

Energy

by Sophia



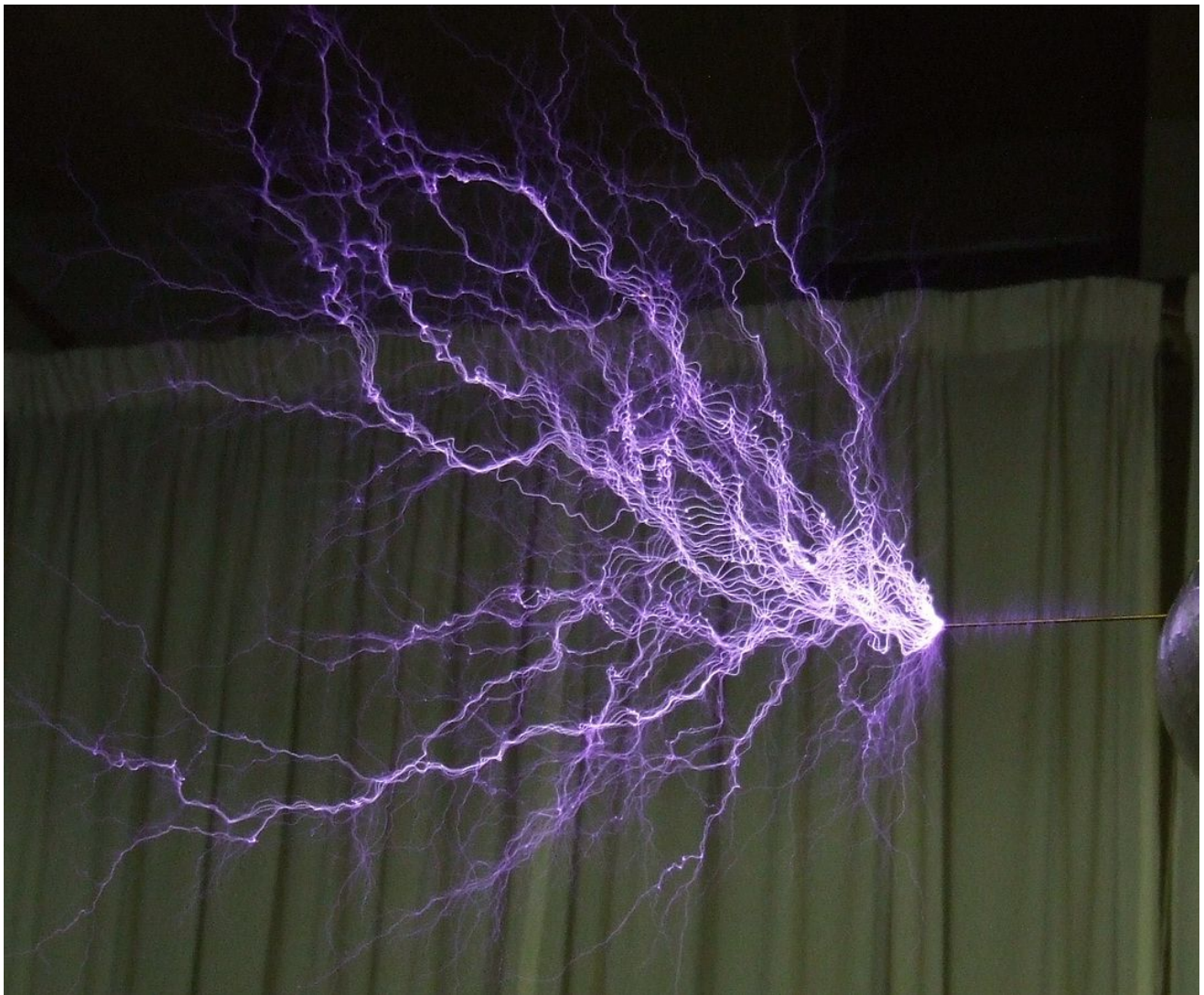
WHAT'S COVERED

In this lesson, we will discuss the definition of energy and explore its sources. We will cover the two main categories of energy sources: renewable and nonrenewable. We will also explore fossil fuels and the global carbon footprint. Finally, we will explore how energy use has changed over time. Specifically, this lesson will cover the following:

1. What is Energy?

Energy is used in almost every facet of modern life: to run our cars, heat our homes, clean and transport water, light our buildings, power our electronics, and manufacture our products. Energy is defined as work that can be done by a fuel source. Fuel sources can vary, and the form of energy they take can vary as well.

Energy can be thermal, mechanical, or even chemical, though a large portion of what is used by humans is in the form of electric energy, which powers houses, businesses, and various industries. Different fuel sources provide different amounts of energy in their various forms.



2. Sources of Energy

Energy sources are split into two main categories: renewable and nonrenewable. As of 2021, 80% of energy used in the United States comes from nonrenewable sources, while the remaining 20% comes from renewable sources. The percentage of energy derived from renewable sources has nearly doubled in the last ten years!

2a. Renewable Energy

Renewable energy is considered renewable because it can be replaced in a reasonable human lifespan, which could be months, years, or decades, or it is simply available in unlimited supply.

The following table shows the sources that make up the total renewable energy consumption in the country according to the U.S. Department of Energy.

Renewable Energy Source	Percent of Total Generated
Wind	46%
Hydroelectric	31.5%
Photovoltaics/Solar	14%

Biomass	6.5%
Geothermal	2%
Total	100%

2b. Nonrenewable Energy

At 80%, nonrenewable sources provide the vast majority of energy used in the United States. Nonrenewable energy sources are those that cannot be replaced in the normal human lifespan. Most nonrenewable resources take thousands to millions of years to form, so for human purposes, there is a finite supply.

The following table shows the sources that make up the total nonrenewable energy generated.

Nonrenewable Energy Source	Percent of Total Generated
Natural gas	39%
Oil	21.5%
Coal	27.5%
Nuclear	12%
Total	100%

Both natural gas and oil are used for heating and transportation, while coal and nuclear power plants (which use a rare form of uranium) are used for electricity in the home and industry.



DID YOU KNOW

The United States is the largest global producer of natural gas. Also, oil is the largest source of energy in the United States, even though it is not the largest utilized.

2c. Fossil Fuels

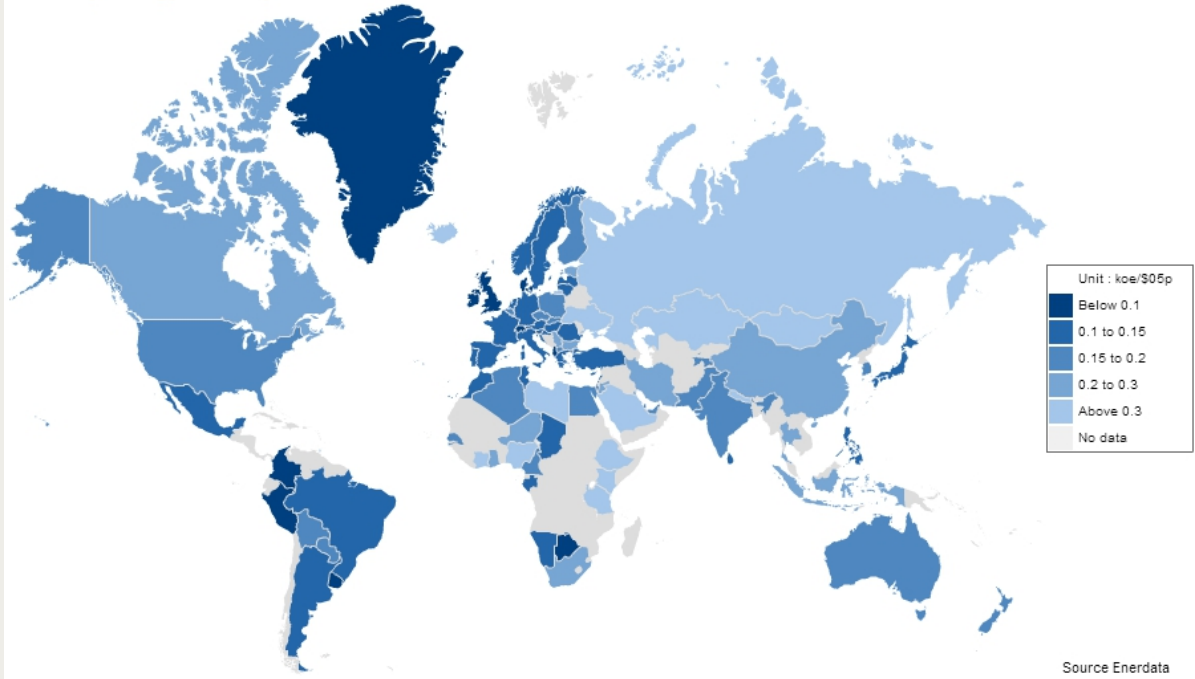
The majority of energy in the United States is nonrenewable energy and comes from fossil fuels, which are most often oil, natural gas, and coal. Fossil fuels are sought after for their energy-dense nature and their accessibility; hence, once discovered, they quickly became the world's prime energy sources.

They provide energy for transportation in cars, buses, trucks, boats, and airplanes, as well as electricity to power homes, industries, and businesses—and heating for the same end uses.

IN CONTEXT

Despite being only 5% of the world's population, the United States consumes approximately 20% of the world's energy. This graph illustrates energy intensity globally in kg of oil equivalent, a standard measure of the amount of energy that can be extracted from 1 kg of crude oil. The lighter the country's color, the higher the energy intensity.

Primary energy intensity

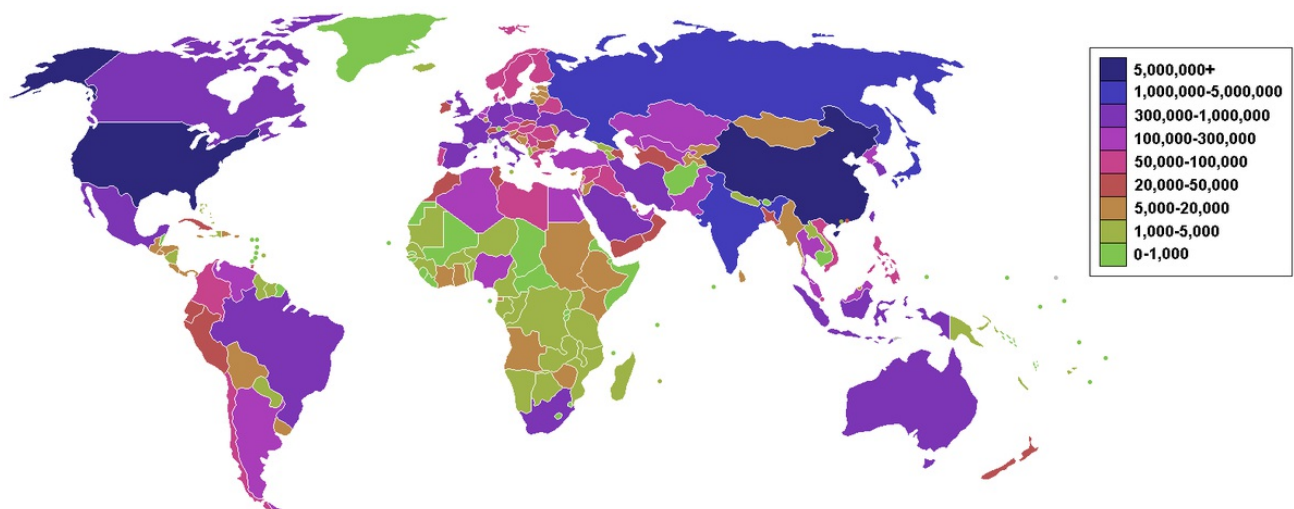


As you can see, while the United States is one of the highest in energy intensity, its population is only 5% of the world.

3. Carbon Footprint

Carbon footprint is a tool used to measure the amount of greenhouse gases produced by a source, whether it is a person, a product, a company, or a country. Carbon footprint assessments are tools used to increase the awareness of impacts at an individual, organizational, or product level.

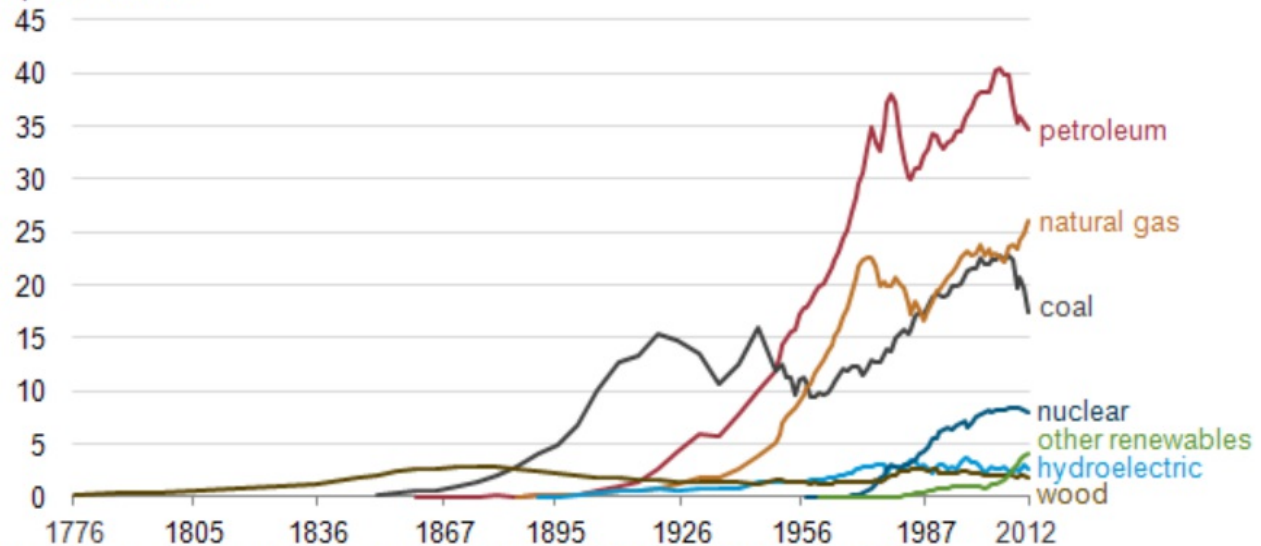
Greenhouse gases are of interest because of their capacity to accelerate and exacerbate climate change. Carbon footprint is actually just a part of ecological footprint calculations and can be used as an indicator of sustainable energy use. The map below shows the average amount of carbon dioxide emissions of each country in a year. Notice that the United States and China are by far the biggest producers.



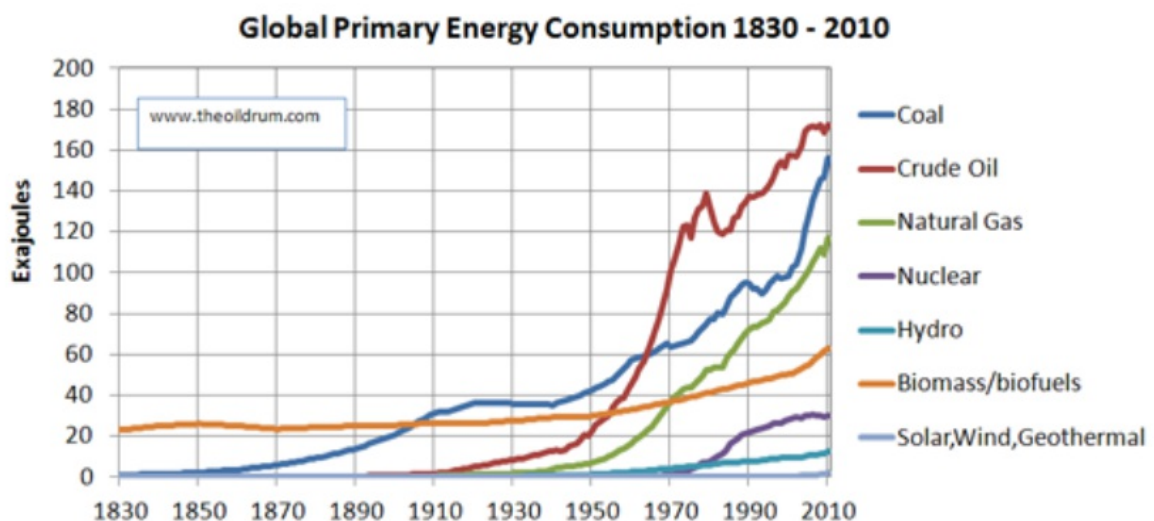
4. Evolution of Energy Use

When talking about energy, it is important to highlight how its use has changed in quantity over time. In the graph below, you can see that U.S. energy use has dramatically increased since the 1700s. The graph follows the rise of the Industrial Revolution. As technology use has increased, so has the need for electricity and other forms of energy.

History of energy consumption in the United States (1776-2012)
quadrillion Btu



The graph of global energy consumption looks quite similar. It also follows the rise of the Industrial Revolution, which caused increased technology use and electric energy needs, resulting in increased energy consumption.



SUMMARY

In this lesson, we learned about **energy**. We discussed an overview of energy and its different **sources**. We learned about the two main categories of energy: **renewable energy** and **nonrenewable**

energy. We also saw a break-up of the We learned about the nature of **fossil fuels**, **carbon footprint**, and how **energy use has evolved** over time in the United States and worldwide.

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