Macroeconomic Activity Module

The Macroeconomic Activity Module (MAM) represents the interaction between the U.S. economy as a whole and energy markets. The rate of growth of the economy, measured by the growth in gross domestic product (GDP) is a key determinant of the growth in demand for energy. 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 EIA publication, *Model Documentation Report: Macroeconomic Activity Module (MAM) of the National Energy Modeling System*, DOE/EIA-M065(2003), (Washington, DC, January 2003).

Key Assumptions

The output of the U.S. economy, measured by GDP, is expected to increase by 3.0 percent between 2002 and 2025 in the reference case. The growth in GDP can be explained by two key factors: the growth rate of nonfarm employment and the rate of productivity change associated with employment. As Table 3 indicates, GDP growth slows down in each of the periods identified, from 3.3 percent between 2002 and 2005, to 3.2 percent between 2005 and 2010, to 2.7 percent in the last five-year period from 2020 to 2025. The table highlights two elements of the forecast that explain these trends – nonfarm employment and productivity as measured by output per hour of nonfarm business. In the near term from 2002 through 2005, the growth in nonfarm employment is low at 0.9 percent compared with the second half of the 1990s, while the economy is currently experiencing strong productivity growth of 2.8 percent. Over the forecast, the rate of employment growth increases between 2005 and 2010, reflecting a lag in the recovery from the loss in emploment during the recession beginning in 2001, then decline over the remainder of the forecast period. This reflects a view that while population growth is expected to remain fairly constant after 2002, growing by 0.8 percent per year on average, employment growth is expected to slow as a result of demographic changes, such as an increase in the share of the population aged 65 and over from 12 percent in 2002 to 18 percent in 2005.

Table 3.   Growth in Gross Domestic Product, Labor Force, and Productivity
(Percent per Year)

Assumptions	2002-2005	2005-2010	2010-2015	2015-2020	2020-2025	2002-2025
GDP (Billion Chain-Weighted $1996)						
High Growth	3.8	4.0	3.2	3.1	3.3	3.5
Reference	3.3	3.2	3.0	2.8	2.7	3.0
Low Growth	2.5	2.9	2.4	2.2	2.0	2.4
Non Farm Employment						
High Growth	1.5	2.0	1.2	1.1	1.4	1.4
Reference	0.9	1.6	1.1	1.0	0.9	1.1
Low Growth	0.1	0.9	0.5	1.2	1.6	0.9
Productivity						
High Growth	3.3	2.4	2.7	2.6	2.5	2.7
Reference	2.8	2.1	2.3	2.2	2.1	2.3
Low Growth	2.3	1.9	1.9	1.6	1.6	1.8

Source: Energy Information Administration, *AEO2004* National Energy Modeling System runs: *AEO2004*.d101703e; lm2004.d101703a; and hm2004.d101703a.

To achieve the reference case's long-run 3.0 percent economic growth, there is an anticipated steady growth in labor productivity. The improvement in labor productivity reflects the positive effects of a growing capital stock as well as technological change over time. Nonfarm labor productivity is expected to diminish from its current high level to a more sustainable level between 2.1 and 2.3 percent for the remainder of the forecast period from 2005 through 2025. Business fixed investment as a share of nominal GDP is expected

to grow over time. The resulting growth in the capital stock and the technology base of that capital stock helps to sustain productivity growth of 2.3 percent from the 2002 to 2025.

To reflect the uncertainty in forecasts of economic growth, the *AEO2003* forecasts use high and low economic growth cases along with the reference case to project the possible impacts on energy markets. The high economic growth case incorporates higher population, labor force and productivity growth rates than the reference case. Due to the higher productivity gains, inflation and interest rates are lower compared to the reference case. Investment, disposable income, and industrial production are increased. Economic output is projected to increase by 3.5 percent per year between 2002 and 2025. The low economic growth case assumes lower population, labor force, and productivity gains, with resulting higher prices and interest rates and lower industrial output growth. In the low economic growth case, economic output is expected to increase by 2.4 percent per year over the forecast horizon.