

Macroeconomic Activity Module

The Macroeconomic Activity Module (MAM) represents interactions between the U.S. economy and the energy markets. How fast the economy grows, as measured by growth in real gross domestic product (GDP), is a key determinant of growth in energy demand. Associated economic factors, such as interest rates and disposable income, strongly influence various elements of the supply and demand for energy. At the same time, reactions to energy markets by the aggregate economy, such as a slowdown in economic growth resulting from increasing energy prices, are also reflected in this module. A detailed description of the MAM is provided in the U.S. Energy Information Administration (EIA) publication, [Model Documentation Report: Macroeconomic Activity Module \(MAM\) of the National Energy Modeling System](#).

Key assumptions

The U.S. economy, measured by GDP, is expected to increase by 1.9% per year from 2019 to 2050 in the Reference case. The growth rate of nonfarm employment and the rate of productivity change associated with employment help determine the rate of GDP growth. In the Reference case, real GDP grows by (Table 1)

- 1.9% per year from 2019 to 2020
- 1.9% from 2021 to 2030
- 1.8% from 2031 to 2040
- 1.8% from 2041 to 2050

The High Economic Growth case grows 0.5 percentage points faster compared with the Reference case from 2019 to 2050; the Low Economic Growth case grows 0.5 percentage points slower. Nonfarm employment shows higher growth from 2019 to 2020 in the Reference case and then returns to its long-term trend growth of 0.5% from 2019 to 2050. Both the High and Low Economic Growth cases differ by 0.2 to 0.3 percentage points compared with the Reference case from 2019 to 2050, reaching 0.8% and 0.3% in the High Economic Growth and Low Economic Growth cases, respectively. In the Reference case, productivity (measured as output per hour in nonfarm business) grows by 1.5% from 2019 to 2050, compared with the 1.9% growth experienced from 1989 to 2019. EIA expects nominal business-fixed investment to grow as a share of nominal GDP during the projection period (2019–2050). The resulting growth in the capital stock and the technology base of that capital stock helps sustain productivity growth of 1.5% from 2019 to 2050 in the Reference case.

Table 1. Economic growth in gross domestic product (GDP), nonfarm employment, and productivity

Assumptions	2019–2020	2021–2030	2031–2040	2041–2050	2019–2050
Real GDP (billion chain-weighted \$2009)					
High Economic Growth	2.4%	2.3%	2.3%	2.5%	2.4%
Reference	1.9%	1.9%	1.8%	1.8%	1.9%
Low Economic Growth	1.4%	1.4%	1.4%	1.3%	1.4%
Nonfarm Employment					
High Economic Growth	1.4%	0.6%	0.7%	0.9%	0.8%
Reference	1.1%	0.4%	0.6%	0.5%	0.5%

Low Economic Growth	0.8%	0.1%	0.4%	0.3%	0.3%
Productivity					
High Economic Growth	1.5%	2.1%	1.8%	1.9%	1.9%
Reference	1.0%	1.8%	1.4%	1.4%	1.5%
Low Economic Growth	0.7%	1.5%	1.0%	1.1%	1.2%

Source: U.S. Energy Information Administration, AEO2020 National Energy Modeling System runs: ref2020.d112119a, lowmacro.d112619a, and highmacro.d112619a.

The U.S. Census Bureau's middle series population projection is the basis for population growth in AEO2020. Total U.S. population is expected to grow by 0.5% per year from 2019 to 2050 in the Reference case, and the share of population over age 65 is expected to increase over time. The share of the labor force in the population over 65 is also projected to increase in the projection period.

EIA anticipates steady growth in labor productivity to achieve the Reference case's long-term 1.9% GDP growth. The improvement in labor productivity reflects the positive effects of a growing capital stock as well as technological change over time. Nonfarm labor productivity annual growth is expected to remain between 1.0% and 1.9% throughout the projection period.

To reflect uncertainty in the Reference case projection of U.S. economic growth, AEO2020 uses High and Low Economic Growth cases to project the possible impacts of alternative economic growth assumptions on energy markets. The High Economic Growth case incorporates higher population, labor force, investment, capital stock, and productivity growth rates than the Reference case. Higher productivity helps reduce the cost of production that is passed on to consumers as lower prices. Lower prices, in turn, promote higher demand, greater output, and more employment. Economic output in the High Economic Growth case is projected to increase by 2.4% per year from 2019 to 2050. The Low Economic Growth case assumes lower population, labor force, investment, capital stock, and productivity gains that result in higher production costs and consumer prices and lower output and employment. In the Low Economic Growth case, economic output is expected to increase by 1.4% per year during the projection period.