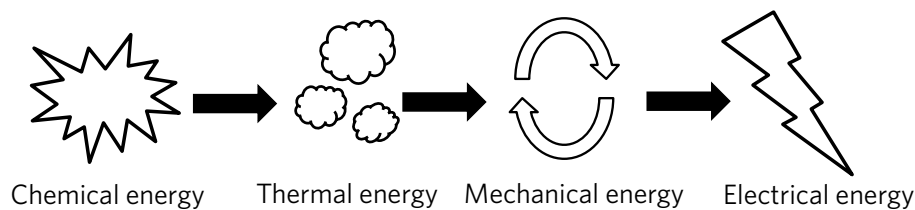




Fossil Fuels

Coal, oil/petroleum¹, and natural gas are three main types of fossil fuels. They are called ‘fossil fuels’ because they formed from the remains of decaying plants and animals that were buried by layers of rock 300 million years ago. As this material was buried by more and more rock, high heat and pressure transformed it over millions of years. And depending on whether this occurred in vegetated swamps or plankton-filled seas, either coal, oil, or natural gas was formed.

When fossil fuels are burned—when they undergo a chemical reaction with oxygen—they release a lot of energy that we can use to power things. For example, in a coal-fired power plant, coal is burned in a boiler, releasing chemical energy that heats water into steam. The steam turns a turbine—a thing with blades that spins—connected to a generator. The generator converts the mechanical energy of the spinning turbine into electrical energy that can be transmitted to homes and buildings through transmission lines. While coal is typically used to produce electricity, oil can be refined into a variety of liquid fuels to power cars, trucks, and airplanes and is also made into a wide variety of everyday products, including plastics, cosmetics, clothes, electronics, and more. Natural gas is commonly used for heating and cooking in homes.



Coal, oil, and gas can generate huge amounts of energy and power a wide variety of things. Fossil fuels are relatively cheap, but as they become harder to extract from the Earth, they will become more expensive. Fossil fuels are easily stored and easily transported, and thus they can be used to power things almost anywhere and anytime.

One problem with fossil fuels is that they are nonrenewable resources, meaning that we are extracting them from the Earth and using them faster than they can form. Mining or pumping fossil fuels from the ground can damage ecosystems and the environment, as can accidents like oil tanker spills that are expensive to clean up². Fossil fuels produce air pollution when they are burned. They also release carbon dioxide and other greenhouse gases into the atmosphere that not only warm the climate, but change the chemistry of the ocean.

¹ ‘Oil’ and ‘petroleum’ are often used interchangeably. For more information on the difference between the two, visit the [U.S. Energy Information Administration’s website](#).

² [Fortune Magazine: 6 big oil spills, and what they cost](#)



Exploring Energy



Weighing the Benefits and Drawbacks of Fossil Fuels

For a complex problem, we need to evaluate how a solution fares across multiple dimensions:	Benefits	Drawbacks
Environmental Factors		<ul style="list-style-type: none">▪ Burning fossil fuels releases carbon dioxide into the atmosphere, contributing to global warming and changing the chemistry of the ocean.▪ Burning fossil fuels releases air pollution.▪ Mining and extracting fossil fuels from the ground can harm the environment.
Social & Cultural Factors	<ul style="list-style-type: none">▪ Fossil fuels are accessible to a lot of people since they are easily transported and stored.	
Economic Factors	<ul style="list-style-type: none">▪ Fossil fuels are turned into a variety of the products that we use every day, like plastic and clothing.▪ Fossil fuels are relatively cheap.	<ul style="list-style-type: none">▪ Fossil fuels are nonrenewable resources.▪ Damage to the environment caused by things like oil spills can be expensive to clean up.▪ As fossil fuels become harder to find, they will become more expensive.

Additional resources

California Academy of Sciences: [Fossil Fuels: Air Pollution and the Greenhouse Effect activity](#)

California Academy of Sciences: [Fossil Fuels: Chocolate Chip Mining activity](#)

