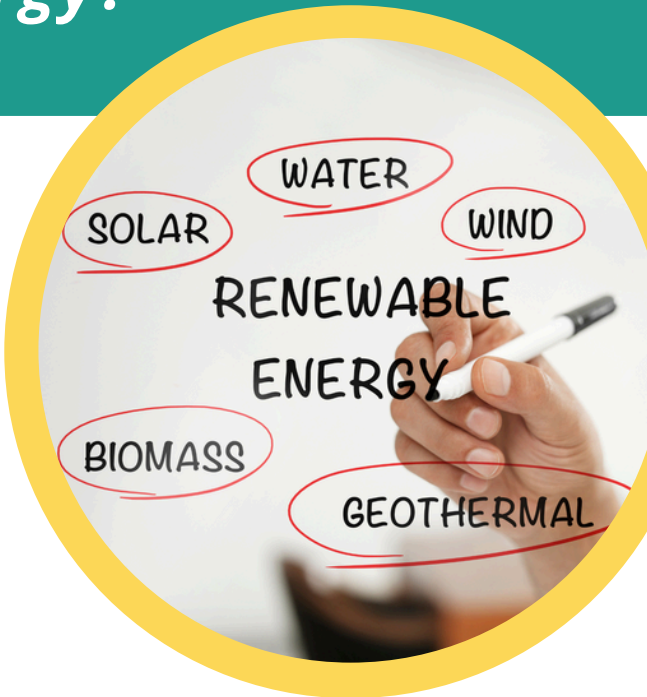
What is Renewable Energy?



An Introduction to Energy

We use energy every day. It surrounds us in different forms—such as light, heat, and electricity. Our bodies use the energy stored in molecules like carbohydrates and protein to move, breathe, grow, and think. We also use energy to work and play. Humans have invented thousands of machines and appliances, including those that provide heat for our homes and transportation. Some of these machines use electricity, while others, like automobiles, use the energy stored in substances such as gasoline.

Common Uses of Energy

The most common forms of energy we use are heat and electricity.

- **Heat** is the energy of moving particles in any substance. The faster the particles move, the warmer the substance is

- **Electricity** is the energy of electrons moving along a conductor, like a copper electrical wire.

Example: An electric clothes dryer

- The dryer uses an electric motor to turn the drum that tumbles the clothes inside. The same motor also turns a fan that blows air through the clothes as they tumble. Lastly, a heating element creates large amounts of heat, which is used to dry the clothes more quickly.

Energy is easily converted from one form to another, which is an important and useful property of energy. Since energy is often produced at some distance from where it is eventually used (or its end use), we also need to transmit energy from its source location to where it is needed. This is done by means of wires in the case of electricity, or pipelines, tanks, or trucks in the case of oil or natural gas. Not all forms of energy can be easily stored of transported. For instance, light is impossible to store directly. It must be converted to some other form first, such as chemical energy.

Source: Brett Sayles. *Retrieved from Prexel:* https://www.pexels.com/photo/line-of-electric-post-near-concrete-building-1936750/

Electrical wires used to transport electricity.

Comparing Energy Sources

Energy can be grouped into two main categories based on its source—**non-renewable energy** and **renewable energy**.

Non-Renewable Energy

Much of our energy comes from coal, oil, natural gas, or radioactive elements. These energy sources are considered non-renewable because once they are removed from the ground and used, they are not immediately replaced. In fact, the world's natural gas, crude oil and coal deposits took millions of years to form.

Source: of David Thielen. *Retrieved from Unsplash:* https://unsplash.com/photos/black-and-orange-metal-machine-on-green-grass-field-during-daytime-R5Ob28wpWzo

The extraction of non-renewable oil resources is not sustainable. Spills from oil pumps ruins the environment

Renewable Energy

Renewable energy is the form of energy that quickly replaces itself after being used and is usually available in a never-ending supply. Renewable energy comes from natural flow of sunlight, wind, or water around the world. With the help of special collectors, we can capture some of this energy and put it to use in our homes and businesses. If sunlight, water, and wind continue to flow, and trees and other plants continue to grow, we will have access to a ready supply of renewable energy.

Retrieved from Pixabay: https://pixabay.com/photos/renewable-energy-environment-wind-1989416/

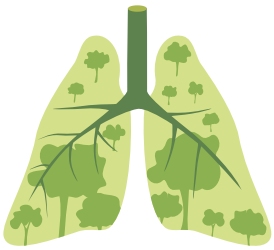
Why is renewable energy important today?

There has been a clear shift towards renewable energy development in the last few decades. There are various reasons behind this transition towards renewable energy, some of which are summarized below.

Energy Price Stability

In the last few years, we have seen large fluctuations in the cost of natural gas, oil, and electricity due to global economics, market deregulation, and political events in some parts of the world. Renewable energy is not subject to sharp price changes because it comes from sources such as sunshine, flowing water, wind, and biological waste, all of which are free. This gives people greater certainty about the cost of energy, which is good for society and the economy. By comparison, fossil fuels are limited in their supply, and their price will increase as they become scarcer.

Clean Air



Air pollution is a major problem in many cities in Canada and around the world. The biggest cause of air pollution in cities is the burning of fossil fuels, including fuels used for transportation. The Canadian federal government estimates that more than 16,000 Canadians die prematurely each year from diseases caused by air pollution. Thousands more suffer from long-term illnesses and disabilities. The great advantage of using renewable energy in place of fossil fuels is that renewable energy adds very few pollutants to the environment. Renewable energy is considered “clean” and “green.”

Protecting Global Climates

When fossil fuels are burned, they release carbon dioxide. This gas acts like an invisible blanket in the Earth's atmosphere, causing the Earth to warm up little by little. Carbon dioxide has been building up in Earth's atmosphere over the years as more and more fossil fuels are used in homes, factories, and automobiles.

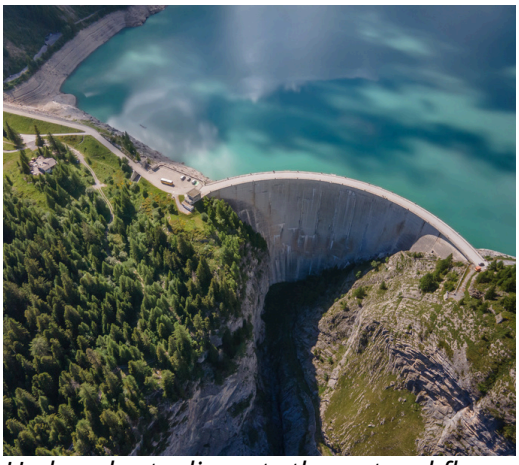
If we continue to burn fossil fuels at the Earth will get significantly warmer. Consequently, there will be many serious problems around the world—such as melting of arctic ice and glaciers around the world, increased forest fires, rising sea levels, loss of animal habitat, damage to coral reefs, the spreading of tropical diseases, expanding deserts, and more frequent and severe storms. Many of these changes are already occurring around the world, requiring immediate action to combat the changing climate of our world.

This large exhaust stack shown emits harmful gases into our atmosphere every day.

Rising temperatures can cause an ice berg like this to melt.

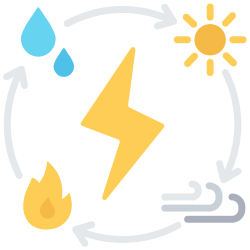
Protecting Landscapes and Watersheds

Some energy projects, particularly big coal mines, hydro dams, and oil and gas activities, can have a large impact on lands and watersheds. Damage or loss of natural lands and watersheds is likely to affect humans and animals. For example, wilderness areas could be lost when energy resources are extracted. Hydro dams can flood large areas, while the facilities associated with oil and gas and oil sands development can affect forests and disrupt animal movement and migration. On the other hand, solar energy can provide a continuous supply of energy, which is integrated directly into buildings so that it has very little impact on land use. Additionally, run-of-river hydro plants can be designed to allow for free flow of existing streams.



Hydro plants disrupts the natural flow of water causing flooding in one area.

Unlimited Supplies of Energy



Renewable energy supplies will never run out. While the supplies of coal, oil, and natural gas are limited, sunshine, wind, biomass, and waterpower are considered almost limitless resources. Canada's coal supply is expected to last 200 years, and natural gas about 100 years. Our large, untapped supplies of wind, sun, water, and biomass can power our society indefinitely.

Photo courtesy of Australian Cooperative Research for Renewable Energy.

Renewable energy such as this rooftop photovoltaic panel can save the owner a lot of money over time.

Jobs and the Economy

Renewable energy can be developed in such a way that every household or neighbourhood could have its own renewable power generating equipment. This would create many new jobs for people involved in setting up and maintaining this energy supply, and in manufacturing the equipment. It is also more efficient to produce renewable energy in small amounts right where it is needed. The energy losses and equipment needed to transmit power over long distances can also be minimized in this way.

Did you know?

- By 2050 the renewable energy sector in Canada is expected to employ 2.7 million people [1].
- Since 2019, Alberta alone made $3.75 billion dollars from wind and solar energy plants [1].

Reference

1. Singh, K., & Jeyakumar, B. (2023, June 14). *Economic benefits of a clean grid in Canada.* Pembina Institute. Available from: https://www.pembina.org/pub/economic-benefits-clean-grid-canada.