

## Power from Crude Oil

### History

Crude Oil is a fossil fuel that has formed over time from prehistoric plant and animal organisms. When alive, these plants and animals used and stored energy from the sun as carbon molecules. When they died, they settled at the bottom of oceans and lakes and were covered by sediment. Over time, more and more layers of sediment and other organisms settled and the weight of the sediment compressed (squished) the material. With the buildup of pressure came a rise in temperature and the mixture of pressure and high temperature helped transform the dead organisms into oil.

Some of the crude oil escapes through cracks in the earth, but other pockets are still trapped underground. These pockets are what we drill into today to get our oil supply.

### Pros and Cons

Crude oil is a non-renewable resource, meaning that a finite amount exists, and like all other energy sources, it has both pros and cons.

#### Pros:

- ❖ Crude Oil has a high energy density, so a small amount of oil can produce a large amount of energy.
- ❖ Crude Oil has been a popular commodity for some time, so infrastructure for transporting oil – including pipelines, tankers, ships, etc. – are in place making oil easily available around the world.
- ❖ Crude Oil has many diverse uses from cosmetics to cloth to medicines and more, and the byproducts of processing oil can be used for other things.
- ❖ Crude Oil can be found in a wide range of places from land to sea, so oil rigs are located all around the world. The technology to refine oil has also been around for a while and advances have made refining and production much easier.
- ❖ Crude Oil, unlike solar and wind energy, is highly reliable and can provide power all day, every day. Engines that run on oil have also been around for a while and are highly reliable vehicles of energy.

## Cons:

- ❖ Since crude oil is formed by plant and animal matter, which are largely made up of carbon molecules, burning oil releases carbon dioxide gas into the atmosphere which traps heat and causes a global warming effect.
- ❖ Oil spills and leaks from drill sites and oil tankers have caused major pollution in bodies of water worldwide. This pollution has led to the deaths of land and aquatic wildlife and plants.
- ❖ Crude Oil is located and drilled in some of the most terrorist-active countries. Often, the money made on oil goes to fund terror organizations and leads to an increase in violence.
- ❖ Oil refining plants emit toxic substances such as sulfur dioxide and carbon monoxide. These substances can cause major health problems to those living near the plants and can contribute to acid rain.
- ❖ Sometimes the byproducts of crude oil – like plastic – can have its useful purposes but can become harmful to the environment due to not being biodegradable and sitting in landfills for years unless recycled.

## How it Becomes Usable Energy

Believe it or not, oil is pretty useless in its natural state. In order for it to become useful, it has to be refined or boiled. At different stages of the refining process, various products are formed including petroleum, gasoline and even plastic.

Electricity is sometimes generated by the heating of oil. Oil is piped to a burner where the chemical energy is converted to heat energy. The heated oil heats up water in pipes which eventually turns to steam. As steam pressure builds up in the pipes, it is released to spin a steam turbine that is connected to a generator. The generator uses a powerful electromagnet to convert the mechanical of the spinning turbine to electrical energy that is used to power homes and businesses.

## Cool Facts

- ❖ Crude oil is liquid at room temperature.
- ❖ In most situations, oil and water do not mix, but substances called emulsifiers can be added to help the two mix. A common emulsifier is soap.
- ❖ Crude oil is found in underground pockets while other oils such as olive, coconut, palm, safflower and others come from plants.

- ❖ Crude Oil is used to make many different products including cosmetics, cloth, medicine, paint, lubricants and gasoline/fuel.
- ❖ Crude Oil takes a very long to form naturally underground, so it is not a renewable resource. However, at times synthetic oils are used in engines and other applications and work just as well, if not better than natural crude oil.

## **Classroom Activities**

[Check out this cool experiment from PBS Kids](#)

[Repurpose Plastic to Make a Wind Chime](#)

[Oil Spill Clean Up with Diaper Fill](#)

## **Resources Links**

Information:

<http://www.edfenergy.com/energyfuture/oil>

<http://www.greenworldinvestor.com/2011/07/07/advantages-and-disadvantages-of-oil-cons-disregarded-by-powerful-lobbies/>

## **Related WV Science Content Standards and Objectives**

## **Next Generation Science Standards**

## **Science and Engineering Practice**

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## **Disciplinary Core Ideas**

PS1.A Structure and Properties of Matter

PS2.B Forces and Motion

PS2.B Types of Interactions

PS3.A Definitions of Energy

PS3.B Conservation of Energy and Energy Transfer

PS3.C Relationship between Energy and Forces