

*Coal is a plentiful, reliable, and affordable electric power generation resource that produces minimal emissions in modern power plants.*

## Introduction

Coal is formed when plant debris from mostly swampy areas is gradually buried, compacted over millions of years, and made into rock by heat and pressure deep underground.

In a coal power plant, coal is burned and used to make steam, which turns a turbine and produces electricity.<sup>1</sup>

Coal generated 35 percent of the world's electricity in 2022, representing the largest single source of world electricity generation.<sup>2</sup> The largest consumer of coal in the world, by far, is China, followed by India, and the United States.<sup>3</sup> While coal consumption has declined over time in North America and Europe, global coal consumption and production continues to increase largely because of China, India, and Indonesia.<sup>4</sup>

## Energy

Coal plants in the United States typically operate at an average capacity factor of over 60 percent, however, in seasons where less power is needed, the factor can drop below 50 percent.<sup>5</sup> These plants are classified as dispatchable power because they can gradually ramp supply up or down, operating at a higher or lower capacity factor, depending on demand. Coal power plants are not dependent upon weather conditions and can store up to six months of fuel on site. As a result, coal plants are among the most consistent and reliable sources of "baseload" electric power.

## Economics

Using coal for electricity generation in the United States is affordable and the prices are more stable than other fuel sources. The most recent data on fuel costs show coal is approximately \$2.51 per million BTU.<sup>6</sup> That's compared to \$37.92 per million BTU

## Quick Bullets

- Coal generates the most electricity in the world of any single energy source.
- Coal is the most affordable fuel for electricity generation in the United States.
- The largest consumer, by far, of coal is China.
- Worldwide, there are more than one trillion tons of known coal reserves.
- In the United States, there is an estimated recoverable reserve of 251 billion short tons of coal, which at 2021 U.S. production rates, would last approximately 435 years.

for petroleum liquids, and \$2.66 per million BTU for natural gas.

Despite its low cost, the use of coal to generate electricity has declined in the United States and many other developed countries during the past decades for multiple reasons. The first is a natural result of the increased use of natural gas, which became less expensive after the boom in shale gas production. New gas plants are also cheaper to build and scalable to size compared to coal-fired power plants. Additionally, governments have forced the premature closure of coal plants by imposing strict emissions standards, which have essentially made operating coal plants uneconomic. Renewable energy mandates by states; subsidies for renewables provided by federal, state, and local governments; and shifting the cost burdens of the intermittent nature of wind and solar power onto coal power have also added to coal power's cost challenges. The final blow is utilities frequently seek to close existing coal power plants so they can build expensive

## Emissions From Coal Power Plants Per MWh Electricity Produced

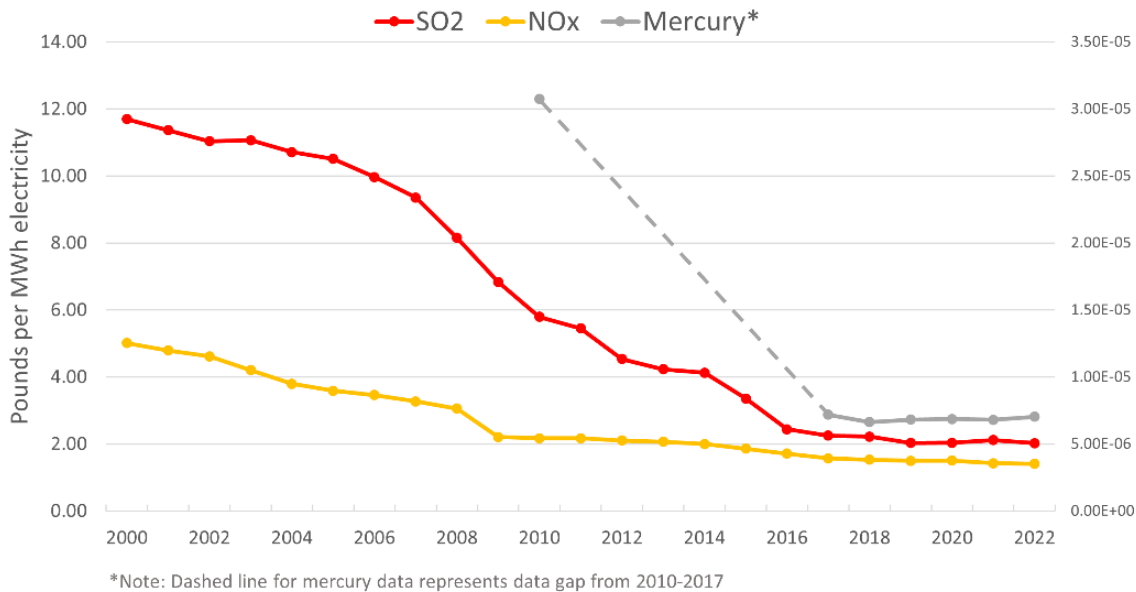


Figure 1: Emissions of sulfur dioxide, nitrogen oxides, and mercury from coal power plants. From United States Environmental Protection Agency “Clean Air Markets Program Data.”

wind and solar farms at what is typically a 10-percent guaranteed profit on construction costs. These policies have forced power plants to close or change fuels, in many instances well before the end of their operational life.<sup>7</sup> The result has been an increase in energy costs in states that mandated rapid coal plant shutdowns, especially when they are not replaced by another non-intermittent resource.<sup>8</sup>

For instance, the Production Tax Credit (PTC) for wind power allows wind power producers to sell power into the market at prices below what it takes to generate the power. During these “negative price periods,” wind power generators pay grid operators to take their electricity. Coal plants do not receive this benefit, and are shut out of the market during negative price periods. Because they still have to pay to maintain equipment, capital costs, and contracted fuel supplies, many coal plants have shut down because they cannot afford to maintain operations. They only receive revenue when wind power is scarce and prices are high.<sup>9</sup>

There are more than one trillion tons of currently known, economically recoverable, coal reserves in the world, with more than 251 billion tons in the United States. At 2022 rates of coal use, there are at least 122 years of known world reserves remaining.<sup>10</sup> Concentrating on the United States, at 2021 U.S. coal production rates, our coal supplies could last approximately 435 years.<sup>11</sup>

## Environmental Analysis

Coal-fueled power plants emit regulated air pollutants (carbon monoxide, lead, sulfur dioxide, nitrogen oxides, ozone, mercury, and particulate matter) as well as carbon dioxide. However, modern coal technology has resulted in a dramatic reduction in such emissions.<sup>12</sup>

Modern pollution controls have reduced particulate matter emissions from coal plants by 99.8 percent, nitrogen oxides have been reduced by 83 percent, and sulfur dioxide has been reduced by 98 percent, when compared to older coal plants with no controls.<sup>13</sup> As a result, from 1990 to 2021, emissions of sulfur dioxide from the coal power sector in the United States has declined by 93 percent and nitrogen oxide emissions have dropped 90 percent.<sup>14,15</sup> With modern technologies, emissions from coal plants pose virtually no threat to human health or the environment.

Coal power is one of the least land-hungry energy sources, even when accounting for the land used by mining, waste material, and processing.<sup>16</sup> And, modern coal mining involves post-mining land reclamation, mine drainage treatment, and water handling to prevent land and water pollution.<sup>17</sup>

## Endnotes

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