

GROWTH IN ENERGY DEMAND

Growth in the world and the U. S. energy consumption as a function of time, follow what is known as exponential function. The exponential increase is characterized as follows. The amount of change (increase in energy consumption) per unit time is proportional to the quantity (or consumption) at that time.

$$\Delta N/\Delta t \propto N$$

or

$$\Delta N/\Delta t = \lambda N$$

Where Greek letter Δ (delta) is the change or increment of the variable and λ (lambda) is the growth rate. After some mathematical methods, it can be shown that the equation changes to the form

$$N = N_0 e^{\lambda t}$$

where e is a constant = 2.71

We can determine how long it takes for N_0 to become $2N_0$ (twice its original number or double). That time period is called doubling time. After some mathematical steps it can be written as:

Doubling Time =

70 / % Growth Rate per Year

Illustration

Use of coal is projected to increase at the rate of 1.7% per year in the U.S. How long will it take to double its usage?

$$\text{Doubling Time (years)} = 70/1.7 = 41.17 \text{ years}$$

In 41.17 years, the consumption of coal will be twice as much as it is today.

World Energy Outlook

The United States Department of Energy projects strong growth for worldwide energy demand over the 27-year projection period from 2008 to 2035.

- Total world consumption of marketed energy is expected to expand by 53 percent, from 505 quadrillion British thermal units (Btus) in 2008 to 559 quadrillion Btus in 2020 and then to 770 quadrillion Btus in 2035.

- The fastest growth is projected for the nations of developing Asia, including China and India, where robust economic growth accompanies the increase in energy consumption over the forecast period.
- Gross domestic product (GDP) in developing Asia is expected to expand at an average annual rate of 5.3 percent, compared with 2.1 percent per year for the world as a whole.

With such strong growth in GDP, demand for energy in developing Asia doubles over the forecast, accounting for 50 percent of the total projected increment in world energy consumption and 70 percent of the increment for the developing world alone.

Asia is heavily populated and continues to grow at a rapid pace. As a result industrial growth has also increased, requiring a need for more energy.

Source: <https://www.e-education.psu.edu/egee102/node/1931>