

## Hydraulic Fracturing

Hydraulic fracturing is a technique used in one step of the extraction of energy resources. Sometimes referred to as "fracking," its wide application over the last decade has led to debate over its risks and benefits.

### Basics



Hydraulic fracturing opens narrow cracks in rock layers in order to allow oil, gas, or water to flow through the rock. During hydraulic fracturing, pressurized fluid is injected through a well into a subsurface rock layer in order to open the fractures. Hydraulic fracturing requires large volumes of water mixed with chemicals and proppants (often sand, used to "prop" open the fractures). These fluids must be recycled or disposed of in deep wells, separate from local water tables.[1] [Read more](#)

### Frequently Asked Questions

What is produced water?

American Geosciences Institute

How much water does the typical hydraulically fractured well require?

U.S. Geological Survey

How and where is waste hydraulic fracturing fluid disposed?

U.S. Geological Survey

What environmental issues are associated with hydraulic fracturing?

U.S. Geological Survey

What is frac sand?

American Geosciences Institute

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### Coal

Coal is a carbon-rich rock formed from plants that grew millions of years ago. Coal is a major source of electricity in the United States and the largest source of energy for electricity generation worldwide.



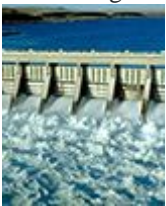
### Energy

All of the energy we use comes from the Earth, its atmosphere, or the Sun. Some resources are mined or extracted, like coal, uranium, oil, and gas. Others, like wind, solar, tidal, biomass, and hydropower resources, are harnessed at the Earth's surface. Geoscientists play an essential role in developing energy resources and evaluating their environmental impacts.



### Geothermal Energy

Geothermal energy is harvested by drilling into underground reservoirs of steam or water heated by the Earth. While western states like California and Nevada lead the country in geothermal energy production, emerging technologies may make it possible to extract geothermal energy throughout the United States.



### Hydropower

Hydropower uses the energy from moving water to power machines or generate electricity. Used for over two thousand years in water mills, today hydropower is more commonly associated with electricity generation.



### Nuclear Energy

Nuclear energy is produced from fission, which splits the large atoms of heavy elements like uranium into smaller atoms, releasing enormous amounts of energy. Thirty U.S. states have nuclear power plants, and nuclear energy makes up around 20% of the U.S. electricity supply.



## Oil and Gas

Petroleum ("oil") and natural gas are hydrocarbons that formed over millions of years under heat and pressure deep in the Earth. Petroleum and natural gas are the largest sources of energy in the United States.



## Renewable Energy

Renewable energy comes from sources that are constantly replenished, like running water, the heat of the Earth, the Sun's light, or wind. Renewables account for around 11% of U.S. energy consumption and 17% of electricity production.



## Solar Energy

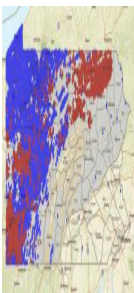
Solar energy is energy from the Sun, which can be harnessed in several ways. Solar panels use the photovoltaic effect to generate electricity directly from sunlight. The Sun's heat can be used directly to heat water or air, or it can be concentrated to boil water, driving steam turbines that generate electricity.



## Wind Energy

Wind energy is harnessed by wind turbines, which convert the energy of the wind into electricity. Wind energy is one of the largest sources of renewable energy. Wind farms can now be found in more than 40 states.

# Maps & Visualizations



Interactive map of oil and gas wells in Pennsylvania

Pennsylvania Department of Environmental Protection

The Pennsylvania Department of Environmental Protection provides a large amount of information on oil and gas wells in the state in an interactive map. The map includes detailed information on wells across the state, generally split into conventional (blue) and unconventional (red) wells, and...

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## Case Studies & Factsheets



### What Determines the Location of a Well?

Introduction Oil- and gas-rich rocks are only found in certain parts of the United States, so most of the country has no oil or gas wells. Where oil and gas production is commercially viable, many factors determine the exact location of each well, including leasing, permitting, competing land uses...

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## Webinars & Forums



### Making Produced Water More Productive

Geoscience is essential to our understanding and management of produced water, an inevitable by-product of oil and gas development. This Critical Issues webinar provides a scientific and regulatory background of produced water, how it is commonly disposed, what opportunities exist for the re-use...

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