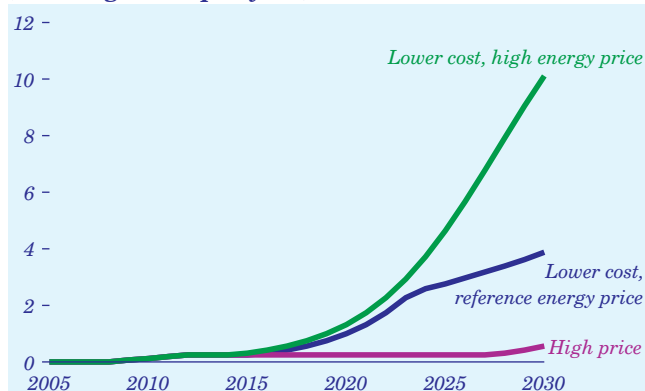


Coal Production

Lower Costs, Greater Demand Could Spur Cellulose Ethanol Production

Figure 85. Cellulose ethanol production, 2005-2030 (billion gallons per year)

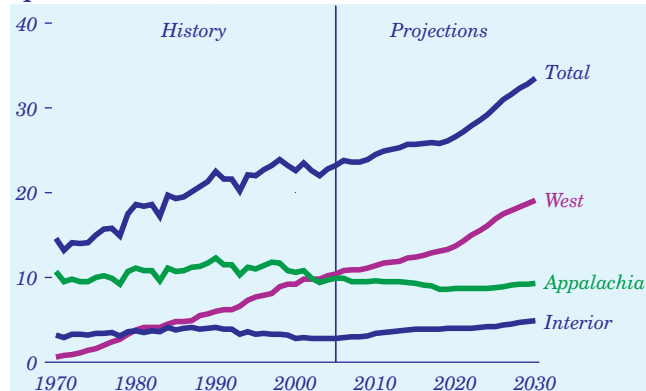


For *AEO2007*, two alternative ethanol cases examine the potential impact on ethanol demand of lower costs for cellulosic ethanol production, in combination with policies that increase sales of FFVs [170]. The reference case projects that 10.5 percent of new light-duty vehicles will be capable of burning E85 in 2016. The lower cost ethanol case using reference energy prices assumes that capital and operating costs for cellulose ethanol plants in 2018 are 20 percent lower than projected in the reference case, that at least 80 percent of new light-duty vehicles in 2016 can run on E85, and that energy prices will be the same as projected in the reference case. The lower cost ethanol case using high energy prices is based on the same assumptions for cellulose ethanol plant costs and FFV sales but with energy prices from the high price case.

E85 is projected to be competitive with gasoline in both alternative ethanol cases, and projected demand for ethanol fuels increases accordingly. In the lower cost ethanol case with reference prices, E85 demand in 2030 is projected to be 1.9 billion gallons, or 1.7 billion gallon higher than in the reference case. In the lower cost ethanol case with high energy prices, E85 demand in 2030 is projected to be 27.9 billion gallons, or 24.7 billion gallons higher than in the high price case. Increased demand for E85 and reduced production costs in the alternative ethanol cases result in increased production of cellulosic ethanol, which exceeds the mandated level in 2015 in both cases, growing to 3.9 billion gallons per year in 2030 in the lower cost ethanol case with reference prices and to 10.1 billion gallons per year in 2030 in the lower cost ethanol case with high energy prices (Figure 85).

Western Coal Production Continues To Increase Through 2030

Figure 86. Coal production by region, 1970-2030 (quadrillion Btu)



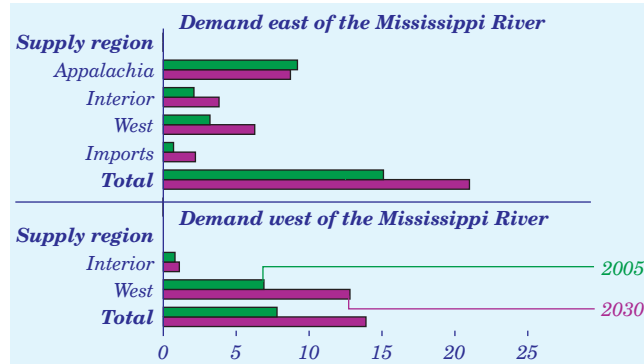
In the *AEO2007* reference case, increasing coal use for electricity generation at existing plants and construction of a few new coal-fired plants lead to annual production increases that average 1.1 percent per year from 2005 to 2015, when total production is 25.7 quadrillion Btu. The growth in coal production is even stronger from 2015 to 2030, averaging 1.8 percent per year, as substantial amounts of new coal-fired generating capacity are added and several CTL plants are brought on line.

Western coal production, which has grown steadily since 1970, continues to increase through 2030 (Figure 86). Much of the projected growth is in output from the Powder River Basin, where producers are well positioned to increase production from the vast remaining surface-minable reserves. Constraints on rail capacity limited growth in coal production from the Basin during 2005 and 2006, but recent and planned maintenance and investment in the rail infrastructure serving the region should allow for substantial growth in future production.

Appalachian coal production declines slightly in the reference case. Although producers in Central Appalachia are well situated to supply coal to new generating capacity in the Southeast, the Appalachian basin has been mined extensively, and production costs have been increasing more rapidly than in other regions. The eastern portion of the Interior coal basin (Illinois, Indiana, and western Kentucky), with extensive reserves of mid- and high-sulfur bituminous coals, benefits from the new coal-fired generating capacity in the Southeast.

Eastern Power Plants Are Expected To Use More Western Coal

Figure 87. Distribution of coal to domestic markets by supply and demand regions, including imports, 2005 and 2030 (quadrillion Btu)



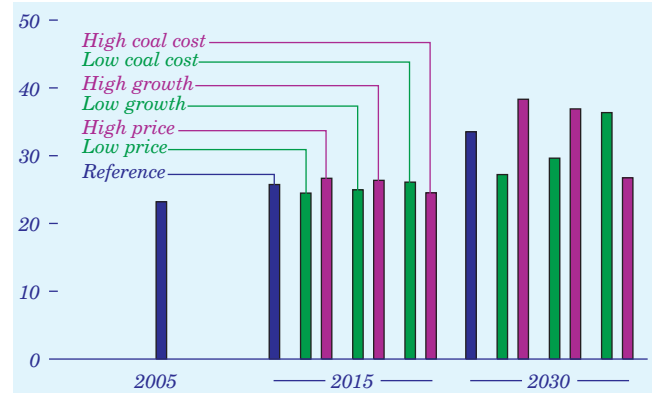
In the reference case, coal use is expected to grow substantially throughout the United States. For States east of the Mississippi River, coal demand is projected to increase by 5.9 quadrillion Btu, or 39 percent, from 2005 to 2030. Much of that increase is expected to be met by western coal—particularly in those States that are relatively close to the Powder River Basin supply region. Coal supply from Appalachian producers to markets east of the Mississippi River remains close to current levels, but increases in shipments from mines in the Eastern Interior region and in coal imports contribute to the overall decline in Appalachia’s share of the market east of the Mississippi, from 61 percent in 2005 to 42 percent in 2030.

West of the Mississippi River, coal demand is projected to increase by 6.1 quadrillion Btu, or 79 percent, from 2005 to 2030, with western coal producers as the primary source of supply (Figure 87). Most of the remainder is expected to be supplied from lignite mines in the Gulf Coast area, primarily in Texas.

East of the Mississippi River, an increase in utilization rates for existing coal-fired power plants—from 71 percent in 2005 to 82 percent in 2030—accounts for approximately 30 percent of the projected increase in coal demand for the electric power sector. In contrast, west of the Mississippi, existing coal-fired plants already are operating at an average utilization rate of 80 percent. Therefore, increased utilization accounts for only a small amount of the projected increase in the region’s coal demand over the projection period.

Long-Term Production Outlook Varies Considerably Across Cases

Figure 88. U.S. coal production, 2005, 2015, and 2030 (quadrillion Btu)



In all the AEO2007 cases, U.S. coal production is projected to increase from 2005 to 2030; however, different assumptions about economic growth and the costs of producing fossil fuels lead to different results. The reference case projects a 44-percent increase from 2005 to 2030, whereas the alternative cases show increases ranging from as little as 15 percent to as much as 65 percent (Figure 88). Because the level of uncertainty is higher in the longer term, the projected increases in coal production from 2005 to 2015 show significantly less variation, ranging from 6 percent to 15 percent.

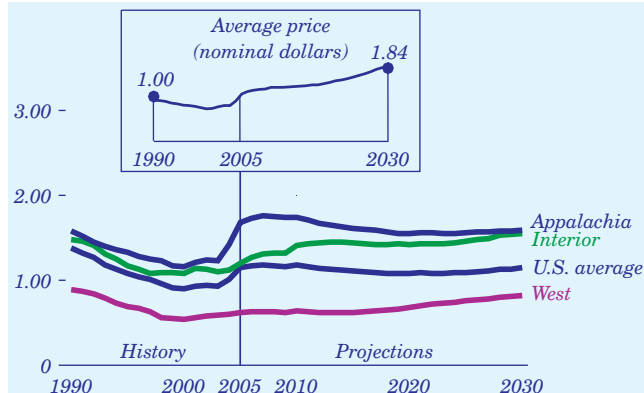
Regional coal production trends generally follow the national trend. For example, production of sub-bituminous coal in Wyoming’s Powder River Basin is projected to increase by 73 percent from 2005 to 2030 in the reference case, as compared with 45 percent in the low price case and 95 percent in the high price case. The projected regional shares of total coal production in 2030 (from the Appalachian, Interior, and Western supply regions) do not vary by much among the reference, high and low price, and high and low economic growth cases.

In the high coal cost case, higher mining and transportation costs for coal from the Powder River Basin hold the projected increase in the region’s annual coal production from 2005 to 2030 to a relatively small 0.2 quadrillion Btu, or 2 percent. As a result, the Wyoming Powder River Basin share of total U.S. coal production in 2030 is 26 percent in the high coal cost case, as compared with 33 percent to 36 percent in the other cases.

Coal Prices

Minemouth Coal Prices in the Western and Interior Regions Increase Slowly

Figure 89. Average minemouth price of coal by region, 1990-2030 (2005 dollars per million Btu)



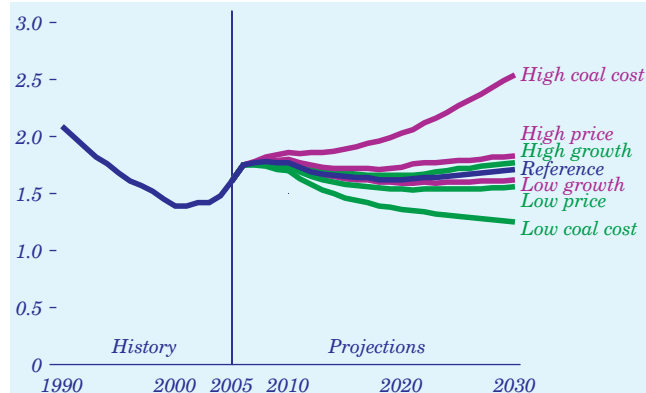
From 1990 to 1999, the average minemouth price of coal declined by 4.5 percent per year, from \$1.38 per million Btu (2005 dollars) to \$0.91 per million Btu (Figure 89). Increases in U.S. coal mining productivity of 6.3 percent per year helped to reduce mining costs and contributed to the price decline. Since 1999, U.S. coal mining productivity has declined by 0.6 percent per year, and the average minemouth coal price has increased by 3.9 percent per year, to \$1.15 per million Btu in 2005.

In the reference case, the average minemouth coal price drops slightly from 2010 to 2019, as mine capacity utilization declines and production shifts away from higher cost Central Appalachian mines. After 2019, rising natural gas prices and the need for additional generating capacity result in the construction of 119 gigawatts of new coal-fired generating plants. The substantial investment in new mining capacity required to meet increasing demand during the period, combined with low productivity growth and rising utilization of mining capacity, leads to an increase in the average minemouth price, from \$1.08 per million Btu in 2019 to \$1.15 per million Btu in 2030. In the projection, the increasing share of lower rank coals (subbituminous and lignite) in the U.S. production mix tempers the price increase.

Strong growth in production in the Interior and Western supply regions, combined with limited improvement in coal mining productivity, results in minemouth price increases of 1.0 and 1.1 percent per year, respectively, for the two regions from 2005 through 2030. Average minemouth prices in Appalachia decline by 0.2 percent per year over the same period.

Higher Mining and Transportation Costs Raise Delivered Coal Prices

Figure 90. Average delivered coal prices, 1980-2030 (2005 dollars per million Btu)



Alternative assumptions for coal mining and transportation costs affect coal prices and demand. Two alternative coal cost cases developed for *AEO2007* examine the impacts on U.S. coal markets of alternative assumptions about mining productivity, labor costs, and mine equipment costs on the production side, and about railroad productivity and rail equipment costs on the transportation side.

In the high coal cost case, the average delivered coal price in 2005 dollars is \$2.54 per million Btu in 2030—49 percent higher than in the reference case (Figure 90). As a result, U.S. coal consumption is 6.4 quadrillion Btu (18 percent) lower than in the reference case in 2030, reflecting both a switch from coal to natural gas, nuclear, and renewables in the electricity sector and reduced CTL production. In the low coal cost case, the average delivered coal price in 2030 is \$1.25 per million Btu—27 percent lower than in the reference case—and total coal consumption is 2.3 quadrillion Btu (9 percent) higher than in the reference case.

Because the high and low economic growth and high and low price cases use the reference case assumptions for coal mining and rail transportation productivity and equipment costs, they show smaller variations in average delivered coal prices than do the two coal cost cases. Different coal price projections in the high and low economic growth cases and high and low price cases result mainly from higher and lower projected levels of demand for coal. In the price cases, higher and lower fuel costs for both coal producers and railroads contribute to the variations in projected coal prices.