

# MINING COAL:

## HOW IMPORTANT IS IT?



**A**s an abundant natural resource, coal has been important to Earth's inhabitants for thousands of years. Coal has many uses, but is mined primarily for the production of energy, either in the form of heat or electricity. It has a rich history in the United States, as coal was used heavily to heat homes and power factories. Coal played a major role as it powered the locomotives that spurred the expansion of the U.S. Industrial Revolution in the 1800s.

### WHAT IS COAL?

The most plentiful fossil fuel in the United States and a nonrenewable resource, coal is simply a sedimentary rock that burns, but has innumerable uses worldwide. It is composed mainly of carbonized vegetable matter and hydrocarbons.

Energy in coal comes from plants and trees that existed millions of years ago. Over time, layers of dead vegetation in swampy areas piled up

and were covered by layers upon layers of water and soil. This trapped the energy contained in the plants and trees — energy that originally came from the sun. The top layers created so much pressure and heat that, eventually, the bottom layers of trapped vegetation and energy were turned into coal.

### DIFFERENT COALS AND THEIR USES

Today, coal has a variety of uses in several different industries. The majority of coal is used for generating electricity, producing steel, manufacturing cement, and gasification or liquefaction (coal-to-liquids) to create synthetic liquid fuels. Different types of coal have different uses. Some of these include:

- **Steam coal**, also known as thermal coal, is primarily used in generating power.
- **Coking coal**, also known as metallurgical coal, is primarily used for producing steel.

- Water and air purification filters and kidney dialysis machines use **activated carbon**.

- A strong, lightweight coal called **carbon fiber** is used in construction and in the manufacturing of high impact sports equipment such as mountain bikes and tennis rackets.

- **Silicon metal**, used in silicones and silanes, produces lubricants, resins, shampoos, cosmetics, toothpaste and many more.

Additionally, coal is used by aluminum refineries and paper manufacturers. Chemical and pharmaceutical companies use refined coal tar and coal by-products in manufacturing several different chemical products. Coal-produced chemicals include creosote oil, naphthalene, phenol, and benzene. Ammonia salts, nitric acid and agricultural fertilisers are produced with the use of ammonia gas recovered from coke ovens. Other products that use coal or coal by-products include dyes

# Products Made from Coal

**Over 80%** of Utah's electricity and more than 50% of the United States' electricity **comes from coal**, and we export 4% of the coal we mine to countries with fewer resources, most of which is used for making steel.

solvents, soap, aspirins, and nylon, rayon, and other plastics and fibers.

Not all coal is created equally. The energy found in coal can vary dramatically even within the same deposit. There are four ranking levels of coal, in terms of energy output. Differences exist as a result of variations in pressure, heat and time.

- **Lignite.** This brownish-black coal has the lowest energy value and is considered "immature" and still soft. It has high moisture and ash content and can be used for generating electricity.
- **Subbituminous Coal.** This dull black coal has a somewhat higher energy value than lignite but is also used to generate electricity, as well as for space heating.
- **Bituminous Coal.** Utah's coal is bituminous. This dark, hard coal has a higher energy value than subbituminous coal, and is the most common type in the United States, accounting for about 50% of the coal used. It is most commonly used for electric power generation. Additionally, bituminous coal is used to produce coke for making steel.
- **Anthracite.** This coal is very hard and shiny and has the highest energy value of the four types of coal because it is the most compact. It was created from bituminous coal experiencing increased pressures during the formation of mountain ranges. It is the least common, making up about 1.5% of the coal

used in the United States and is found primarily in Pennsylvania's Appalachian Mountains. Anthracite is used both for generating electricity and space heating.

## HOW IS ELECTRICITY GENERATED FROM COAL?

Electricity is generated at a power plant. From coal to consumption, it is created in 6 steps:

1. Coal is mined and is transported to the power plant.
2. Coal is burned in boiling water to produce steam.
3. The steam flows through pipes to power a turbine, which blades begin to spin.
4. The spinning blades are connected to a shaft that also turns and is connected to the generator.
5. Magnets in the generator spin close to coils of wire, which produces electrical currents.
6. The wires go out to deliver electricity to homes, businesses, schools and other buildings.

## COAL AROUND THE WORLD

Five countries account for 77% of total coal use worldwide. These are China, the United States, India, Russia, and Japan. Over 80% of Utah's electricity and more than 50% of the United States' electricity comes from coal, and we export 4% of the coal we mine to countries with fewer resources, most of which is used for making steel. ✨

Fuel

Gas

Carbon dioxide

Soda water

Acetylene

Synthetic rubber

Charcoal briquettes

Artificial silk

Carbolic acid

Fire proofing

Food preservatives

Billiard balls

Medicines

Perfumes

Ammonia

Baking powder

Rubber cement fertiliser

Paint pigments

Sulfer

TNT explosive

Linoleum

Sugar substitute

Insecticides

Fungicides

Moth balls

Paint thinner

Batteries

Wood preservatives

Disinfectants

Varnish

Insulation

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### COMPREHENSION QUESTIONS

1. What fuel did trains use during the U.S. Industrial Revolution in the 1880s?
2. What is coal?
3. What is coal made of?
4. How was the coal transformed from dead vegetation into coal?
5. What is the most common use for coal today?
6. Which coal product is used to make mountain bikes and tennis rackets?
7. Which kind of coal has the highest energy value?
8. What happens to most of the 4% of exported coal purchased by other countries?