

## For our modern life, we need ENERGY.

Using this energy gives us more convenient, comfortable lives.



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## The Down Side

Some energy releases harmful chemicals and greenhouse gases. This harms our health and damages our climate. Some things have to change.



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## What is Renewable Energy?

It is energy from nature, like:

- ◆ wind
- ◆ water
- ◆ sunlight
- ◆ earth

It does not run out. Nature replaces it.

It is “clean energy” or “green power” - it doesn’t pollute the environment.



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## What is Non-Renewable Energy?

It is energy that comes from things formed in the earth over millions of years (so they are called “fossil” fuels.)

- ◆ coal, oil, natural gas

Eventually, these will be used up. They also release greenhouse gases that pollute and cause climate change.



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## Solar - Electricity

Solar panels create electricity from sunshine.

Light energy from the sun hits the solar panel causing the electrons to move and create an electrical current.

The cost of solar panels is dropping so they are being used more.



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# TYPES

## OF RENEWABLE ENERGY

## Solar - Heating

When light from the sun hits an object, the energy causing molecules to move faster and produces heat.

This heat can be trapped and used to heat the air in your house, water for washing, even food in a solar oven.



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## Wind - Electricity

A windmill can be anywhere from a farmers open field, on the top of treed hills or even at sea. While the wind is blowing, it turns the blades of a windmill, which turns an electrical generator.

## Water - Electricity

Hydroelectricity uses moving water to turn a turbine that generates electricity. Dams can be built to provide constant water flow or the flow of a river, changing tides or even wave action can be used.



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## Plant - Energy

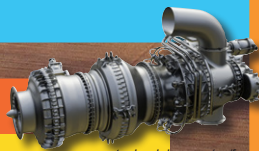
Biomass energy comes from living things like wood waste, plant waste or manure. In homes, farms or industry, wood and plant waste can be burned for energy. Biomass can also be fed to microorganisms to create bio-gas. This can be burned, similar to natural gas to turn a turbine or create heat energy.



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### Did You Know?

**A turbine** is a machine that uses a moving stream of air, water, steam, or hot gas to turn a wheel to produce mechanical power which can then be used to make electricity.



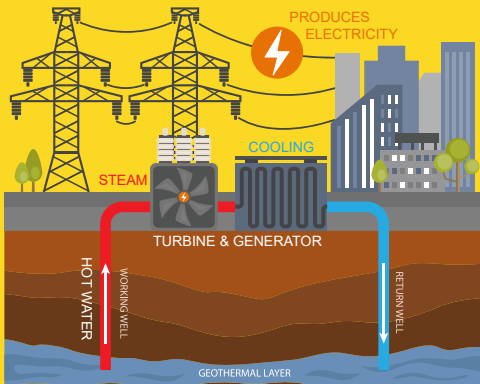
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## Earth - Heating

Geo-thermal heat comes from the Earth's crust, as you can see from volcanoes. This can be used to superheat water to make steam that turns an electric turbine. The heat can also be pumped directly into homes and buildings to keep them warm.



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## Hydrogen

Hydrogen is all around us, in the air and in water. When hydrogen is isolated by itself, it is combustible like fossil fuels, with one fantastic difference. Instead of releasing greenhouse gases, it gives off pure water vapour. Hydrogen is used to power vehicles or combined with natural gas to make it a more environmentally friendly heat source.



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## ABOUT RENEWABLES:

### Good News

- ◆ Energy Security: these fuel sources will never disappear
- ◆ Now Less Expensive: creates cheaper energy than fossil fuels
- ◆ Environmentally Better: normal operation does not produce greenhouse gases
- ◆ Healthy: produces less pollution

### Not So Good News

- ◆ Costs: initial set-up costs may be higher
- ◆ Storage: often needs special storage like batteries
- ◆ Space: some renewable energy takes up more space than fossil fuels. For example, 1 KG of wood will have less energy than a KG of natural gas
- ◆ Land: often more land is needed for renewable energy compared to coal/gas power plants.

## See More Online!

(Use your smart phone with these QR codes.)



### VIDEO:

National Geographic - Renewable Energy 101

<https://www.youtube.com/watch?v=1kUjE0BzITRc>



### INFO:

Natural Resources Canada

<https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/renewable-energy/about-renewable-energy/7295>

