

Drilling deep for knowledge about fossil fuels - power and pollution

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Big Bend Power Station is a major coal-fired power plant near Apollo Beach, Florida.

A fossil fuel is a natural substance like oil or coal, formed from the buried remains of organisms. Fossil fuels are used as a source of energy.

It took millions of years for fossil fuels to form. Heat and pressure from layers of sediment changed the decayed organic remains into materials such as coal and petroleum.

The energy in fossil fuels is the energy from sunlight stored in the tissues of the buried organisms as a result of photosynthesis. Photosynthesis is the process that plants use to make their own food.

Fossil fuel usage has steadily increased since the Industrial Revolution, which started in the mid-1700s. This is when new manufacturing processes came about. Fossil fuels also enabled people to generate electricity on a large scale to light homes, offices and city streets. They powered new and faster types of transportation like steam boats and locomotives, and later automobiles and jet planes.

At the start of the 21st century, fossil fuels made up nearly 90 percent of the world's energy supplies. However, fossil fuels are nonrenewable resources, which means once we use them, they are gone forever.

Because it takes millions of years for fossil fuels to form, they cannot be replaced.

Fossil fuels may be solids, liquids or gases. All fossil fuels are hydrocarbons, a class of chemicals composed only of carbon and hydrogen atoms. Coal, petroleum and natural gas are the most commonly known fossil fuels.

Coal

Coal is the most widely used of the solid fossil fuels. Most coal formed from plants that grew in or near swamps in warm, humid regions of the Earth. This happened during the Carboniferous Period, which was about 359 to 299 million years ago.

Dead plant matter fell into the swamps and settled at the swamp bottom. Over millions of years, sediment covered and compressed the decaying plant matter, forming peat. The pressure and heat of more sediment layers changed the peat into lignite, which is soft coal. Continued heat and pressure on the lignite changed it into harder forms of coal.

Anthracite is the hardest coal and was the last to form. Hard coals are considered the best energy sources among the coals because they burn the hottest and do not release as many pollutants into the air as other types of coal.

Oil And Natural Gas

Petroleum, or oil, is the most common liquid fossil fuel and natural gas is the most gaseous fossil fuel. Petroleum is often called crude oil, or just oil.

Oil and natural gas formed through a similar process, often in the same swampy location. They were made from the buried remains of tiny water organisms. As these organisms died and sank to the muddy bottom, their buried remains changed into a substance called kerogen.

Over millions of years, increasing heat and pressure from more sediment layers changed the kerogen into petroleum. Depth and temperature determined whether the petroleum was liquid or gaseous. Natural gas formed at deeper, hotter locations.

The main liquid fossil fuels used today are made from oil. These include gasoline, fuel oils such as diesel and jet fuel, and oils for home heating.

Kerosene was used a long time ago to provide light, and is still used in many places for cooking. It also is the main fuel for modern jet engines.

Natural gas is used for heating and cooking in the home and for industrial heating. It is also used to generate electricity.

Other Fossil Fuels

Peat and coke are solid fossil fuels that are commonly used today. Peat is used as a heating fuel in areas where other fuels are not available. But, it burns slowly and produces a lot of smoke and very little heat. Coke is a residue that remains after gases and tar are extracted from some types of coal. Coke is used to make iron and in other processes.

As fossil fuel reserves are used, the search for other fuel sources has increased. Two such resources are oil shale and tar sands, which contain fuel sources. Extracting useful substances from them is difficult and costly. Until recent years, these resources were not good fuel options.

Where Fossil Fuels Are Found

Fossil fuels are not found equally around the world. For example, the United States, Russia, and China have the largest coal deposits. Australia, India and South Africa also have large amounts.

More than half of the world's known oil and natural gas reserves are located in the Middle East. This means that the Middle East contains more oil than the rest of the world combined.

Limited Supply, Pollution Problems

Two main disadvantages of fossil fuels are their limited supply and the environmental harm they cause. Burning petroleum and coal releases harmful gases into the air. These gases pollute the air and react with moisture in the atmosphere to create acid rain.

Burning fossil fuels also releases carbon dioxide into the atmosphere. Over many years, the percentage of carbon dioxide in the atmosphere has increased. Scientific evidence shows this buildup increases temperatures. This warming of Earth's atmosphere is called the greenhouse effect. It contributes to climate change, which is a serious environmental concern.

These problems have led scientists and engineers to develop new ways to generate power without using fossil fuels.

For example, some cars are now powered by electricity instead of gasoline. Homes can be heated using solar or geothermal energy. Some electric power plants run on nuclear energy, water power or wind power.

These alternative energy sources are forms of renewable resources because—unlike fossil fuels—they cannot be depleted. Also, renewable energy does not emit carbon dioxide. This can help limit climate change.

Quiz

- 1 Read the sentence from the introduction [paragraphs 1-7].

Heat and pressure from layers of sediment changed the decayed organic remains into materials such as coal and petroleum.

Which word or phrase from the article provide the BEST context clue to the meaning of "organic"?

- (A) plant matter
- (B) sediment layers
- (C) energy sources
- (D) atmosphere

- 2 Read the sentence from the section "Other Fossil Fuels."

Coke is a residue that remains after gases and tar are extracted from some types of coal.

Which two words could BEST replace "residue" and "extracted" in this sentence?

- (A) compound; combined
- (B) material; developed
- (C) resource; burned
- (D) leftover; removed

- 3 What is the MAIN reason WHY the author includes the sections "Coal" and "Oil And Natural Gas"?

- (A) to show what different fossil fuels were used for in the past
- (B) to explain how different fossil fuels are formed
- (C) to suggest that all fossil fuels are equally valuable
- (D) to indicate which fossil fuels are the least harmful

- 4 WHY does the author include information about the greenhouse effect?

- (A) to show that alternative energy sources are not perfect yet
- (B) to predict a disastrous future for planet Earth
- (C) to illustrate a problem caused by using fossil fuels
- (D) to explain how fossil fuels work to provide energy