

# How much energy do we really need?

Modern societies use an unbelievable amount of energy. Not just our houses and our gas tanks, but every thing we buy, eat, or use requires a lot of energy to make it available to us.

## Predicting future energy demand

A lot of people with a lot of knowledge and expertise spend a lot of time trying to understand and predict this accurately in the near future. Their predictions vary widely.

It doesn't take a crystal ball to understand roughly what we need decades from now. You only need to know the current situation and reasonable estimates of two things: 1) how much will each of us use relative to today; and 2) how many of us will there be.

A large increase in the world's demand for electricity seems both imminent and desirable. Efficiency improvements are not enough.

## United States Energy Use

Information	1973	2011	Average Annual Growth Rate
Energy - all types (million BTU per capita)	360	310	-0.36%
Energy - all types (Quadrillion BTU)	76	97	0.66%
Electrical energy (kW-hr per capita)	8,000	12,000	1.1%
Electrical energy (GW-yr)	200	440	2.2%
Population (million)	210	310	1.0%

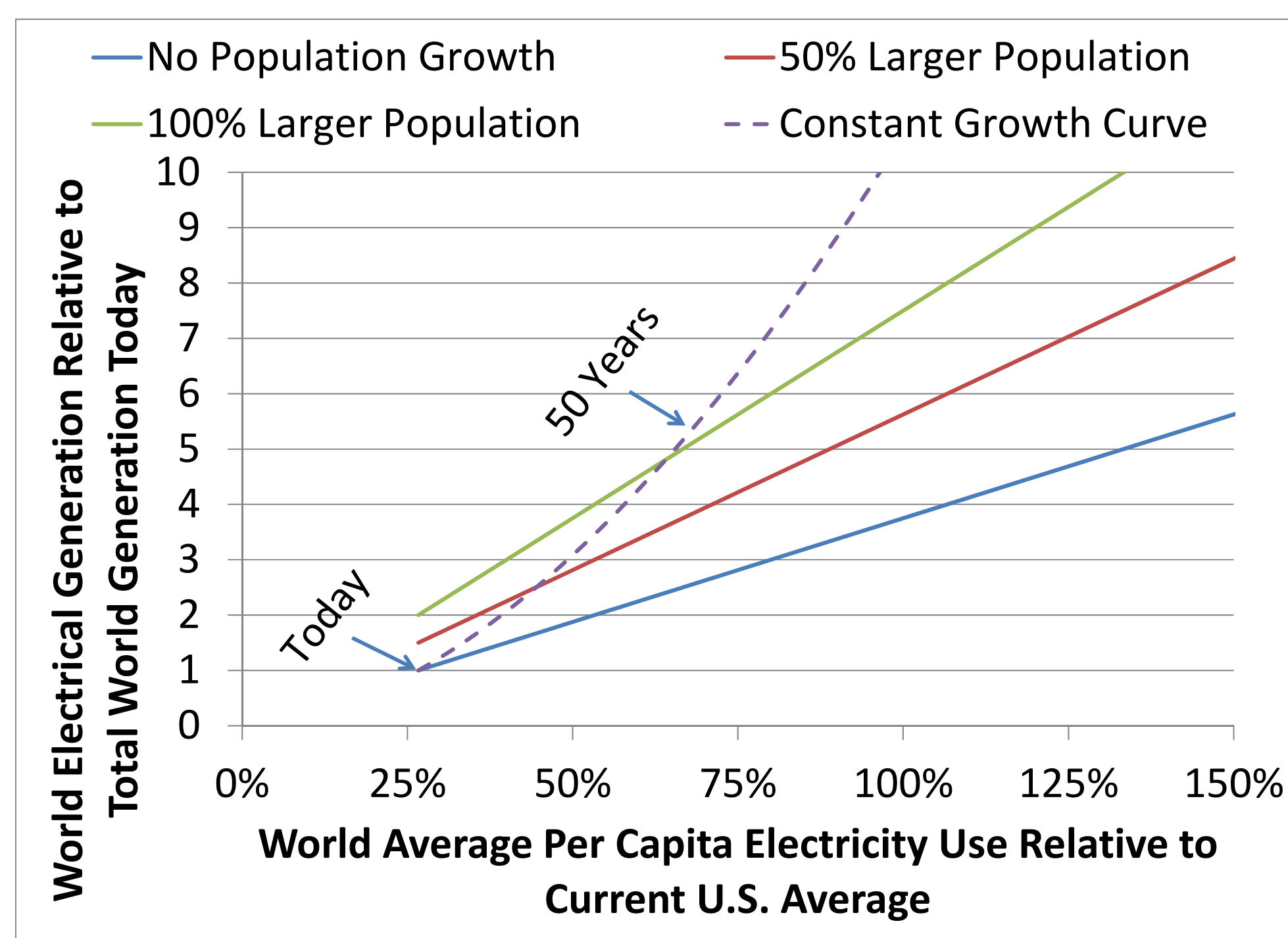
Note: Energy can be used in many forms and often different units are used based on the form. BTU, kW-hr, and GW-yr are simply different units for energy like inches, kilometers, and miles are different units for length.

## World Energy Use

Information	1973	2011	Average Annual Growth Rate
Energy - all types (BTU per capita)	62	77	0.58%
Energy - all types (Quadrillion BTU)	240	530	2.1%
Electrical energy (kW-hr per capita)	1,600	3,200	1.9%
Electrical energy (GW-yr)	700	2,500	3.4%
Population (million)	3,900	6,900	1.5%

## Very Rough Predictions of Energy Needs

Assuming growth continues for the next 50 years like it has for the last 38 years – need over 5 times as much electricity world wide – world wide average is still only the same as the U.S. in 1973 (70% of today).



Note: Growth curve assumes same growth rate of population and per capita electrical energy demand for the world as the average from 1973 to 2011.

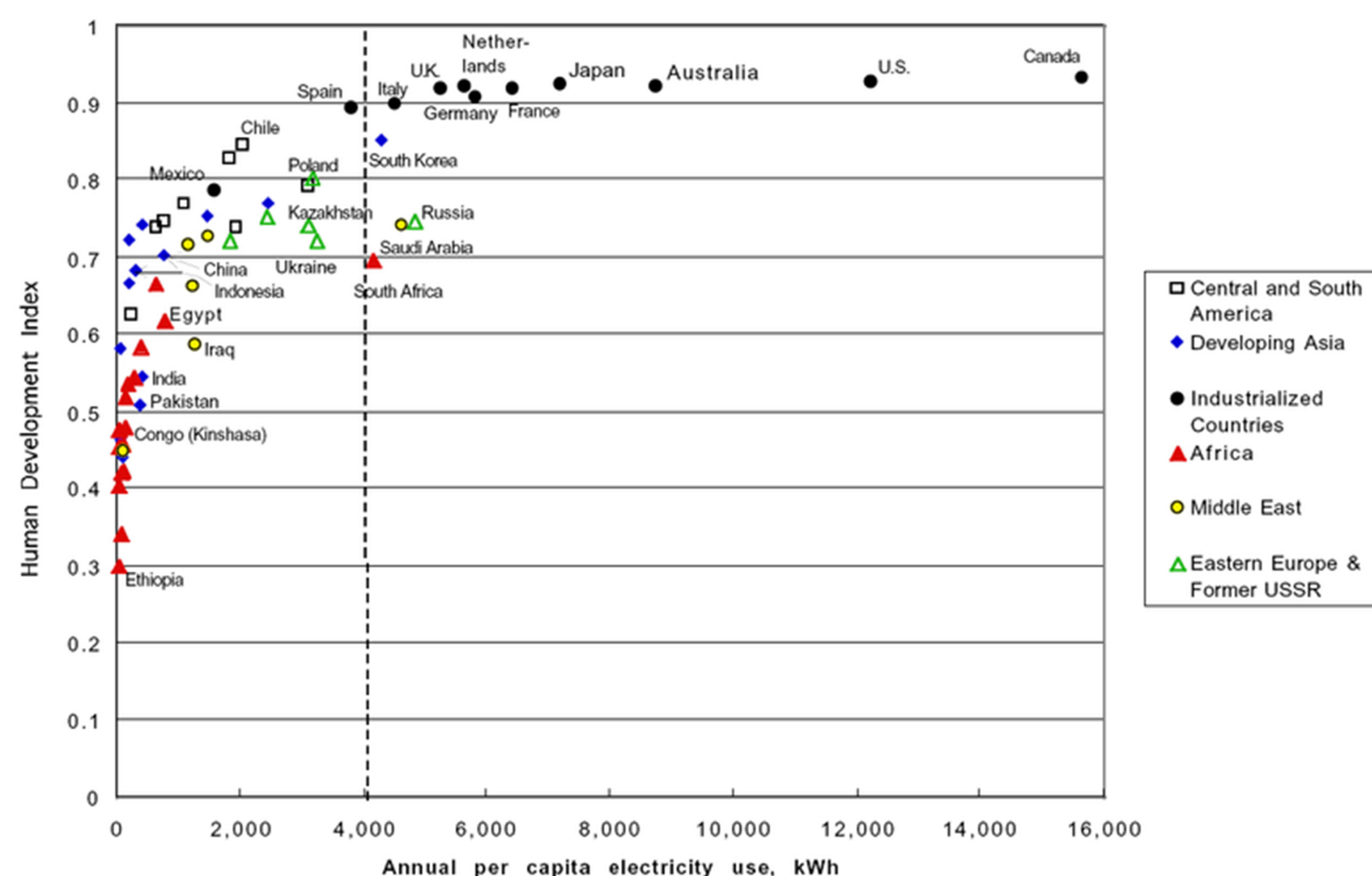
These type of extrapolations are typically very wrong in the long run. However, they still don't take us outside the range of the average that actually exists today in America for per capita electricity use for 70 years.

Population increases by 50% in 27 years and 100% in 46 years.

Electricity demand doubles every 21 years.

## Benefits of Electricity Expansion

Strong correlation between quality of life and energy, especially electricity use.



Human Development Index (HDI) is a composite index measuring average achievement in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living.

