Market Trends

The projections in *AEO2009* are not statements of what will happen but of what might happen, given the assumptions and methodologies used. The projections are business-as-usual trend estimates, reflecting known technology and technological and demographic trends. *AEO2009* generally assumes that current laws and regulations are maintained throughout the projections. Thus, the projections provide a policy-neutral reference case that can be used to analyze policy initiatives. EIA does not propose or advocate future legislative or regulatory changes.

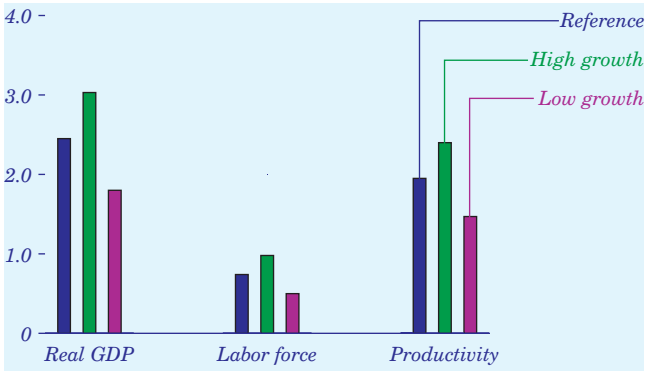
Because energy markets are complex, models are simplified representations of energy production and consumption, regulations, and producer and consumer behavior. Projections are highly dependent on the data, methodologies, model structures, and assumptions used in their development. Behavioral characteristics are indicative of real-world tendencies rather than representations of specific outcomes.

Energy market projections are subject to much uncertainty. Many of the events that shape energy markets cannot be anticipated, including severe weather, political disruptions, strikes, and technological breakthroughs. In addition, future developments in technologies, demographics, and resources cannot be foreseen with certainty. Many key uncertainties in the *AEO2009* projections are addressed through alternative cases.

EIA has endeavored to make these projections as objective, reliable, and useful as possible; however, they should serve as an adjunct to, not a substitute for, a complete and focused analysis of public policy initiatives.

AEO2009 Presents Three Views of Economic Growth

Figure 27. Average annual growth rates of real GDP, labor force, and productivity in three cases, 2007-2030 (percent per year)



AEO2009 presents three views of economic growth (Figure 27). The rate of growth in real gross domestic product (GDP) depends mainly on assumptions about labor force growth and productivity. In the reference case, growth in real GDP averages 2.5 percent per year from 2007 to 2030.

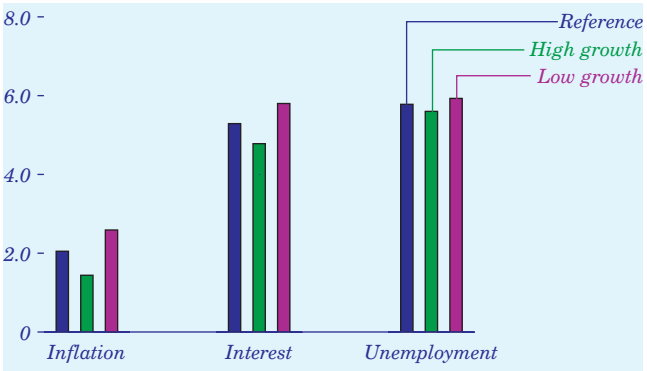
GDP growth is considerably slower in the near term as a result of the recent downturn in financial markets. In the *AEO2009* reference case, annual real GDP growth is negative in 2009 and does not start to recover until the fourth quarter of 2009.

The *AEO2009* high and low economic growth cases examine the impacts of alternative assumptions about the U.S. economy (see Appendix E for descriptions of all the alternative cases). The high economic growth case includes more rapid growth in the labor force, nonfarm employment, and productivity, resulting in real GDP growth of 3.0 percent per year. With higher productivity gains and employment growth, inflation and interest rates are lower than in the reference case.

In the low economic growth case, real GDP growth averages 1.8 percent per year from 2007 to 2030 as a result of slower growth in the labor force, nonfarm employment, and labor productivity. Consequently, the low growth case shows higher inflation, higher interest rates, and lower growth rates for industrial output and employment.

Inflation, Interest, and Jobless Rates Vary With Increases in Productivity

Figure 28. Average annual inflation, interest, and unemployment rates in three cases, 2007-2030 (percent per year)



In the *AEO2009* reference case, the average annual consumer price inflation rate is 2.1 percent, the annual yield on the 10-year Treasury note averages 5.3 percent, and the average unemployment rate is 5.8 percent (Figure 28). The higher inflation, interest, and unemployment rates in the low economic growth case and the lower rates in the high economic growth case depend on differences in assumptions about labor productivity and population growth.

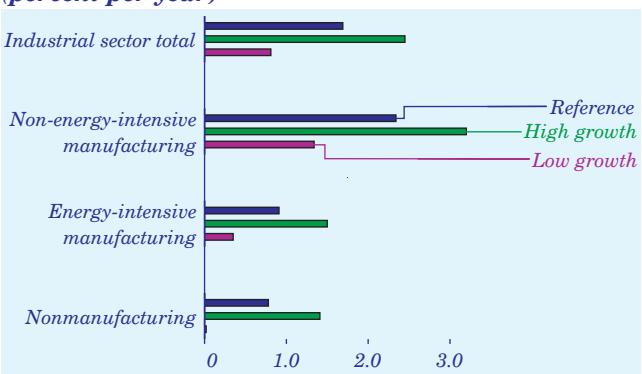
Over the first 5 years of the *AEO2009* reference case, inflation and interest rates are low, and unemployment rates rise as a result of the recession that began at the end of 2007. With the downturn affecting household wealth and economic output, unemployment remains high as people need more time to find employment. The unemployment rate does not fall back to its long-run average of 5.8 percent until 2015.

From 1982 to 2007, inflation averaged 3.1 percent per year, the average yield on 10-year Treasury notes was 7.1 percent per year, and the unemployment rate averaged 6.0 percent per year. In the *AEO2009* reference case, continuing gains in labor productivity and lower labor costs relative to historical averages lead to more optimistic projections for inflation, interest, and unemployment rates.

For U.S. consumers, energy prices in the reference case rise more rapidly than overall prices. For energy commodities, annual price increases average 3.0 percent per year from 2007 to 2030, and for energy services they average 2.3 percent per year.

Output Growth for Energy-Intensive Industries Is Expected To Slow

Figure 29. Sectoral composition of industrial output growth rates in three cases, 2007-2030 (percent per year)



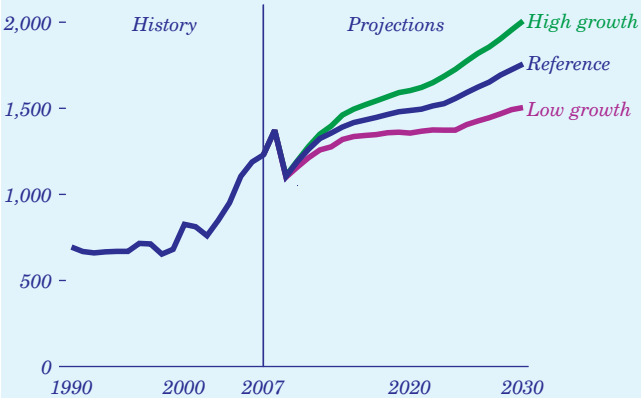
Industrial sector output has grown more slowly than the total economy in recent decades, as imports have met a growing share of demand for industrial goods. In the *AEO2009* reference case, real GDP grows at an annual average rate of 2.5 percent from 2007 to 2030, whereas the industrial sector grows by a slower 1.7 percent per year (Figure 29). Manufacturing output of goods grows more rapidly than nonmanufacturing output (which includes agriculture, mining, and construction). With higher energy prices and more foreign competition, the energy-intensive manufacturing sectors [*94*] grow at a slower overall rate of 0.9 percent per year, which includes a 0.4-percent annual decline for bulk chemicals and a 1.8-percent annual increase for food processing.

The construction, chemicals, primary metals, and transportation equipment industries grow slowly in the early years of the projection as the economy recovers from the current economic recession. After 2011, however, their output returns to its long-run growth path. Increased foreign competition, weak expansion of domestic production capacity, and higher energy prices mean more competitive pressure for most energy-intensive industries, particularly after 2015.

In the high economic growth case, output from the industrial sector grows by an annual average of 2.4 percent, still below the annual growth of real GDP (3.0 percent). In the low economic growth case, real GDP and industrial output grow by 1.8 and 0.8 percent per year, respectively. In both cases, the non-energy-intensive manufacturing industries show higher growth than the rest of the industrial sector.

Energy Expenditures Decline Relative to Gross Domestic Product

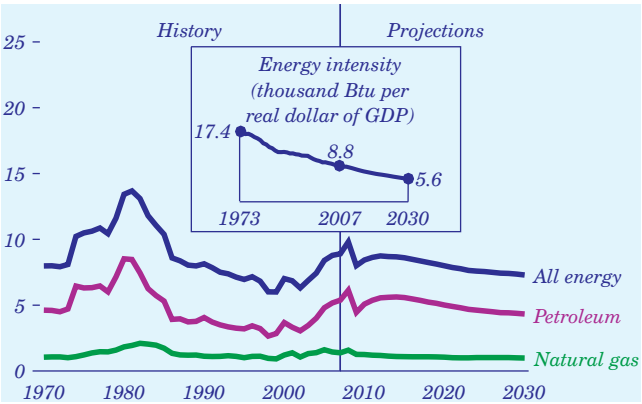
Figure 30. Energy expenditures in the U.S. economy in three cases, 1990-2030 (billion 2007 dollars)



Total expenditures for energy services in the U.S. economy were $1.2 trillion in 2007. Energy expenditures rise to $1.8 trillion (2007 dollars) in 2030 in the *AEO2009* reference case, $2.0 trillion in the high economic growth case, and $1.5 trillion in the low economic growth case (Figure 30). Energy intensity, measured as energy consumption (thousand Btu) per dollar of real GDP, was 8.8 in 2007 (Figure 31). With structural shifts in the economy, improvements in energy efficiency, and rising world oil prices, energy intensity declines to a ratio of 5.6 in 2030.

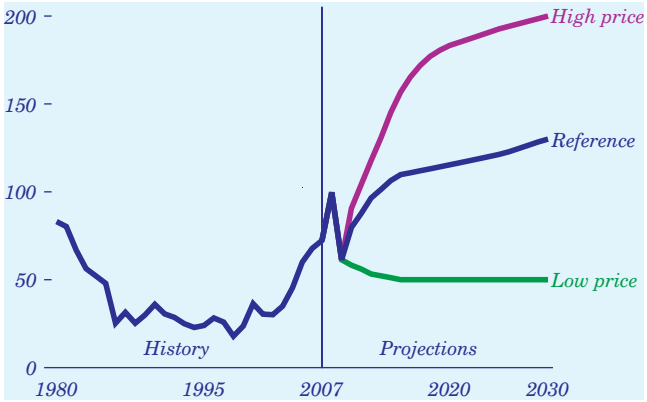
Since 2003, rising oil prices have pushed the nominal share of energy expenditures as a percent of GDP upward, and their 9.8-percent share in 2008 was the highest since 1986. In the reference case, as the energy efficiency of the economy improves, their share declines to 7.3 percent of GDP in 2030.

Figure 31. Energy expenditures as a share of gross domestic product, 1970-2030 (nominal expenditures as percent of nominal GDP)



Oil Price Cases Show Uncertainty in Prospects for World Oil Markets

Figure 32. World oil prices in three cases, 1980-2030 (2007 dollars per barrel)



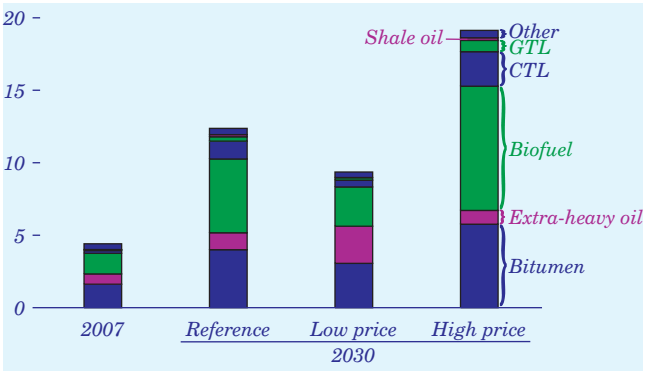
World oil price projections in *AEO2009*, defined in terms of the average price of imported low-sulfur, light crude oil to U.S. refiners, span a broad range that reflects the inherent uncertainty of world oil prices (Figure 32). The *AEO2009* low and high oil price paths are not intended to provide lower and upper bounds for future oil prices but rather to allow the analysis of possible future world oil market conditions that differ significantly from those assumed in the reference case. The long-term oil price paths are based on access to and cost of non-OPEC oil, OPEC supply decisions, and the supply potential of unconventional liquids, as well as the demand for liquids.

The high price case depicts a future world oil market in which conventional production is restricted by political decisions as well as by resource availability, as major producing countries use quotas, fiscal regimes, and various degrees of nationalization to increase their national revenues from oil production, and consuming countries turn to high-cost production of unconventional liquids to satisfy demand.

The low price case depicts a market in which non-OPEC producing countries develop stable fiscal policies and investment regulations directed at encouraging private-sector participation in the development of their resources. Although OPEC nations are not expected to change current investment restrictions significantly, the organization is expected to increase production in order to achieve an approximate 50-percent share of total world liquids production (119 million barrels per day) in 2030.

Unconventional Resources Gain Market Share as Prices Rise

Figure 33. Unconventional production as a share of total world liquids production in three cases, 2007 and 2030 (percent)



World production of liquid fuels from unconventional resources in 2007 was 3.6 million barrels per day, or about 4 percent of total liquids production. In the low oil price, reference, and high oil price cases, production from unconventional sources grows to between 11 million barrels per day and 17 million barrels per day, accounting for 9 percent to 19 percent of total liquids production, respectively, in 2030 (Figure 33).

Bitumen production from Canadian oil sands—by far the largest source of future unconventional liquids supply from any country—varies by about 1.5 million barrels per day across the three cases. The fiscal regime, extraction technologies, and relative profitability of projects associated with the Canadian bitumen are relatively constant, regardless of world oil prices. Production from Venezuela's extra-heavy oil resource depends on the market environment, not because of the oil price path but as a result of the levels of economic access to resources in the different cases. In the low price case, with more foreign investment, production in 2030 is more than double that in the reference case. In the reference and high price cases, with growing nationalization trends, production is limited to about 1 million barrels per day in 2030.

Production of biofuels, CTL, and GTL will be dictated largely by the needs of consuming nations—particularly, the United States and China, to compensate for restrictions on economic access to conventional liquid resources. In 2030, total production from those three sources ranges from 4.0 million barrels per day in the low price case to 10.4 million barrels per day in the high price case.