Grade 7 Science

Week of February 8 – February 12

Making Electricity

Energy

Did you know that energy can **never be created or destroyed**? It's true! Energy is simply converted from one state to another.

So what does this mean? Well, for example, when you eat an apple, the energy found in the apple is transferred to your body for you to use, or energy from the wind can be converted into electricity!

Energy is constantly **changing forms**, but it is **never being created or destroyed**. Watch the following video to learn a bit more about how this works.

Law of Conservation of Energy: https://youtu.be/Vx0yAS2u8gI

Renewable Energy

Energy consumption is a huge part of our daily lives. You could say that here in the western world, we are power-hungry! Both renewable and non-renewable energies are **converted to create electricity**.

We are constantly using energy, and unfortunately, the world is mainly powered by Non-Renewable Energy.

Renewable and Non-Renewable Energy

Renewable Energy: Renewable Energy never runs out, since it is constantly being replaced, naturally.

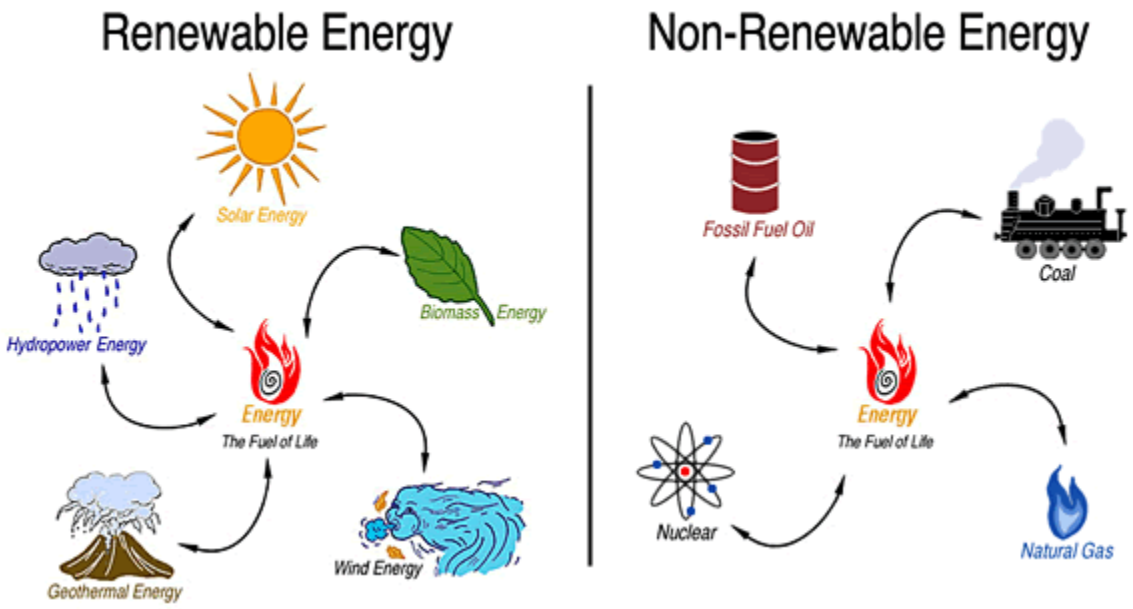
Renewable energy sources are not harmful to the environment and are considered 'green' or 'clean' energy. They ARE sustainable.

Examples: Sun, Wind.

Non-Renewable Energy: Sources of energy that run out. These are energy sources that take millions of years to form, so once they are used, they can't be replaced in a lifetime.

Non-Renewable energy sources are extremely harmful to the environment. They are NOT sustainable.

Examples: Coal, Natural Gas.



Impact

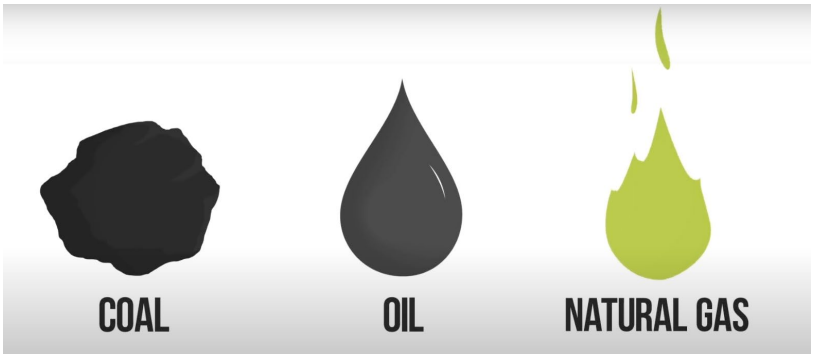
85% of the world's energy still comes from Non-Renewable sources.

Why do we still use Non-Renewable resources?

Non-renewable energy sources are **cheap** and **easy to transport**. Unfortunately, these factors drive companies to use non-renewable energy sources instead of renewable energy sources.

Non-renewable energy is slowly destroying our planet. It is the cause of things like climate change, poor air quality, acid rain, and oil spills.

Most non-renewable energy sources are **Fossil Fuels**. This includes Coal, Oil, and Natural Gas, which are all **burned to create energy and electricity.** When these resources are burned, they emit harmful chemicals.



Take a look below to see some of the negative effects that these resources have on our environment:

Air pollution in India

Air pollution kills around 7 million people a year. This pollution is caused by the burning of fossil fuels.

Oil spill in the Gulf of Mexico

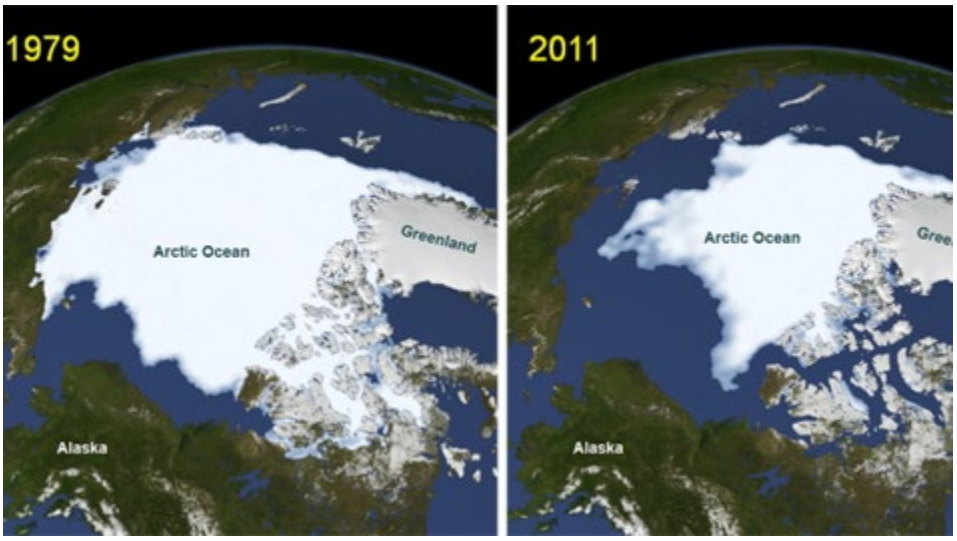
Oil spills are detrimental to marine life. They render the affected area **completely inhabitable**, making those parts of the ocean 'dead zones'. Sometimes, these chemicals can even find their way into our **drinking water**, making it dangerous for human health as well.

Acid rain in Ohio

See all of those dead trees? They were killed from acid rain. Acid rain is formed from a **buildup of chemicals in the atmosphere**, resulting in raindrops becoming acidic and burning everything they touch. You definitely do not want to get caught in an acid rainstorm.

Climate Change

The burning of Fossil Fuels is changing the temperature in certain parts of the world. Up North, in the Arctic, **ice caps are melting**. This makes **sea levels rise**, resulting in more flooding around the world. It is also destroying the habitats of many nordic animals who rely on this ice.



Watch the following video to learn more about non-renewable energy. Make sure you follow along in your Learning Guide:

Non-Renewable Energy Sources: https://youtu.be/MpEJnnpye-k

Clean Energy

Renewable energy is the future! Luckily, our world, mindsets, and technologies are evolving and progressing. This means more progress towards the use of cleaner energy sources. Renewable energy sources are generally quite cheap to operate once facilities are built, but the problem is it can be difficult to produce enough energy to power large cities. However, it's not an impossible task!

For example, Iceland and Paraguay are two countries that have successfully converted to 100% clean, green, renewable energy. An example and source of inspiration for the rest of the world.

So what is renewable energy and why is it beneficial? Take a look at the **videos** below to find out.

Renewable Energy 101: https://youtu.be/T4xKThjcKaE

Renewable Energy National Geographic: https://youtu.be/1kUE0BZtTRc

Solar Energy

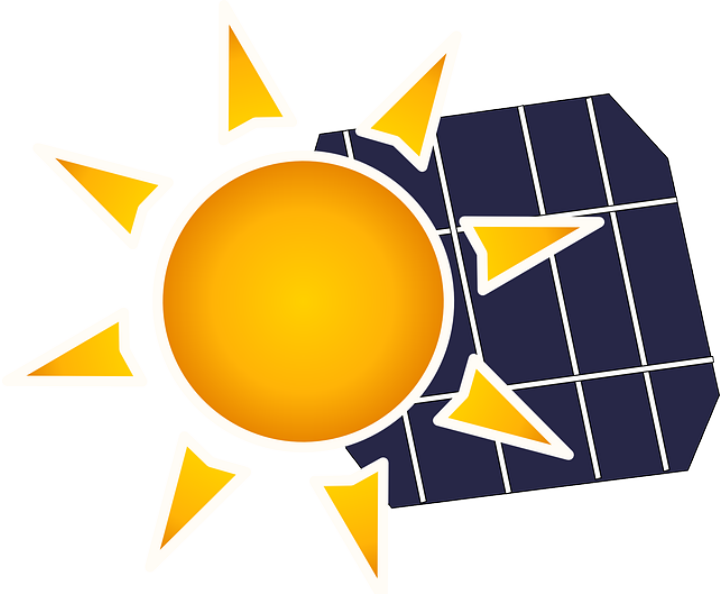
Solar Power 101: https://youtu.be/GzQmo_Wd2Sw

Some benefits of Solar Energy are:

- renewable - as long as there's a sun, we'll have energy coming
- no fossil fuels - doesn't directly create any smog or global warming
- low environmental impact - if strategically placed, you're not directly impacting any animals

Some challenges of Solar Energy are:

- it depends on the weather - high need may align with cloudy days (need to store it)
- solar farms (if not strategically placed) can impact animals
- technology is still emerging to make this inexpensive and plentiful



Wind Energy

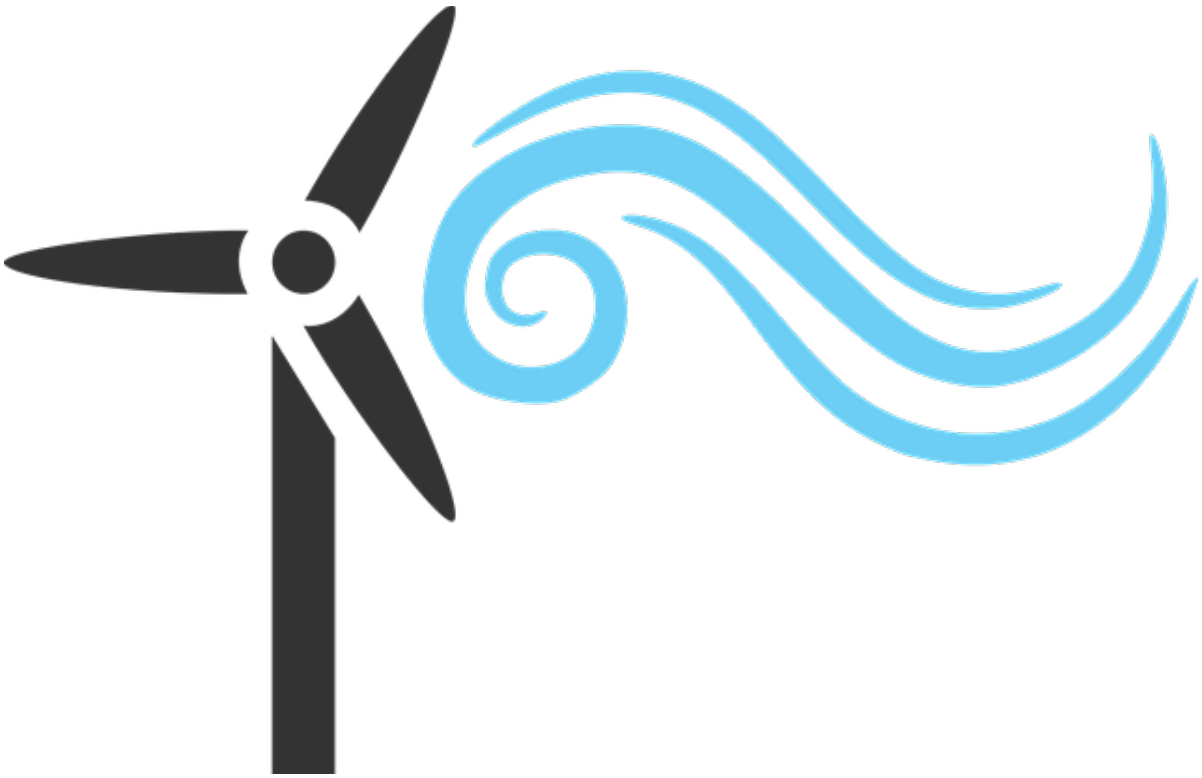
Wind Power: https://youtu.be/SQpbTTGe_gk

Some benefits of Wind Power are:

- renewable - as long as there's wind, we'll have energy coming
- no fossil fuels - doesn't directly create any smog or global warming
- low environmental impact - if strategically placed, you're not directly impacting any animals

Some challenges of Wind Power are:

- it depends on the weather - high need for electricity may align with calm weather (need to store the energy for future use)
- wind farms (if not strategically placed) can impact animals
- technology is still emerging to make this inexpensive and plentiful



Tide Energy

Tidal Power 101: https://youtu.be/VkTRcTyDSyk

Some benefits of Tidal Power are:

- Generate more energy can wind power.
- Easy to install.
- Renewable, with a low environmental impact.
- Predictable since the tides are predictable.

Some challenges of Tidal Power are:

- Site requirements on where you can place tidal power are very specific.
- Tide cycles do not always provide enough energy compared to what is needed.

Hydroelectric

Renewable Energy 101: https://youtu.be/pEUzot8Zufo

While dams are the traditional and more common form of hydropower, take a look at this innovative model in the video below.

The **Whirlpool Turbine** is much less harmful to marine life!

Whirlpool Turbines: https://youtu.be/buF8ASmwXt4

Some of the benefits of Hydro Power are:

- Hydroelectricity is a renewable energy source. The water cycle will continue to transport water down rivers despite our use of dams.
- Hydroelectricity does not require the burning of fossil fuels, so it's much better for our air quality and global warming.

Some of the challenges of Hydro Power are:

- The biggest negative that we have to consider with hydroelectric energy is the impact on wildlife. Constructing a large dam on a river or lake often causes changes in water levels, disruption of spawning for fish, roads, and power lines.

Geothermal

Have you ever been to Hot Springs? Then you've experienced geothermal energy!

Renewable Energy 101: https://youtu.be/j7q653ffQO4

Some benefits of Geothermal Energy are:

- Low environmental impact, no greenhouse gases
- Consistently reliable.

Some challenges of Geothermal Energy are:

- Specific location - geothermal hotspots are only in certain places around the world
- It is incredibly expensive to build a geothermal plant.

Energy Poverty

What is Energy Poverty?

Not everyone is lucky enough to have electricity at their fingertips. Energy poverty means **not having access to modern energy services**. It can also mean **the cost of electricity and energy is too high** to be affordable for most people.

Around the world, lack of electricity can mean no light at school, in a hospital, or at home. It can mean diseases and death, mostly affecting women and children, caused by household smoke from cooking.

Did you know that 1 hour spent cooking over an indoor fire (like the one pictured below) is equal to smoking 400 cigarettes?

Energy Poverty in Canada

Energy poverty is a huge issue in Canada, especially in remote Indigenous communities. There are currently over 200 Indigenous communities in Canada that live without being connected to Canada's electrical grid.

The reality is, it can be challenging to get electrical access to these remote communities. Renewable energies could solve this problem. Installing wind turbines, solar panels or other renewable energy sources could provide reliable, clean, cheap, and abundant energy to even the most remote communities.

Off the Grid

Did you know that some people actually choose to live more self-sufficient, sustainable lives 'off the grid'? Take a look at the video below to see how one family is living a completely sustainable life.

Take note of the systems they have put in place. How do they get fresh water? How do they get electricity?

Homesteading Family Living Off-Grid: https://youtu.be/I9jRYHpeAk0

Energy

1. What does the Law of Conservation of Energy state?

_____

_____

2. Label the following types of energy as either Renewable or Non-Renewable

3. Which type of energy is extremely harmful to the environment?

a. Renewable

b. Non-renewable

4. Which type of energy is not sustainable?

a. Renewable

b. Non-renewable

5. What type of energy does the majority of the world run on?

a. Renewable

b. Non-renewable

6. Coal, Oil and Natural Gas are all:

a. Fossil Fuels

b. Non-renewable

c. Cheap and easy to transport

d. All of the above

7. Watch the video to answer the following questions. **Video 1:** Non-renewable Energy Sources

I. What is coal formed from?

8. What type of energy is the following image showing?

a. Tidal Power

b. Hydropower

c. Flow Power

9. What is energy poverty?