

Market Trends

The projections in *AEO2002* 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 forecasts, given known technology, technological and demographic trends, and current laws and regulations. Thus, they provide a policy-neutral reference case that can be used to analyze policy initiatives. EIA does not propose, advocate, or speculate on future legislative and regulatory changes. All laws are assumed to remain as currently enacted; however, the impacts of emerging regulatory changes, when defined, are reflected.

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.

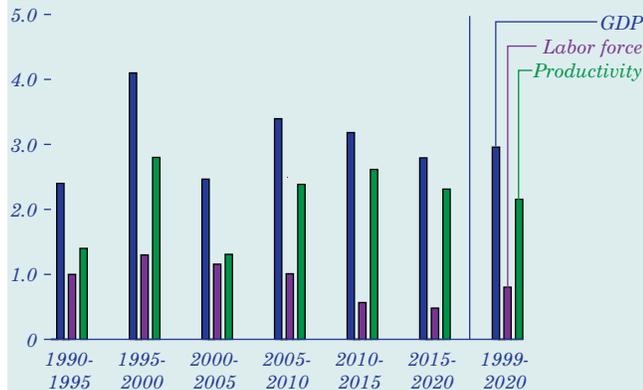
Energy market projections are subject to much uncertainty. Many of the events that shape energy markets are random and cannot be anticipated, including severe weather, political disruptions, strikes, and technological breakthroughs. In addition, future developments in technologies, demographics, and resources cannot be foreseen with any degree of certainty. Many key uncertainties in the *AEO2002* 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, analytical processes in the examination of policy initiatives.

Trends in Economic Activity

Strong Economic Growth Is Expected To Continue

Figure 13. Projected average annual real growth rates of economic factors, 2000-2020 (percent)

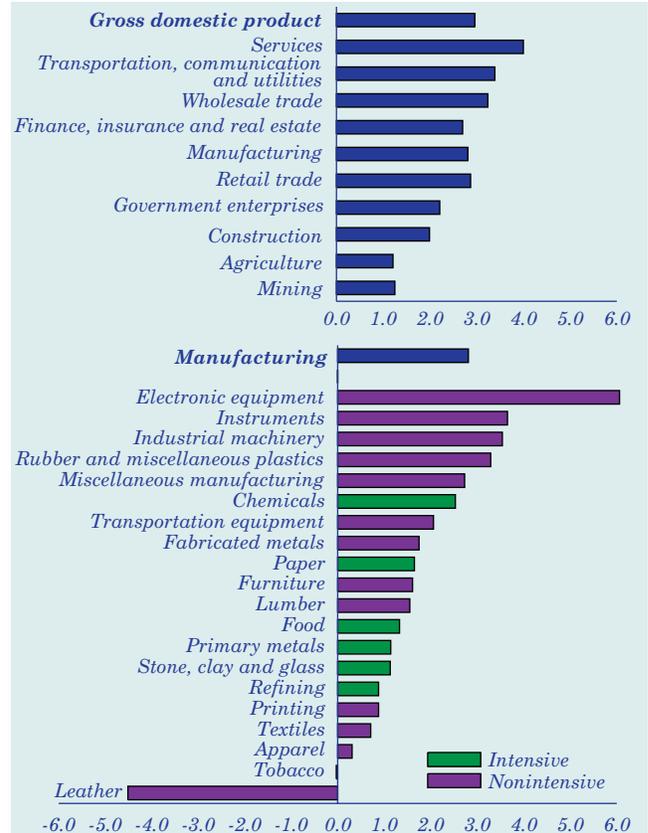


The output of the Nation's economy, measured by gross domestic product (GDP), is projected to increase by 3.0 percent per year between 2000 and 2020 (with GDP based on 1996 chain-weighted dollars) (Figure 13), slightly higher than the 2.9-percent growth projected in *AEO2001* for the same period. The projected growth rate for the labor force is similar to last year's forecast through 2020; however, in the *AEO2002* projection, productivity growth (GDP growth minus labor force growth) is 2.2 percent per year, up from 2.0 percent per year in *AEO2001*.

The projected rates of growth in GDP and labor force productivity are lower in the first 5 years of the forecast period, reflecting present economic uncertainties and revisions to historical trends. They are expected to pick up as productivity increases and the economy moves back to its long-term growth path. Total population growth is expected to remain fairly constant after 2000, with an annual growth rate of 0.8 percent per year; the slowing growth in the size of the labor force results instead from the increasing size of the population over the age of 65 years after 2000. As more people retire from the work force, and as life expectancy rises, the labor force participation rate—the percentage of the population over 16 years of age actually employed or looking for employment—is expected to decline as “baby boom” cohorts begin to retire. After the first 5 years of the forecast period, labor force productivity growth is expected to remain well above 2 percent per year through 2020.

Electronic, Industrial Equipment Lead Manufacturing Growth

Figure 14. Projected sectoral composition of GDP growth, 2000-2020 (percent per year)

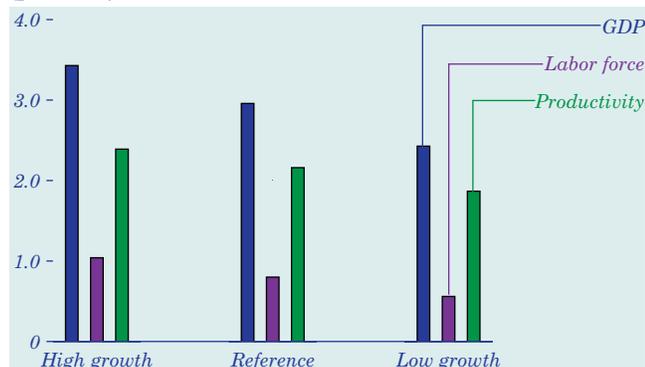


The projected growth rate for manufacturing production is 2.8 percent per year, slightly lower than the approximately 3.0-percent annual growth projected for the aggregate economy (Figure 14). Energy-intensive manufacturing sectors are projected to grow more slowly than the non-energy-intensive manufacturing sectors (1.2 percent and 3.3 percent annual growth, respectively).

The electronic equipment, instruments and related products, and industrial machinery sectors lead the expected growth in manufacturing, as semiconductors and computers find broader applications. The rubber and miscellaneous plastic products sector is expected to grow faster than manufacturing as a whole, with plastics continuing to penetrate new markets as well. As in last year's forecast, higher growth is expected for the services sector than for the manufacturing sector.

High and Low Growth Cases Reflect Uncertainty of Economic Growth

Figure 15. Projected average annual real growth rates of economic factors in three cases, 2000-2020 (percent)



To reflect the uncertainty in forecasts of economic growth, *AEO2002* includes high and low economic growth cases in addition to the reference case (Figure 15). The high and low growth cases show the projected effects of alternative growth assumptions on energy markets. The three economic growth cases are based on macroeconomic forecasts prepared by DRI-WEFA [75]. The DRI-WEFA forecasts incorporate the expected effects of recent events.

The high economic growth case assumes higher projected growth rates for population (1.0 percent per year), labor force (1.0 percent per year), and labor productivity (2.4 percent per year). With higher productivity gains, inflation and interest rates are projected to be lower than in the reference case, and economic output is projected to grow by 3.4 percent per year. GDP per capita is expected to grow by 2.4 percent per year, compared with 2.1 percent in the reference case. The low economic growth case assumes lower growth rates for population (0.6 percent per year), labor force (0.6 percent per year), and productivity (1.9 percent per year), resulting in higher projections for prices and interest rates and lower projections for industrial output growth. In the low growth case, economic output is projected to increase by 2.4 percent per year from 2000 through 2020, and growth in GDP per capita is projected to slow to 1.8 percent per year.

Long-Run Trend Shows Slowing of the U.S. Economic Growth Rate

Figure 16. Annual GDP growth rate for the preceding 20 years, 1970-2020 (percent)

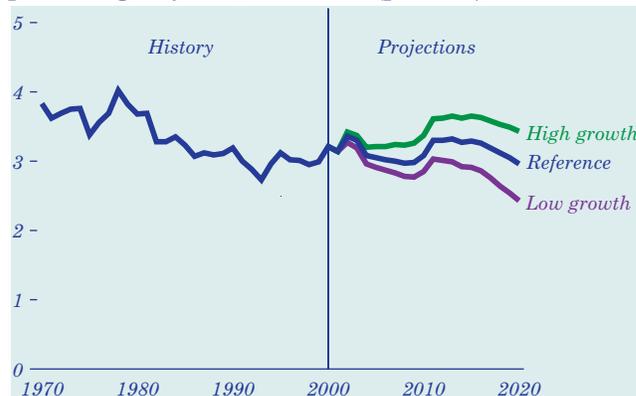


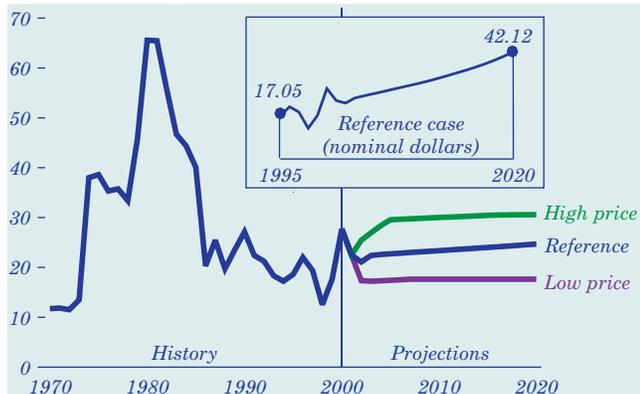
Figure 16 shows the trend in the moving 20-year average annual growth rate for GDP, including projections for the three *AEO2002* cases. The value for each year is calculated as the annual growth rate over the preceding 20 years. The 20-year average shows major long-term trends in GDP growth by smoothing more volatile year-to-year changes (although the increase shown for 2000-2002 reflects the slow and negative growth of 1980-1982). Annual GDP growth has fluctuated considerably around the trend. The high and low growth cases capture the potential for different paths of long-term output growth.

One reason for the variability of the forecasts is the composition of economic output, reflected by growth rates of consumption and investment relative to the overall GDP growth for the aggregate economy. In the reference case, consumption is projected to grow by 2.9 percent per year, while investment grows at a 4.1-percent annual rate. In the high growth case, growth in investment is projected to increase to 4.8 percent per year. Higher investment rates lead to faster capital accumulation and higher productivity gains, which, coupled with higher labor force growth, yield faster aggregate economic growth than projected in the reference case. In the low growth case, annual growth in investment expenditures is projected to slow to 3.1 percent. With the labor force also growing more slowly, aggregate economic growth is expected to slow considerably.

International Oil Markets

Projections Vary in Cases With Different Oil Price Assumptions

Figure 17. World oil prices in three cases, 1970-2020 (2000 dollars per barrel)



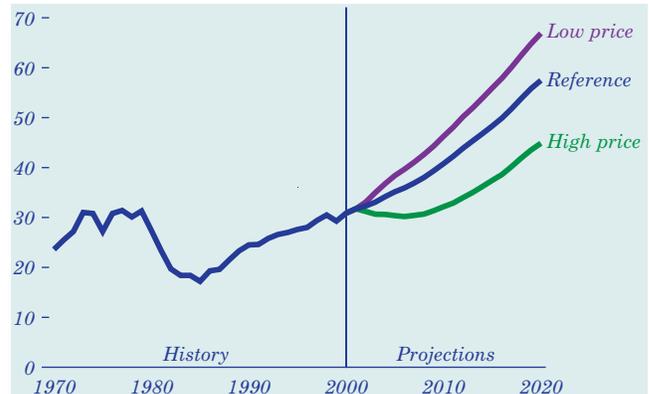
The historical record shows substantial variability in world oil prices, and there is similar uncertainty about future prices. Three *AEO2002* cases with different price paths allow an assessment of alternative views on the course of future oil prices (Figure 17). In the reference case, projected prices fall initially (through 2002) and then rise by about 0.9 percent per year, reaching \$24.68 in 2020 (all prices in 2000 dollars unless otherwise noted). In nominal dollars, the reference case price is expected to exceed \$42 in 2020. In the low price case, prices are projected to decline from their high in 2000, reaching \$17.41 by 2005, and to remain at about that level out to 2020. The high price case projects a price rise of about 2.2 percent per year from 2001 to 2015, with prices remaining at about \$30.50 out to 2020. The projected leveling off in the high price case is due to the market penetration of alternative energy supplies that could become economically viable at that price.

The price projections in the three cases are somewhat higher than those in *AEO2001*, reflecting the recent success of OPEC production cutbacks in raising oil prices and a more optimistic economic outlook for the world's developing economies, particularly in Asia. Production from countries outside OPEC is expected to show a steady increase, exceeding 45 million barrels per day in 2000 and increasing gradually thereafter to 61 million barrels per day by 2020.

Total worldwide demand for oil is expected to reach almost 119 million barrels per day by 2020. Developing countries in Asia show the largest projected growth in demand, averaging 3.8 percent per year.

Uncertain Prospects for Persian Gulf Production Shape Oil Price Cases

Figure 18. OPEC oil production in three cases, 1970-2020 (million barrels per day)



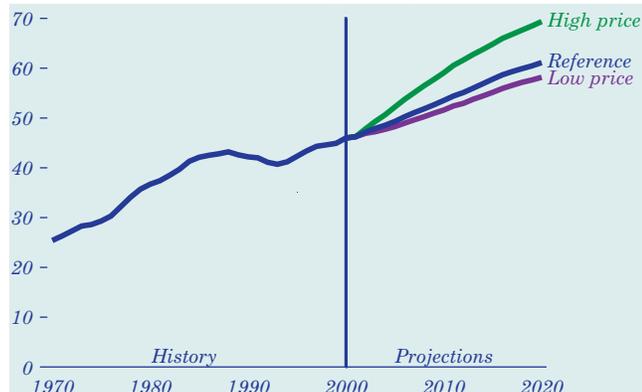
The three price cases are based on alternative assumptions about oil production levels in OPEC nations: higher in the low price case and lower in the high price case. With its vast store of readily accessible oil reserves, OPEC—primarily the Persian Gulf nations—is expected to be the principal source of marginal supply to meet increases in demand.

The projected increase in OPEC production capacity in the reference case is consistent with announced plans for OPEC capacity expansion [76]. By 2020, OPEC production is projected to be over 57 million barrels per day (almost twice its 2000 production) in the reference case, 45 million in the high price case, and 67 million in the low price case (Figure 18). Worldwide demand for oil varies across the price cases in response to the price paths. The forecasts of total world demand for oil range from about 125 million barrels per day in the low price case to about 115 million barrels per day in the high price case.

The variation in oil production forecasts reflects uncertainty about the prospects for future production from the Persian Gulf region. The expansion of productive capacity will require major capital investments, which could depend on the availability and acceptability of foreign investments. Iraq is assumed to continue selling oil only at sanction-allowed volumes through 2002. Iraq has indicated a desire to expand its production capacity aggressively, to about 6 million barrels per day, once the sanctions are lifted. Recent discoveries offshore of Nigeria, as well as Venezuela's aggressive capacity expansion plans, will more than accommodate increasing demand in the absence of Iraq's full return to the oil market.

Production Increases Are Expected for Non-OPEC Oil Producers

Figure 19. Non-OPEC oil production in three cases, 1970-2020 (million barrels per day)

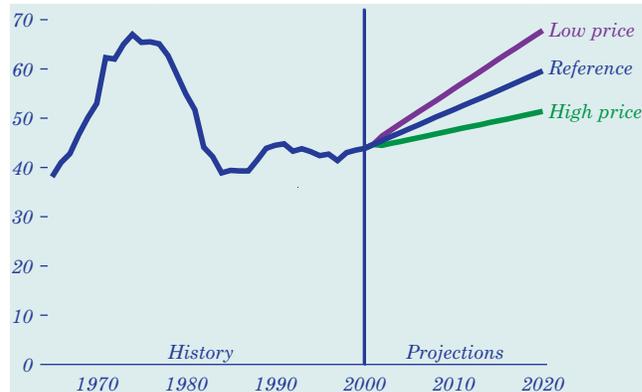


The growth and diversity in non-OPEC oil supply have shown surprising resilience even in the low price environment of the late 1990s. Although OPEC producers will certainly benefit from the projected growth in oil demand, significant competition is expected from non-OPEC suppliers. Countries in the Organization for Economic Cooperation and Development (OECD) that are expected to register production increases over the next decade include North Sea producers, Australia, Canada, and Mexico. In Latin America, Colombia, Brazil, and Argentina are showing accelerated growth in oil production, due in part to privatization efforts. Deepwater projects off the coast of western Africa and in the South China Sea will start producing significant volumes of oil early in this decade. In addition, much of the increase in non-OPEC supply over the next decade is expected to come from the former Soviet Union, and political uncertainty appears to be the only potential barrier to the development of vast oil resources in the Caspian Basin.

In the *AEO2002* reference case, non-OPEC supply is projected to reach 61 million barrels per day by 2020 (Figure 19). In the low oil price case, non-OPEC supply is projected to grow to 58 million barrels per day by 2020, whereas in the high oil price case it is projected to reach 69 million barrels per day by the end of the forecast period.

Persian Gulf Producers Could Take More Than Half of World Oil Trade

Figure 20. Persian Gulf share of worldwide crude oil exports in three cases, 1965-2020 (percent)

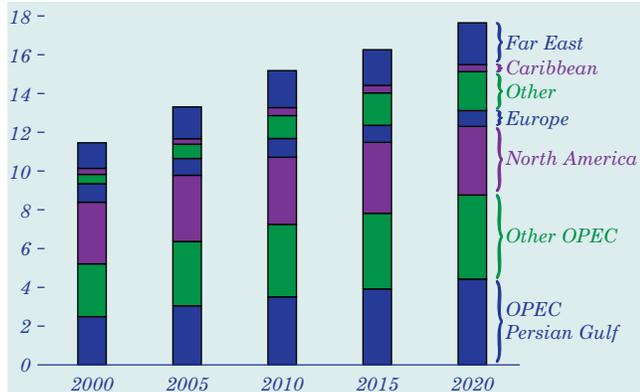


Considering the world market in crude oil exports, the historical peak for Persian Gulf exports (as a percent of world oil exports) occurred in 1974, when they made up more than two-thirds of the crude oil traded in world markets (Figure 20). The most recent historical low for Persian Gulf oil exports came in 1985 as a result of more than a decade of high oil prices, which led to significant reductions in worldwide petroleum consumption. Less than 40 percent of the crude oil traded in 1985 came from Persian Gulf suppliers. Following the 1985 oil price collapse, the Persian Gulf export percentage again began a gradual increase, but it leveled off in the 1990s at 40 to 50 percent when non-OPEC supply proved to be unexpectedly resilient.

In the *AEO2002* reference case, Persian Gulf producers are expected to account for more than 45 percent of worldwide trade by 2020—for the first time since the early 1980s. After 2002, the Persian Gulf share of worldwide petroleum exports is projected to increase gradually to almost 60 percent by 2020. In the low oil price case, the Persian Gulf share of total exports is projected to exceed 67 percent by 2020. All Persian Gulf producers are expected to increase oil production capacity significantly over the forecast period, and both Saudi Arabia and Iraq (assuming the lifting of United Nations export sanctions after 2002) are expected to nearly triple their current production capacity.

OPEC Is Expected To Account for Half of U.S. Oil Imports by 2020

Figure 21. Projected U.S. gross petroleum imports by source, 2000-2020 (million barrels per day)



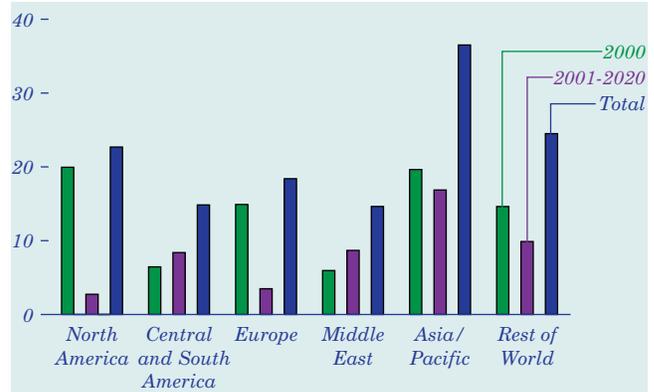
In the reference case, total U.S. gross oil imports are projected to increase from 11.5 million barrels per day in 2000 to 17.7 million in 2020 (Figure 21). Crude oil accounts for most of the expected increase in imports through 2005, whereas imports of petroleum products make up a larger share of the increase after 2005. Product imports are projected to increase more rapidly as U.S. production stabilizes, because U.S. refineries lack the capacity to process much larger quantities of imported crude oil.

OPEC is expected to account for less than 50 percent of total projected U.S. petroleum imports through most of the forecast. The OPEC share is expected to increase gradually to 50 percent in 2020, and the Persian Gulf share of U.S. imports from OPEC is projected to range between 48 and 51 percent consistently throughout the forecast. Crude oil imports from the North Sea are projected to increase slightly through 2010, then to decline gradually as North Sea production ebbs. Significant imports of petroleum from Canada and Mexico are expected to continue, and West Coast refiners are expected to import crude oil from the Far East to replace the declining production of Alaskan crude oil.

Imports of light products are expected to nearly triple by 2020, to 4.5 million barrels per day. Most of the projected increase is from refiners in the Caribbean Basin and the Middle East, where refining capacity is expected to expand significantly. Vigorous growth in demand for lighter petroleum products in developing countries means that U.S. refiners are likely to import smaller volumes of light, low-sulfur crude oils.

Asia/Pacific Region Is Expected To Surpass U.S. Refining Capacity

Figure 22. Projected worldwide refining capacity by region, 2000 and 2020 (million barrels per day)



Worldwide crude oil distillation capacity was 81.5 million barrels per day at the beginning of 2000. To meet the growth in international oil demand in the reference case, worldwide refining capacity is expected to increase by about 61 percent—to more than 131 million barrels per day—by 2020. Substantial growth in distillation capacity is expected in the Middle East, Central and South America, and the Asia/Pacific region (Figure 22).

The Asia/Pacific region was the fastest growing refining center in the 1990s. It surpassed Western Europe as the world's second largest refining center and, in terms of distillation capacity, is expected to surpass North America by 2002. While not adding significantly to their distillation capacity, refiners in the United States and Europe have tended to improve product quality and enhance the usefulness of heavier oils through investment in downstream capacity.

Future investments in the refinery operations of developing countries must include configurations that are more advanced than those currently in operation. Their refineries will be called upon to meet increased worldwide demand for lighter products, to upgrade residual fuel, to supply transportation fuels with reduced lead, and to supply both distillate and residual fuels with decreased sulfur levels. An additional burden on new refineries will be the need to supply lighter products from crude oils whose quality is expected to deteriorate over the forecast period.