



U.S. DEPARTMENT OF
ENERGY

2009 Energy Conference

April 7, 2009



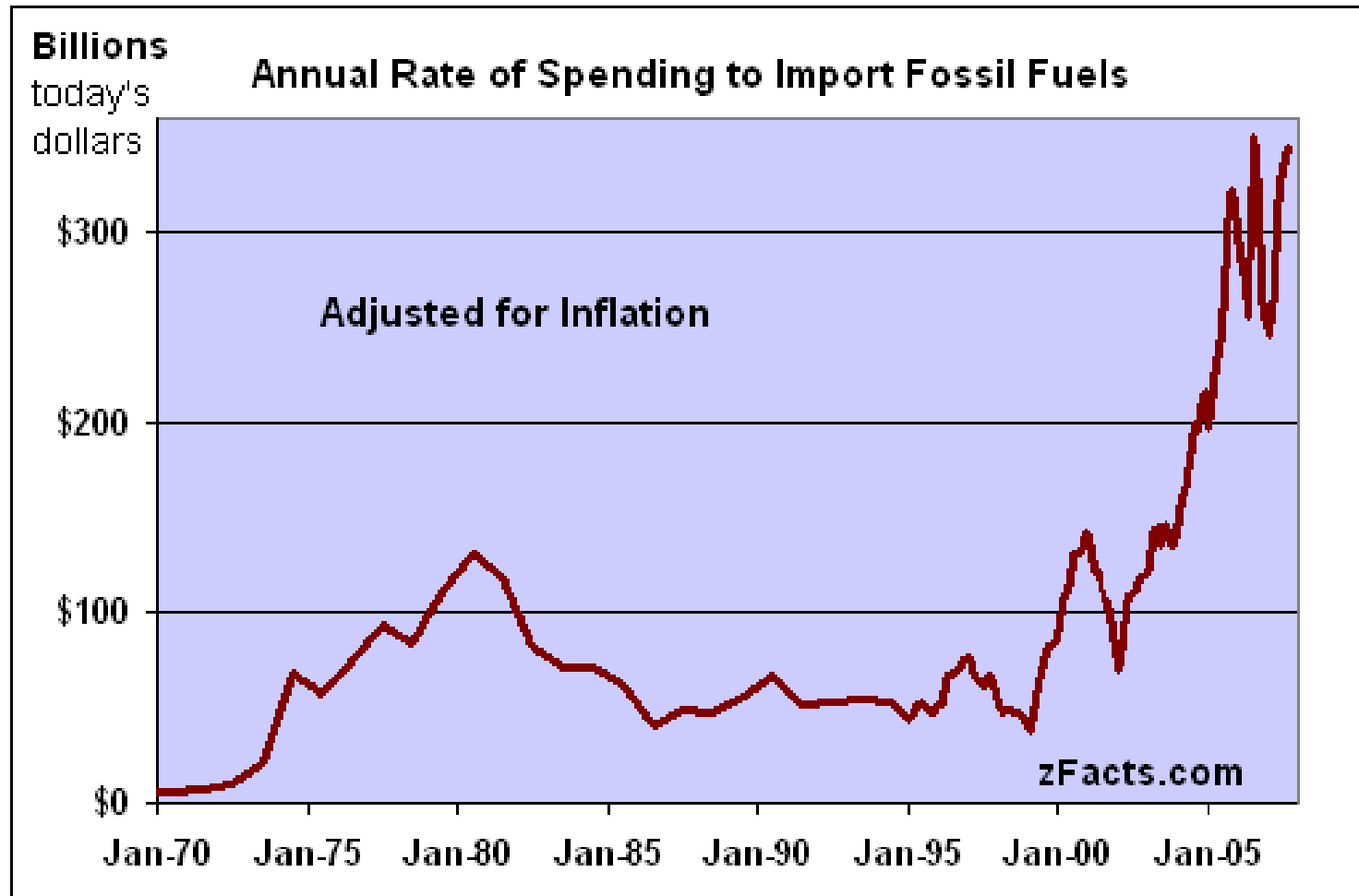
www.eia.doe.gov

Energy
Information
Administration

The Energy Problem

- (1) Economic prosperity is intimately tied to affordable energy.
- (2) There is potential for geopolitical conflict due to escalating competition for energy resources.
- (3) The risk of adverse Climate Change.

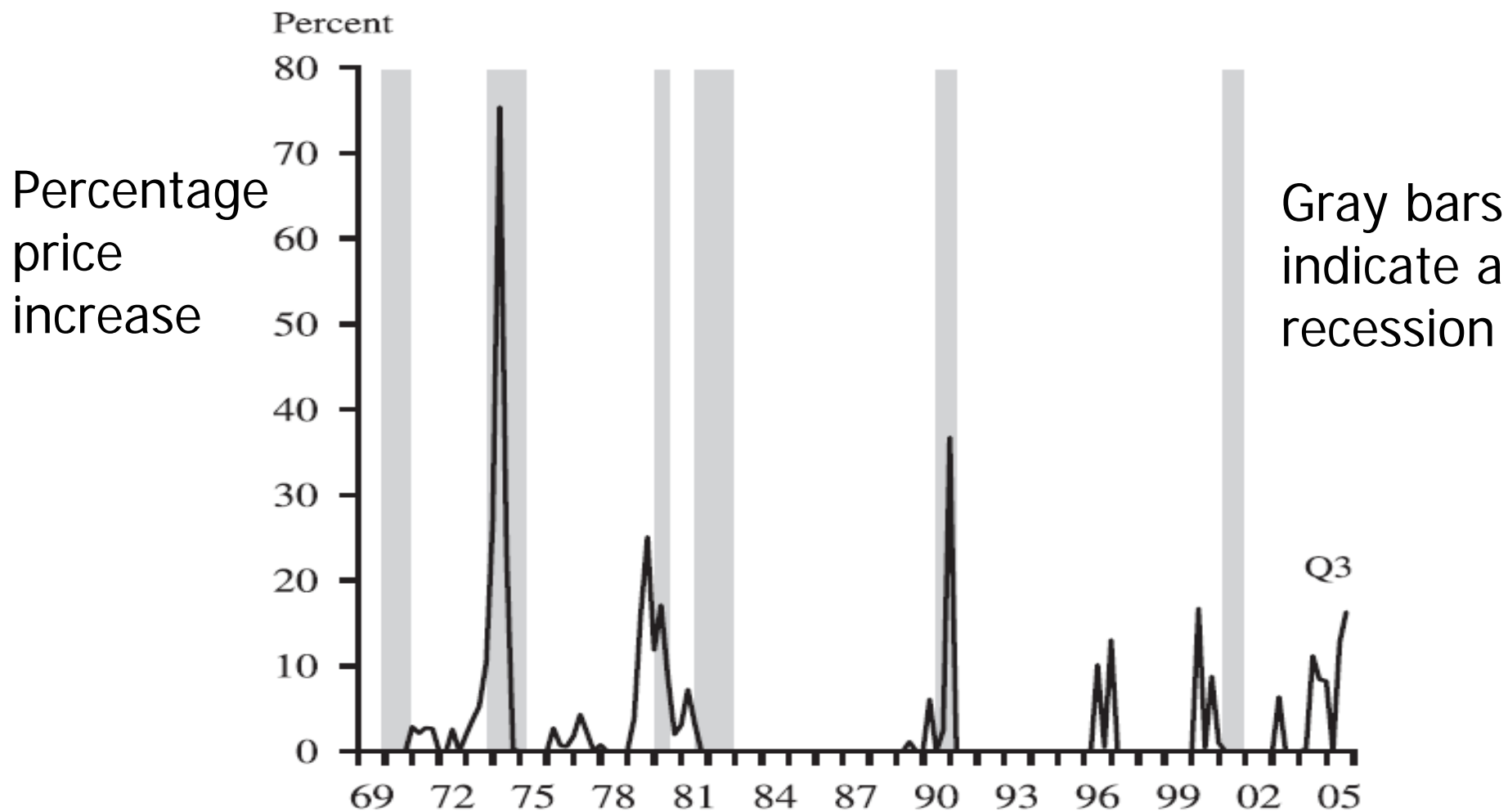
Oil Dependency is a Drain on our Economy



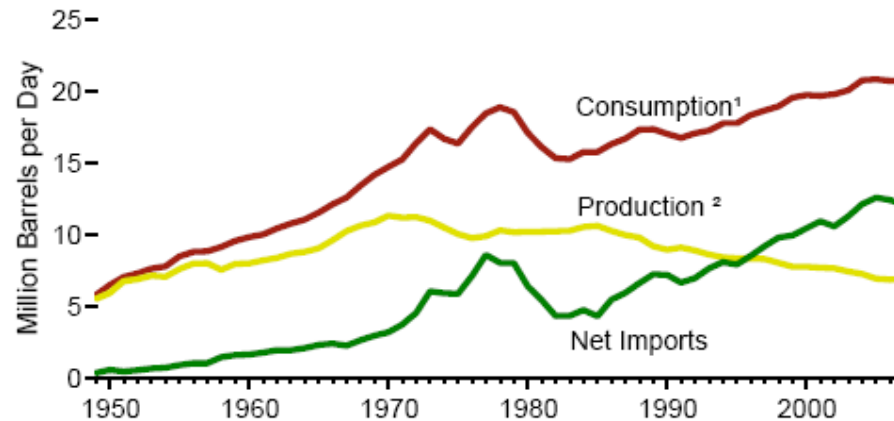
(Using EIA data)

Oil Dependency is a Drain on our Economy

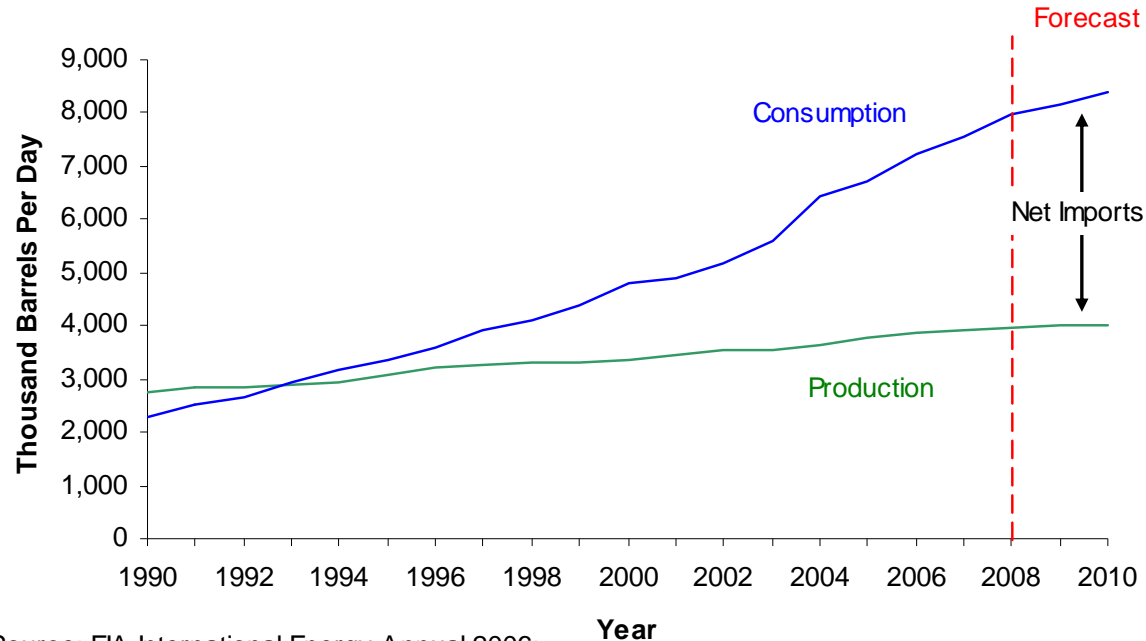
Oil price shocks using Hamilton's price-increase transformation



US oil became a net oil importer in the 1940s



China's Oil Production and Consumption, 1990-2010*



Source: EIA International Energy Annual 2006;
Short-Term Energy Outlook (March 2009)

*forecasted

Energy is a security issue

Russia to cut Ukraine gas supply

Monday, 5 January 2009

BBC NEWS

Iran uses oil to woo allies abroad

By TAREK EL-TABLAWEY , 04.02.09 , 12:55 PM EDT

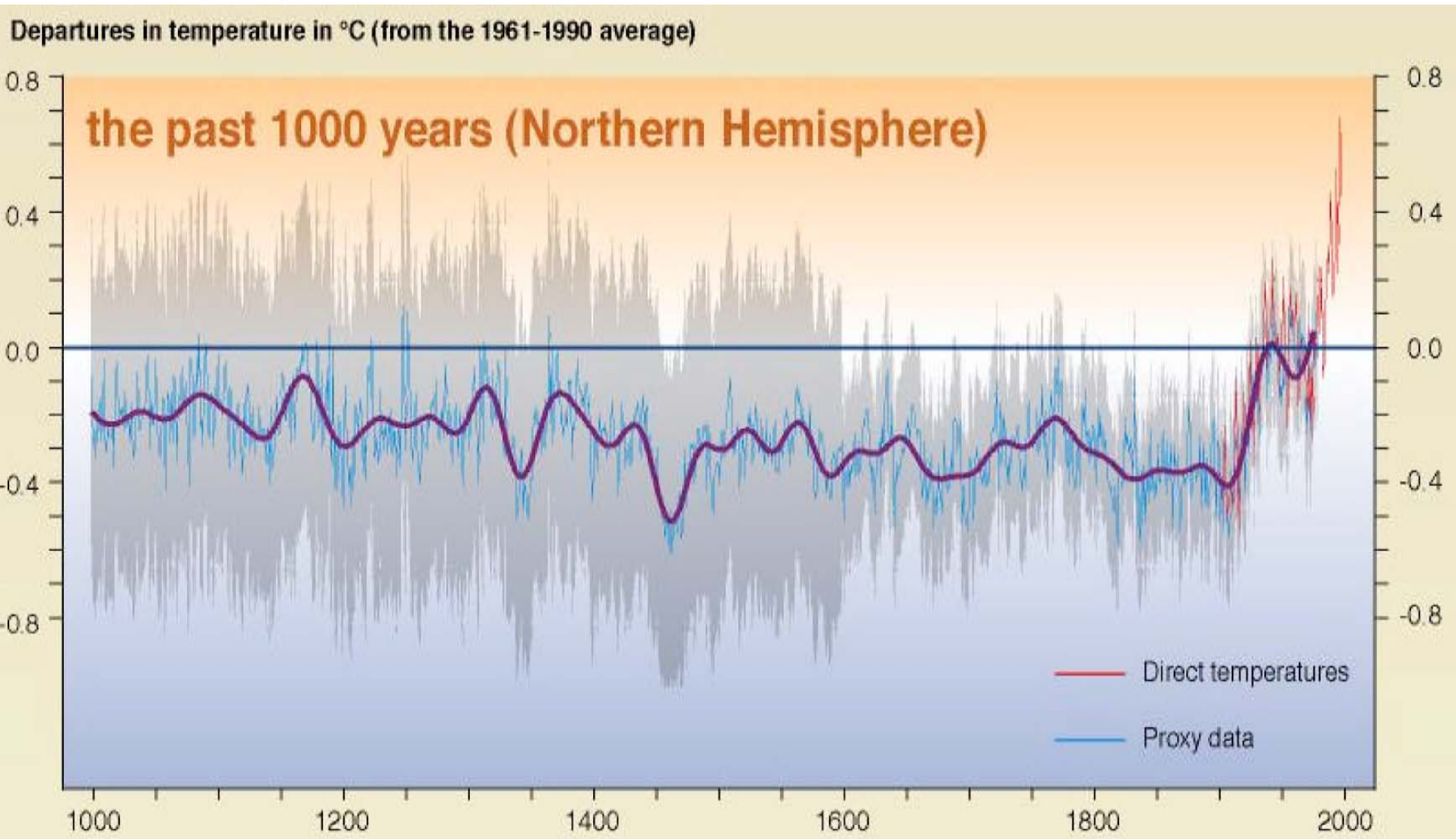
AP Associated Press

Iraq and China Sign \$3 Billion Oil Contract

Deal Is First of Its Kind Since Invasion

By Amit R. Paley
Washington Post Foreign Service
Friday, August 29, 2008; A08

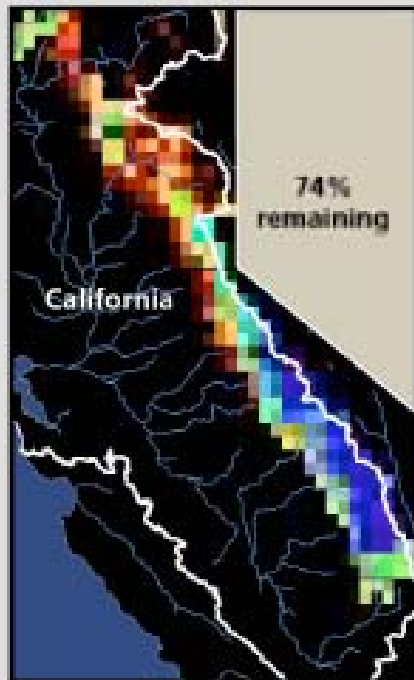
Global average temperature



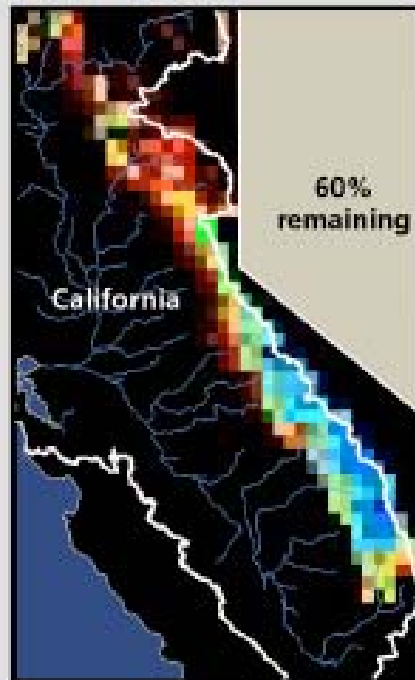
Projections of Sierra snow-pack and implications for water

2020-2049

Lower Emissions

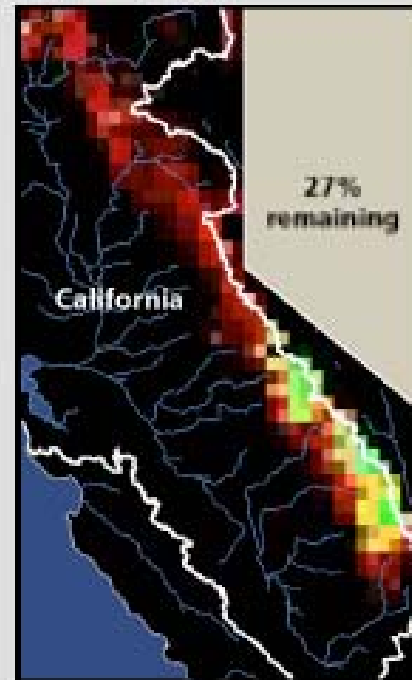


Higher Emissions

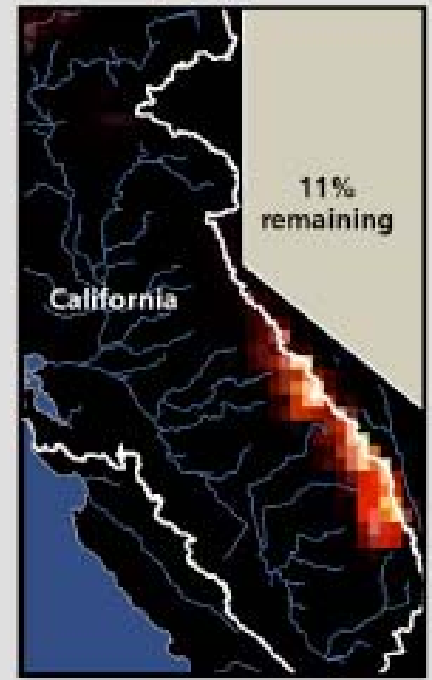


2070-2099

Lower Emissions



Higher Emissions

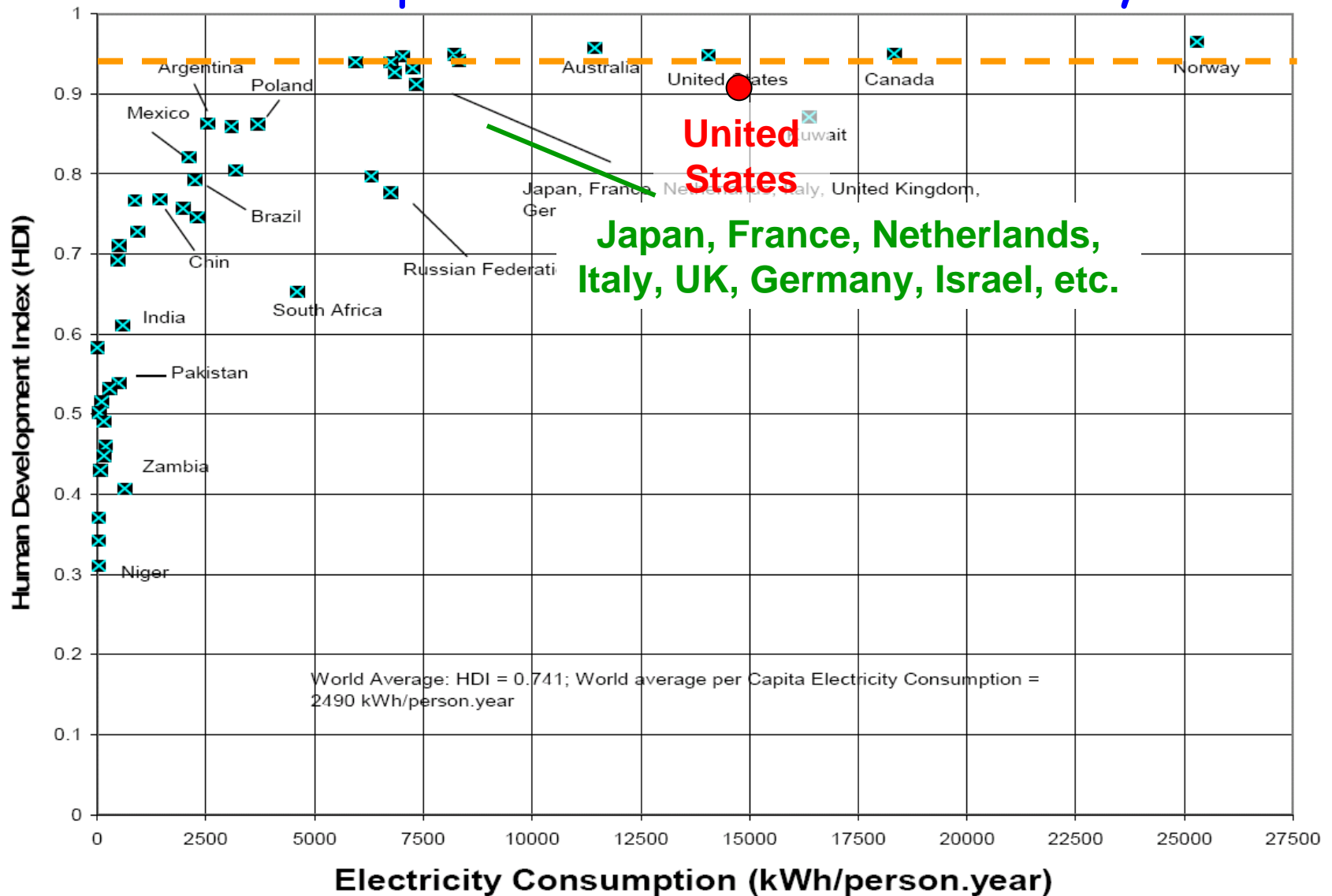


Remaining Snowpack (%)

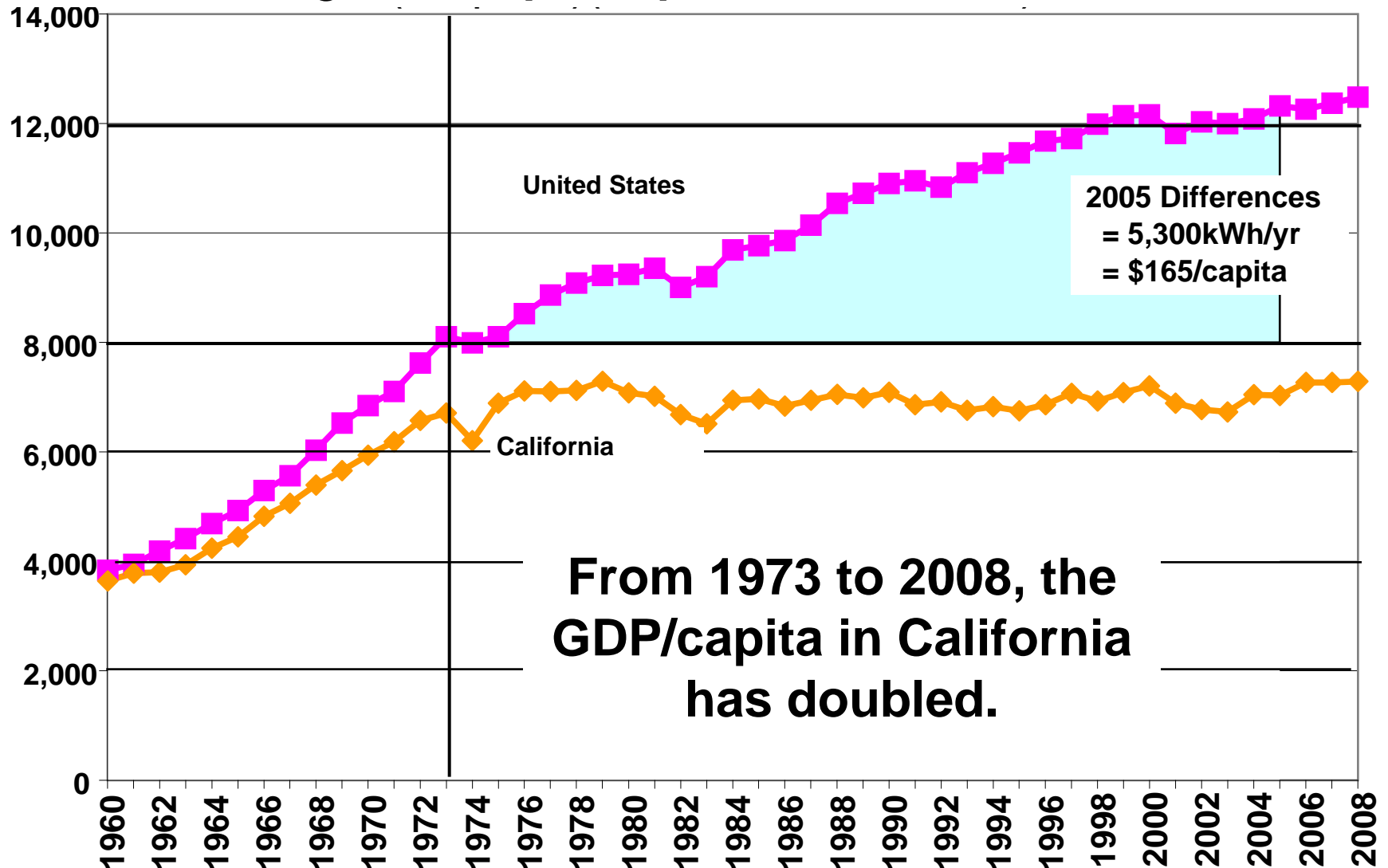


The standard of living of a country is *not* proportional to its energy consumption:

Human Development Index vs. Electricity use

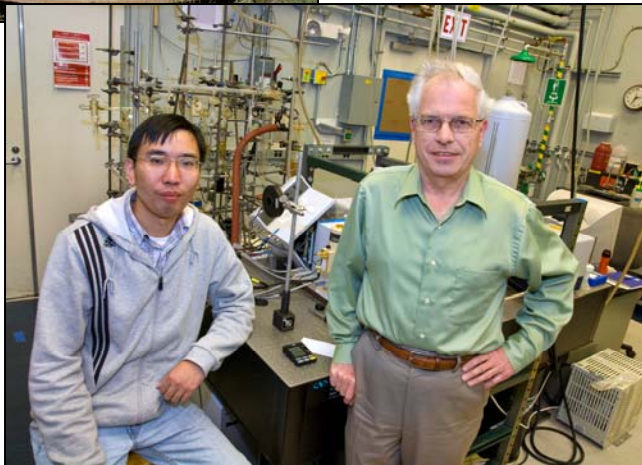


Electricity use per person (1960 – 2008)



Clean Energy Economy

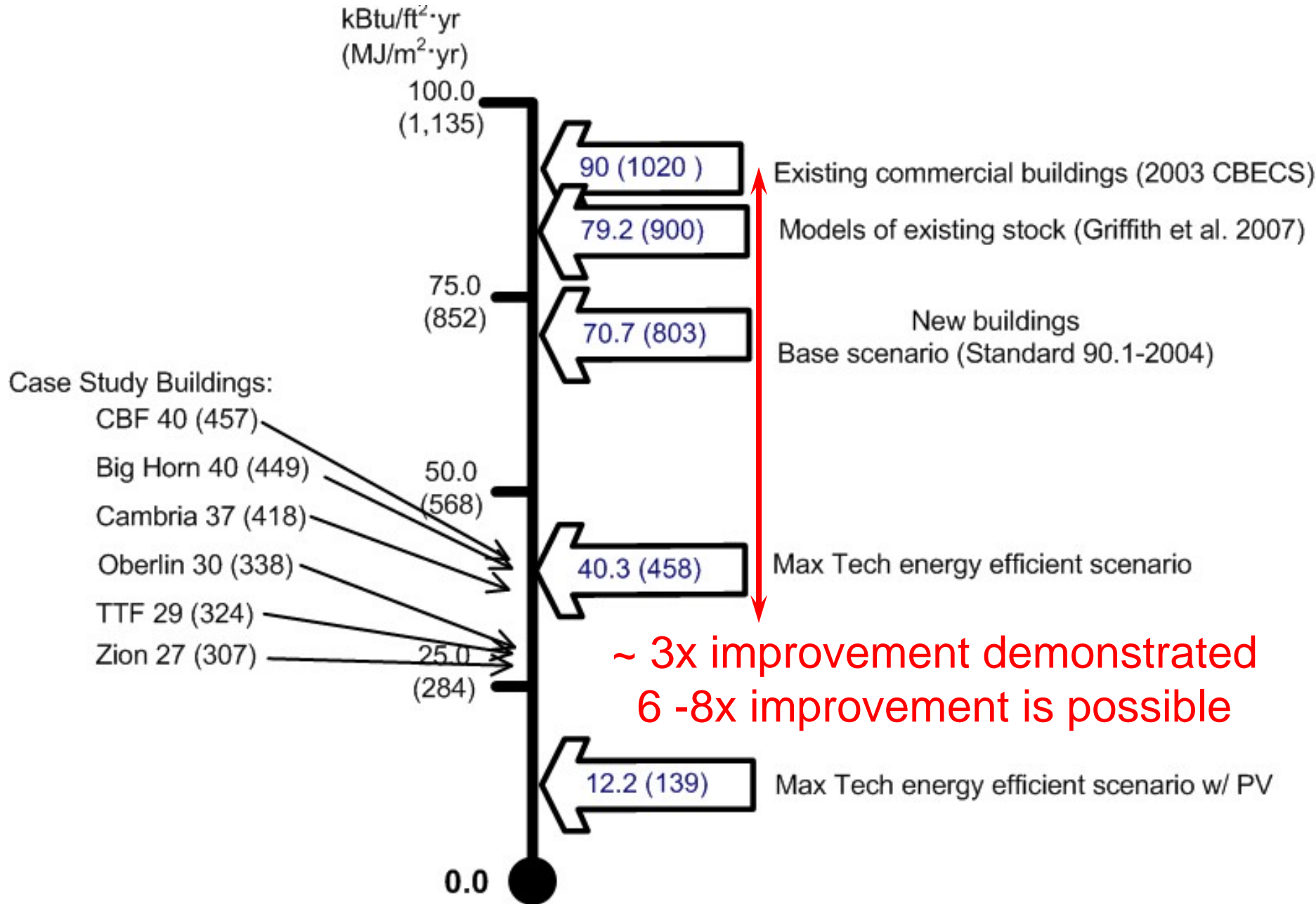
President Obama's plan:
Create new green jobs
that can't be outsourced
and
add to America's future
competitiveness



American Competitiveness



Building Efficiency: Where we are & where we *can* be.



An energy efficient economy requires:

- Federal investments to promote efficiency
- Strong and sensible standards
- Research, development, and deployment of new technologies
- The collective will of the American people.

New Energy for America's Economy

U.S. DEPARTMENT OF
ENERGY

Fuel Fights!

SAVE YOUR SHARE

- 1 Keep temperature at 65° F. during day - lower at night.
- 2 Don't heat unused rooms.
- 3 Keep windows closed.
- 4 Draw window shades at night.
- 5 Shut off heat when weather permits.
- 6 Keep heating plant in top condition.
- 7 Use less hot water.



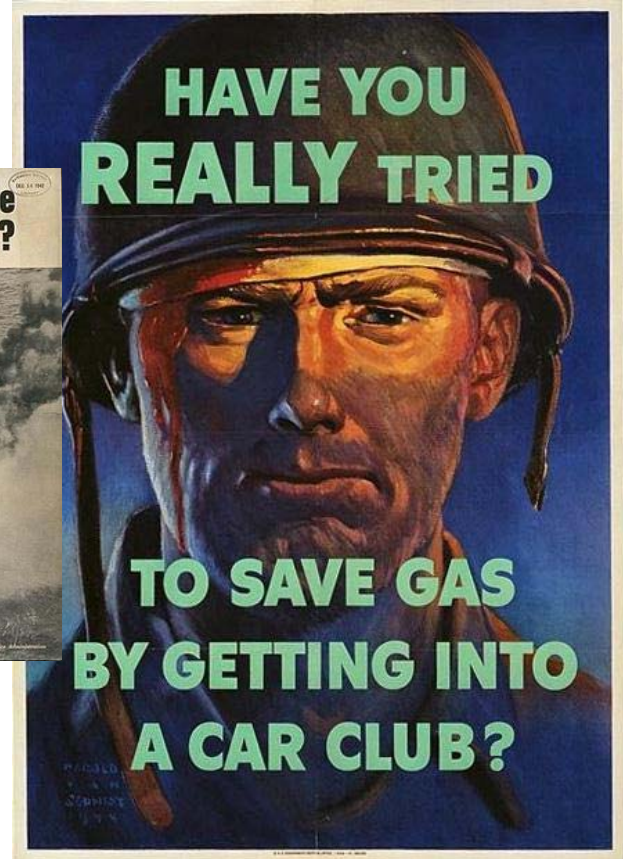
Saving fuel also saves manpower, material, equipment
CONSERVE COAL, OIL, GAS... FOR WAR

**ANOTHER TANKER TORPEDOED
OFF THE ATLANTIC COAST !**

**Should brave men die
so you can drive ...?**



**HAVE YOU
REALLY TRIED
TO SAVE GAS
BY GETTING INTO
A CAR CLUB?**



Step 1: Federal investments to promote efficiency

President Obama's American Recovery and Reinvestment Act

**Double alternative energy
production over three years**



\$6 billion in loan guarantees

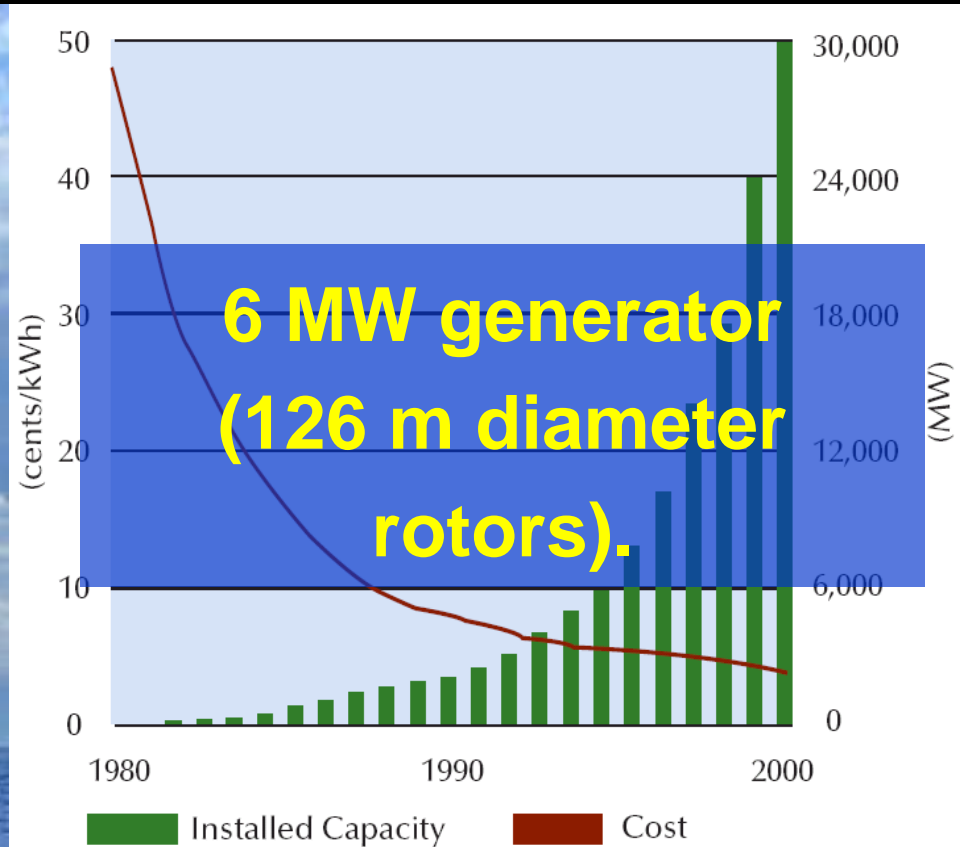
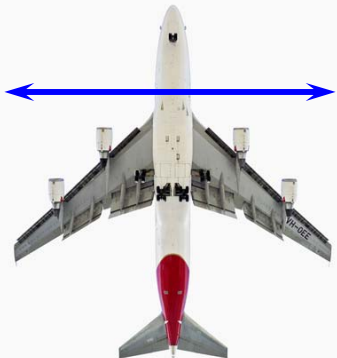
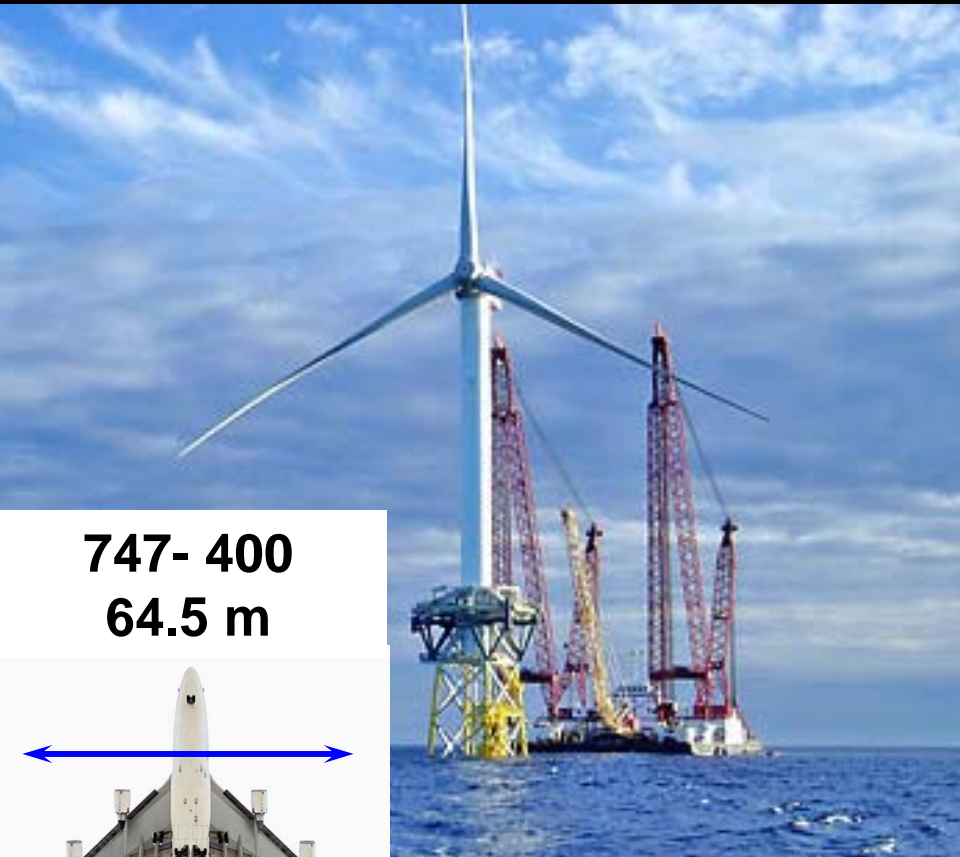
\$8.2 billion for weatherization and energy efficiency

\$3.1 billion for state energy efforts

\$11 billion for smart grid

President Obama wants R & D tax credit to be permanent

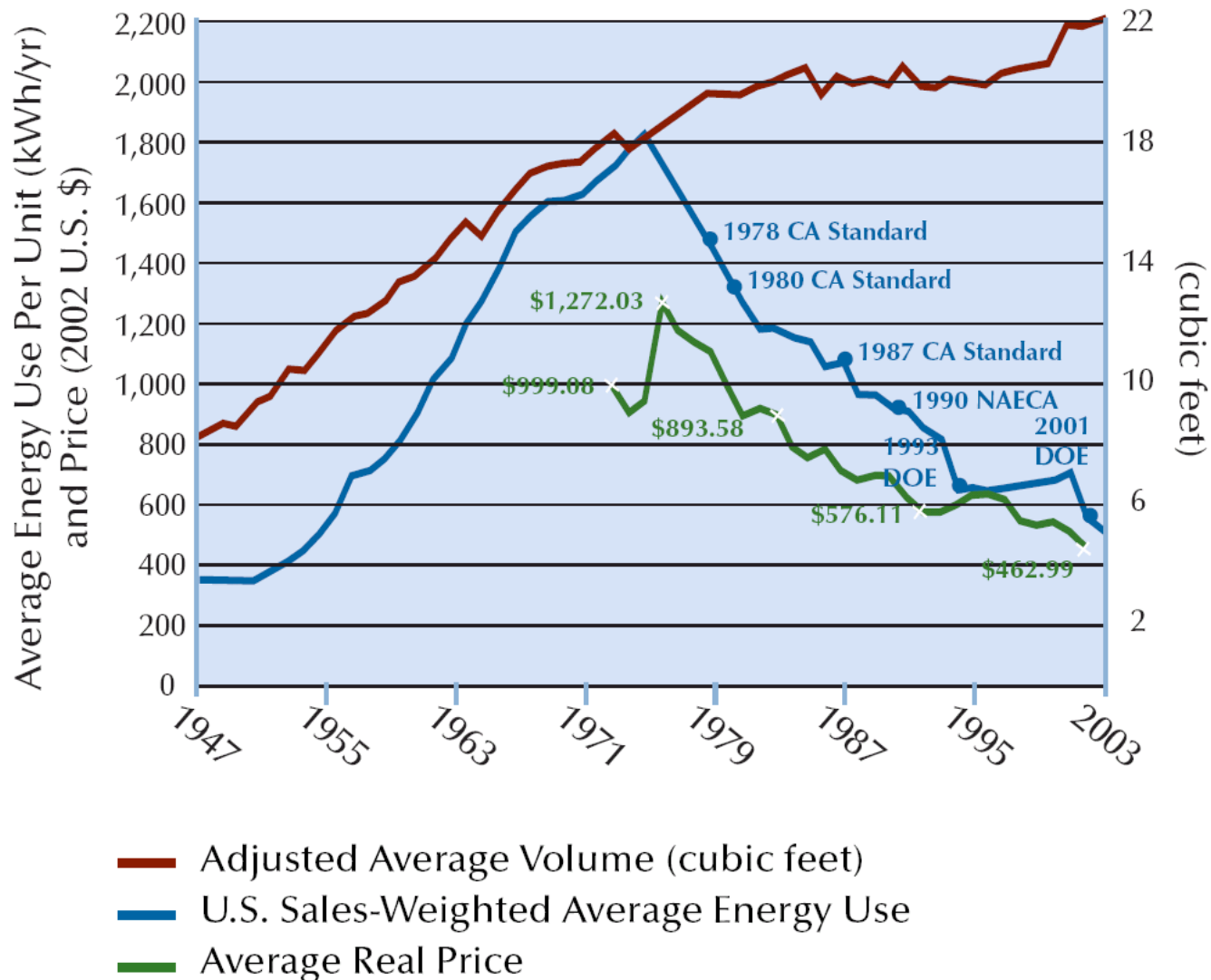
Modest but **stable** fiscal incentives were essential to stimulate long term development. Energy transmission/storage is also needed.



Step 2: Strong and sensible standards

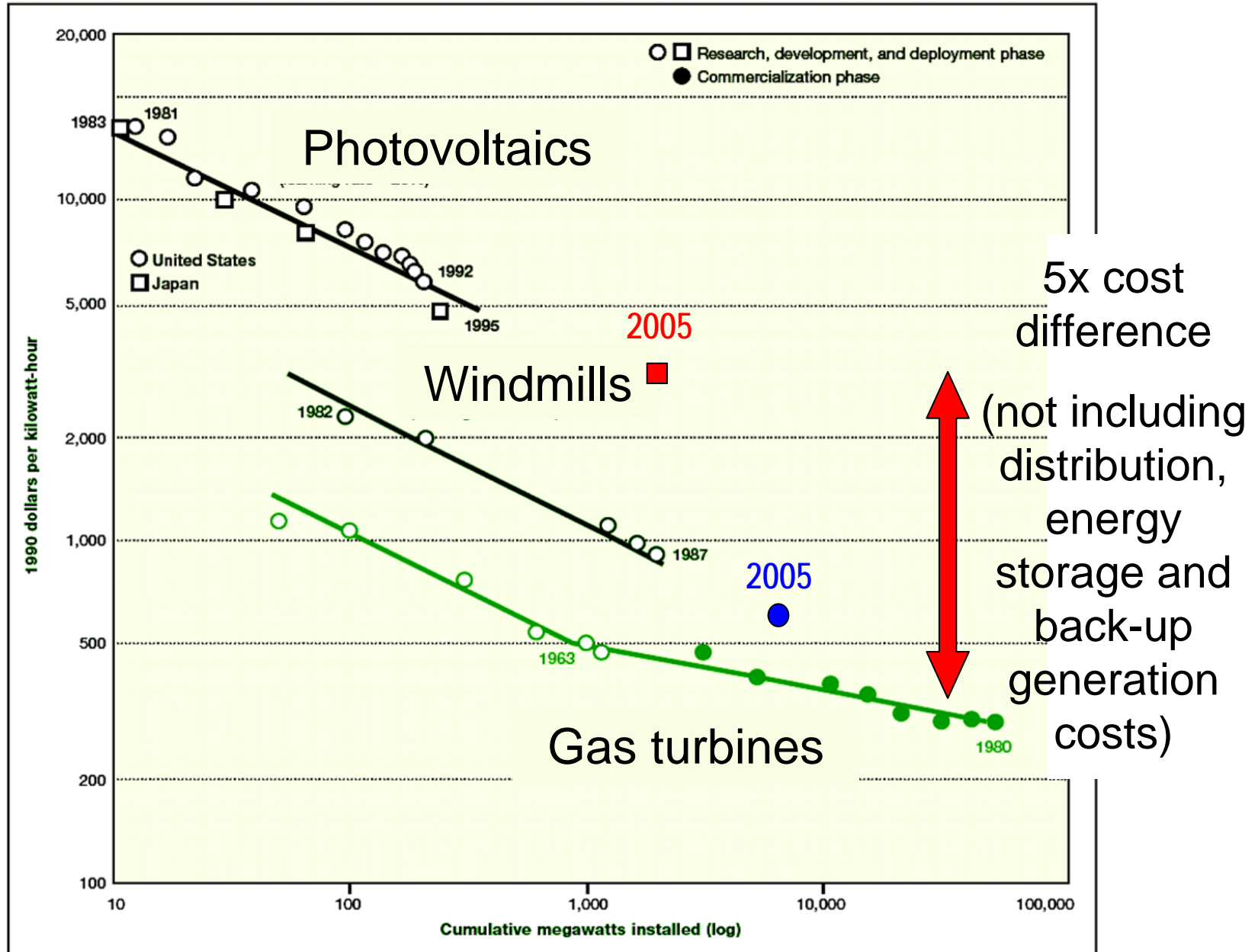
Higher standards stimulate technology and innovation:

Refrigerator efficiency

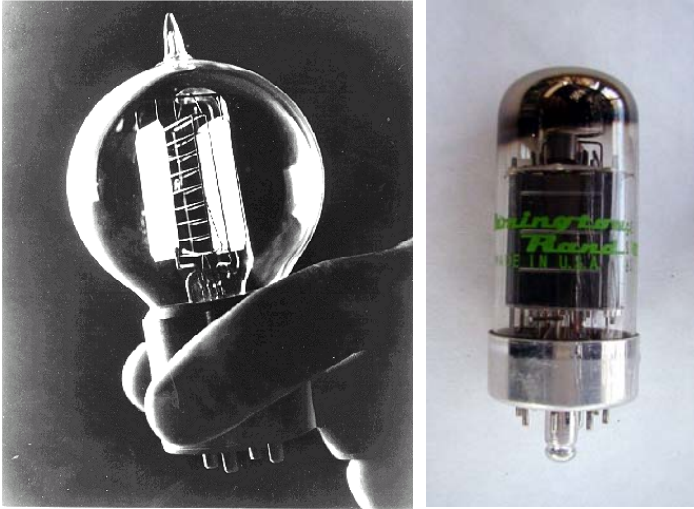


Step 3: Research, development, and deployment of new technologies

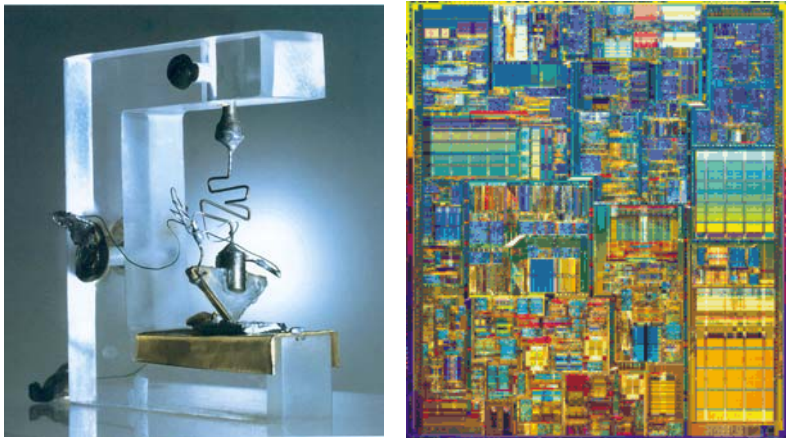
Cost of electricity generation vs. installed capacity (1990 dollars / installed Megawatt hour)



A transformative technology

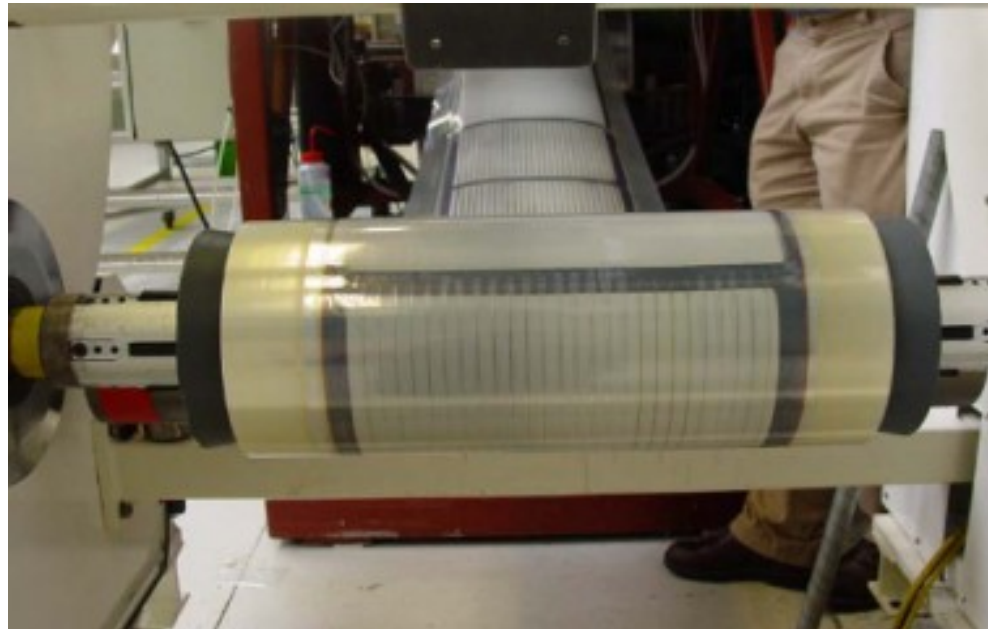


- An essential component transcontinental telephone line was the vacuum tube.
- Vacuum tubes generated a lot of heat and burned out.



- AT&T Bell Laboratories invested heavily in improving vacuum tubes. They **also** embarked on a research program to develop a solid state replacement to the vacuum tube.

Reel-to-reel mass production of *efficient* solar cells based on rapidly developing nano-technology may be possible.



The Department of Energy must become the modern Bell Labs



Argonne National Laboratory



Oak Ridge National Laboratory



National Renewable Energy Laboratory



Berkeley National Laboratory

Department of Energy



Largest science funder

17 National Laboratories

Researchers at 300 universities

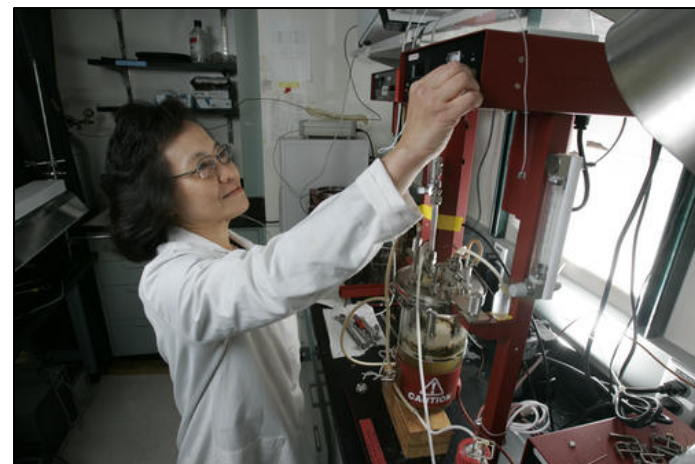
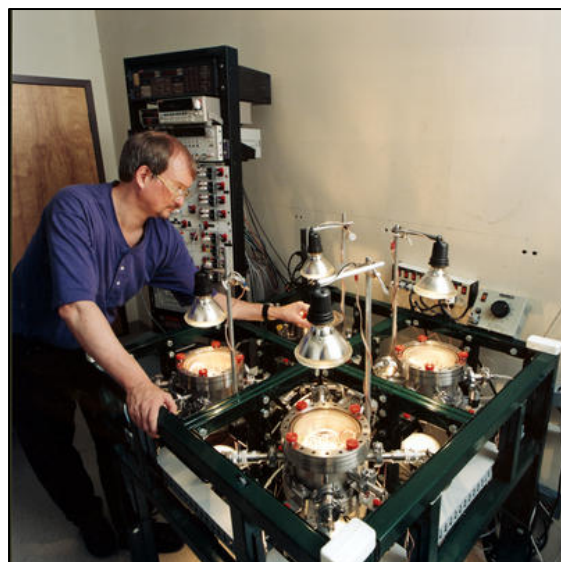
88 Nobel Prize winners



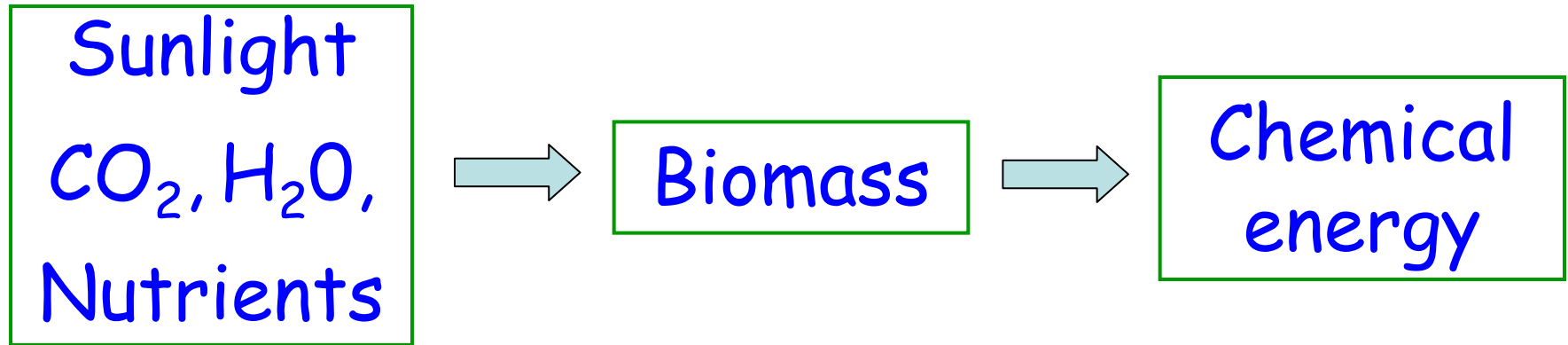
**Time to harness
our intellectual horsepower**



President Obama:
Double investment in
science over 10 years



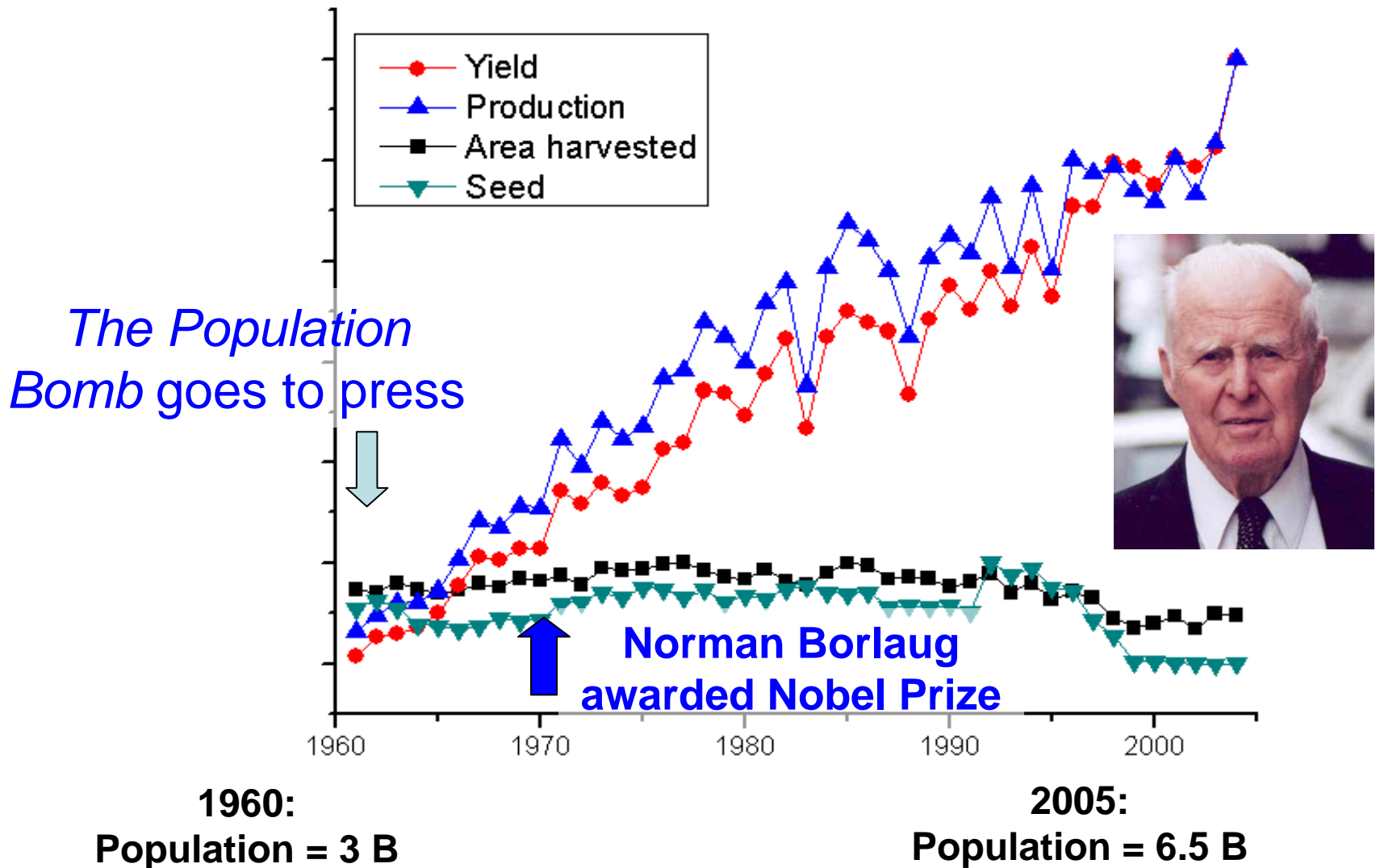
Sunlight to energy via Bio-mass



Develop **energy** plants that can use marginal agricultural land, need less nutrients, water, and are easier to breakdown into simple sugars

Improved conversion of cellulose into fuel.
New organisms for biomass conversion.

World Production of Grain (1961 – 2004)



Source: Food and Agriculture Organization (FAO), United Nations

The invention of ammonia synthesis by Haber and Bosch made possible artificial fertilizers.

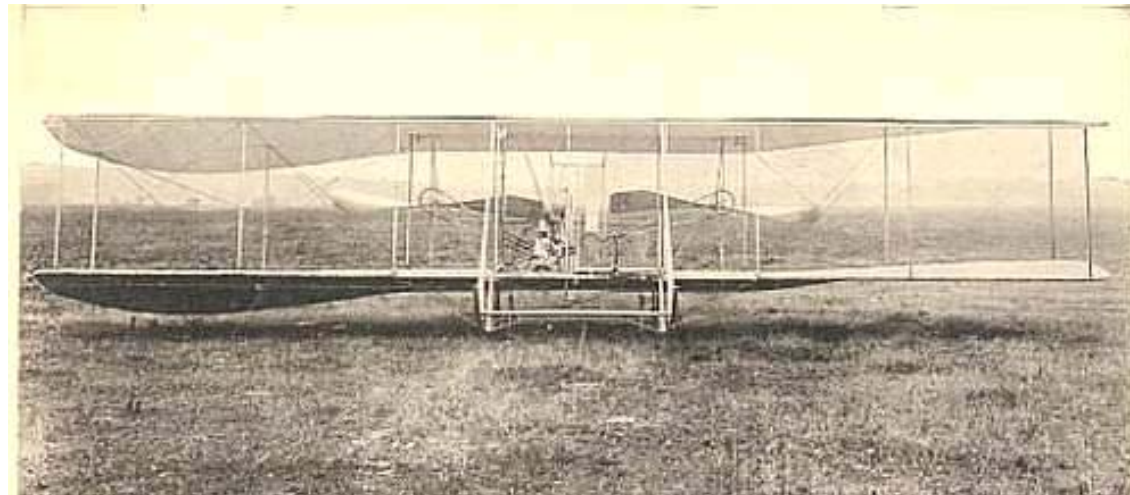
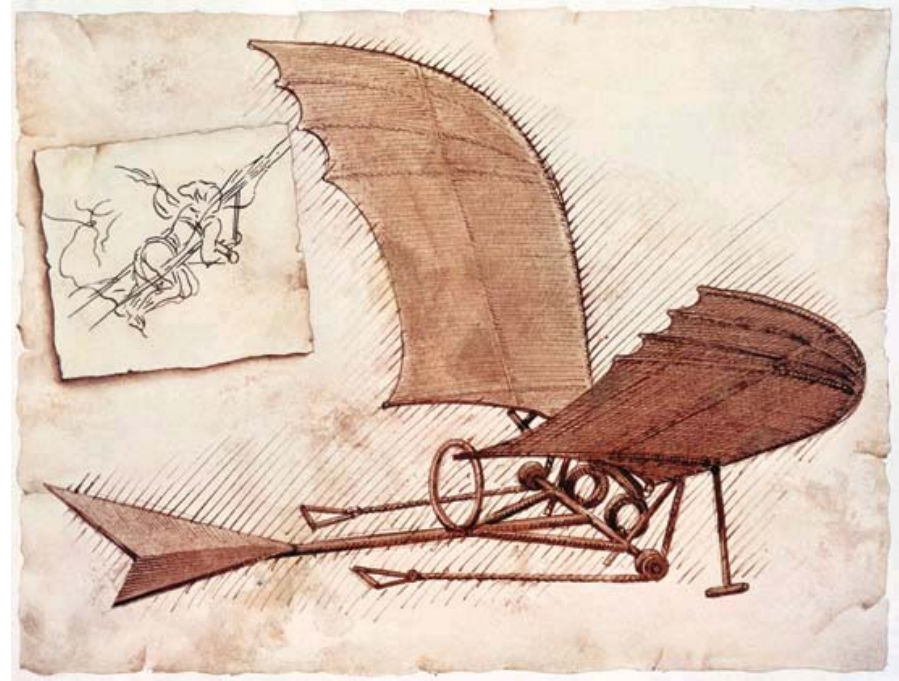
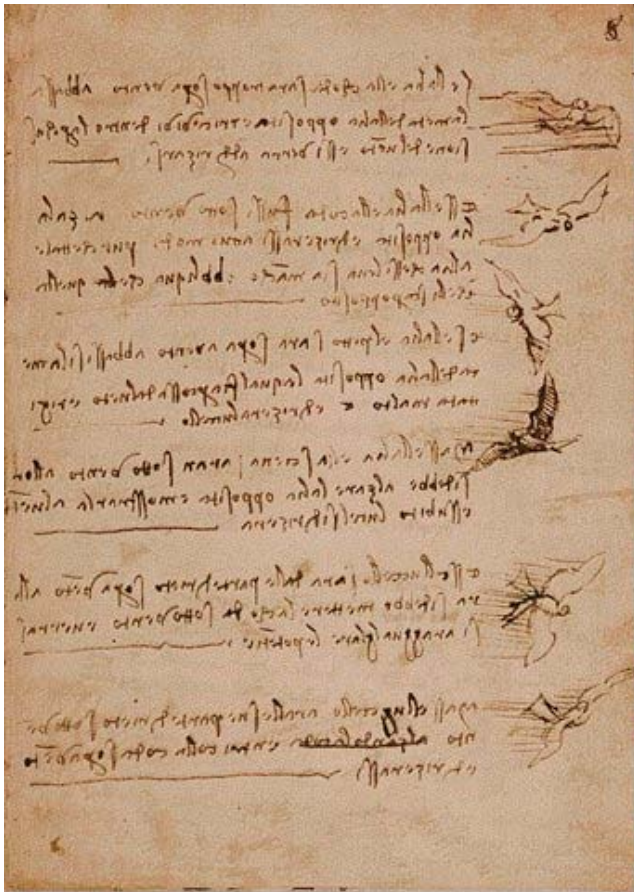


Fritz Haber

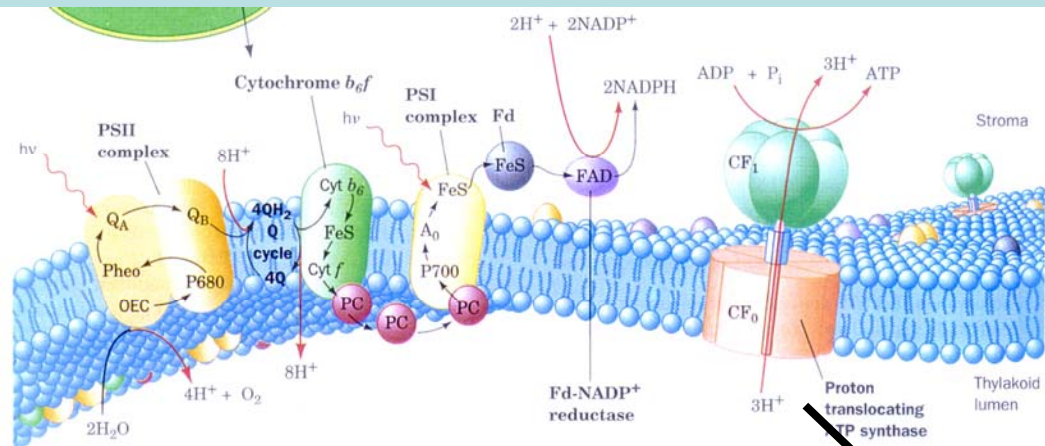


Carl Bosch

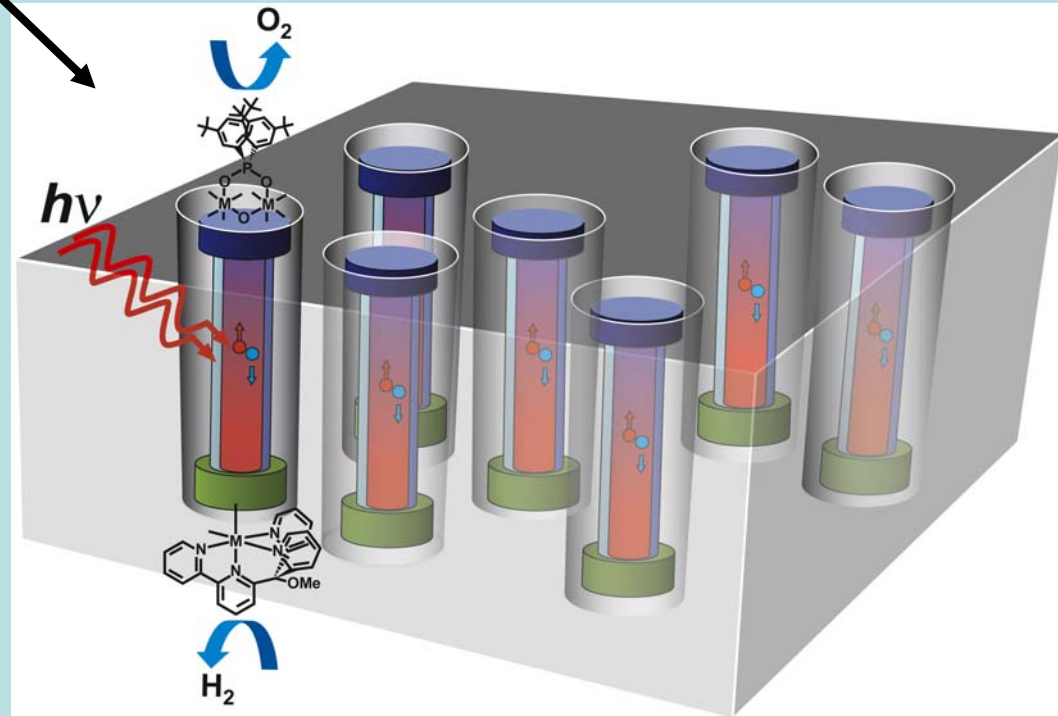
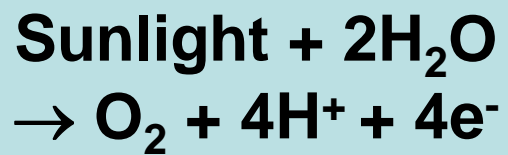
Man first learned to fly by imitating nature



Helios Artificial Photosynthesis Project



The first important step:



Earthrise from Apollo 8 (December 24, 1968)

