

Coal 101



Institute for 21st Century Energy | U.S. Chamber of Commerce



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Coal is the most abundant energy resource produced in the U.S., generating nearly 50% of our electricity supply. Coal is also consistently the most affordable fossil fuel source according to the Energy Information Administration. Coal is mined in 26 U.S. states and there are over 600 plants that generate electricity from coal in 48 states.

Coal is a critical component of a common sense energy strategy and necessary to ensure America's energy security and economic vitality. In addition to producing electricity, coal and its by-products are used by industry to produce iron, steel, plastics, fertilizers and medicines and to manufacture cement and paper. Coal's abundance, affordability, and domestic availability make it an important fuel source for America's energy future. Sustained investments in clean coal technology are necessary to ensure that we continue to reduce emissions and use coal more cleanly.

FACTS AND FIGURES

U.S. Consumption: The U.S. consumed 1.12 billion tons of coal in 2008, making it the second largest consumer of coal in the world after China. Texas consumed 104,784 tons of coal in 2007, more than any other state. One ton equals 2000 pounds of coal, which could provide a residential household with electricity for two months.

U.S. Production: In 2008, the U.S. produced about 1.17 billion tons of coal. With 263 billion tons of coal reserves recoverable using today's technology, America has enough coal to last approximately 234 years at current consumption rates.

U.S. Exports: The U.S. exported approximately seven percent of the coal it produced in 2008.

Global Reserves: Four countries hold 69 percent of the world's coal reserves: the United States (28 percent), Russia (19 percent), China (14 percent), and India (7 percent). In the U.S., coal is mined in 26 states, with Wyoming, West Virginia, Kentucky, Pennsylvania and Texas producing the most coal.

FREQUENTLY USED TERMS

Coal: The world's most abundant fossil fuel, coal is composed mainly of carbon and is found in layers of rock. Coal-powered electricity costs a fraction of what other fossil fuels cost, making it one of today's most affordable electricity fuels. There are four main types of coal ranked by energy content (measured in British Thermal Units or BTUs) and volatility: anthracite (highest BTUs), bituminous, subbituminous, and lignite (lowest BTUs). Nearly 90 percent of the coal mined in the U.S. is higher-quality subbituminous or bituminous

coal, which generates more energy per BTU than lower ranked coal.

Coke: A solid material made from heating coal at a very high temperature, coke is used as fuel in iron ore and steel production.

Coal Ash: Also known as coal combustion byproducts (CCBs), coal ash is the substance produced when coal is used for electricity generation in coal-fired power plants. Coal ash is used in construction materials such as concrete, cement, road base materials, wallboard and for mine reclamation.

Mining: Coal is produced by several mining methods, including surface mining, mountaintop mining, and underground mining. Surface mining is used when coal is less than 200 feet underground. Earth is removed to expose the coal, which is then mined in long, successive strips. When mining is complete, the earth is returned to the area and vegetation is replanted. Mountaintop Mining is used primarily in the Appalachian region of the U.S. for coal that is close to the top of a mountain. Earth is moved to an adjacent valley so that the coal resources can be exposed. Underground Mining is also known as "deep mining" and is used to produce coal that is buried several hundred-feet below the surface. Coal is extracted through a tunnel or shaft using machinery to remove it.

Reclamation: Since 1977, more than 2.5 million acres of previously mined U.S. land have been restored for other uses by mining companies.

Clean Air Act (CAA): Enacted in 1970 and amended in 1977 and 1990, the CAA requires industries to use various technologies to reduce air pollutants that contribute to acid rain and smog by establishing national ambient air quality standards. As a result, coal-based power generation in the U.S. is 77 percent cleaner in terms of emissions per unit of energy produced as compared to 1970 levels.

Clean Coal Power Initiative (CCPI): Administered by the U.S. Department of Energy, CCPI supports public-private partnerships for research and demonstration of various types of clean coal technologies to ultimately accelerate their adoption by the private sector. Since 1990, the U.S. power industry has invested approximately \$90 billion to deploy clean coal technologies to reduce emissions.



Carbon Capture and Sequestration (CCS): A promising technology that captures carbon dioxide (CO₂) instead of emitting it into the atmosphere, CCS sequesters carbon and injects it into a permanent storage location underground. This technology is still being researched and is not yet used commercially in the United States.

Integrated Gasification Combined Cycle (IGCC): A technology that turns coal into a synthetic gas, IGCC removes impurities such as sulfur dioxide before it is used to generate electricity. IGCC uses excess heat from the gasification process to produce additional power, making it cleaner and more efficient than traditional coal-fired power plants. There are currently two U.S. IGCC plants operating in Florida and Indiana respectively.

Coal to Liquids Technology (CTL): CTL is a proven process that can be used to turn coal into a synthetic gasoline or diesel fuel used in the transportation sector as well as for raw materials for industrial products. At a typical conversion rate of two barrels of oil equivalent (BOE) per ton, the coal reserves in the U.S. could produce 526 billion BOE-equivalent to twice the oil reserves of Saudi Arabia. The use of gasoline and diesel fuel made from coal can reduce oil imports and drilling in environmentally sensitive areas and counter the outflow of dollars resulting from U.S. oil imports. Using carbon capture and sequestration technology, the CTL process has an environmental footprint smaller than the average U.S. refinery, and gasoline and diesel made from coal qualify as ultra-low sulfur fuels.

FREQUENTLY ASKED QUESTIONS:

How many Americans work in the coal industry? The coal industry supports nearly 550,000 jobs in the U.S. Putting America's coal supplies to work using advanced technologies will not only help fuel our economic recovery by providing consumers and businesses with affordable energy, but will create much needed jobs and enhance our energy security.

What role will coal play in our future? The U.S. has abundant coal resources that provide a reliable, affordable source of energy for our nation. Although we must use all available sources of energy, coal is still projected to make up 44 percent of our electricity generation by 2035. Affordable energy is a key driver of economic growth, which makes coal an important fuel for the foreseeable future. Investments in

clean coal technology will allow coal to continue its strong record of emissions reductions. Global coal consumption is expected to increase by 49 percent from 2006 to 2030, and will supply about 28 percent of the world's energy consumption in 2030. This means that domestic coal has tremendous export potential in the years to come. Substantial investments by both the public and private sectors in advanced clean coal technologies such as CCS and IGCC will allow our nation to continue to be a world leader in efficiency and emissions reductions and offer additional export potential.

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Why aren't there more coal-fired power plants being built today? The regulatory framework and permitting process for siting new coal-fired power plants is unduly burdensome. Further, regulatory and legislative uncertainty makes it risky for utilities to invest in new coal-fired plants. These factors limit new coal-fired capacity, which ultimately could undermine the reliability of America's electricity supply.

What are the challenges facing the development of CCS technologies? The carbon capture and sequestration process faces significant challenges before it can be used widely in the marketplace. According to a 2007 MIT study, a ten-year research commitment of \$8-8.5 billion will be needed to advance CCS technology to commercial viability, and it is unlikely that the technology will be ready for commercial use until 2020-2025. In addition, the federal government must address CCS siting requirements, monitoring, and liability issues in concert with current research efforts.

How much CO₂ can we sequester underground? The U.S. and Canada produce approximately 3.8 billion tons of carbon dioxide each year, and have storage space for 3.5 trillion tons, which means there is enough storage for over 920 years worth of carbon dioxide underground. Globally it is estimated that there are thousands of years of storage space, according to the government's National Energy Technology Lab. Certain geologic rock formations deep underground are suitable for CO₂ storage.



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