



# Why Efficiency Gains Won't Reduce Consumption

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Jeavons' paradox says energy efficiency improvements tend to increase energy consumption, so without other consumption controls, efficiency improvements cannot decrease consumption.

When there are "other consumption controls", for example irremediable depletion or punishing taxes, efficiency improvements mitigate the economic effect of

having to make do with less energy, but are limited in the three ways described below. In the case of irremediable depletion, these limitations must be understood in the context of the relationship of energy to economic growth. The economy grows only when more things, or bigger things, or more services, are delivered. At constant energy efficiency, economic growth in any sector requires growing energy use..

**Limitation 1)** Rate of response. Efficiency gains are made by designing and making new products, buildings, transportation systems, and infrastructure. The design and implementation takes time -- years. The expected oil production decline is between 2 and 3% per year, indefinitely. Actually, it's worse-- the decline of maximum possible production is expected to be linear, a constant number of barrels per year at about 2% of the 2010 expected production rate for about 40 years. (See the ASPO graph.) This is an enormous rate of decline of the energy input to society. The rate of introduction of efficiency improvements will have great difficulty keeping up with the decline. If growth is to be maintained, the yearly introduction of efficiency improvements must be greater than the rate of decline of energy sources. Less energy will be used year after year, certainly, but at least some of the decrease seems likely to be due to stopping economically productive activity.

**Limitation 2)** A high rate of introduction of energy efficiency improvements requires a high rate of economic activity and a correspondingly high rate of energy usage. In times of relentlessly decreasing energy availability, there will be severe competition between alternative uses of limited energy -- to feed people and heat houses, to provide consumer goods, or to invest in efficiency improvements.

**Limitation 3)** In any field, there will be limits to the energy efficiencies that can be made. Even if growth has been maintained by improvements in energy efficiency, when improvements to energy efficiency stop, as they must, or otherwise become insufficient to offset the effects of declining energy input, economic growth must stop.