

MYTHS ABOUT COAL-FIRED POWER PLANTS

*Myth — an idea or story that is believed by many people but that is not true.
(Merriam-Webster Dictionary)*

Myth ... Coal-fired power plants are dirty.

Since 1970, coal-fired power plants have reduced emissions of three major air pollutants — sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter (PM) — by 92% per kilowatt-hour of electricity generated.ⁱ This means that each kilowatt-hour of electricity generated today by the average coal-fired power plant is 92% cleaner than the same kilowatt-hour was some four decades ago. To achieve this reduction, the owners of coal-fired power plants had invested a total of \$111 billion by the end of 2015 and are expected to invest an additional \$16 billion by 2018.ⁱⁱ The coal fleet in each of 28 states has invested more than \$1 billion for emission controls.ⁱⁱⁱ The five states with the largest investments for emission control technologies are Indiana (\$11.8 billion), Ohio (\$9.6 billion), Kentucky (\$8.4 billion), West Virginia (\$8.2 billion), and Pennsylvania (\$8.1 billion).

Myth ... Coal-fired power plants do not use clean coal technology.

There are 16 clean coal technologies being used today by the U.S. coal fleet.^{iv} These include wet and dry scrubbers to reduce SO₂ emissions, selective and non-selective catalytic reduction to reduce NO_x emissions, and electrostatic precipitators and fabric filter technology to reduce PM. Every coal-fired power plant in the U.S. uses one or more clean coal technologies.^v Also, high efficiency coal-fired boilers (such as supercritical and ultra-supercritical) help to reduce carbon dioxide emissions. One clean coal technology — carbon capture and storage (CCS) — is under development but has not been adequately demonstrated yet for widespread use.

Myth ... Coal-fired power plants are retiring because of low natural gas prices.

The owners of 431 retiring coal-fired electric generating units representing 70,300 megawatts of capacity (equivalent to the electricity supply of California) have attributed these retirements, either whole or in part, to EPA regulations.^{vi} Most of the retirements have been caused by EPA's Mercury and Air Toxics Standards rule, which was projected to cost \$10 billion per year.^{vii} In total, EPA regulations were cited by the owners of coal units as the cause of 80% of all announced retirements.^{viii} The role of EPA regulations in causing coal plant retirements has been cited by plant owners in public declarations such as legal filings with public utility commissions and the U.S. Securities and Exchange Commission.^{ix}

Myth ... The U.S. doesn't need coal-fired power plants.

Coal-fired power plants are necessary to maintain electricity system reliability and to help assure that electricity prices are stable and affordable.

Coal-fired power plants provide base-load power. Base-load refers to electricity sources that can operate 24/7. Base-load power plants provide reliable power to maintain a large-scale electrical grid and generally shut down only for scheduled maintenance or emergency repairs.^x In addition, coal-fired power plants are dispatchable — their electricity output can be adjusted as electricity demand rises and falls — and are necessary as backup for intermittent (non-dispatchable) electricity sources such as wind and solar on cloudy days, at night, and when the wind is not blowing. Also, coal-fired power plants provide important spinning and capacity reserve capabilities so the grid remains reliable at times when intermittent sources are not available.^{xi}

In addition, coal-fired power plants provide seasonal reliability. During winter, natural gas is used preferentially for home heating and, therefore, coal (and nuclear power too) must be available to ensure a reliable and affordable supply of electricity. For example, during the 2014 Polar Vortex, natural gas was in short supply, and power plants in New England were forced to burn expensive jet fuel to meet electricity demand. During

January 2014, peak power prices in New England, New York City, and the Mid-Atlantic increased by 400%.^{xii} The North American Electric Reliability Corporation (NERC) recently conducted an assessment of the risks to reliability caused by increased dependency on natural gas. NERC concluded that “overdependence on a single fuel type [for example, natural gas] increases the risk of ... disruptions as experienced during recent extreme weather events, like the 2014 Polar Vortex.”^{xiii}

Electricity ratepayers have made substantial investments in coal-fired power plants and emission controls (see first myth above). Shutting down these still-productive assets and replacing them with, for example, natural gas combined cycle power plants would cost electricity ratepayers some \$300 billion.^{xiv} Similarly, replacing the coal fleet with utility-scale solar would cost nearly \$1 trillion and consume land equivalent in size to either the entire state of Maryland or 175 Districts of Columbia.^{xv}

Myth ... Pollution from coal-fired power plants causes premature mortality.

Claims that premature mortality is caused by fine PM (PM_{2.5}) emissions from power plants are based on the supposition that adverse health effects, especially premature mortality, are caused even by safe levels of fine PM. Basically, safe is assumed to be unsafe in order to support these claims. However, ambient concentrations of fine PM that comply with EPA’s ambient air quality standards protect segments of the U.S. population (e.g., children and the elderly) that may be the most sensitive to the effects of certain air pollutants. Moreover, EPA sets these air quality standards with a margin of safety to protect against any unknown or uncertain health effects.

Myth ... “The Clean Power Plan ... takes real action on climate change.” [EPA Fact Sheet on the Clean Power Plan]

The Clean Power Plan has been stayed by the U.S. Supreme Court because of questions about its legality raised by 28 states and many other parties. However, even if the Clean Power Plan is upheld by the courts, it would reduce CO₂ emissions by approximately 375 million tonnes per year, which

would mean a reduction in global greenhouse gas emissions of less than 1%.^{xvi} Therefore, the Clean Power Plan would have a trivial effect on climate change. For example, global average temperature increase — the driver for climate change — would be reduced by an insignificant 0.013 degree (less than 1/80th degree) Celsius by the year 2100. On the other hand, the Clean Power Plan could cost more than \$20 billion per year.^{xvii}

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ⁱ EIA *Electric Power Monthly*, May 2016; EPA, *National Air Pollutant Emission Trends, 1900-1998*; EPA *Air Markets Program Data*, <https://ampd.epa.gov/ampd/>, accessed June 27, 2016. The total tonnage of these three major air pollutants has been reduced by 83% since 1970.

ⁱⁱ Energy Ventures Analysis, Inc., *Capital Investments in Emission Control Retrofits in the U.S. Coal-fired Generating Fleet through the Years – 2016 Update*, January 26, 2016.

ⁱⁱⁱ *Ibid.*

^{iv} <http://www.americaspower.org/coal-based-electricity/advanced/clean-coal-technologies/>

^v According to SNL Energy data, virtually all operating coal-fired electric generating capacity is equipped with advanced nitrogen oxides controls (low-NO_x burners, selective non-catalytic reduction, and/or selective catalytic reduction) and advanced particulate matter controls (electrostatic precipitators or baghouses). Almost 90% of operating coal-fired electric generating capacity is equipped with flue gas desulfurization (FGD) for sulfur dioxide control, and close to 100% of coal-fired capacity either has FGD or is burning very low sulfur subbituminous coal.

^{vi} ACCCE, *Coal Unit Retirements as of June 13, 2016*. Retirements and conversions are based on plant owner announcements.

^{vii} U.S. EPA, *Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards*, December 2011. EPA estimated the cost of the MATS rule to be \$9.6 billion in 2007\$.

^{viii} ACCCE, *Coal Unit Retirements as of June 13, 2016*.

^{ix} See, for example, ALLETE, Inc. *Second Quarter 2015 Form 10-Q* (August 4, 2015); American Electric Power, Inc., *Form 10-K for the fiscal year ended December 31, 2013*.

^x See, for example, U.S. Energy Information Administration, *Glossary*, <http://www.eia.gov/tools/glossary/index.cfm?id=B>.

^{xi} According to the California Independent System Operator, “Spinning Reserve is the on-line reserve capacity that is synchronized to the grid system and ready to meet electric demand within 10 minutes of a dispatch instruction by the ISO. Spinning Reserve is needed to maintain system frequency stability during emergency operating conditions and unforeseen load swings.”

^{xii} U.S. Energy Information Administration, *Today in Energy*, “Northeast and Mid-Atlantic power prices react to winter freeze and natural gas constraints,” January 21, 2014. <http://www.eia.gov/todayinenergy/detail.cfm?id=14671>.

^{xiii} NERC, *Short-Term Special Assessment: Operational Risk Assessment with High Penetration of Natural Gas-Fired Generation*, May 2016.

^{xiv} This assumes an overnight capital cost of \$1,000/kW for a new, advanced natural gas combined cycle. See EIA, *Assumptions to AEO 2015*, “Electricity Market Module,” September, 2015, accessed July 5, 2016.

^{xv} Approximately 25% of the capacity of solar photovoltaic (PV) power is counted for reliability planning. Therefore, replacing one MW of coal-fired generating capacity would require approximately 3.5 MW of solar generating capacity, and replacing 276,000 MW of coal-fired generating capacity would require nearly one million MW (1,000 GW) of solar. The National Renewable Energy Laboratory estimates 8 acres per MW of utility-scale PV solar. Therefore, one million MW of solar would require 8 million acres of land area, or 12,000 square miles. The land area of Maryland is 12,407 square miles and DC is 68.34 square miles. EIA, *Assumptions to AEO 2015*, “Electricity Market Module,” September, 2015. EIA assumes the overnight capital cost of solar photovoltaic is \$3,279/kW (prior to application of investment tax credits).

^{xvi} EPA, *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, August 2015, pages ES-6 and ES-7, showing a reduction of 415 million (short) tons in 2030 from the rate-based approach and 413 million (short) tons in 2030 from the mass-based approach. These short tons are equivalent to 376 and 375 million metric tons (tonnes), respectively. Intergovernmental Panel on Climate Change, *Climate Change 2014: Mitigation of Climate Change; Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, page 6 (showing total anthropogenic greenhouse gas emissions at 49 billion tonnes of CO₂-equivalent in 2010).

^{xvii} Lomborg, Bjorn, “Impact of Current Climate Proposals,” *Global Policy* (2015) doi: 10.1111/1758-5899.12295; NERA Economic Consulting, *Energy and Consumer Impacts of EPA’s Clean Power Plan*, November 7, 2015.