

# The Role of Nuclear Energy in Our Nation's Future

On December 3, 2007, the University of Maryland's American Nuclear Society Student Chapter (ANSSC), advised by Department of Materials Science and Engineering Professor Mohamad Al-Sheikhly, hosted a panel discussion on the role of nuclear energy in our nation's future.

Keynote:           **Roscoe Bartlett**, U.S. Representative  
  Sixth District, Maryland  
**David Brown**, V.P., Congressional  
  Affairs, Exelon Corporation  
**Col. Paul Roege**, U.S. Army Nuclear and  
  Combating WMD Agency  
  (USANCA)

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Video on Google:

***<http://video.google.com/videoplay?docid=-67051181112457402&hl=en>***



# **The Role of Nuclear Energy in Our Nation's Future**

**Keynote**

**American Nuclear Society Student Chapter  
Panel Discussion**

**University of Maryland, College Park  
*December 3, 2007***

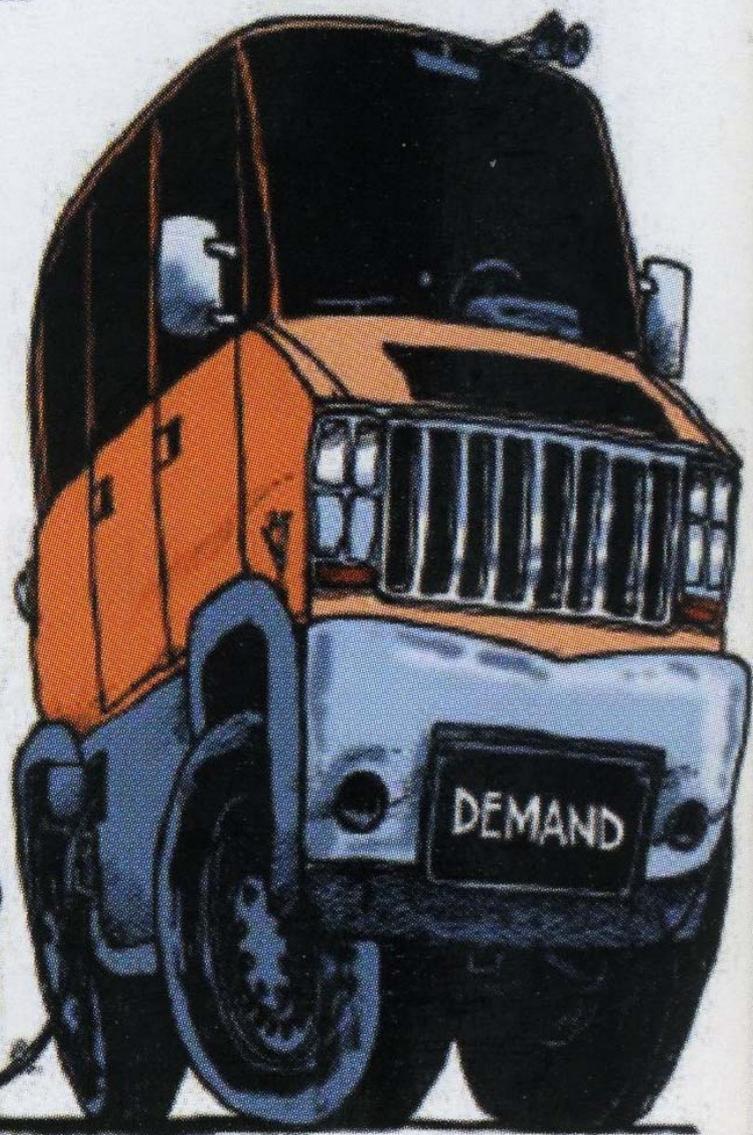
***Congressman Roscoe Bartlett***

***[www.bartlett.house.gov/EnergyUpdates](http://www.bartlett.house.gov/EnergyUpdates)***

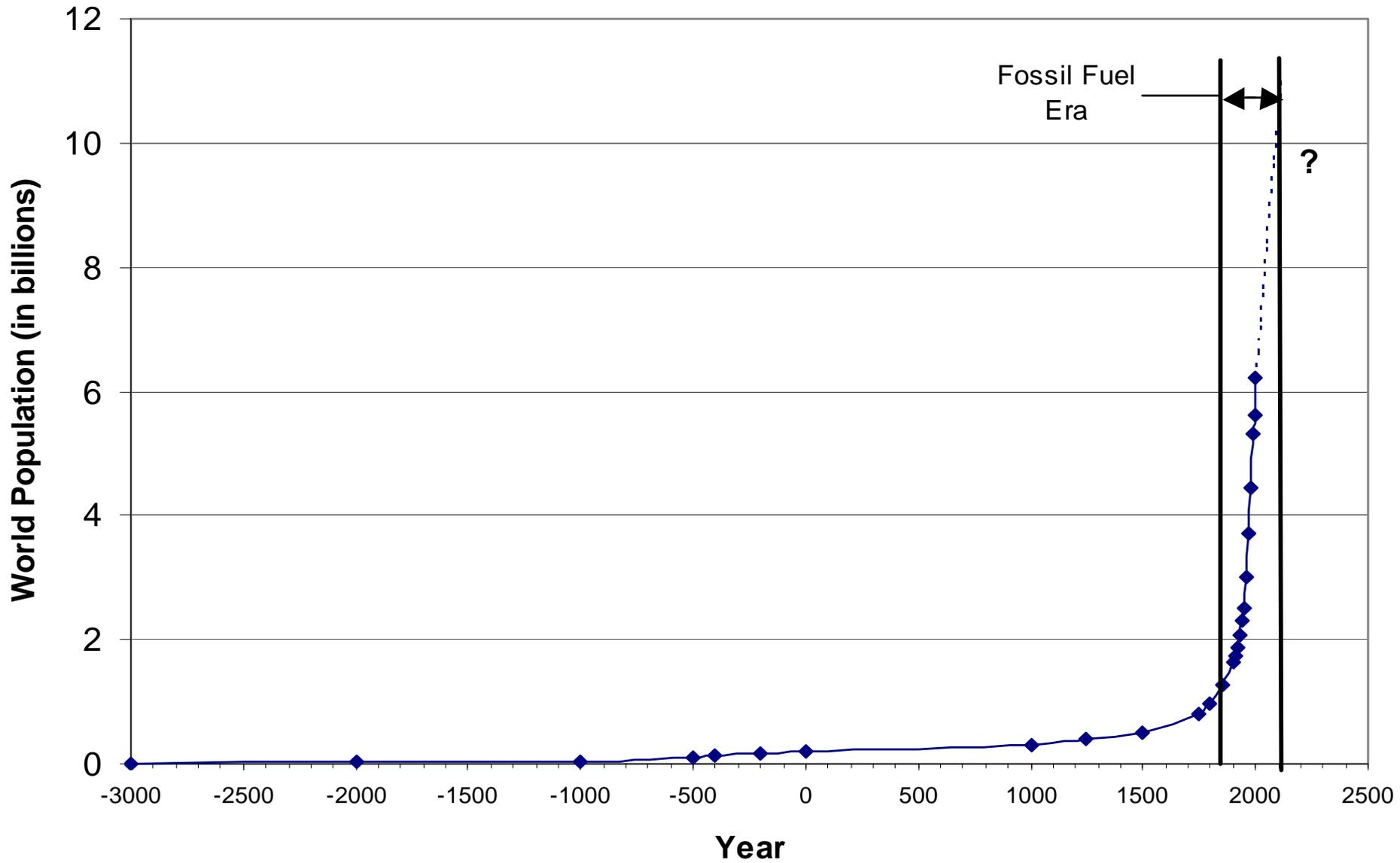


THE WALL STREET JOURNAL  
Business Edition

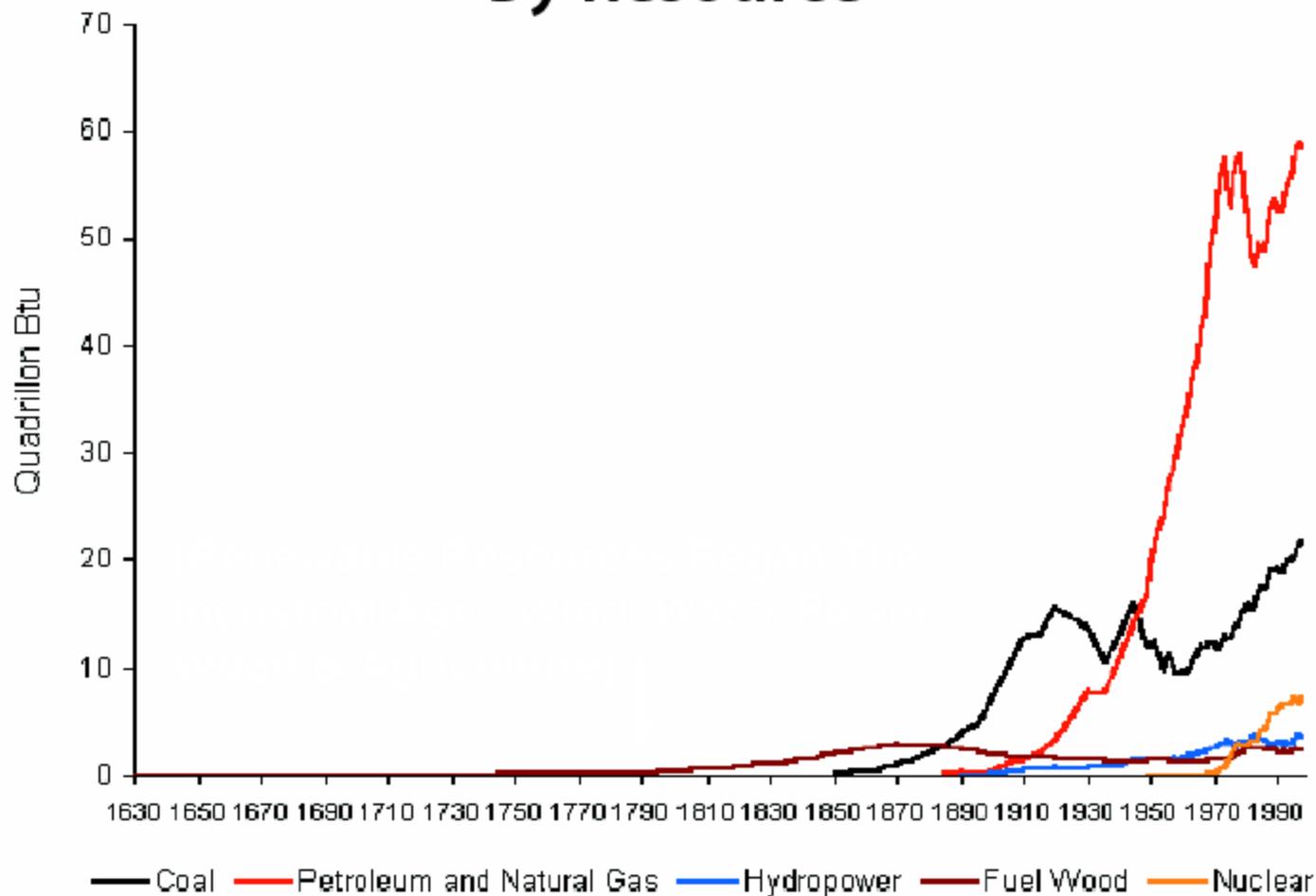
JUST WHY  
IS GAS SO  
EXPENSIVE?



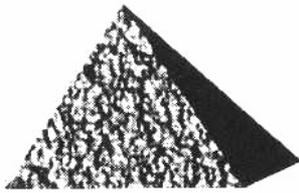
# World Population (in billions)



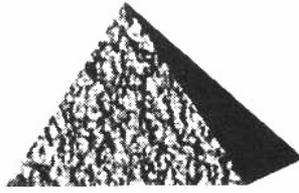
# US Consumption of Energy By Resource



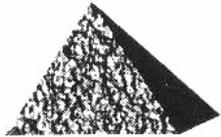
# EACH U.S. CITIZEN USES ANNUALLY:



8440 LBS.  
STONE



8250 LBS.  
SAND AND GRAVEL



720 LBS.  
CEMENT



500 LBS.  
CLAYS



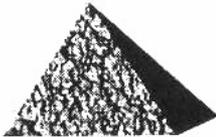
430 LBS.  
SALT



338 LBS.  
PHOSPHATE  
ROCK



1032 LBS.  
OTHER  
NONMETALS



1140 LBS.  
IRON AND  
STEEL



49 LBS.  
ALUMINUM



21 LBS.  
COPPER



14 LBS.  
LEAD



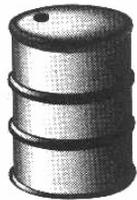
12 LBS.  
ZINC



12 LBS.  
MANGANESE



21 LBS.  
OTHER  
METALS



8,000 LBS.  
PETROLEUM



5150 LBS.  
COAL



4700 LBS.  
NATURAL GAS

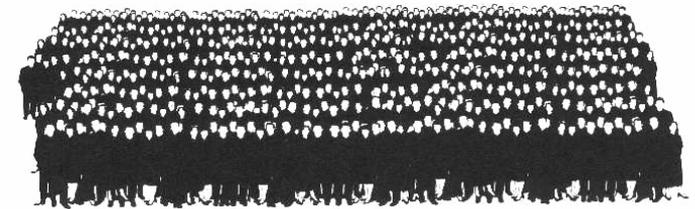


$\frac{1}{10}$  LB.  
URANIUM

**Energy is the key to unlock  
all other physical resources**

US = 1100 lbs of iron & steel per capita  
3<sup>rd</sup> world = 50 lbs of iron & steel per capita

**Current US energy use is  
equivalent to having 300  
people working around the  
clock for each citizen**

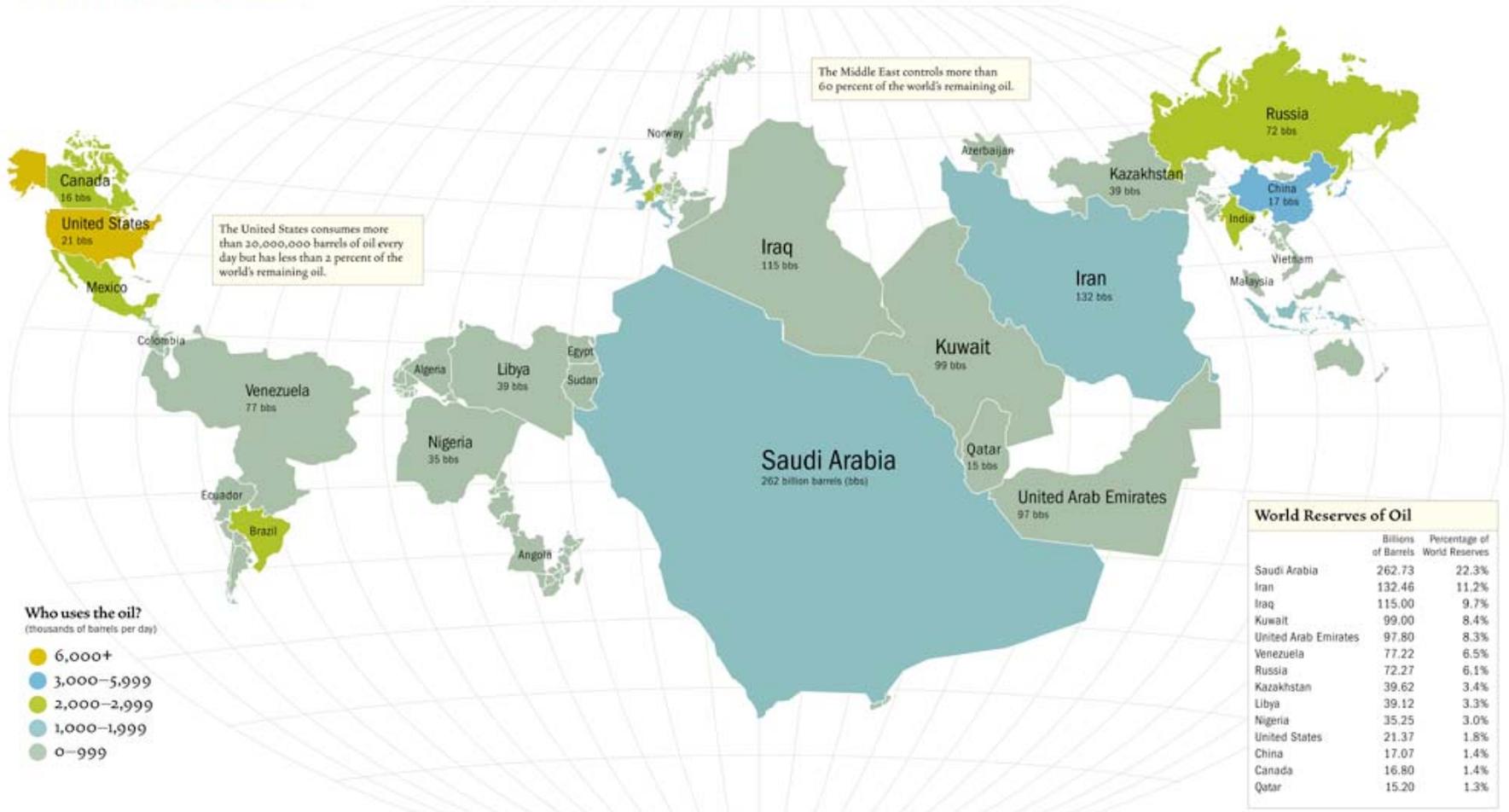


**Figure 2. U.S. per capita annual mineral consumption**

(Source: U.S. Bureau of Mines, 1990)

# The World According to Oil

## Who has the oil?



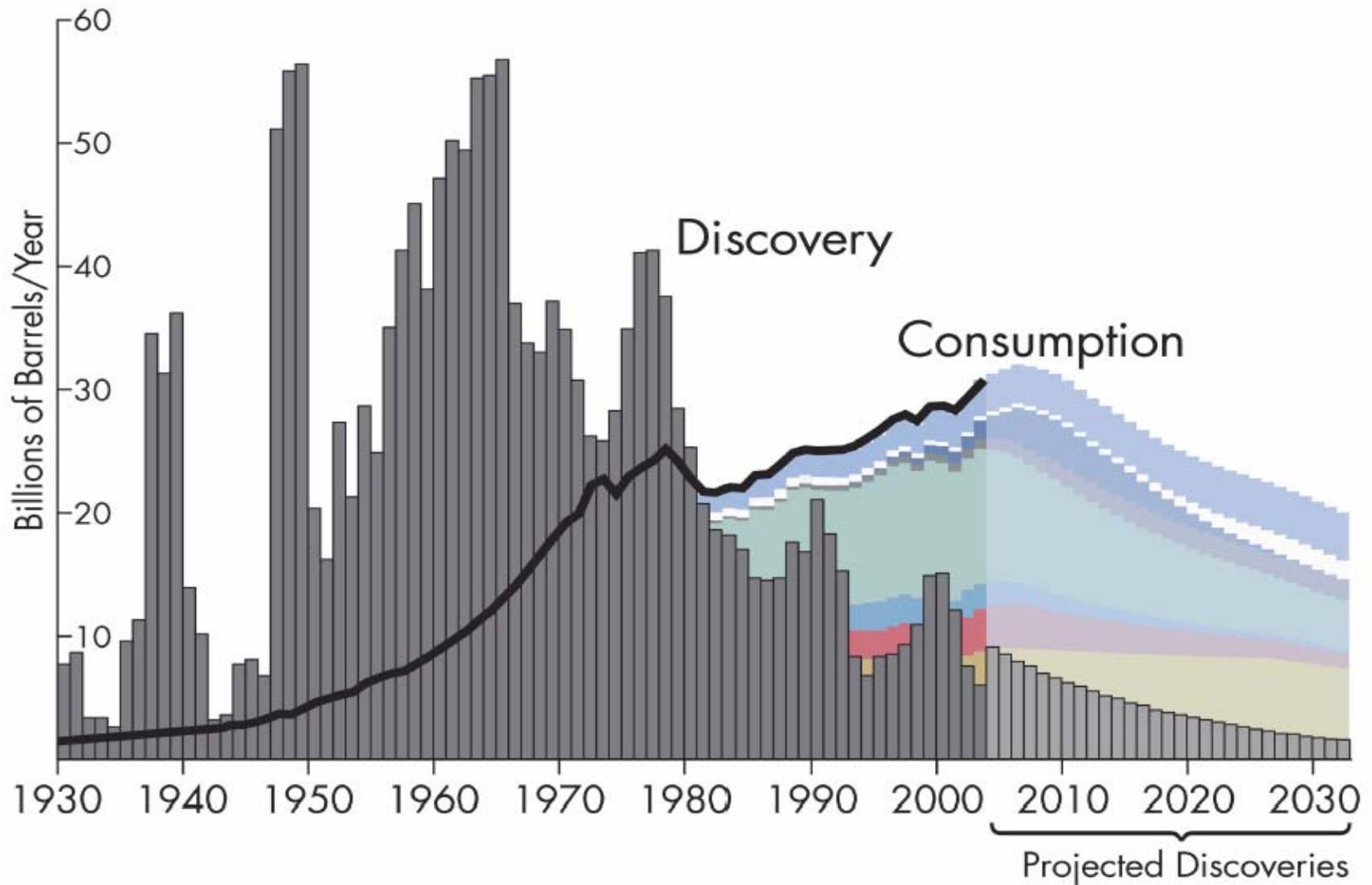
Each country's size is proportional to the amount of oil it contains (oil reserves); Source: BP Statistical Review Year-End 2004 & Energy Information Administration



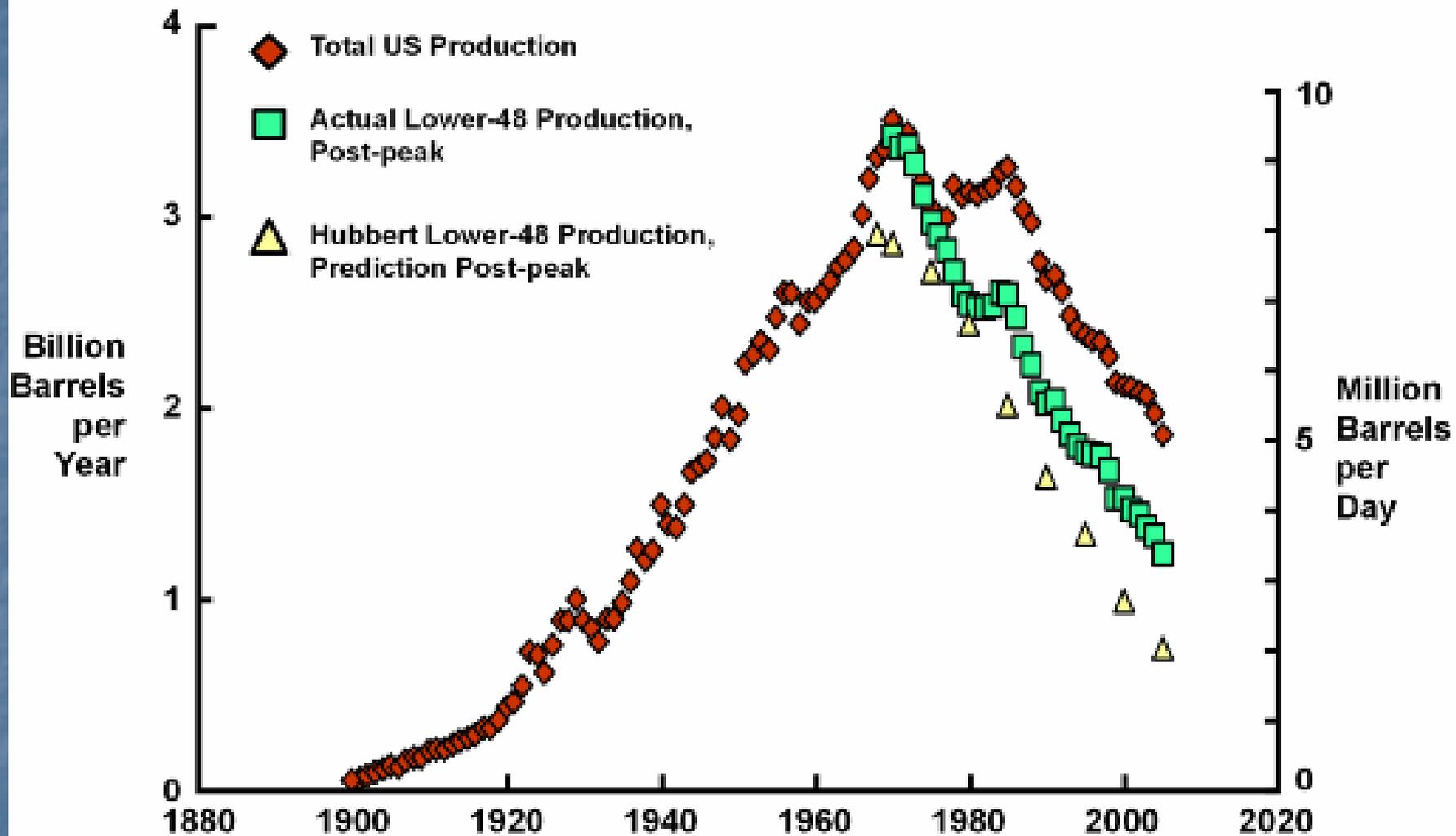
# The United States and Oil

- **2%** of World Reserves
- **8%** of World Oil Production
- **5%** of World's Population
- U.S. Consumes **25%** of World's Oil Production
- More than **66% imported**
- **70%** of oil used in **transportation**
- **U.S. transportation** is dependent upon oil for **97 percent** of its energy needs – a proportion ***unchanged since 1974.***

# Peak Oil – The Growing Gap



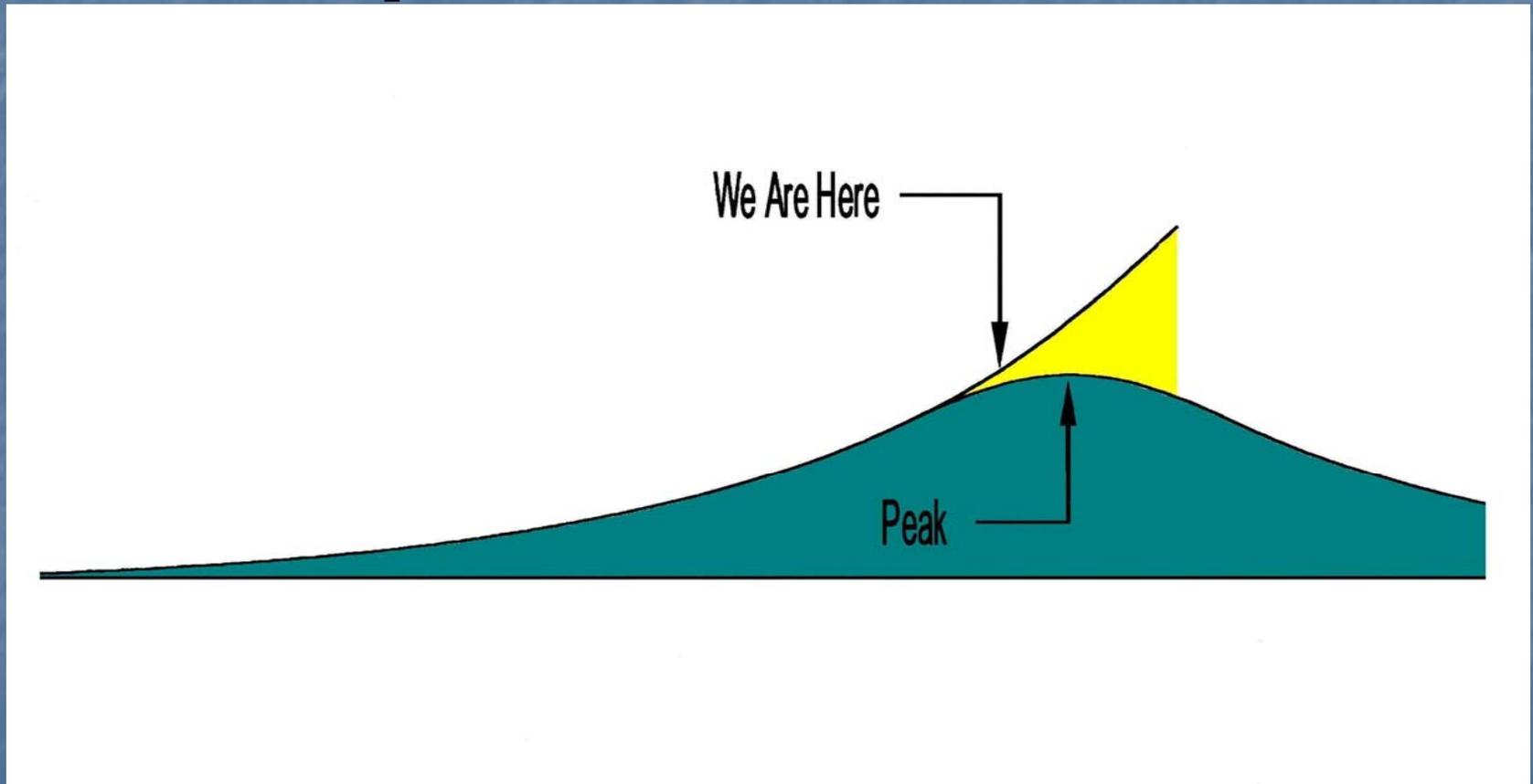
# United States Production, Hubbert versus Actual



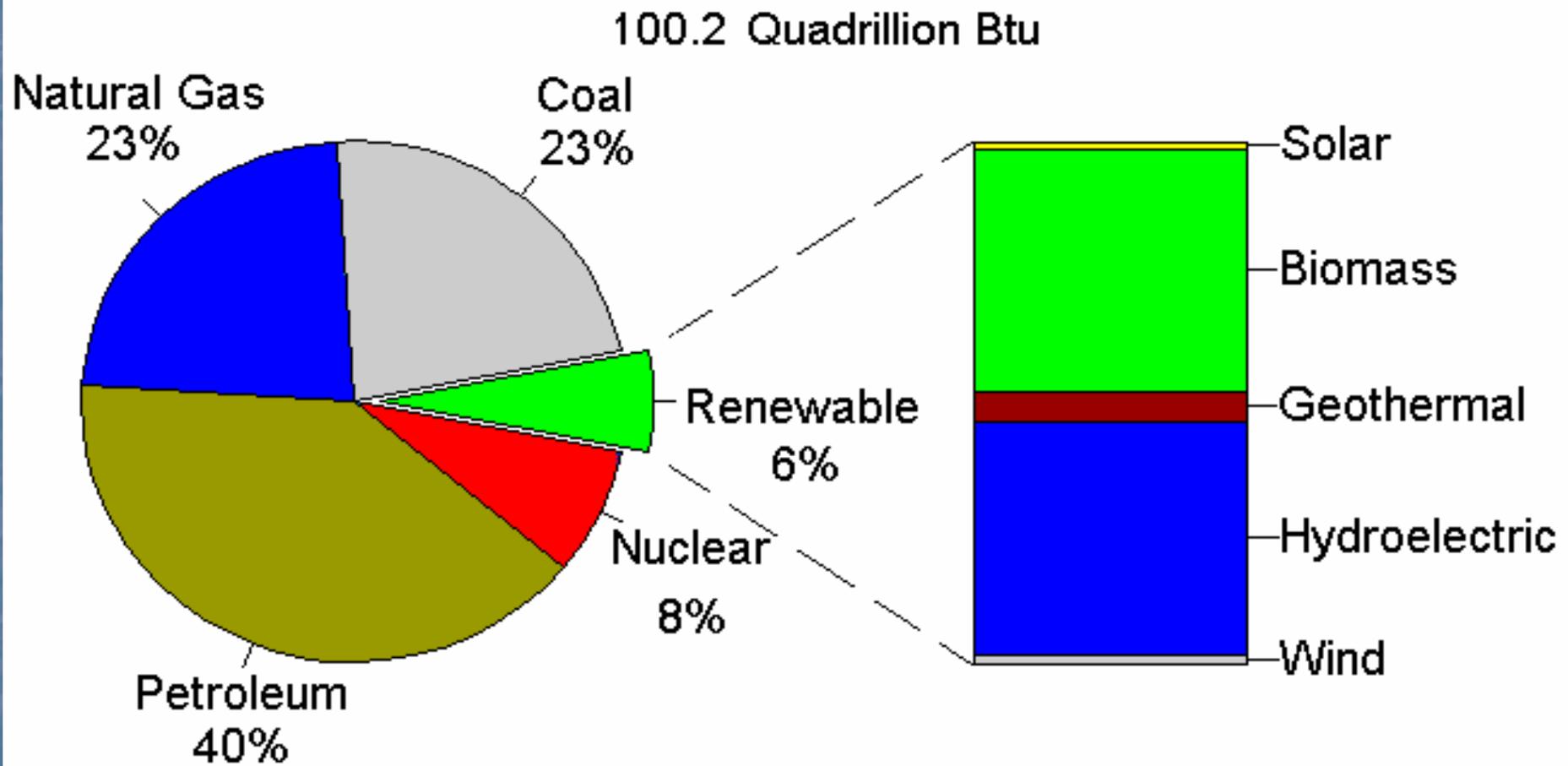
Source: Cambridge Energy Research Associates.

# The Essence of the Problem

There is ***NO*** Ready  
Liquid Fuel Substitute!



# 2004 US Energy Consumption



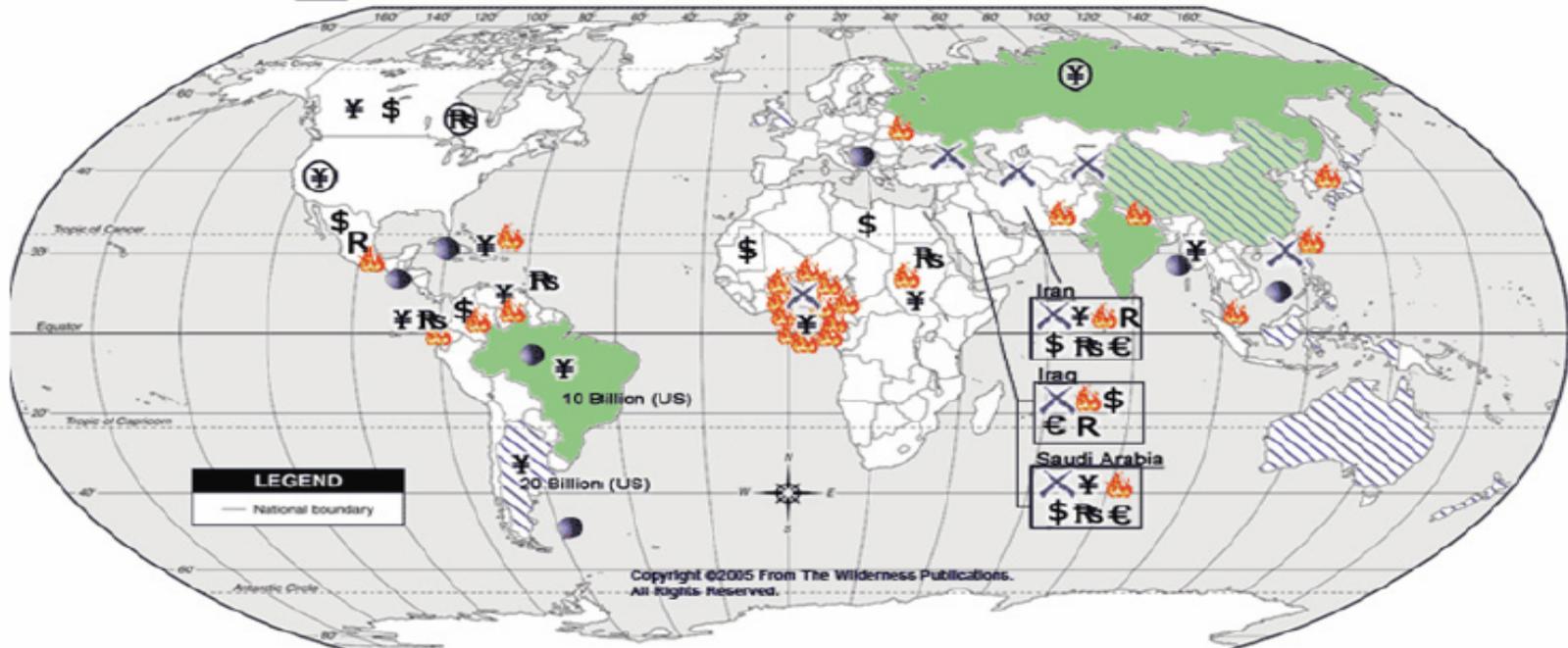
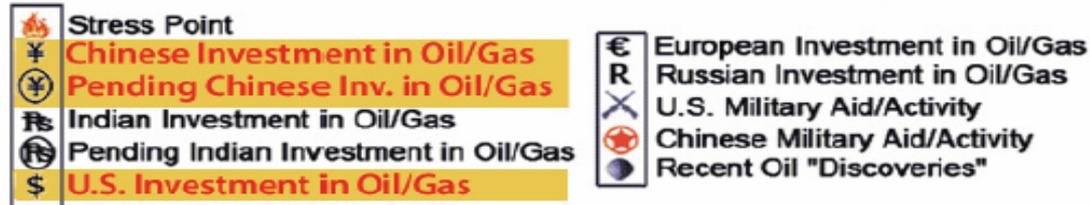


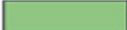
# Five Federal Government Peak Oil Reports

- **DOE Report #1 "Hirsch,"** February 2005
- **U.S. Army Corps of Engineers,** September 2005
- **DOE Report #2,** July 8, 2006
- **Government Accountability Office (GAO),**  
March 29, 2007
- **National Petroleum Council,** Fall, 2007

# Peak Oil

## World Energy Picture January 2005



 - Emerging Alliance       - Current Oil/Gas Shortages

# China's "Post-Oil" Strategy

- **Conservation**
- **Domestic Sources of Energy**
- **Diversify Sources of Energy**
- **Environmental Impact**
- **International Cooperation  
(or confrontation)**

**“Fossil fuels resemble capital in the bank. A prudent and responsible parent will use his capital sparingly in order to pass on to his children as much as possible of his inheritance. A selfish and irresponsible parent will squander it in riotous living and care not one whit how his offspring will fare.”**

“Energy resources and our future” - by Admiral Hyman Rickover, 1957

# Potential Alternatives to Oil

## ■ Finite Sources

### Unconventional Oil

- Ultra Deep Water/Polar
- Tar Sands
- Shale Oil

### Coal

### Nuclear Fission (light water reactors)

- Breeder reactors
- Fusion
- *future – district heating and cooling?*

# ADM. Hyman Rickover in 1957 on the role of nuclear power in our future

- More promising is the outlook for nuclear fuels...The disposal of radioactive wastes from nuclear power plants is, however, a problem which must be solved before there can be any widespread use of nuclear power.

Another limit in the use of nuclear power is that we do not know today how to employ it otherwise than in large units to produce electricity or to supply heating.

# More from ADM. Rickover in 1957

- **We must also induce many more young Americans to become metallurgical and nuclear engineers.** Else we shall not have the knowledge or the people to build and run the nuclear power plants which ultimately may have to furnish the major part of our energy needs.

# Potential Alternatives to Oil

- **Renewable Resources**
  - Hydroelectric
  - Waste to Energy
  - Solar
  - Wind
  - Geothermal
  - Ocean Energy
  - Agricultural (biomass/biofuels)
  - Hydrogen (from renewables)



# What America Needs

- The total commitment of **WWII**
- The technology intensity and focus of the **Apollo Program** to land a man on the moon **\$275 billion in 2006 dollars over @10 years**
- The urgency of the **Manhattan Project** to develop the atom bomb **\$1.1 trillion in 2006 dollars in 5 years**
- **Energy, Capital and Time \$3-4 trillion in 2006 dollars over 20 years** *BEFORE* peak to avoid unprecedented negative consequences (DOE #1 and #2)



# **We Need to Build a Coalition**

- **Improve National Security**
- **Prepare for and mitigate global Peak Oil**
- **Address Climate Change**
- **Increase U.S. Manufacturing & Exports**
- **Improve the Environment**

**We are all in the same  
boat!**



For More Information

<http://www.bartlett.house.gov/EnergyUpdates>