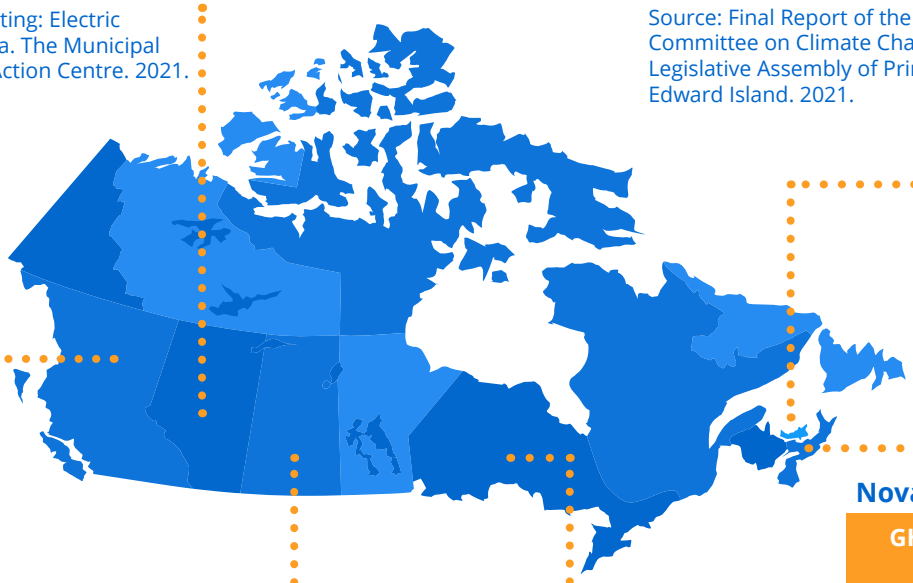
GHG Reduction: 41%

Source: Myth Busting: Electric Vehicles in Alberta. The Municipal Climate Change Action Centre. 2021.

Prince Edward Island

GHG Reduction: Up to 75%

Source: Final Report of the Special Committee on Climate Change. Legislative Assembly of Prince Edward Island. 2021.



British Columbia

GHG Reduction: 75% (including manufacturing of vehicle & batteries)

Source: Electric Vehicles 101. Plug In BC. 2022.

Saskatchewan

GHG Reduction: 30%

Source: Electric Vehicles. City of Saskatoon. 2021.

Ontario

GHG Reduction: 60-90%

Source: Low carbon vehicles and electric vehicles. Government of Ontario. 2022.

Nova Scotia

GHG Reduction: Up to 50%

Source: You Asked, We Answer: Electric Vehicles. Nova Scotia Power. 2021.

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The Role of Renewable Energy

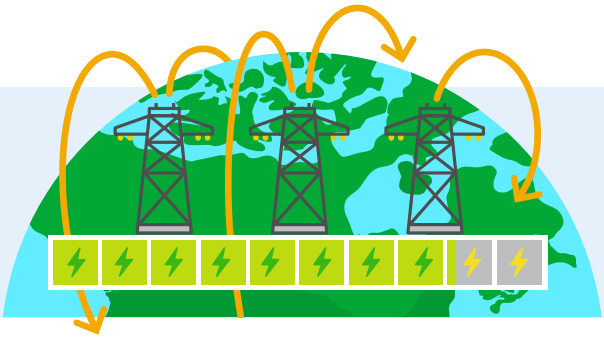
As zero-emission vehicles continue to become more available and affordable for Canadians, it is important to consider the larger picture, which includes renewable energy. Zero-emission vehicles can only be fully 'zero-emission' when the energy source that charges their batteries is also zero-emission.

According to the International Energy Agency, moving to a 100% clean electricity grid is the single most important climate action that countries can take. **Electrification** is the process of hooking up our vehicles, heating systems and industry to a clean electricity grid. This means that Canada needs to produce approximately twice as much emission-free electricity as it does today.[2]

Did you know?

Canada's electricity grid is 83% emission-free.

Making Canada the world's sixth-largest electricity producer and third-largest electricity exporter currently.[3]



Currently, renewable energy sources make up 18.9% of Canada's total energy supply.[4] **Renewable energy** creates energy from natural processes that are restored at a rate that is equal to or faster than the rate at which energy is consumed. Renewable resources include:

Solar Energy
Solar energy uses radiant energy from the sun in the forms of heat and light

Windpower
Windpower uses the kinetic energy in wind

Geothermal Energy
Geothermal energy uses heat energy that is stored beneath the earth's surface or absorbed heat in the atmosphere and oceans

Hydro Energy
Hydro energy uses the kinetic energy of the natural flow of water

Ocean Energy
Ocean energy uses the energy of ocean waves and tides

Hydroelectricity is currently Canada's most important renewable energy resource. However, wind, bioenergy, and solar are also making significant contributions to Canada's energy supply.

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2. Underneath It All. Clean Energy Canada. 2021.
3. Auto$mart Student's Guide. Natural Resources Canada. 2020.
4. About Renewable Energy. Natural Resources Canada. 2017.

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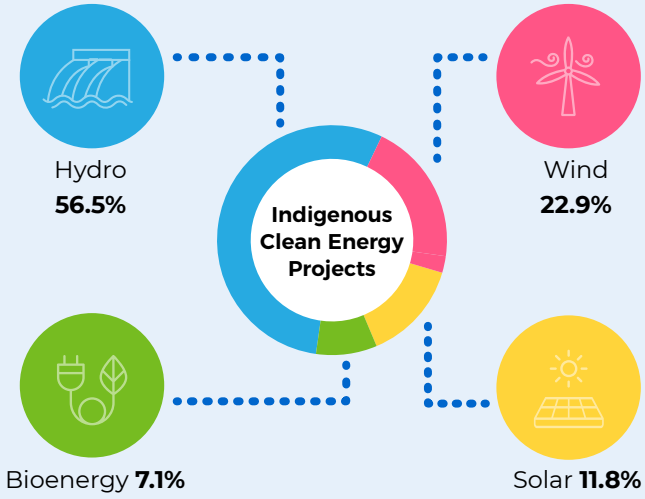
Renewable Energy Highlight

As renewable energy technology advances, it is important to build capacity for clean energy projects in Indigenous, rural and remote communities across Canada. Indigenous clean energy projects are an important link to energy security, self-determination, and economic development for Indigenous communities. Between 2017-2020, medium-to-large renewable energy projects involving Indigenous communities have grown almost 30% within Canada. These projects include: Hydro (56.5%), Wind (22.9%), Solar (11.8%), Bioenergy (7.1%).[5] You can learn more about Indigenous clean energy projects here.



Sources

- Carbon Dioxide Levels Are At a Record High (National Geographic)
- Primer on Energy Systems in Canada (Pollution Probe & Energy Exchange)
- Underneath It All (Clean Energy Canada)
- Accelerating Transition (Indigenous Clean Energy)
- Day in the Life Series (Indigenous Clean Energy)
- Renewable Energy (Natural Resources Canada)

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5. Accelerating Transition. Indigenous Clean Energy. 2020.