

# Brief General Energy & Environmental Overview

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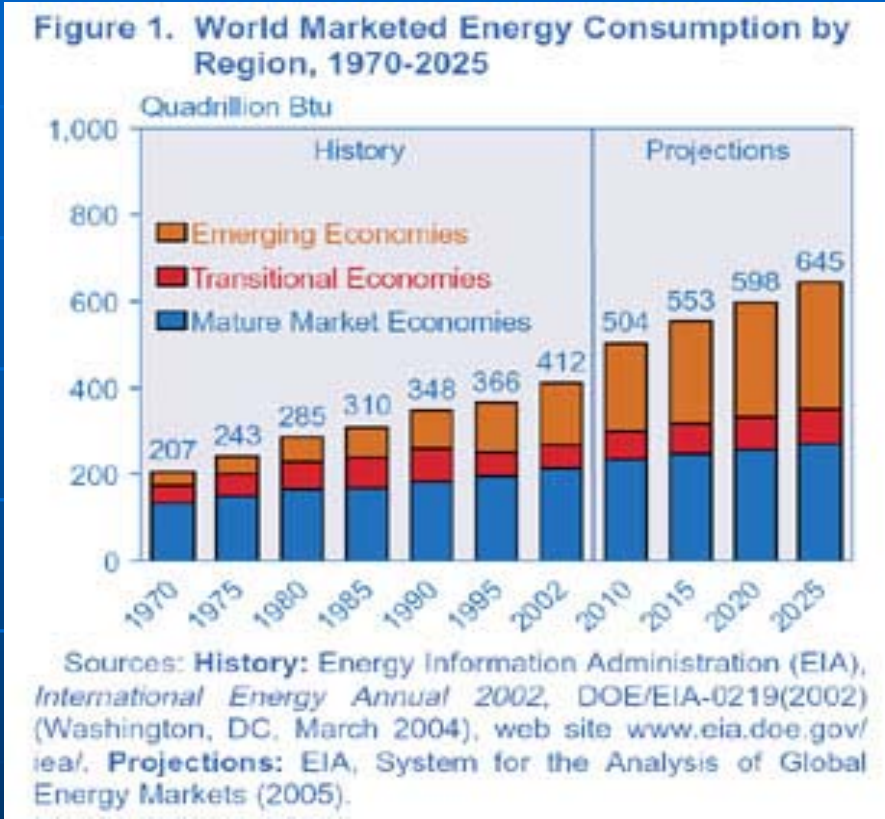
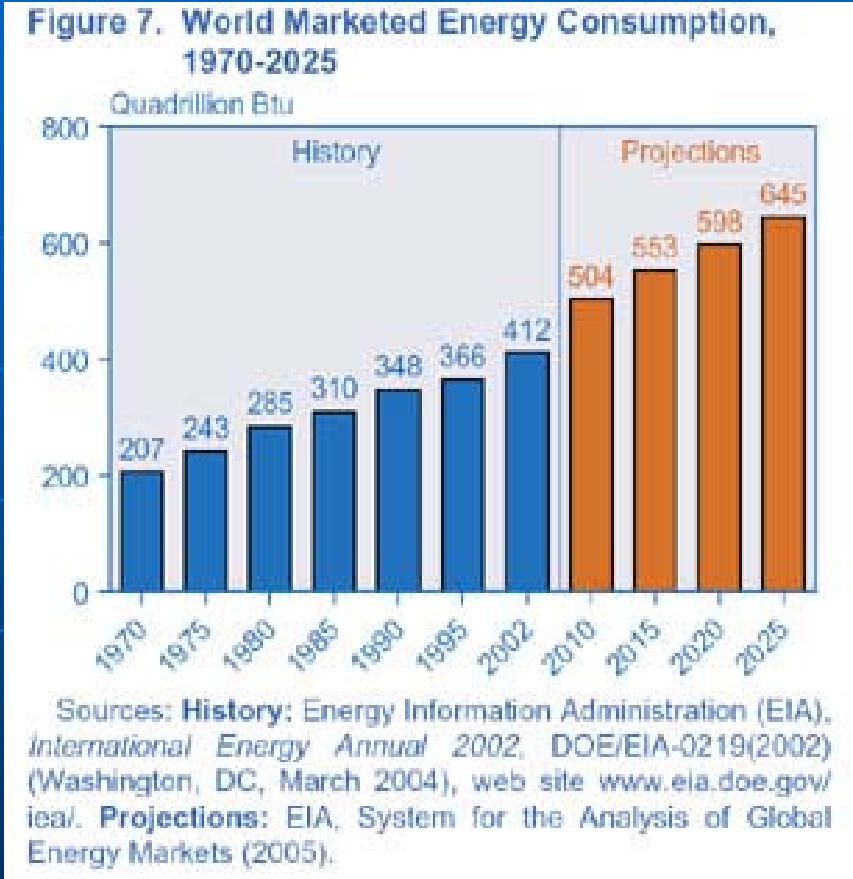
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# World & National Energy Issues – Quick Overview

- World Energy Supply & Demand – Total & Regional



- Total world energy consumption expected to increase **57%** by 2025 – **40%** in US.
- China's economic growth is expected to be the highest in the world and have the world's largest economy.

# The Environmental Impact Factor

$$I = P * C * TF$$

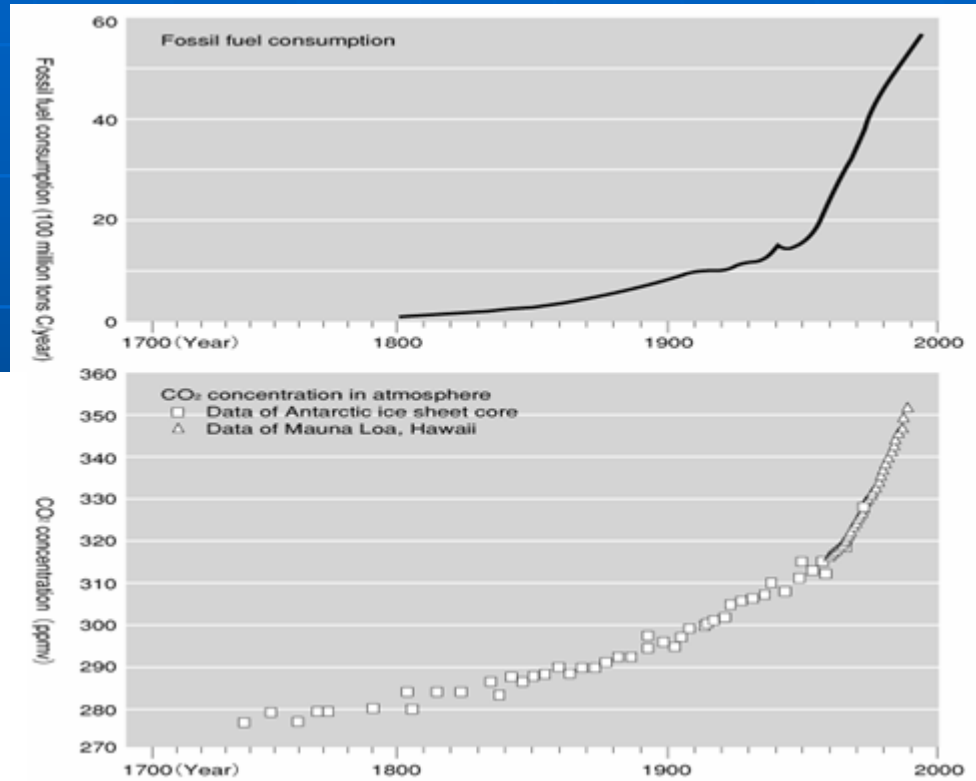
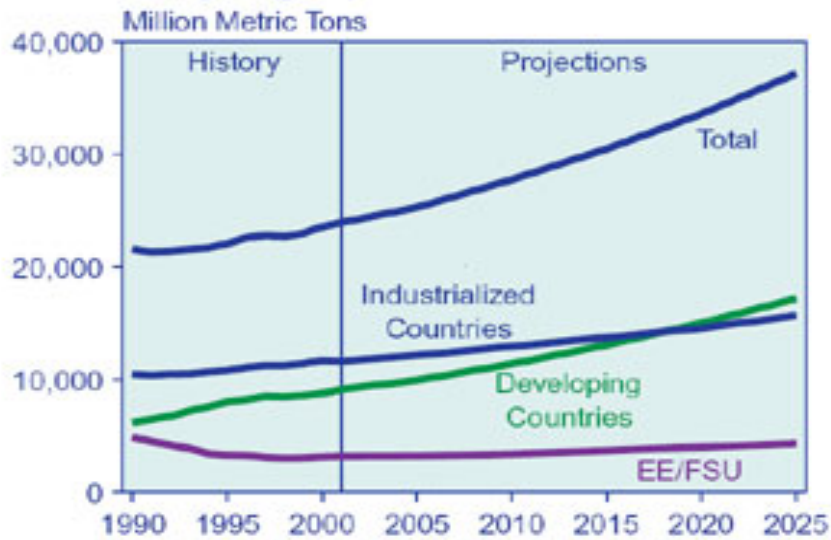
Environmental Impact, I =

Population, P \*

Consumption, C \*

Technology & Fuel, TF

**Figure 72. World Carbon Dioxide Emissions by Region, 1990-2025**



# The Environmental Impact Factor

- Coal - abundant resource, but potentially huge environmental consequences

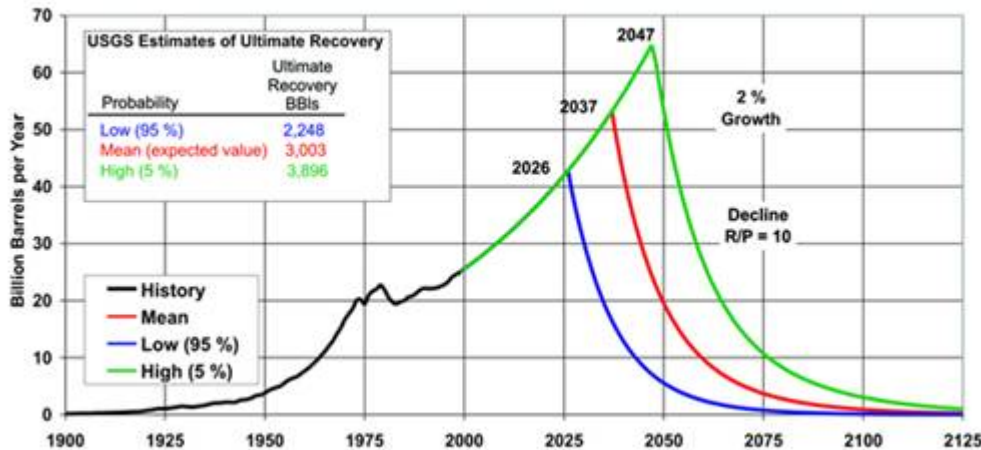


- Petroleum - only viable liquid fuel, but potential resource problems and a contributor to GHG emissions

- Nuclear - waste disposal problems (?), potential proliferation aspects, but no real unsolvable environmental problems
- Renewables - diffuse, intermittent, costly (?), but sustainable and “environmentally-friendly” and a means for climate change management



Figure 2. Annual Production Scenarios with 2 Percent Growth Rates and Different Resource Levels (Decline R/P=10)



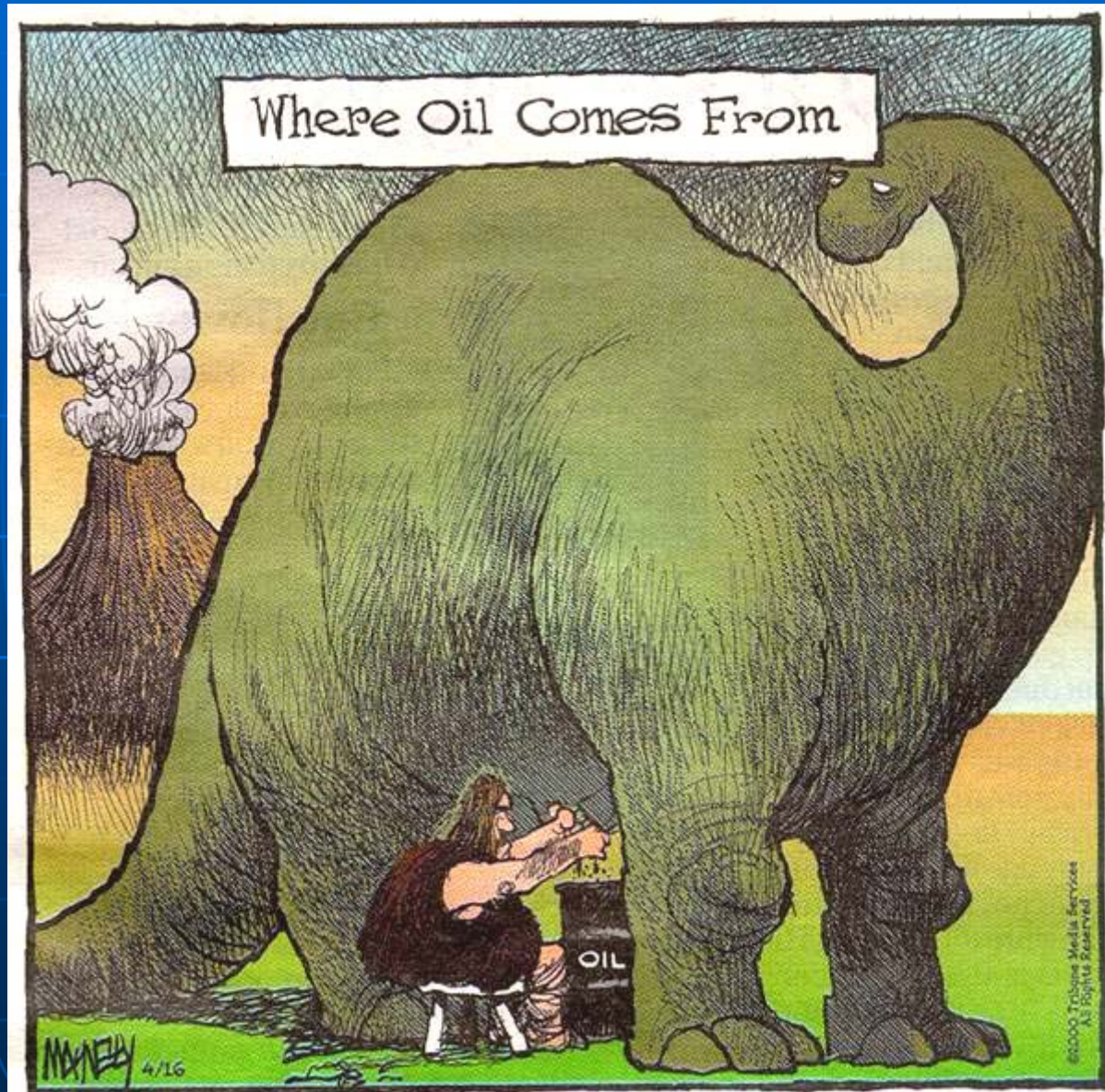
Source: Energy Information Administration  
Note: U.S. volumes were added to the USGS foreign volumes to obtain world totals.

# *Improve total system efficiency with respect to all energy resources*

## **Consider the “Total Picture”**

- Resource Allocation (fossil fuels and renewables)
- Efficient Energy Use (efficiency and conservation)
- Effect on Environment (air, soil, and water quality)
- Development and Implementation of Alternative Energy Sources and Technologies
- Economics (true cost and life-cycle accounting)

# Where Energy Comes From



# Overview



China Oil Consumption is forecasted to increase 15% in 2004

OECD Oil Consumption is forecasted to increase 1% in 2004

## The Challenge

- Energy Today - 214 MMBOE/D
  - ★ US 45.6 MMBOE/Day
- Energy 2025 - 300 MMBOE/D
  - ★ US 60.2 MMBOE/Day
- Energy – Basis for Civilization
- The Resource Is Adequate

# Humanity's Top Ten Problems Next 50 Years

Richard Smalley, 2003 (1996 Noble Laureate in Chemistry)

1. **ENERGY**
2. **WATER**
3. **FOOD**
4. **ENVIRONMENT**
5. **POVERTY**
6. **TERRORISM & WAR**
7. **DISEASE**
8. **EDUCATION**
9. **DEMOCRACY**
10. **POPULATION**

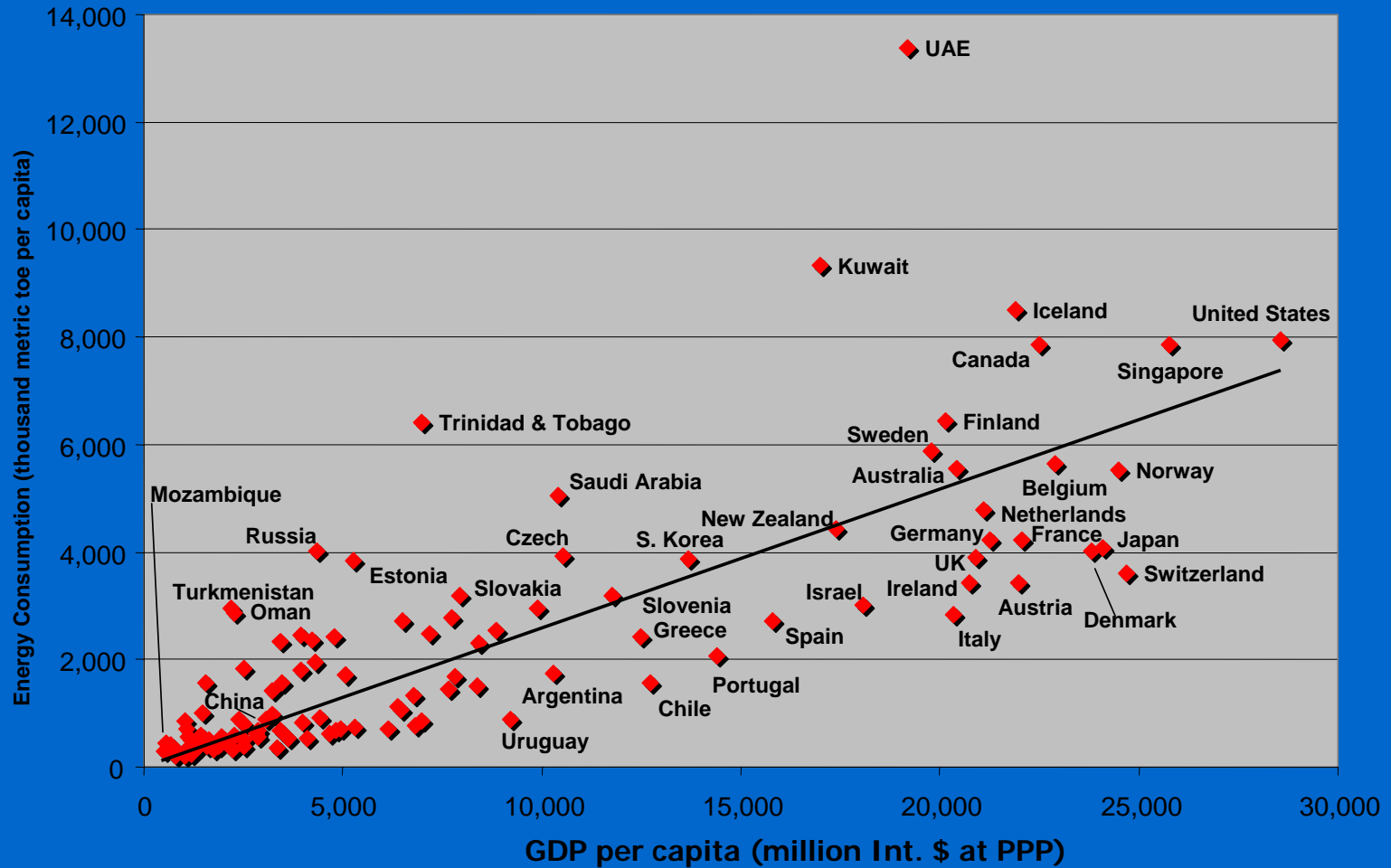


2003	6.3	Billion People
2050	8-10	Billion People

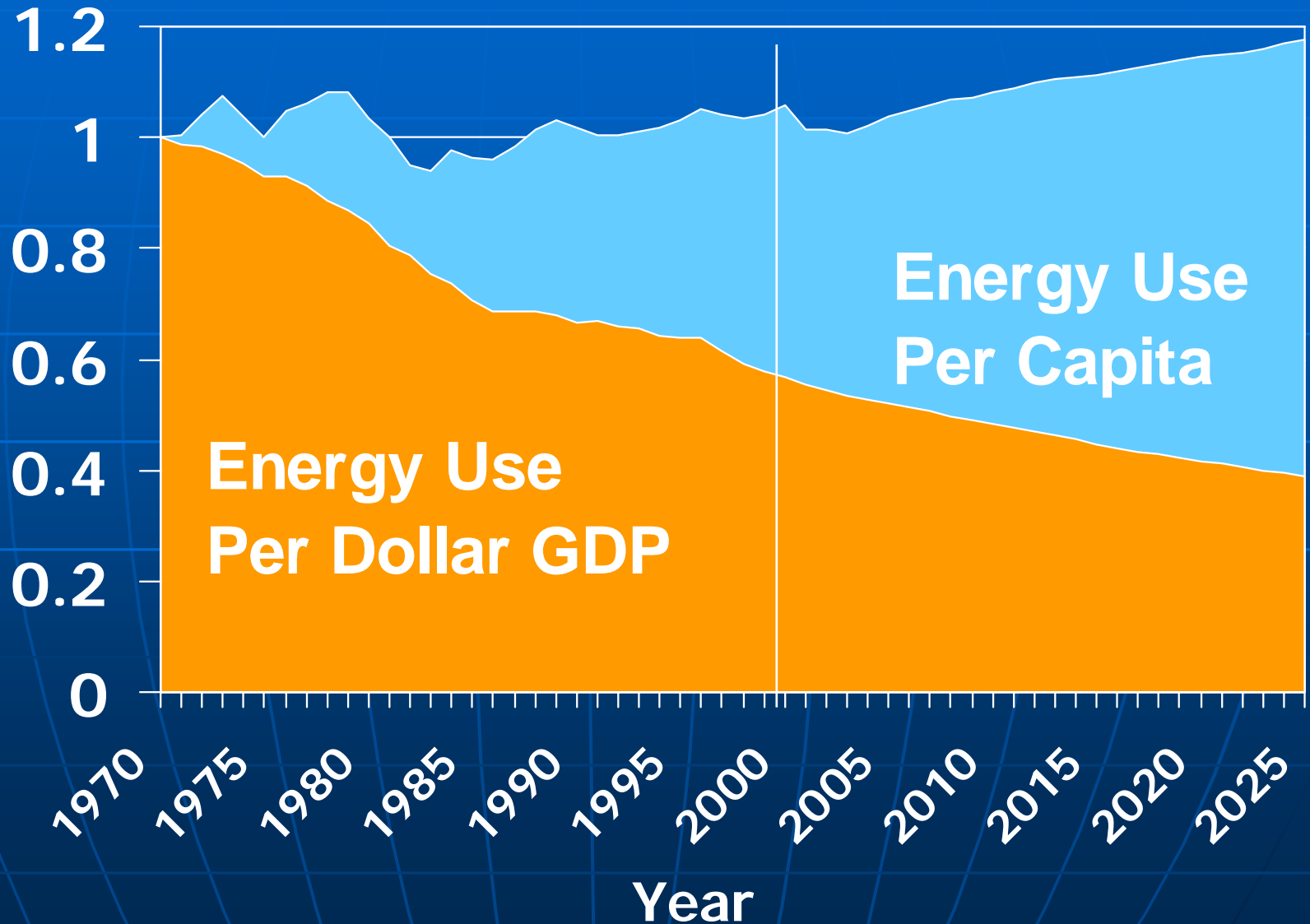


# World Energy

## GDP vs. Energy Consumption



# US Energy Efficiency



# The Need for Action

Today, 1.6 billion people – one quarter of the world population have no access to electricity.

In 2030, 1.4 billion people 17% of the world population will still not have electricity.

2.4 billion people rely on traditional biomass – wood, agricultural residues and dung – for cooking and heating.

- ❑ Energy Today – 214 MMBOE/Day
  - US 45.6 Million BOE/Day
- ❑ Energy 2025 – 300 MMBOE/Day
  - US 64.3 MMBOE/Day
- ❑ Growth 18.29 Million BOE/Day
  - Over the next 25 years
- ❑ Portfolio of Energy Options
  - Technically Sound
  - Economically Sustainable
  - Significant in Size
  - Minimize Environmental Impact
- ❑ Need for Investment
  - Technology
  - Education
  - People