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ECONOMIC, FINANCIAL and STRATEGY CONSULTANTS

Our Nation's Central Energy Challenges: The Context for Wind Powering America



Susan Tierney
Wind Powering America State Summit
Pittsburgh, PA – June 8, 2006

Overview

- Energy Politics/Policy/Realities 101
- Two central energy challenges
- EPACT: did it position us for 20th Century needs?

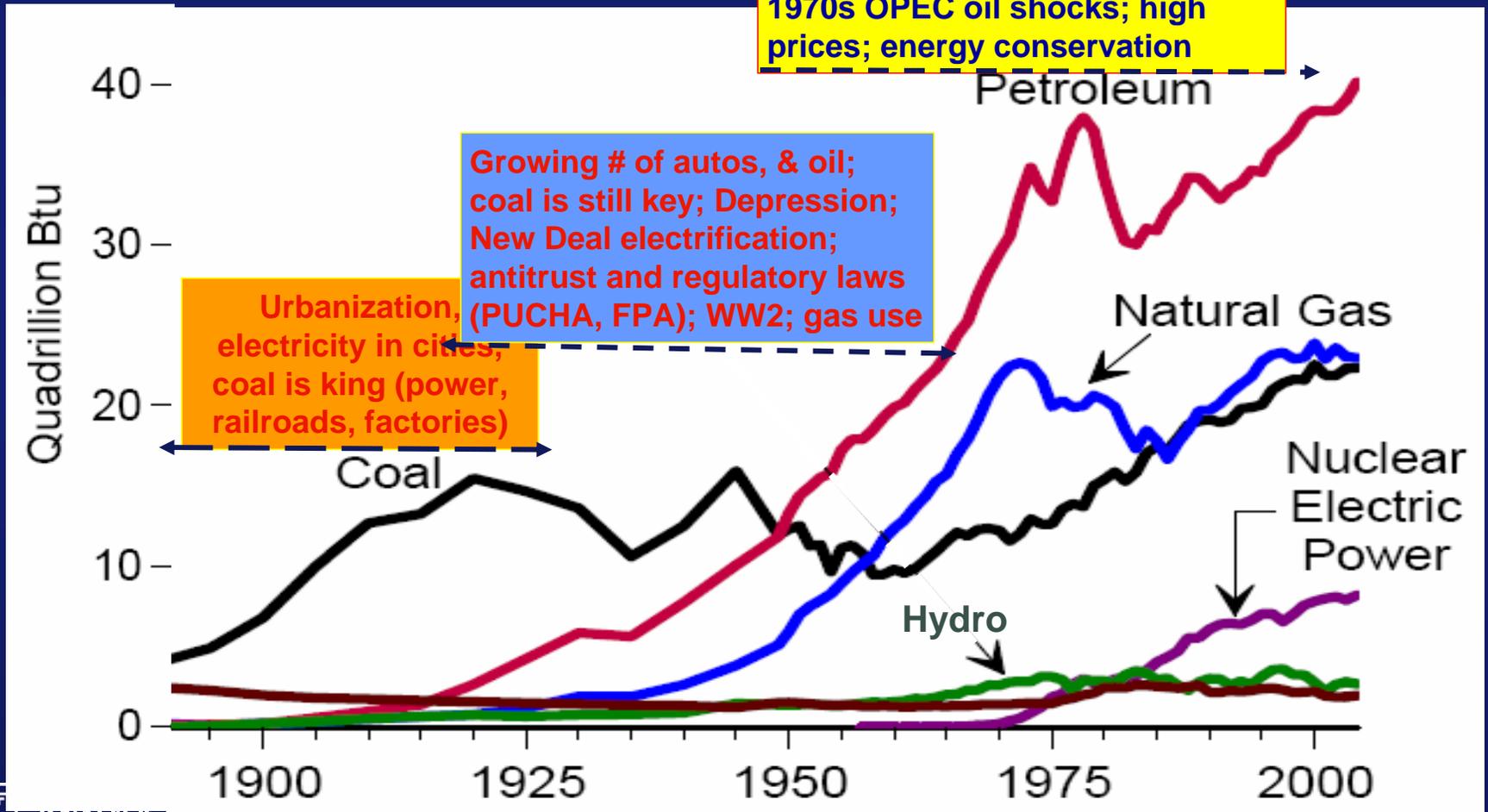




Energy 101 – Politics/Policy/Realities

Eras in U.S. Energy Policy and

Energy Consumption by Source



More vehicles, VMT, oil use; Gas dereg, FUA, boom, bust? environmental regulation; nuclear cost overruns, TMI, cancellations, good operations; pressure for power markets; independent power, power crisis; renewables & efficiency

Post-war highway rising oil use in cities; power technology; coal; post-war nuclear; 1970s OPEC oil shocks; high prices; energy conservation

Growing # of autos, & oil; coal is still key; Depression; New Deal electrification; antitrust and regulatory laws (PUCHA, FPA); WW2; gas use

Urbanization, electricity in cities, coal is king (power, railroads, factories)

Themes in U.S. energy policy over time

National energy policy: a patchwork quilt, no “grand design”

Shifting theories and rationales for national energy policy

“Flavor of the decade” policy shifts

Domestic energy politics/politics is geopolitical

Energy is an economic and environmental policy issue

Globalization and the U.S. role in international markets



Globalization & U.S. role in international energy markets

Energy prices set in international markets

- Pressure from growing demand in other countries
- Supplies concentrated in particular regions globally



Oil

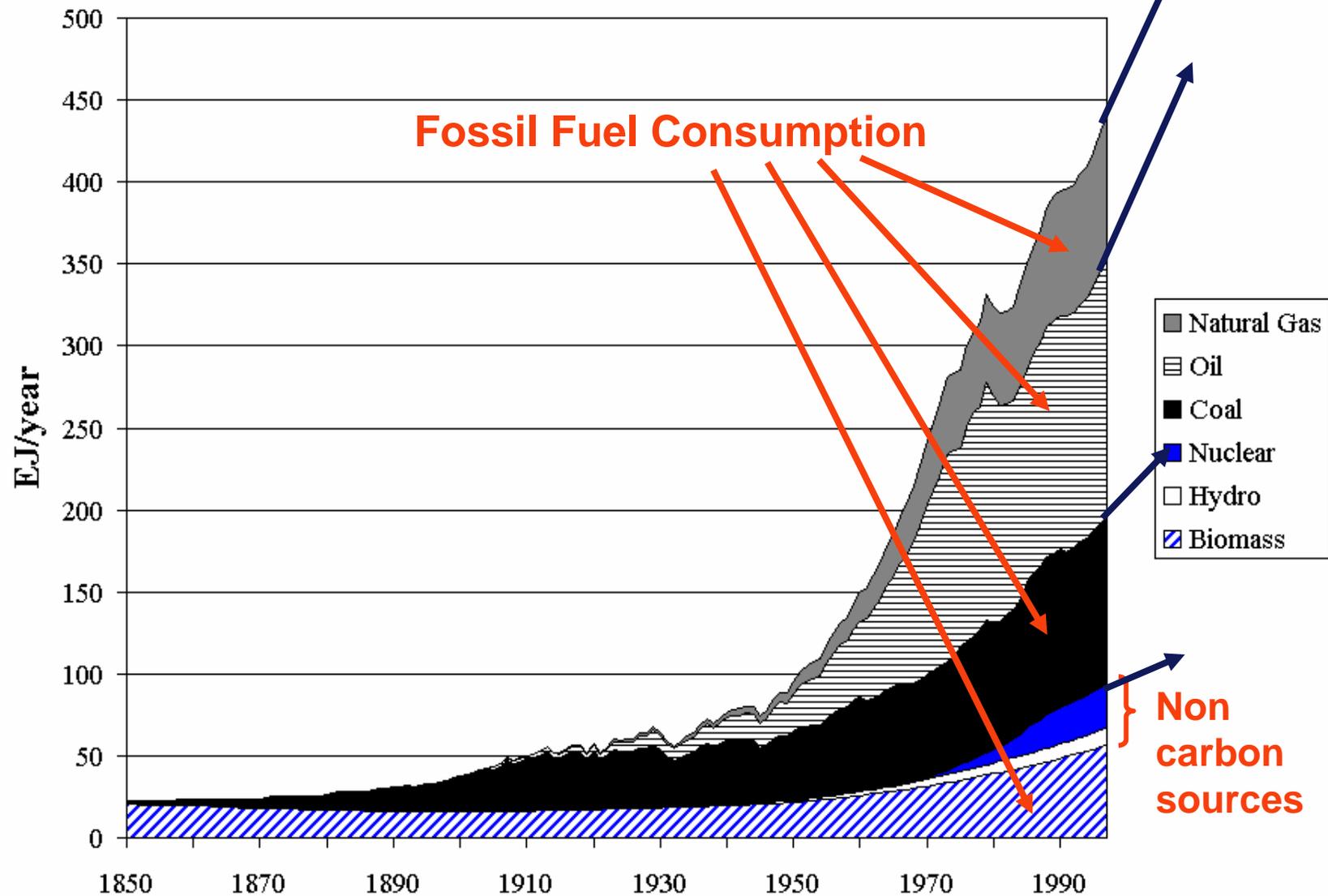
**Gas
(LNG)**

Coal



Rising global primary energy use (1850–1997)* - with forecast to 2010

2010
530



* Rosina Bierbaum, "Climate Change: A matter of Degrees," Energy Foundation Board Meeting, June 16, 2004; EIA, International Energy Outlook, 2005 (Table A-2).

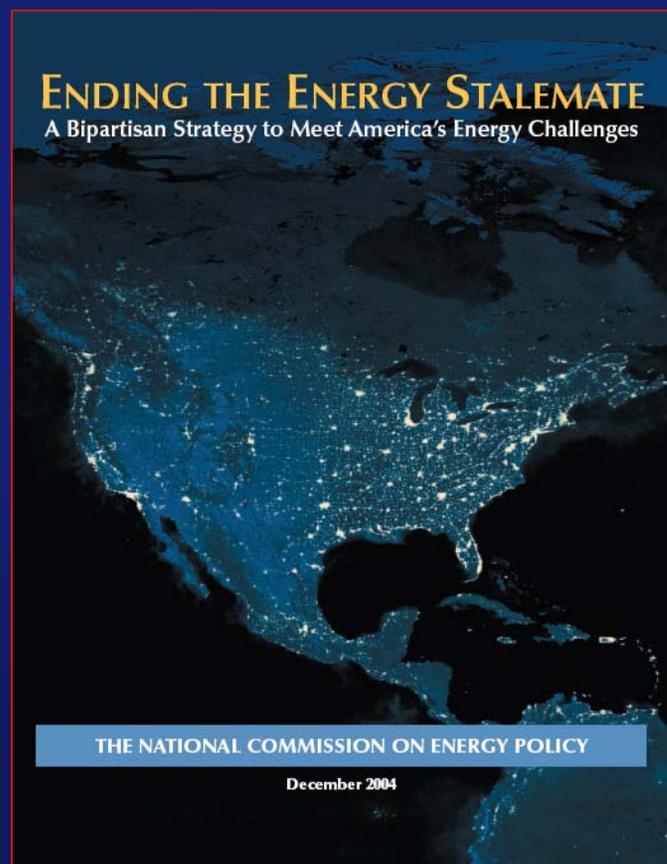


Two central energy challenges*

***National Commission on Energy Policy (NCEP)**

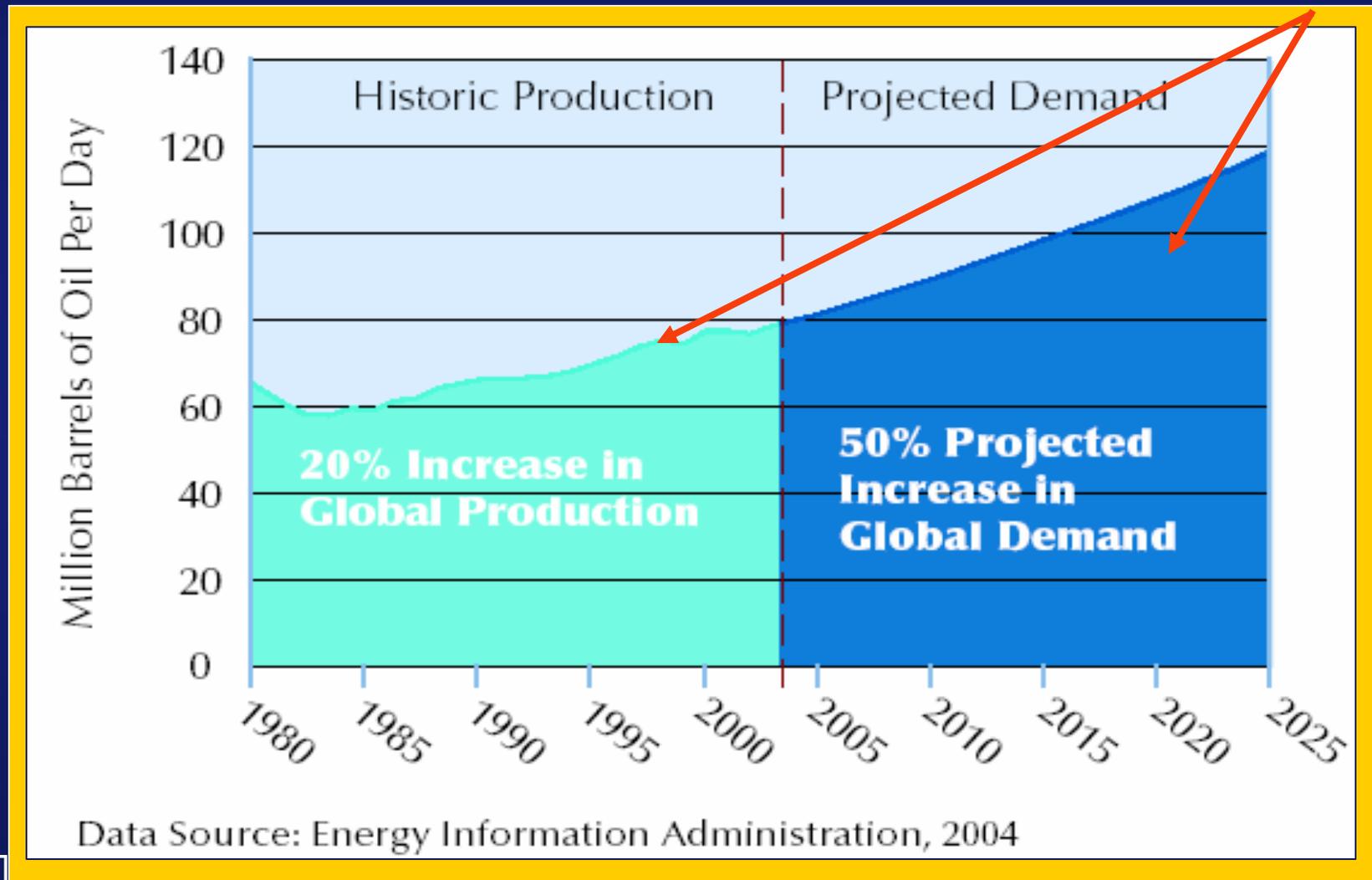
NCEP: Central energy challenges

- Dependence of the economy on oil – especially for transportation.
- Dependence on combustion of fossil fuels which contribute to global warming – especially for electricity and transportation.
- Cannot address the nation's core energy challenges without addressing oil in the transportation sector and carbon content of energy.

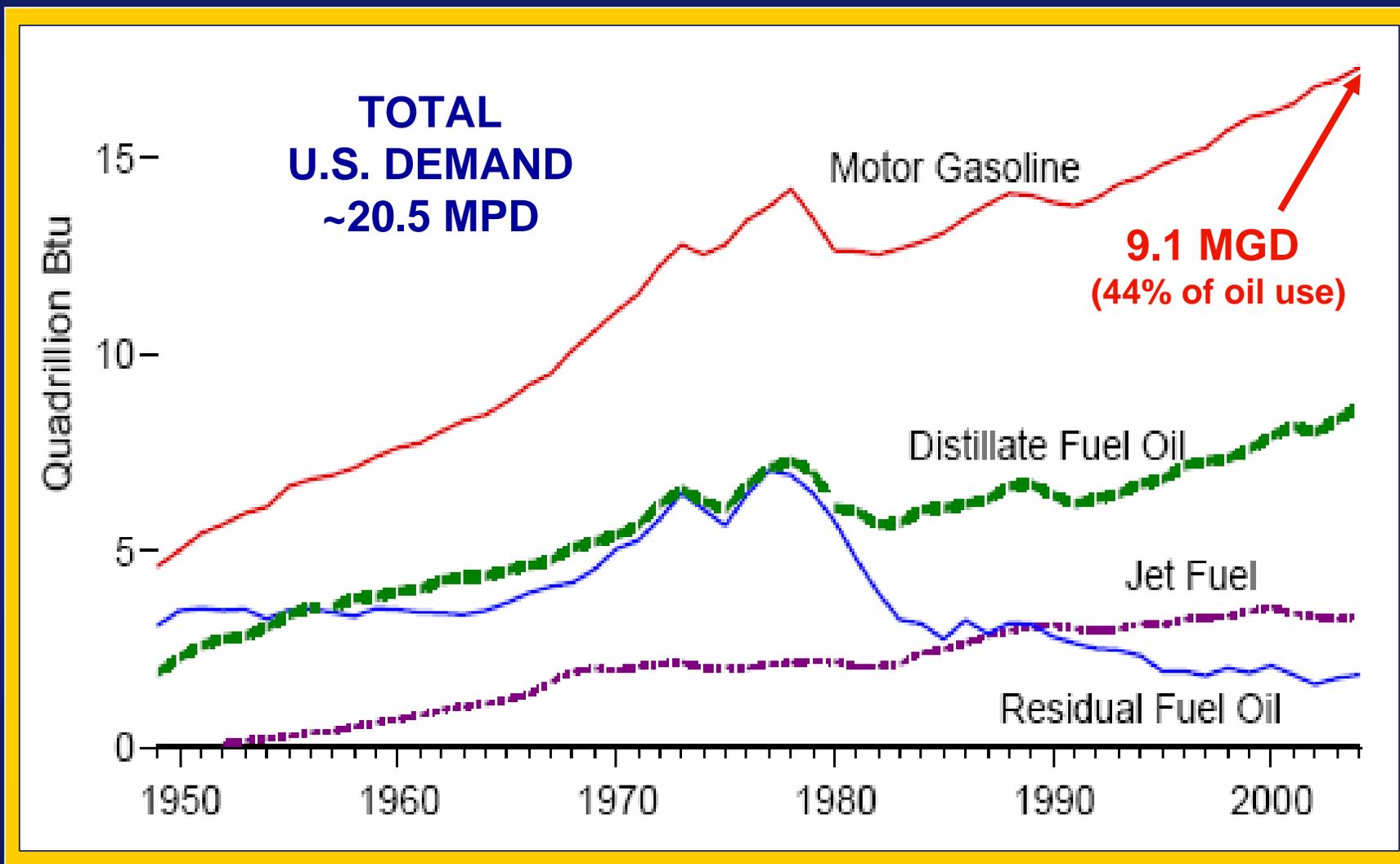


Global energy challenge #1: The “Oil Stakes” are Enormous

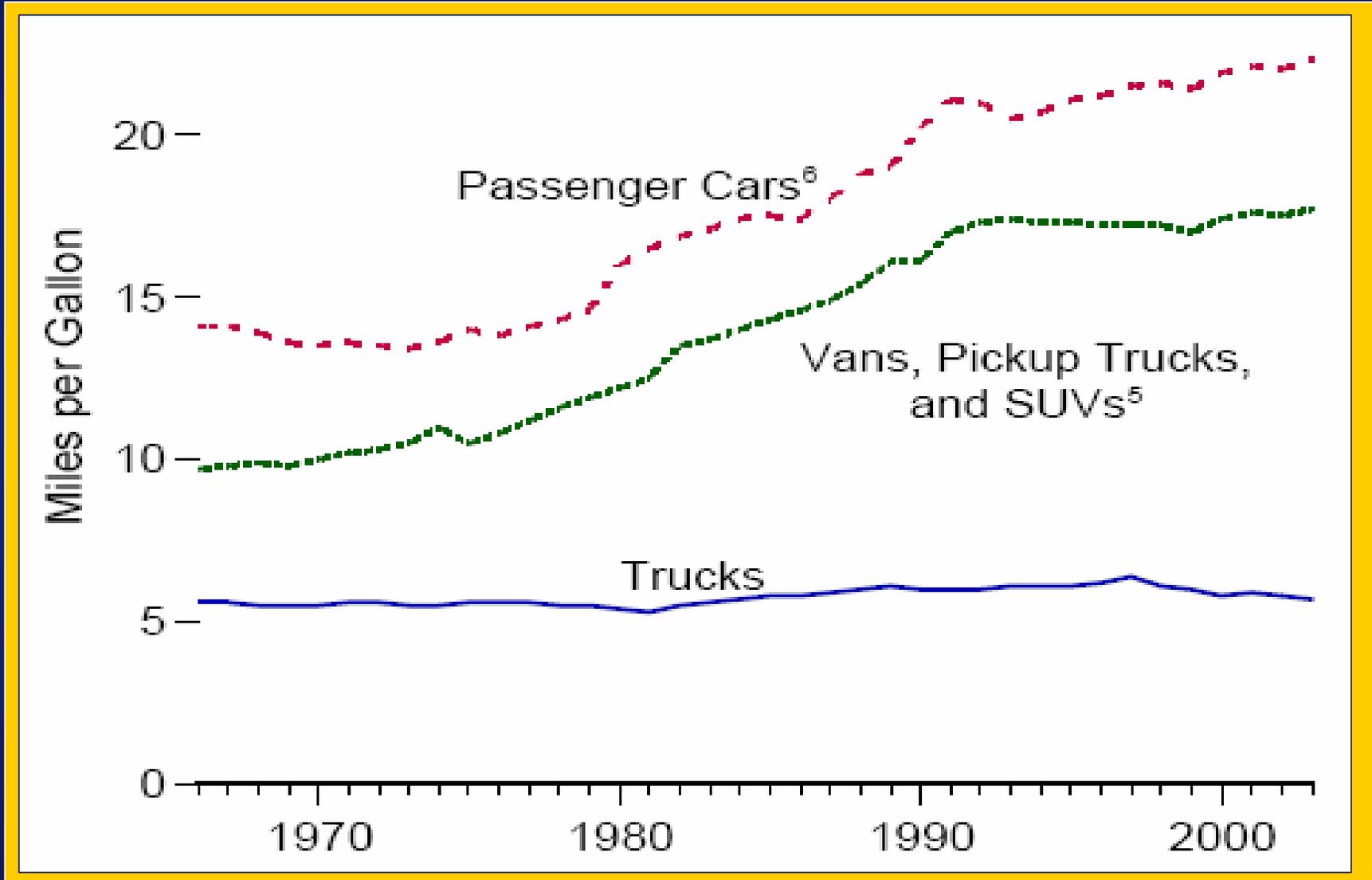
(especially from motor vehicles)



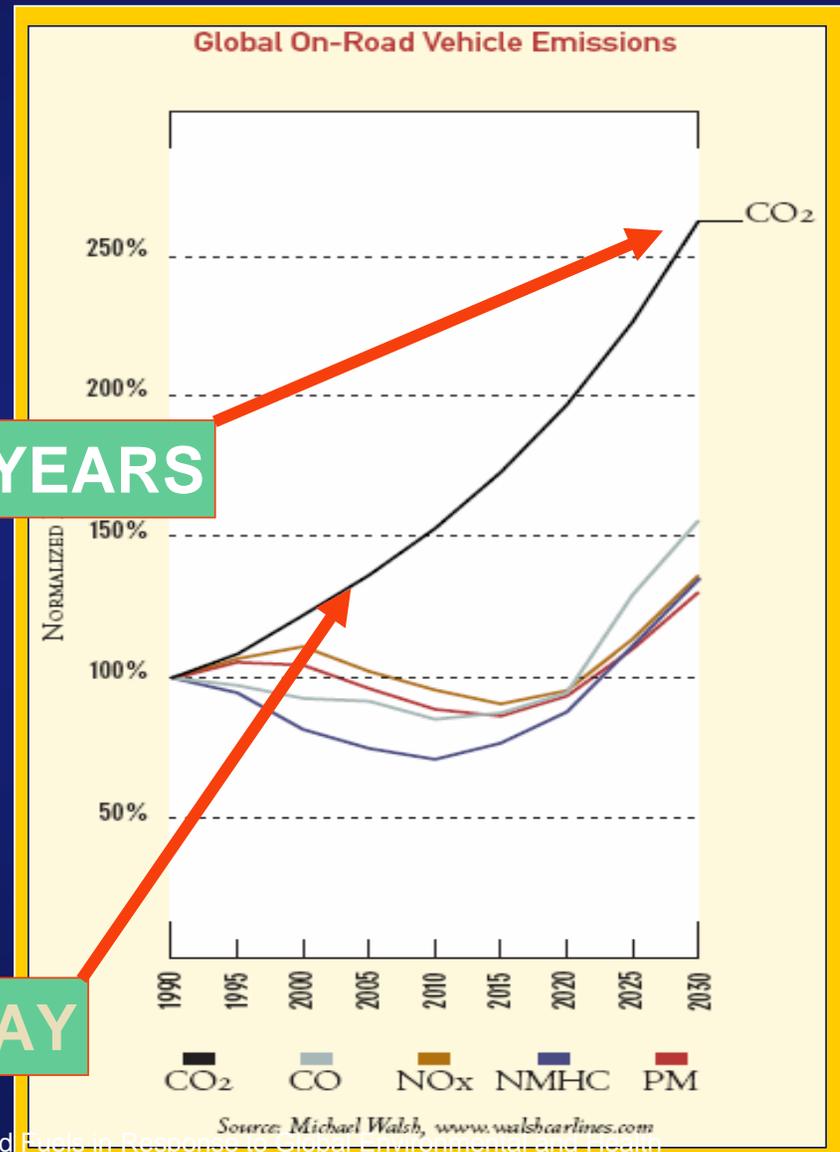
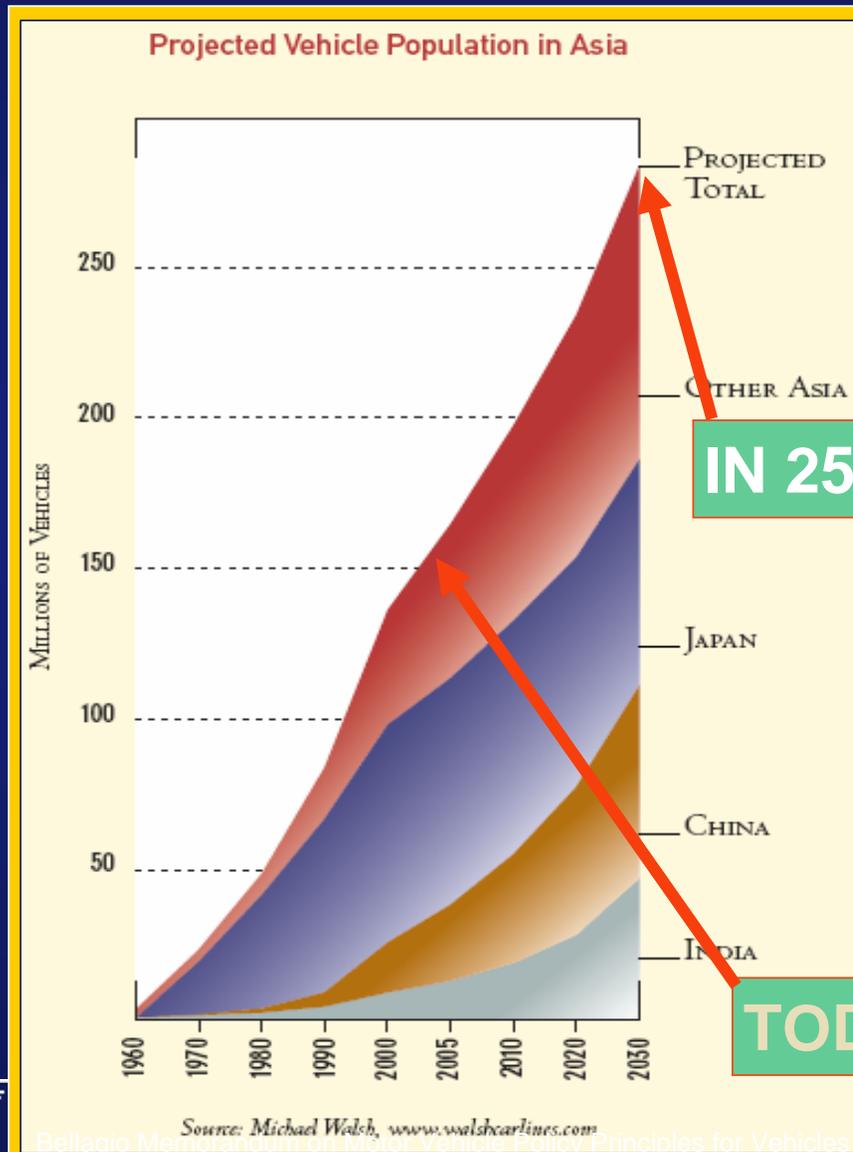
Growing U.S. Motor Vehicle Use of Oil



U.S.: Worsening fuel economy in cars

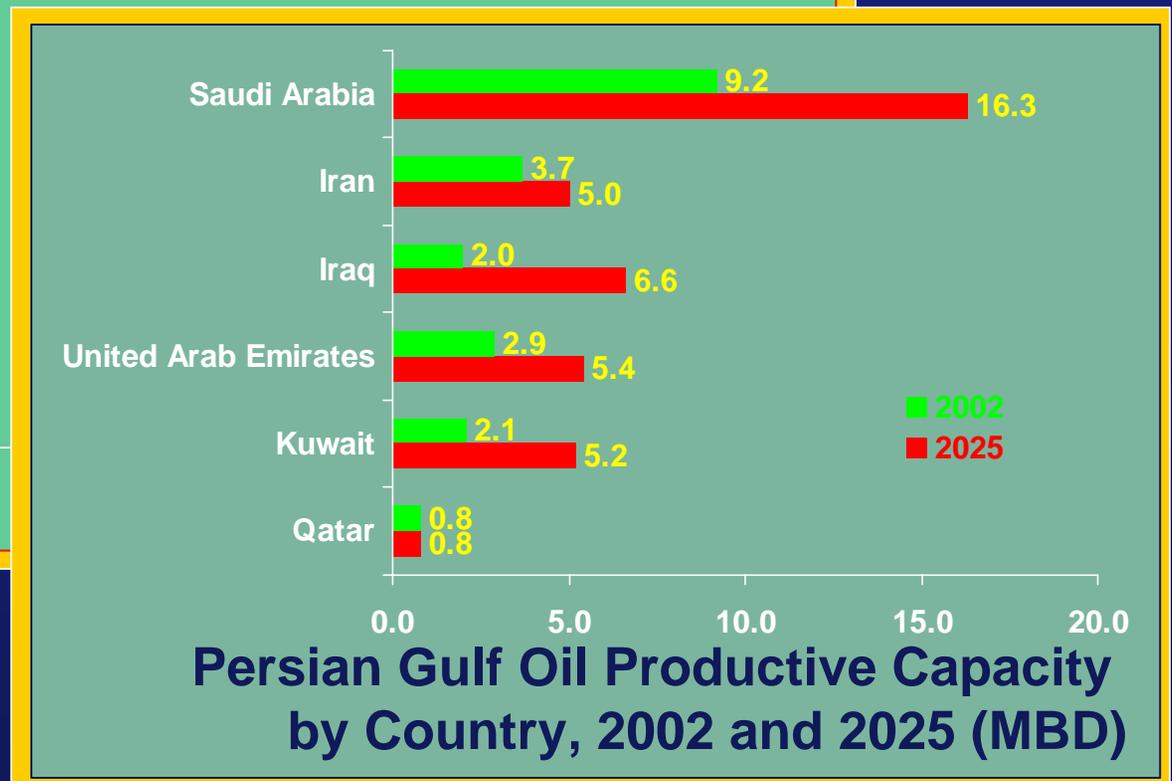
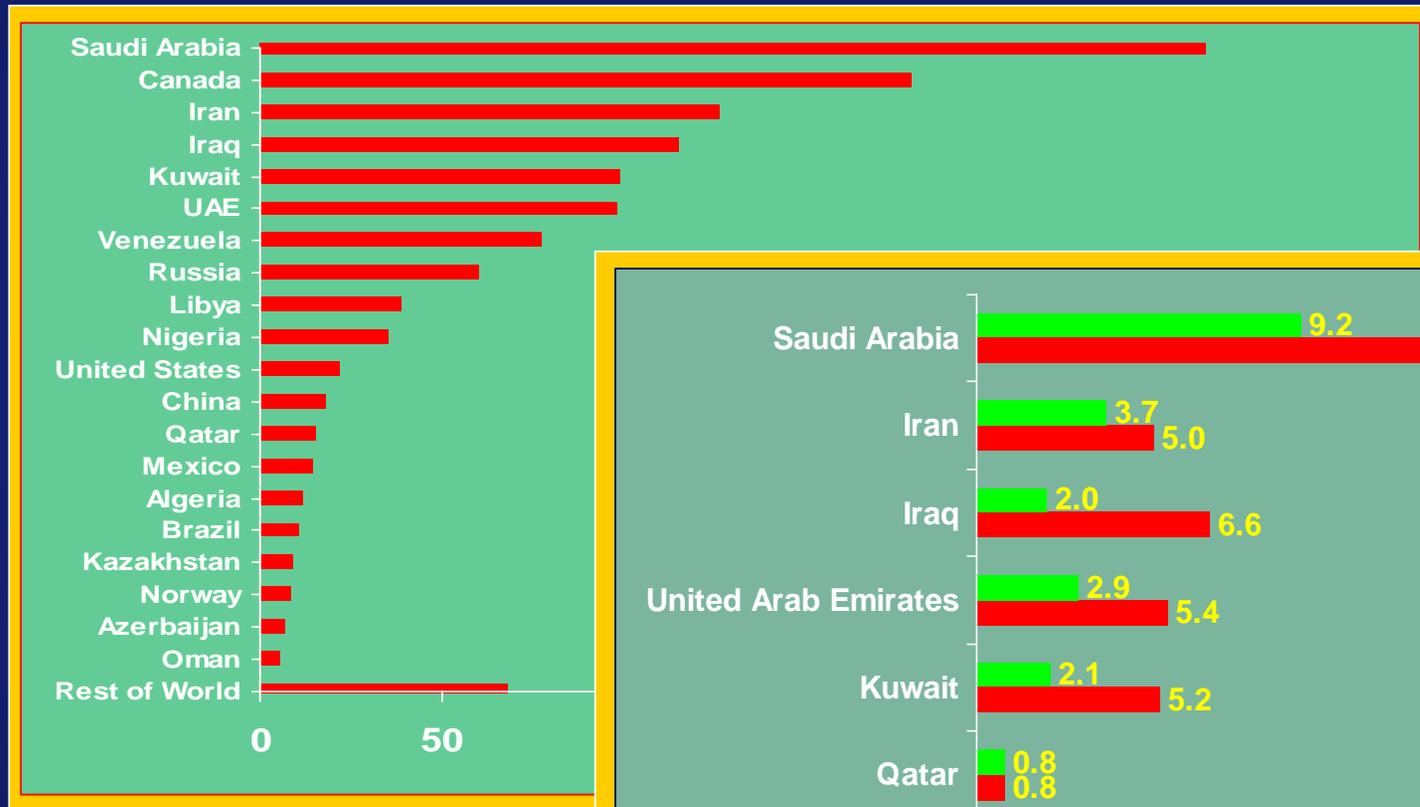


Growing vehicle use in Asia, world (↑ oil, ↑ GHG)



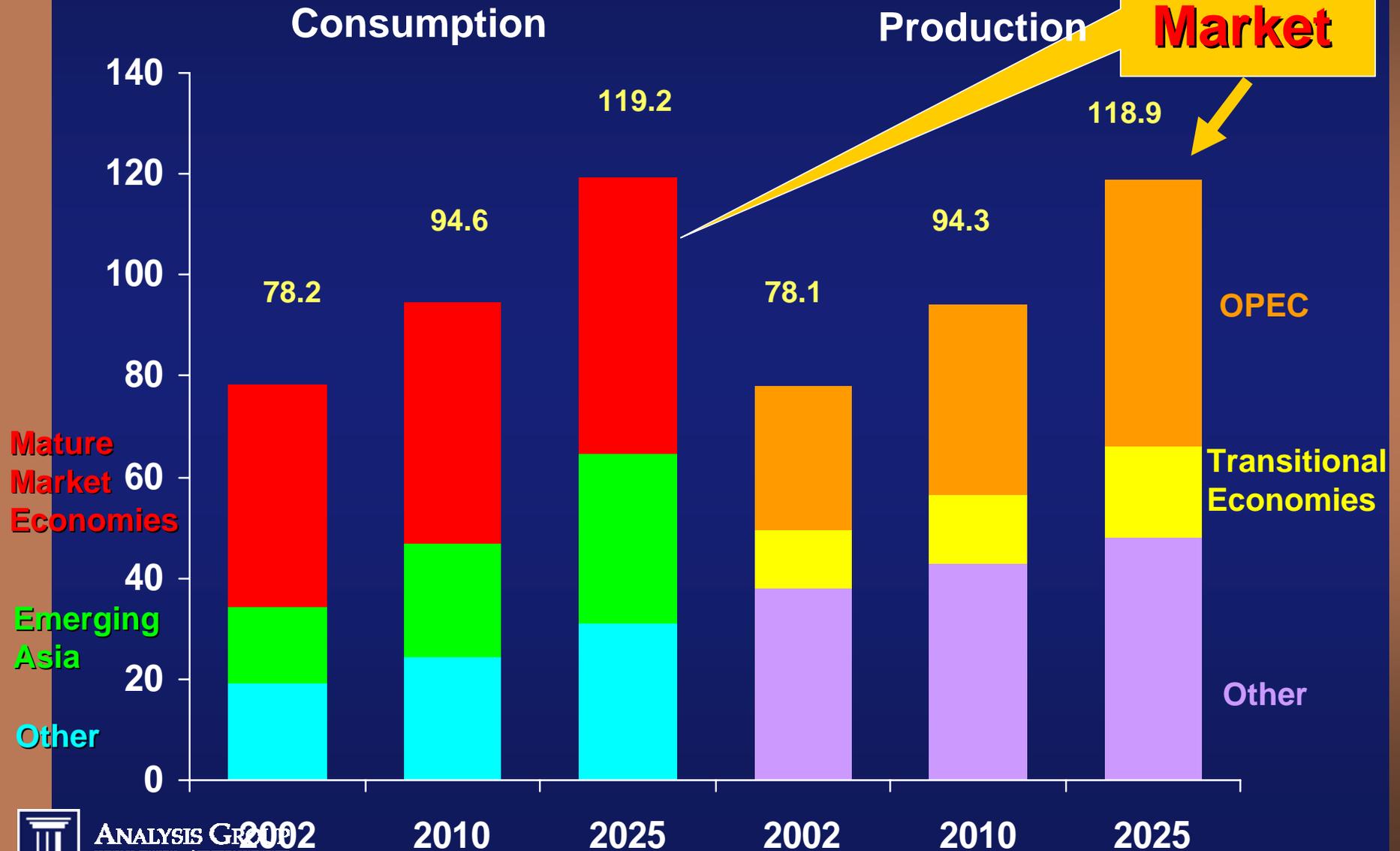
Continuing dependence on Middle East Oil

World Oil Reserves by Country, as of January 1, 2005 (b barrels)



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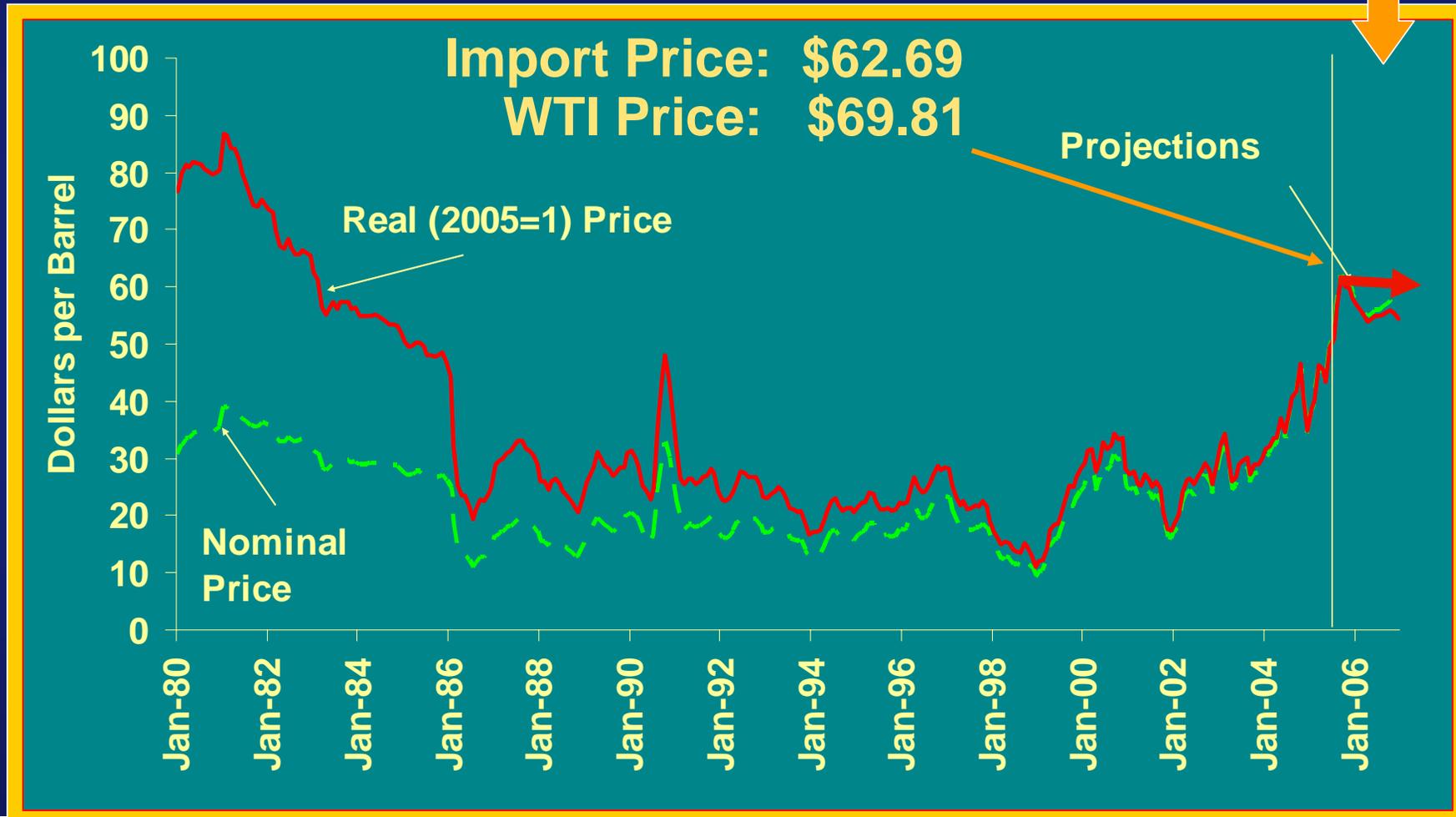
World Oil Consumption and Production, 2002, 2010, and 2025 (MBD)



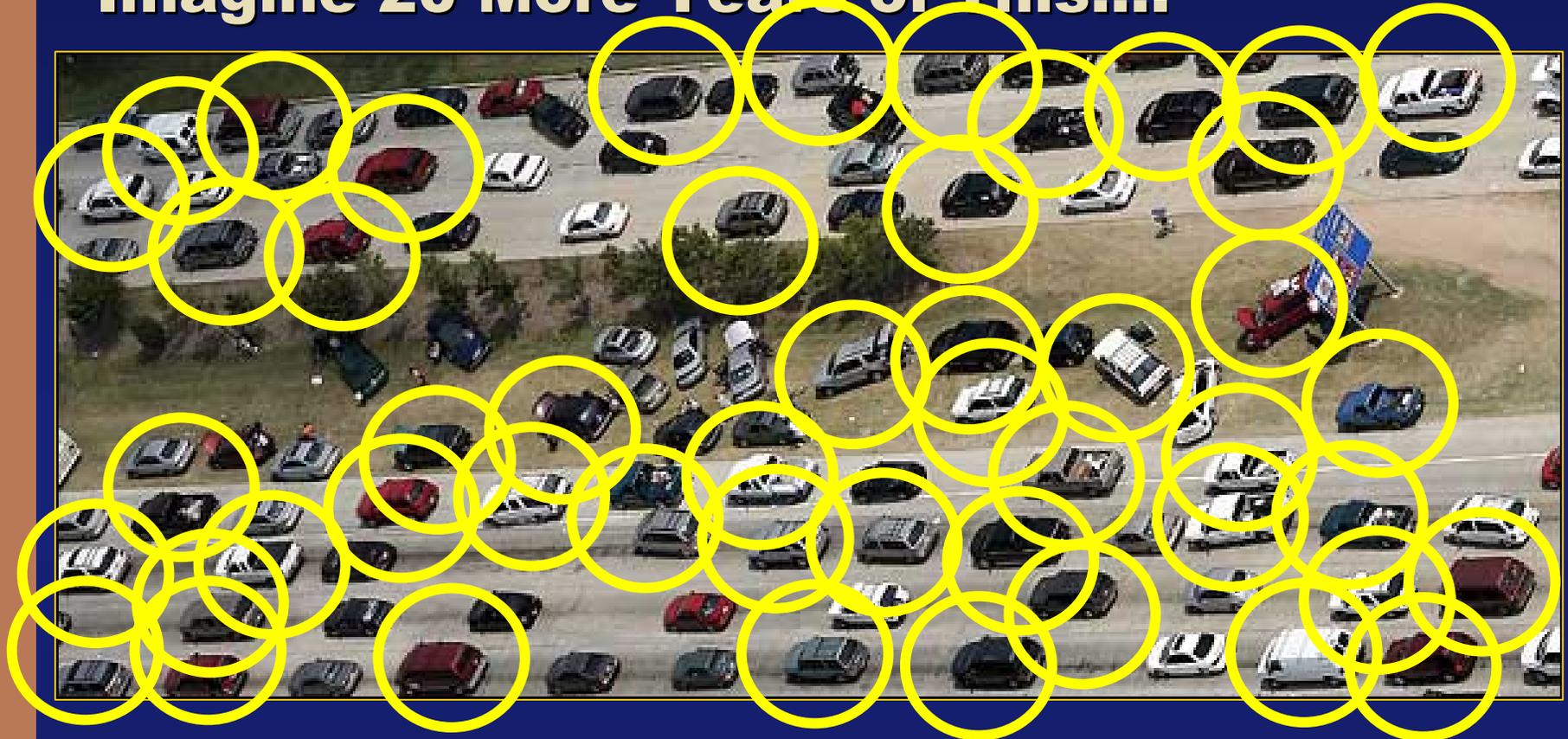
Crude Oil Prices: Nominal, Real

“Peaker” vs.
“Economists”
forecasts?

Short Term Forecast – 2nd Q'06:



“Imagine 20 More Years of This....”



Cars out of gasoline and traffic stalled leaving Houston ahead of Hurricane Rita. NY Times, 9-25-05

“...America's energy industry - both its oil supplies and refineries - is concentrated along the Gulf of Mexico....[G]as prices will almost always spike each time a hurricane heads for the gulf coast.”



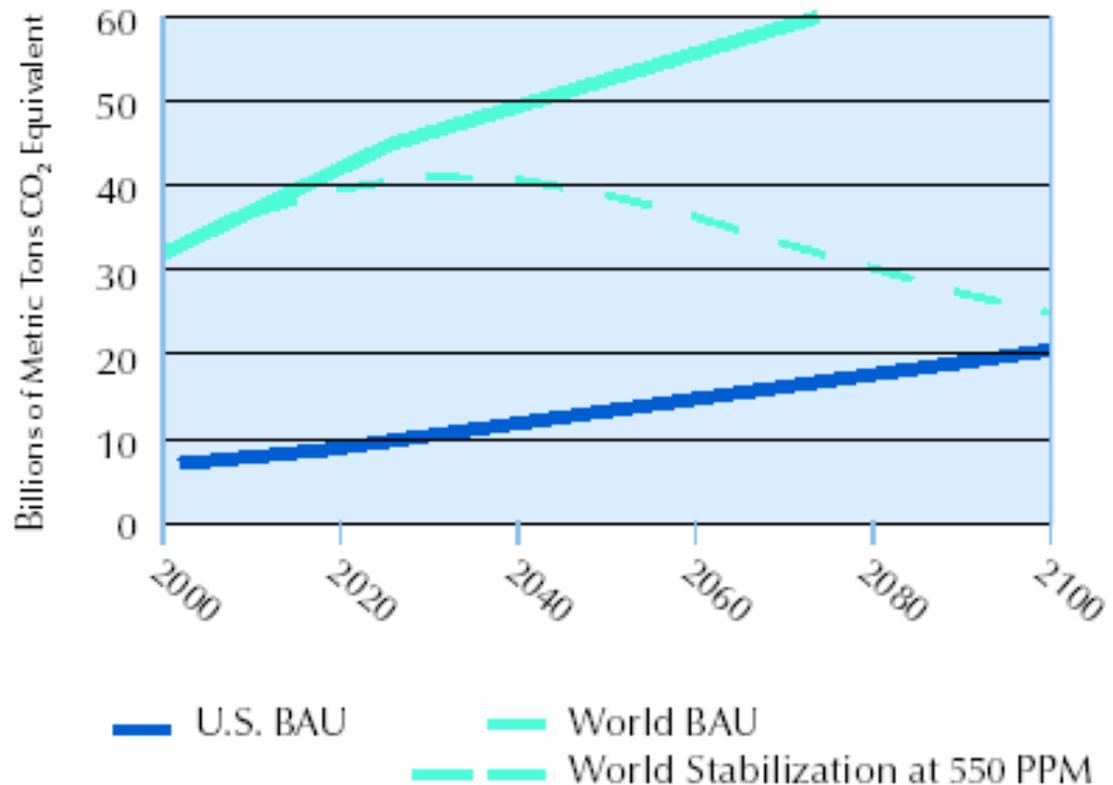
Global energy challenge #2: “Global Warming” Stakes are Enormous

By 2025, U.S. GHG emissions could increase over 40%.

Globally, emissions could increase 55%.

Major sources: electric and transportation.

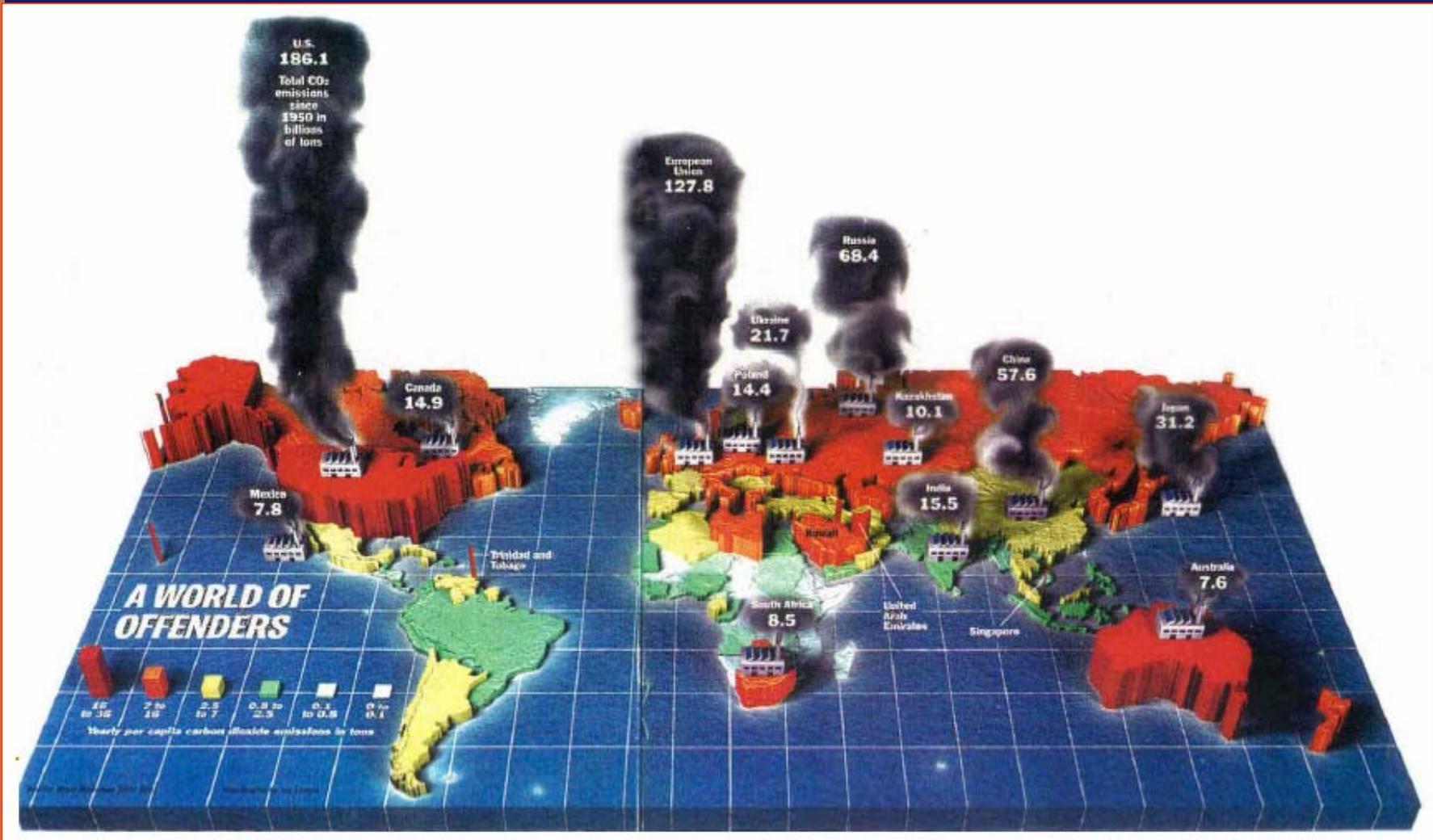
Projected Global and U.S. Greenhouse Gas Emissions Trajectories



Wigley, Richels, and Edmonds, 1996; NCEP projection



CO2 Emissions by Country: Total emissions since 1950 (b tons)



The fundamental challenging equation



**CARBON
EMISSIONS**

=

Number
of
people

*

Economic
activity
per
person

*

Energy
intensity of
economic
activity

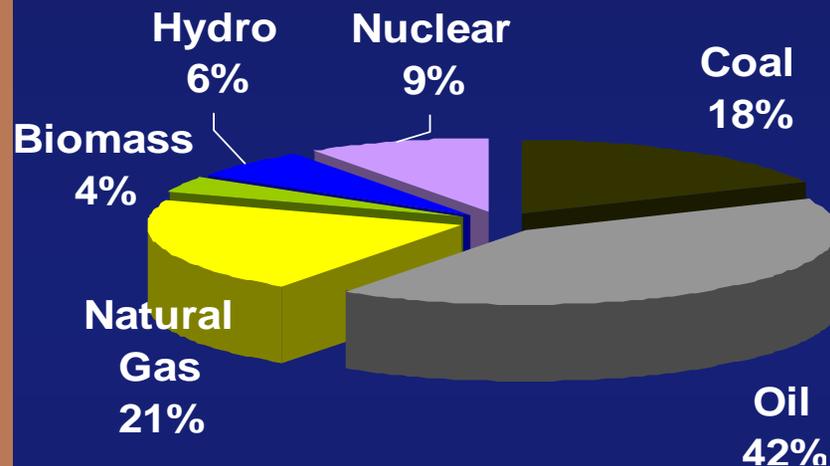
*

Carbon
content of
energy
supply



Growing global energy consumption

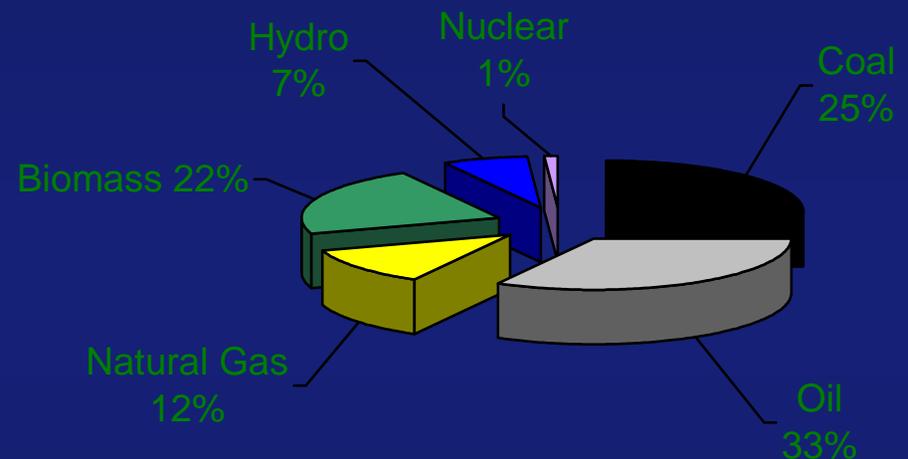
Industrialized Countries



Population: 1.34 billion
% of fossil fuels: 81%
Energy = $6,701 \times 10^6$ toe

5.0 toe/capita

Developing Countries

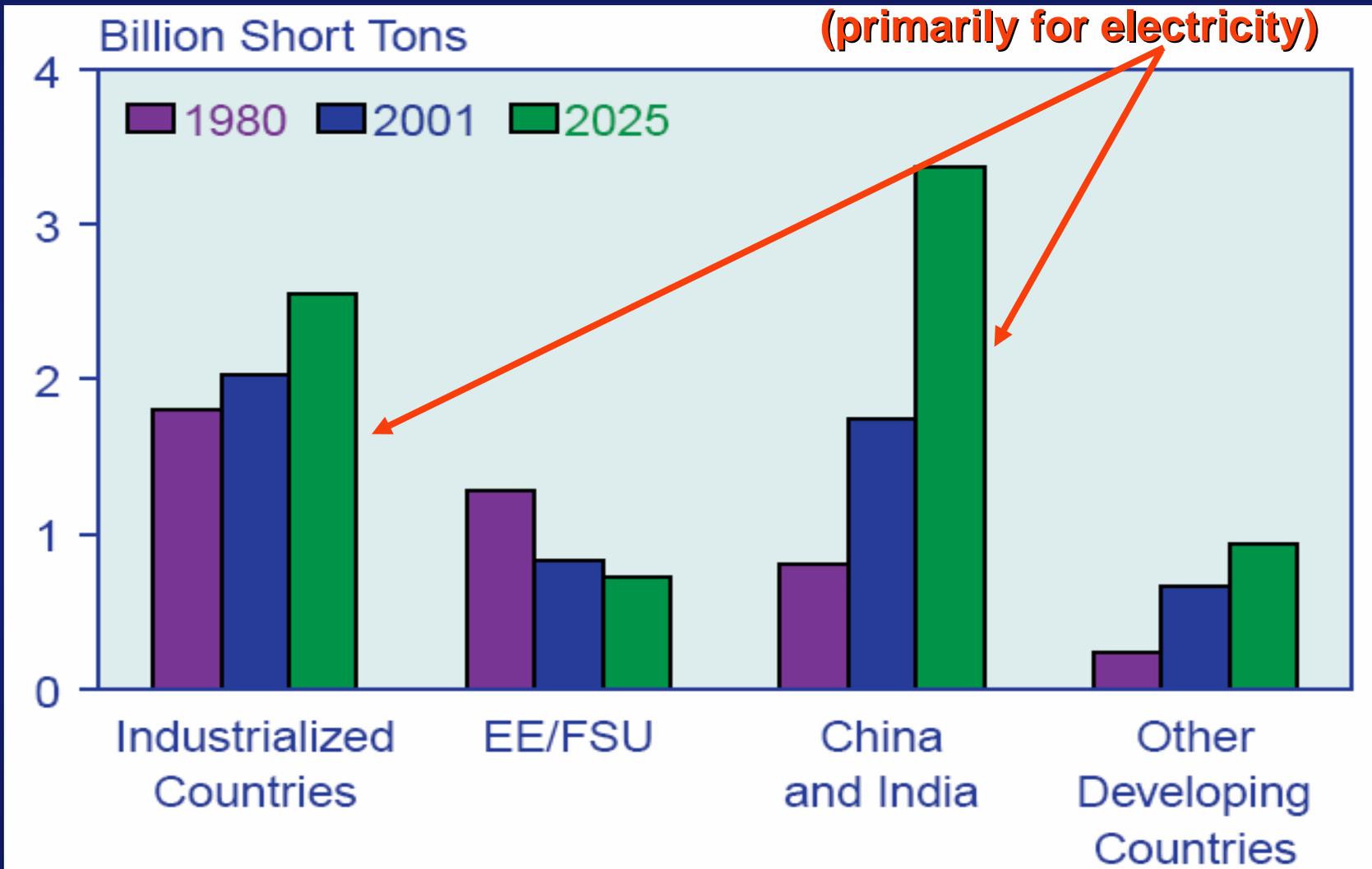


Population: 4.56 billion
% of fossil fuels: 70%
Energy = $3,861 \times 10^6$ toe

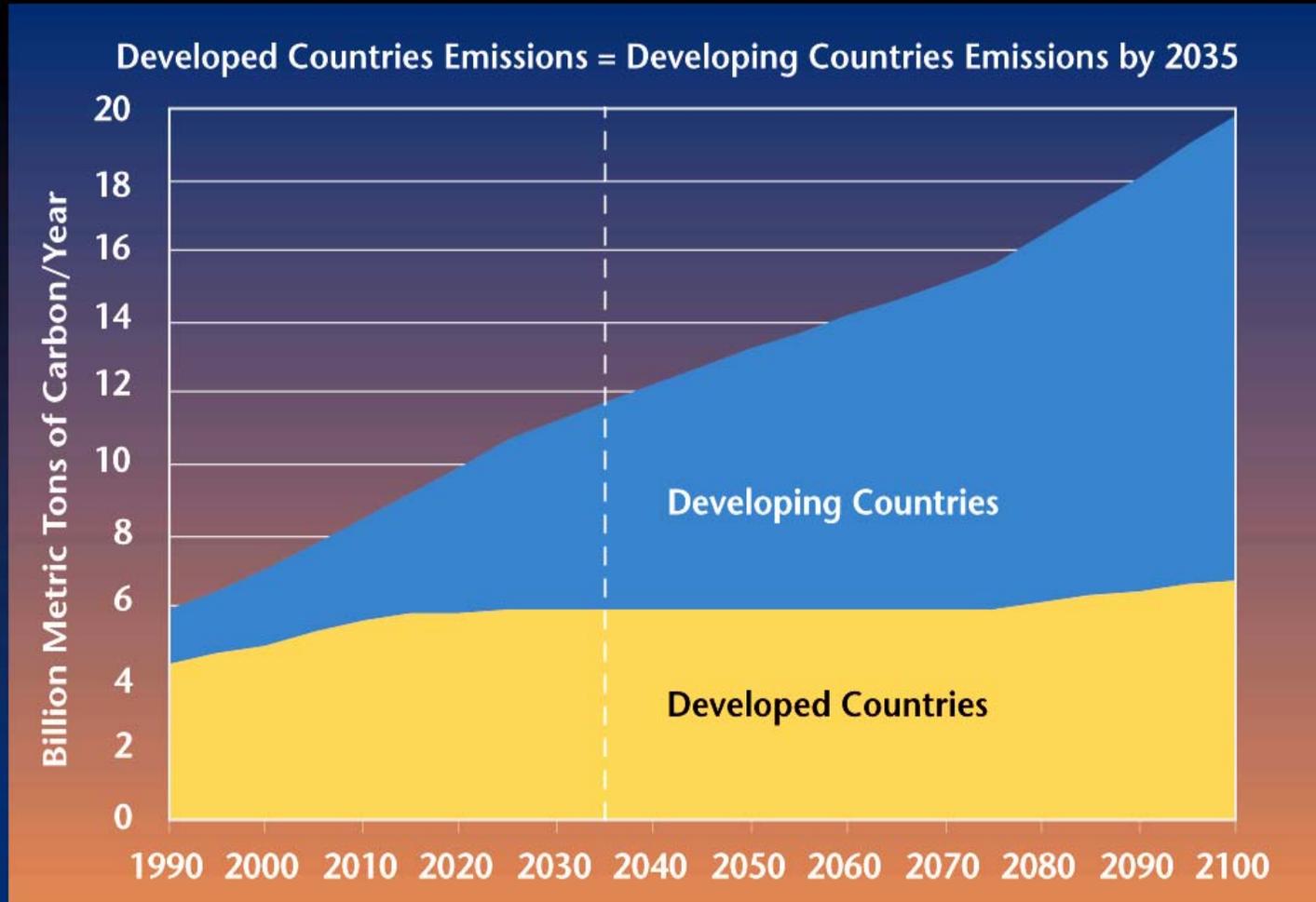
0.85 toe/capita



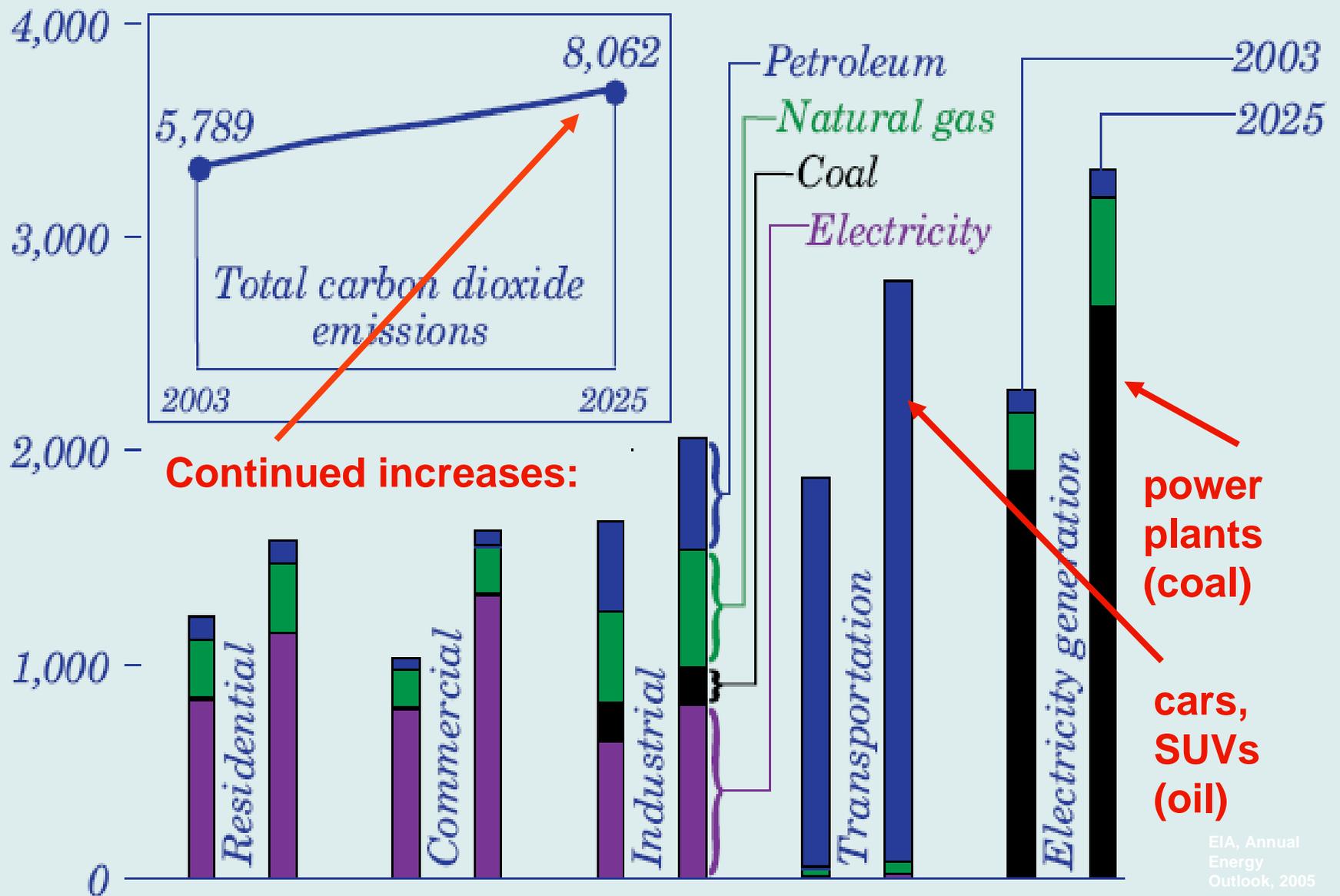
Growing coal use expected worldwide



The Global Carbon Emission Context: Developed and Developing World CO₂ Emissions, 1990-2100



The U.S. Carbon Challenge



Central energy challenges for the U.S.

The era of “cheap energy” is over....

No silver bullet solutions

Need diverse energy strategy with following components:

- Enhance oil security (especially by diversifying the transportation sector’s dependency on oil)
- Reduce climate change risks
- Increase energy efficiency (in end-use technologies)
- Diverse resource mix of resources & technologies
- Enhance infrastructure
- Increase R&D for advanced energy technology



NCEP Climate Change proposal

Premise:

- **Federal policy is needed to support development of and investment in diverse energy resources.**
- **Markets will make choices about which way to go.**
- **Balance environmental and economic impacts.**
- **Start with “architecture” for emissions reductions.**

Approach:

- **Initiate in 2010 mandatory national economy-wide cap-&-trade program to limit GHG emissions.**



Four key features of NCEP Climate Proposal

1. **Cost Certainty:**
safety valve
2. **Environmental Progress:**
tightening cap & safety valve price
3. **International Leadership:**
U.S. joins international regime,
lead others to join
4. **Technology Push:**
use revenues from auction of
some allowances to fund
technology R&D

Components
of the
approach
supported by
Domenici
and
Bingamin

EIA estimate
of cost to the
economy:
+ 0.1%
Impact on GDP
(v. biz as usual)
(with 2x+ more non-
hydro renewables)



2nd core recommendation area: Enhancing Oil Security

Significantly strengthen federal fuel economy:

- Tighten standards for cars and light trucks
- Provide manufacturer and consumer incentives to promote domestic production.

Develop non-petroleum transportation fuel alternatives, especially cellulosic ethanol & diesel from biomass.

Increase and diversify world production and strengthen global network of strategic reserves.





The 2005 Energy Policy Act – Does it take us where we need to go?

The New Energy Policy Act – An Energy Stimulus Package

■ Incentives for investment:

- Tax incentives
- Royalty relief
- Risk mitigation
- Federal funding authorization
- Purchase requirements



The Energy Policy Act: Tax code incentives

\$14.6 billion

Oil & Gas Production/Refining/Delivery	\$ 2.64
<u>Gas distribution lines</u> : shorter depreciation	\$1.02
<u>Geo expenses</u> : shortened amortization	\$0.97
<u>Refinery investments</u> : expensing, and other credits, ded	\$0.65
Electricity Reliability	\$ 1.32
<u>Transmission property</u> : shorter depreciation	\$1.24
Electric Transmission: other tax provisions	\$0.08
Electric Supply	\$ 7.96
Nuclear decommissioning: modifications to funds	\$1.29
<u>Nuclear power</u> : production tax credit	\$0.28
<u>Renewable</u> : extends production tax credit to 12-07	\$2.75
<u>Clean coal technology</u> : 3 new investment tax credits	\$1.61
<u>Coal pollution control equipment</u> : longer recovery	\$1.15
Other tax credits	\$0.88
Energy Efficiency	\$ 1.35
tax credits (<u>homes - weatherization, PV, solar</u>)	\$0.62
tax credits (<u>business - micro-turbines, fuel cells, HVAC</u>)	\$0.47
tax credits (<u>appliance manufacturers</u>) + other	\$0.27
Transportation	\$ 1.32
<u>alternative fuel vehicles</u> : tax credits for purchases	\$0.87
<u>bio-diesel, ethanol, other alt fuels</u> : tax credit	\$0.45

Changes depreciation or amortization, and allowed expensing

Tax credits for investments and output,

Tax credits for purchase (consumer, producer)



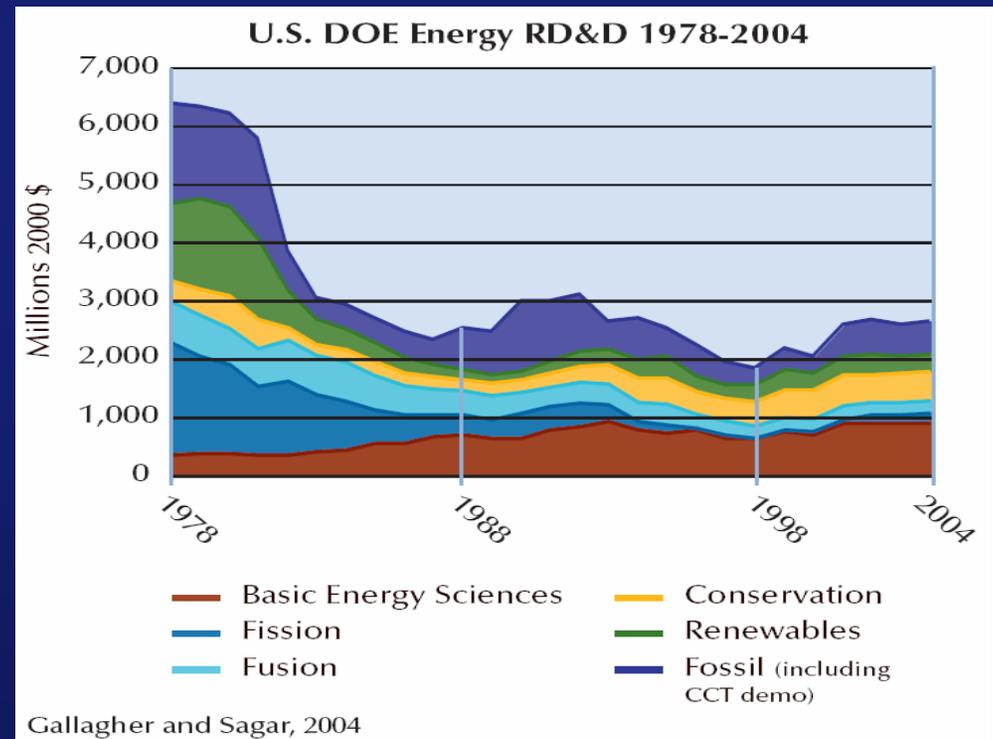
The Energy Policy Act: “Proof of Concept” for Advanced Energy Technologies

- Funding/financing support for initial projects of next-generation technologies.
 - IGCC – coal (loan guarantees, R&D \$)
 - Advanced nuclear (risk insurance, PTC)
 - Renewable fuels & technologies (PTC, innovative technology R&D)



The Energy Policy Act: Federal energy R&D authorizations

- DOE authorized \$1.25 b to build “next generation” nuclear reactor to generate power & hydrogen
- Advanced Fuel Cycle Initiative authorized
- Coal R&D: 3 years of funds authorized
- Carbon capture R&D: 3 years authorized
- Low / No Carbon technologies: Efficiency and renewables
- But..... →



Energy Policy Act – What's not in it?

- No mandatory climate change control policy
 - Significant attempt by Domenici and Bingaman to adopt an NCEP-like mandatory program
 - Sense of the Senate resolution calls

"It is the sense of the Senate that, before the end of the first session of the 109th Congress, Congress should enact a comprehensive and effective national program of mandatory, market-based limits on emissions of greenhouse gases that slow, stop, and reverse the growth of such emissions at a range and in a manner that -

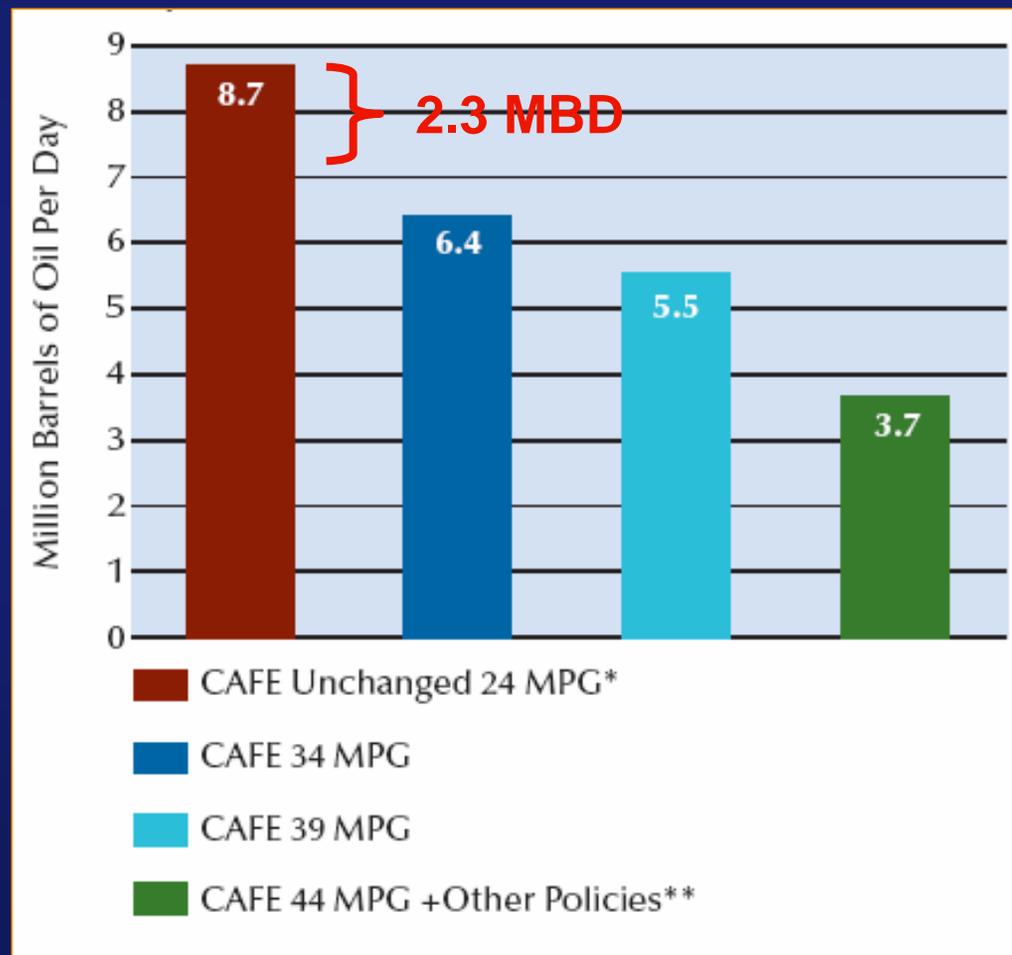
- (1) will not significantly harms the United States economy; and
- (2) will encourage comparable action by other nations that are major trading partners and key contributors to global emissions."



Energy Policy Act – What's not in it?

- Inadequate attention to reducing oil use in motor vehicles
 - Ethanol RPS is in
 - But no change in CAFÉ standards
 - Inadequate long-term support for renewable motor fuels (cellulosic biomass)

* Estimate quoted in Bush/Cheney National Energy Policy, 5/2001, p. 5-9.





Final Thoughts

Sad irony, new opportunity

Painful irony:

- After a decade of effort, EPACT passed in Summer 2005
 - By less than 2 months later (in early Fall), the hurricanes and other world events made clear that EPACT had not addressed core issues, including:
 - Demands for fuel economy in motor vehicles
 - Climate change legislation
 - Headline this week:
 - “Energy May Still Stall Refreshed Congress”
June 3, 2006; Page A4
- WASHINGTON -- Congress's impulse to pass energy legislation, so urgent just a month ago, has lost steam amid a combination of rancorous regional and partisan battles that bode ill for even modest proposals.



Sad irony, new opportunity

New opportunity –

Viewed through the wisdom of Winston Churchill:

- **"Americans will always do the right thing, after they've exhausted every alternative."**
- **"The era of procrastination, of half-measures, of soothing and baffling expedients, of delays, is coming to a close. In its place, we are entering a period of consequences."**





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