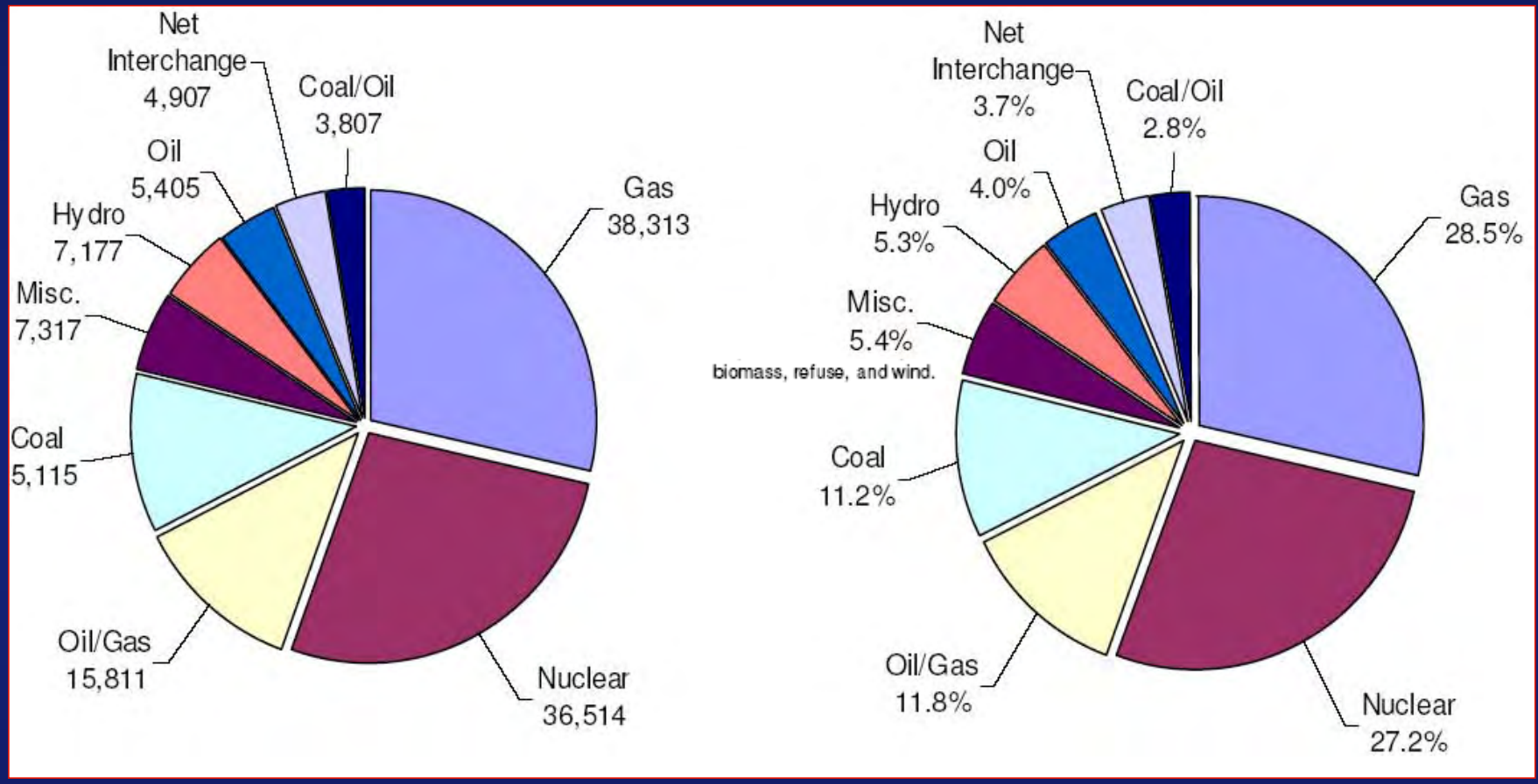
N.E. electricity production by fuel (2004)

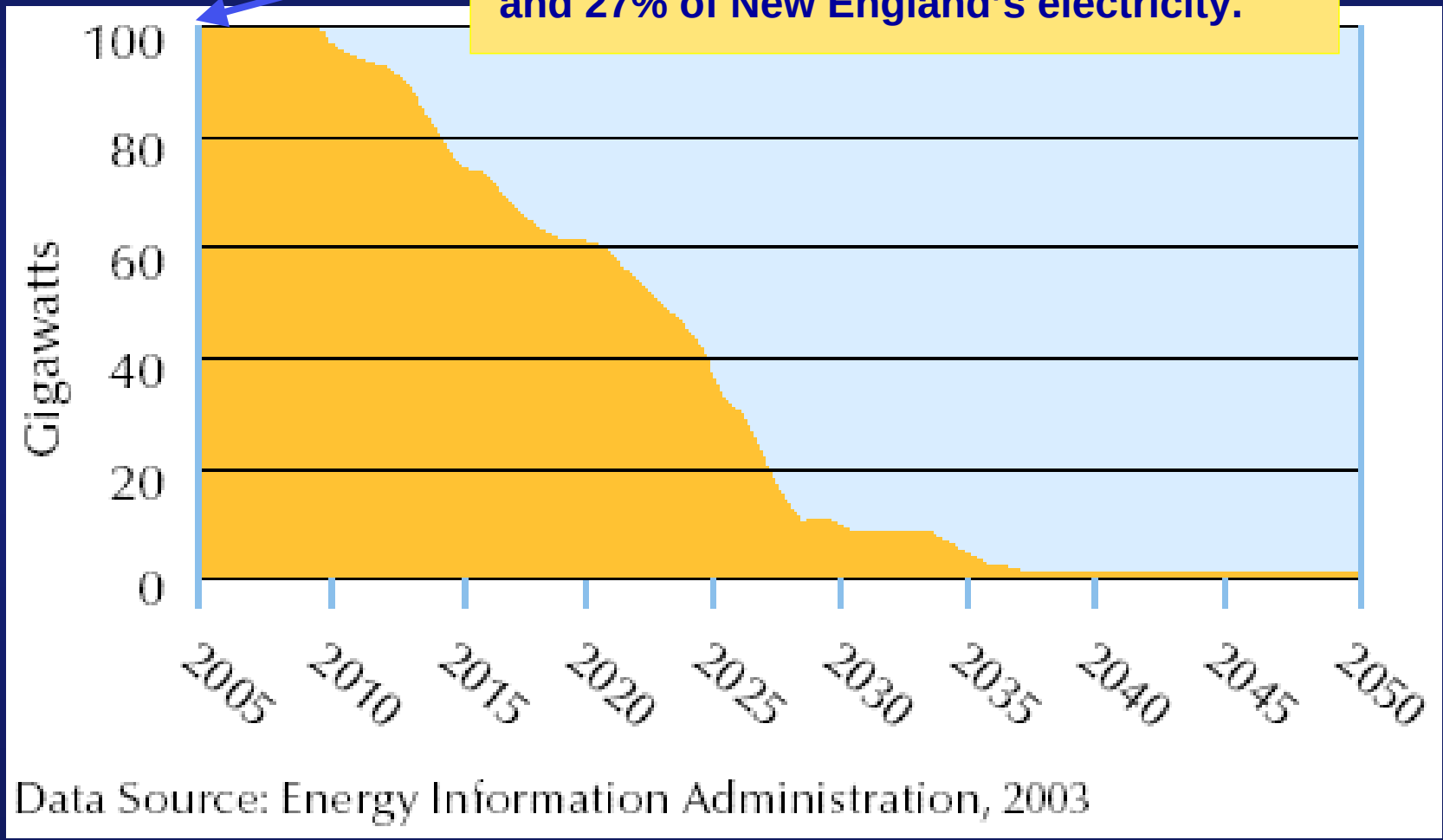


Compared to the U.S.:
New England has more nuclear & gas, less coal & hydro.

ISO-NE, RSP 05.

Current nuclear operating licenses end soon

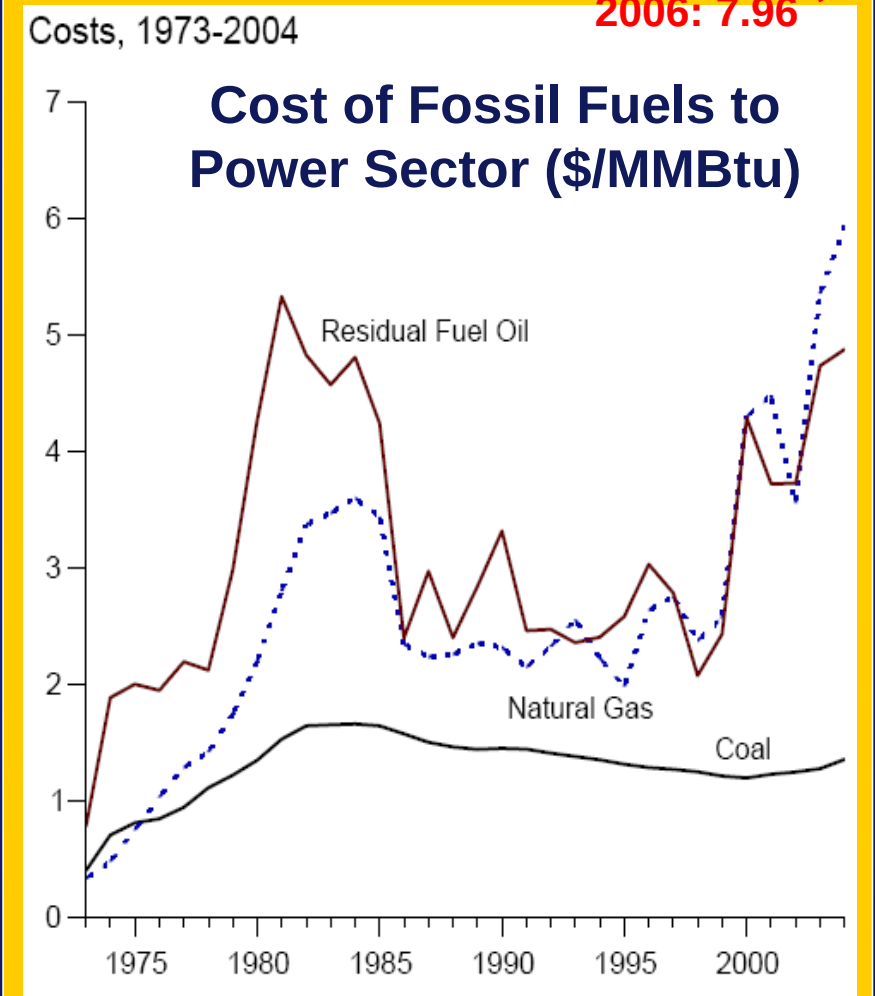
Nuclear = ~20% of US electric generation and 27% of New England's electricity.



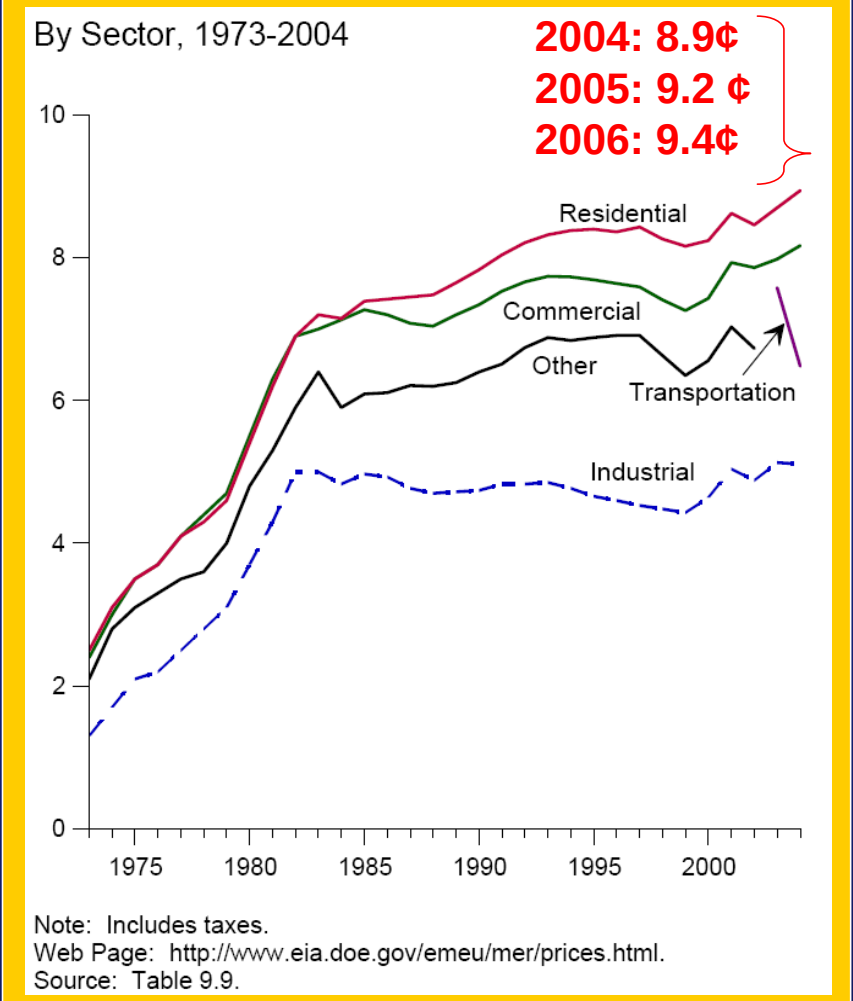
Data Source: Energy Information Administration, 2003

Electricity Prices Rising

New Natural Gas Estimates:
2005: 8.33 *
2006: 7.96 *



Average Retail Electricity Price (¢/kwh)



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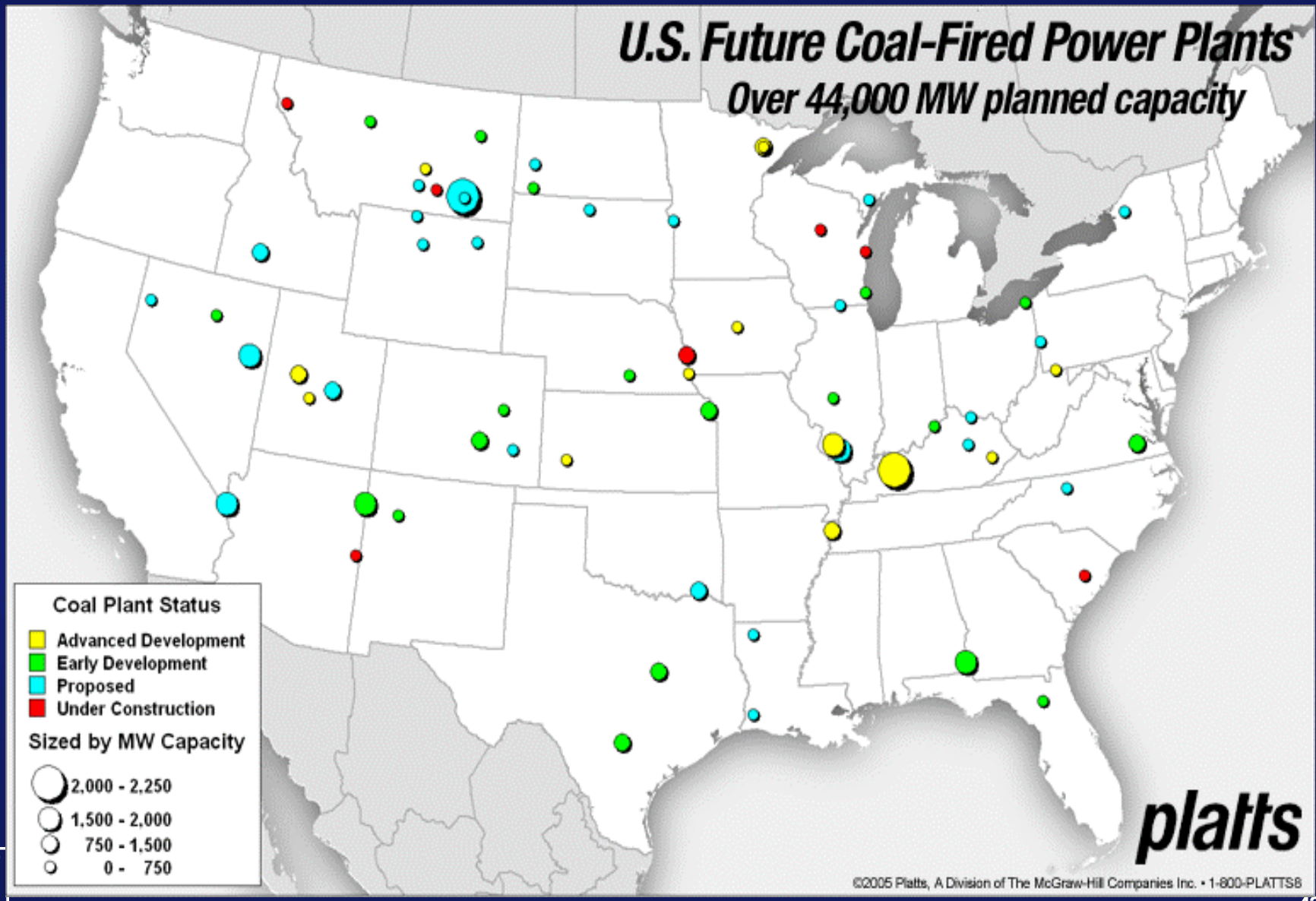
http://www.eia.doe.gov/emeu/mer/pdf/pages/sec9_13.pdf, Figures 9.2, 9.3.

Resurgence of Interest in Coal Plants (after natural gas expansions in 1990s)



Energy prices are high in New England

Energy prices (all) ranked by state (#1 = highest prices):

U.S. average price = $10.72 / mm Btu

1. **D.C. = $15.57**
2. **Hawaii = $15.41**
3. **Massachusetts = $14.18**
4. **Vermont = $14.08**
5. **Rhode Island = $13.95**
6. **New York = $13.41**
7. **Connecticut = $13.30**
8. **New Hampshire = $13.29**

EIA, Annual Review of Energy, 2004, Table 1.6

#35 Maine = $10.05

Rising energy prices & expenditures

EIA's 9-7-05 winter outlook:

This winter's energy expenditures v. last year's:

oil: +20%

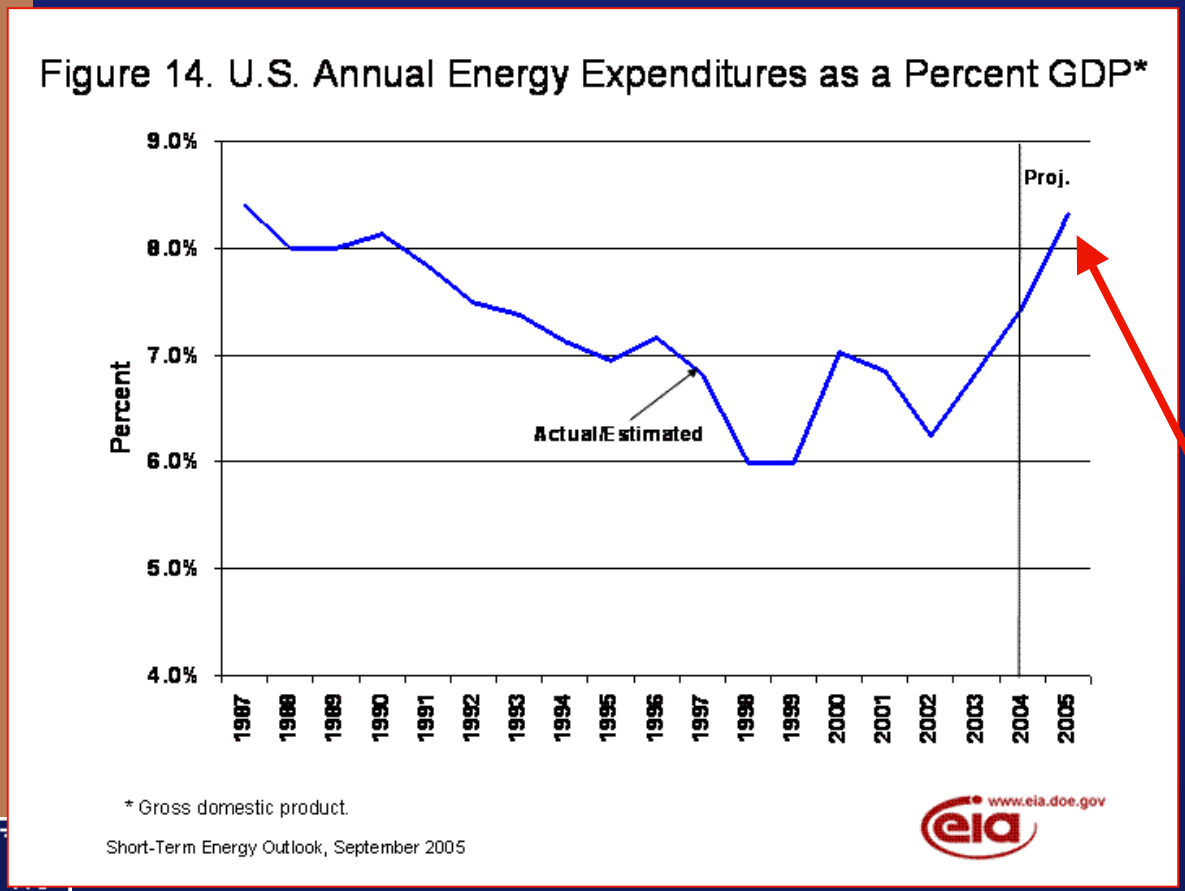
NE Heating oil: +31%

Natural gas: +24%

Coal: +13%

Electricity: +5%

For all of 2005: total US energy expenditures: 18% above 2004 levels



8.3% of GDP

(highest since '87)

[6.2% in 2002]

Central energy challenges for the U.S. and N.E.

The era of "cheap energy" is over….

No silver bullet solutions, few near-term solutions

Diverse energy strategy with following components:

- **Enhance oil security (via supplies, improved efficiency)**
- **Reduce climate change risks (lower-emitting energy production and use)**
- **Increase energy efficiency (in end-use technologies)**
- **Ensure affordable, reliable, clean, safe energy supplies (diverse resource mix of resources & technologies)**
- **Enhance infrastructure (pipes, wires, plants)**
- **Increase R&D for advanced energy technology**

Core New England uncertainties, challenges

Energy efficiency programs – **getting more aggressive in all sectors**

Natural gas –

- **Electric sector's dependency on gas**
- **Need for more delivery and firm supplies (LNG, pipelines)**

Electric sector –

- **No new plants on order, new capacity needed soon**
- **Uncertainty about "rules" affecting investment (RGGI, LICAP)**
- **Diversity of supply given market structure, siting attitudes**
- **Renewables outlook, given state requirements and local siting**

Oil –

- **Dependence on home heating oil – and world oil markets**
- **Domestic/international oil market conditions**
- **Options for biomass**

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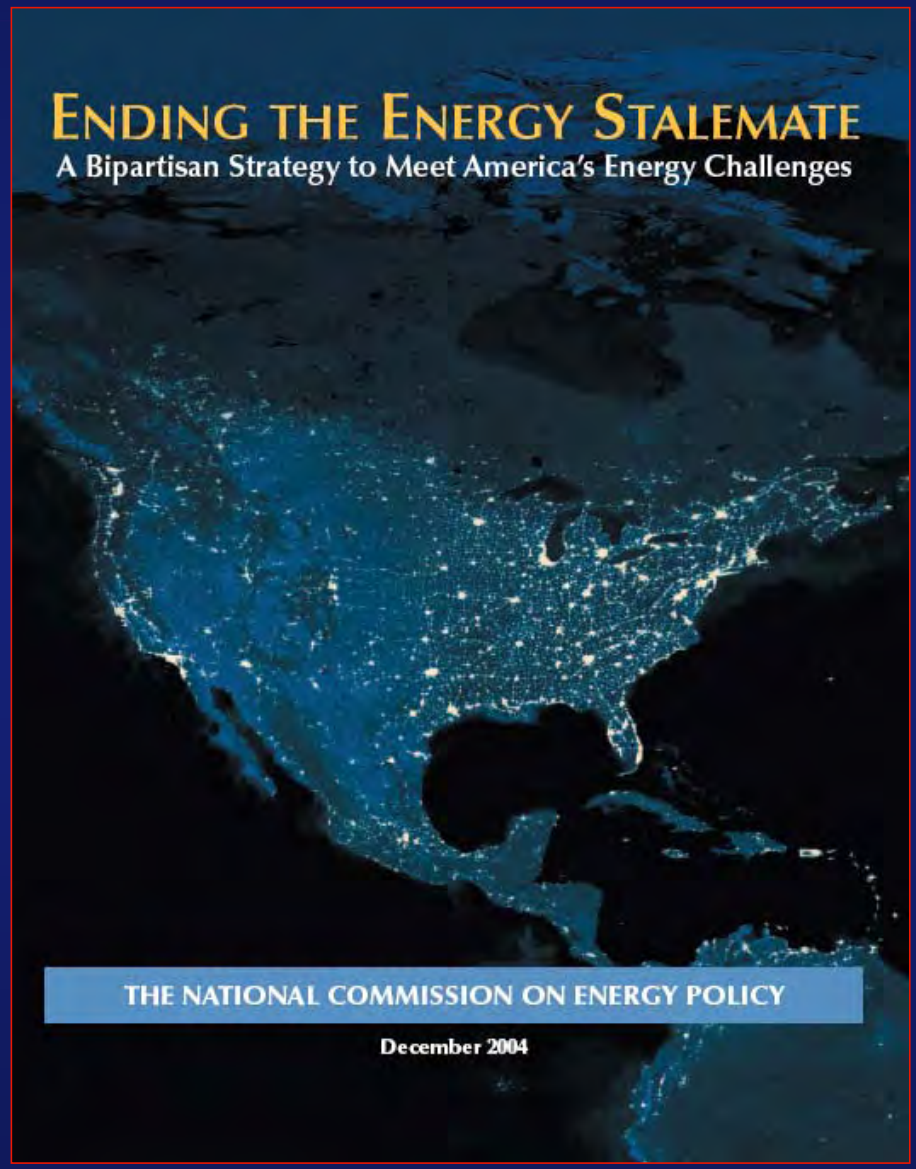
The National Commission on Energy Policy: What core energy strategies are needed?

National Commission on Energy Policy

- 3 year effort, during the "Stalemate"
- December '05 report
- Foundation funded
- Bipartisan commission, with goal of consensus
- Chairs (Reilly, Rowe, Holdren)
- 16 members from various regions, constituencies
- Focus on nat'l policies
- Focus on long-term
- Focus on common ground



National Commission on Energy Policy: Why?

- **Long-term focus: ensuring ample, clean, reliable, and affordable energy for the 21st Century while responding to risks of energy security and global climate change.**
- **Addressing the Energy Stalemate: the context**
  - **Inability (as of 12/04) to pass bipartisan energy law.**
  - **Complex issues, difficult trade-offs.**
  - **Persistent "myths" – on left and right – which contribute to paralysis.**
  - **Divisions about energy have always been as much regional as partisan.**
  - **Energy sector characterized by large investments, long-lived infrastructure – not easy to change.**
  - **Economic and environmental stakes are enormous.**

NCEP: Central energy challenges

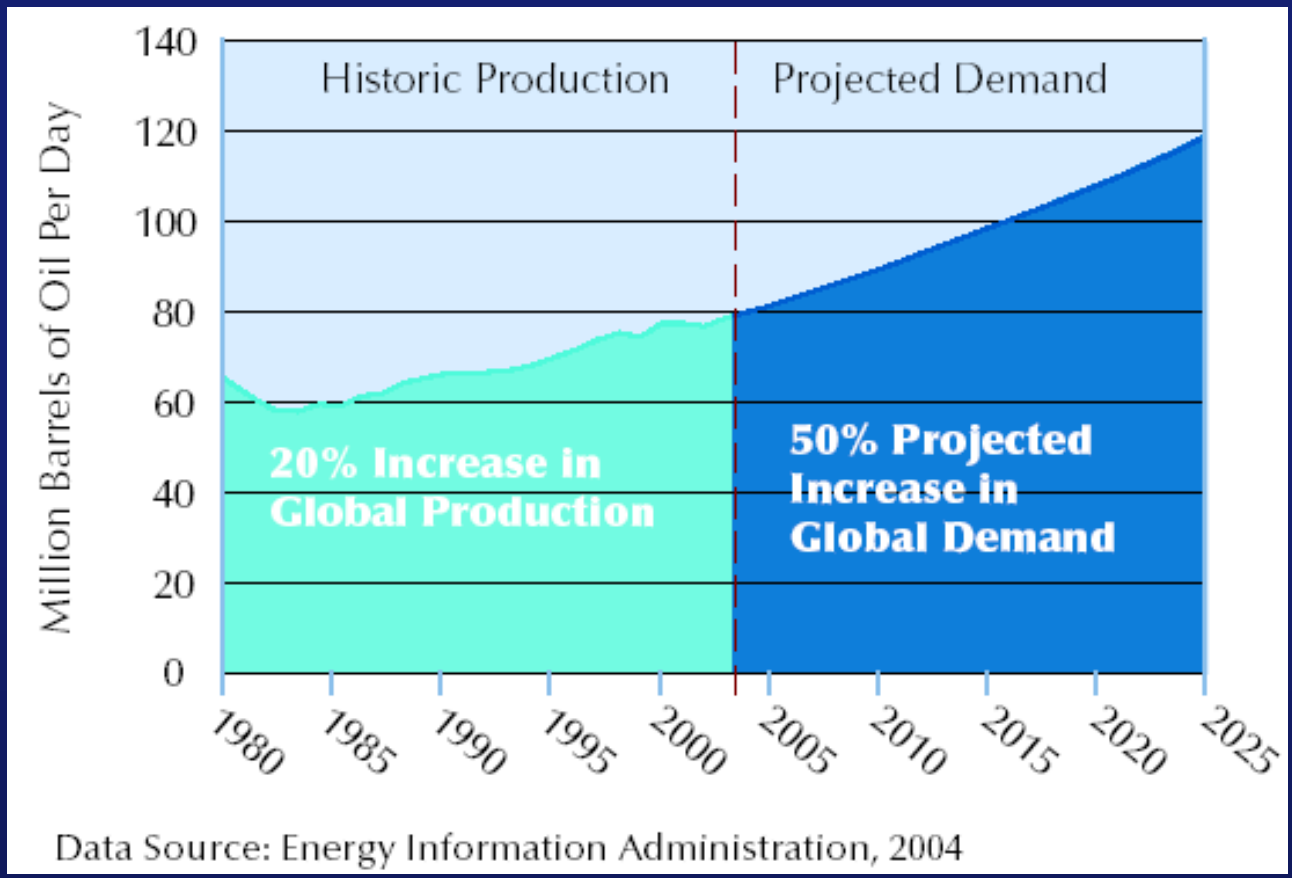
- **Dependence of the economy on oil – especially in the transportation sector.**
- **Dependence on combustion of fossil fuels, which contribute to global warming – especially in the power and transportation sectors.**
- **Disconnection between**
  - **the beneficial uses of energy, and**
  - **the external consequences (for oil security and climate change) of the ways we produce, deliver, price, site energy.**
- **Cannot address the nation's core energy challenges with addressing (a) oil in the transportation sector and (b) carbon content of energy**

Addressing the Stalemate: The "Oil" Stakes are Enormous

By 2025, U.S. oil consumption will increase 43%.

Global oil consumption will grow by over 50%.

Mainly a transport issue.



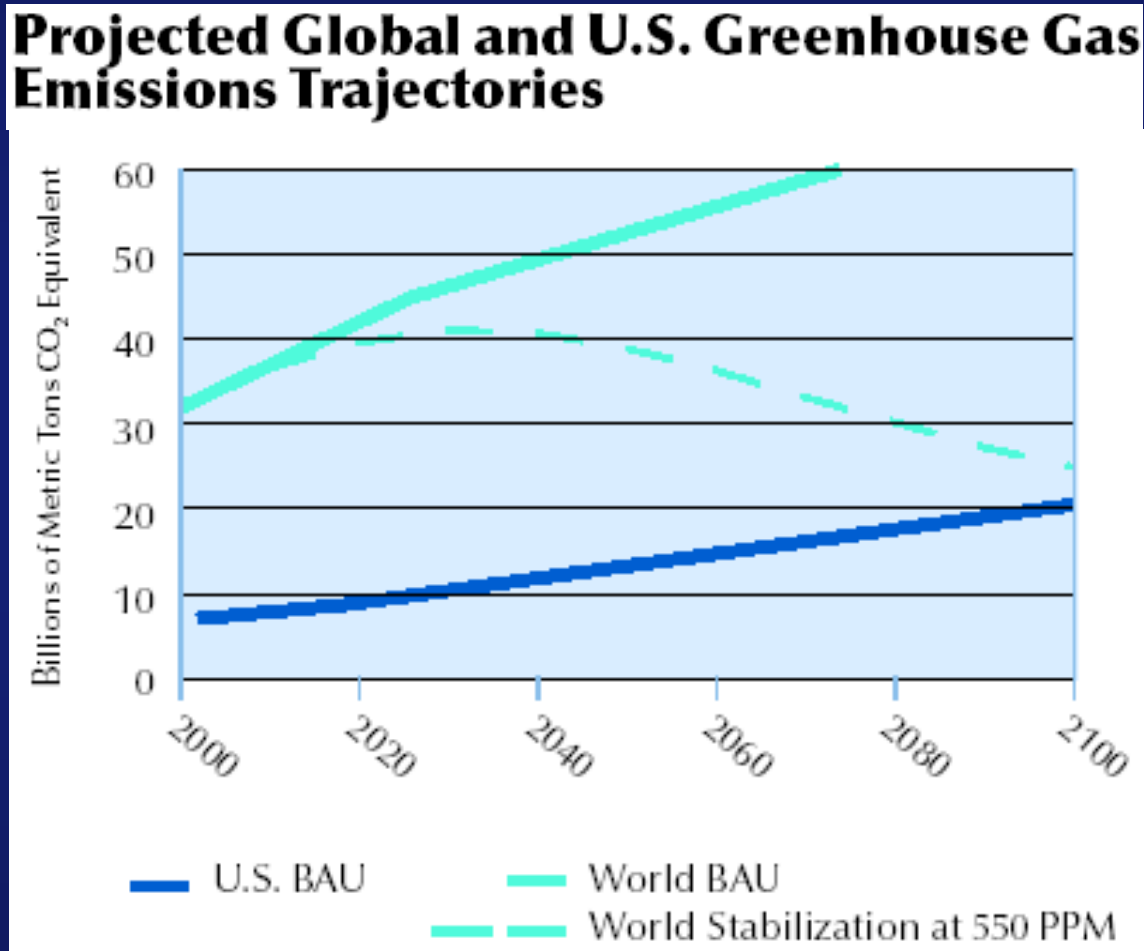
Data Source: Energy Information Administration, 2004

Addressing the Stalemate: "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.



NCEP Climate Change proposal

Premise:

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

Approach:

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

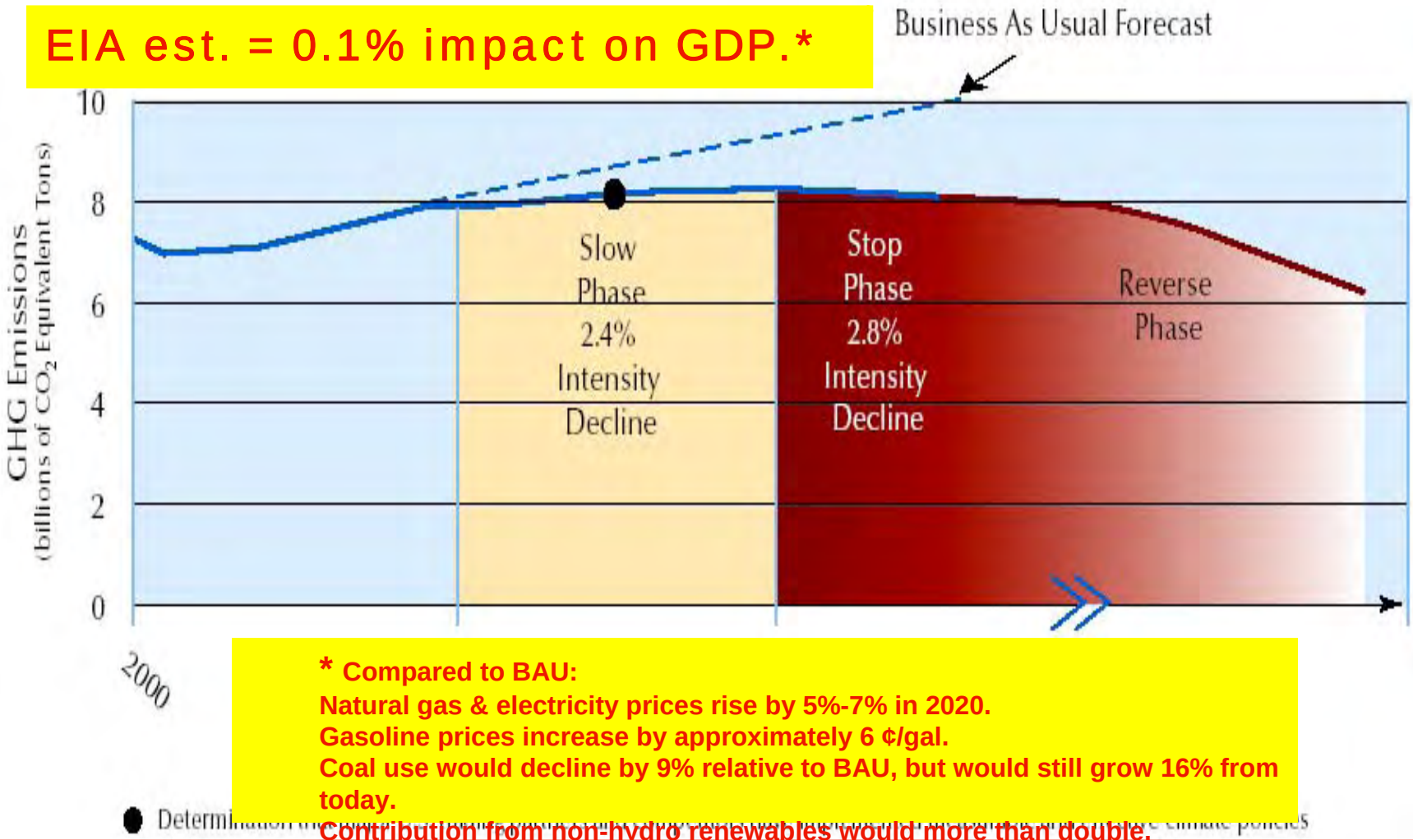
Four key features of NCEP Climate Proposal

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

Estimated Impact of NCEP climate proposal

Recommendation: slow, stop, and eventually reverse U.S. greenhouse gas emissions.

EIA est. = 0.1% impact on GDP.*



* **Compared to BAU:**
Natural gas & electricity prices rise by 5%-7% in 2020.
Gasoline prices increase by approximately 6 ¢/gal.
Coal use would decline by 9% relative to BAU, but would still grow 16% from today.
Contribution from non-hydro renewables would more than double.

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 and increased use of highly efficient advanced diesel and hybrid-electric vehicles.**

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

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

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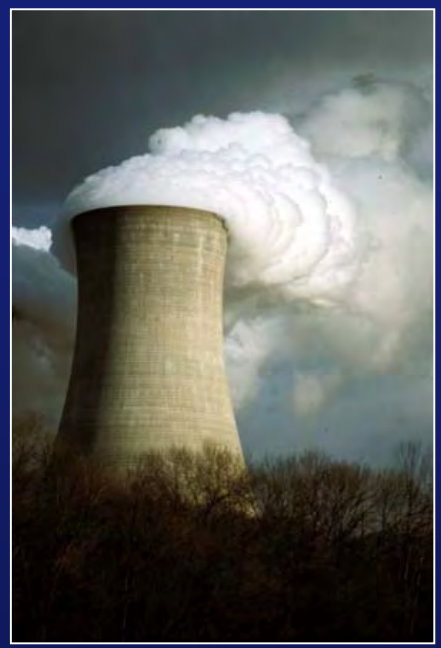
The 2005 Energy Policy Act – Where does it take us?

Energy Policy Act - Overview

- Congressional passage in July 2005
- Signed by President in August 2005 passage
- 1st comprehensive energy Act in 13 years
- 1725 pages – 18 Titles
- $14.6 billion – U.S. budget estimate
- Support from majority of state delegations
- Generally not supported by delegations from Western states, Northeast states, and Florida

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

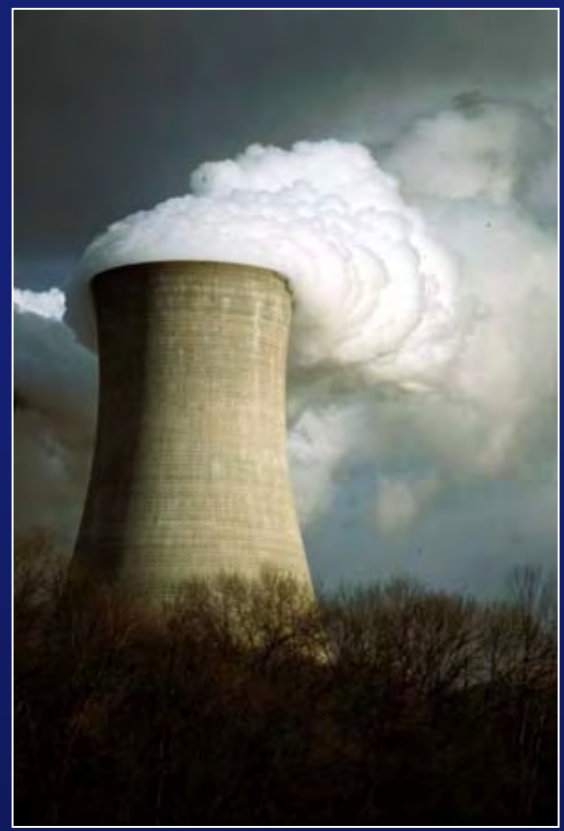
Changes depreciation or amortization, and allowed expensing

Tax credits for investments and output,

Tax credits for purchase (consumer, producer)

The Energy Policy Act – An Energy Stimulus Package

- **Incentives for investment:**
  - **<u>Risk mitigation, e.g.,</u>**
    - nuclear liability insurance – extension of Price Anderson Act to 2025, increased indemnity limits ($500 m))
    - Insurance to cover permitting/ construction delays for first 6 new nuclear power plants built (up to $2 b)
    - wetland impact funds for coastal states (drilling impacts)
    - SPR filling
    - Eligibility for loan guarantees for "innovative technologies" with no/low GHG

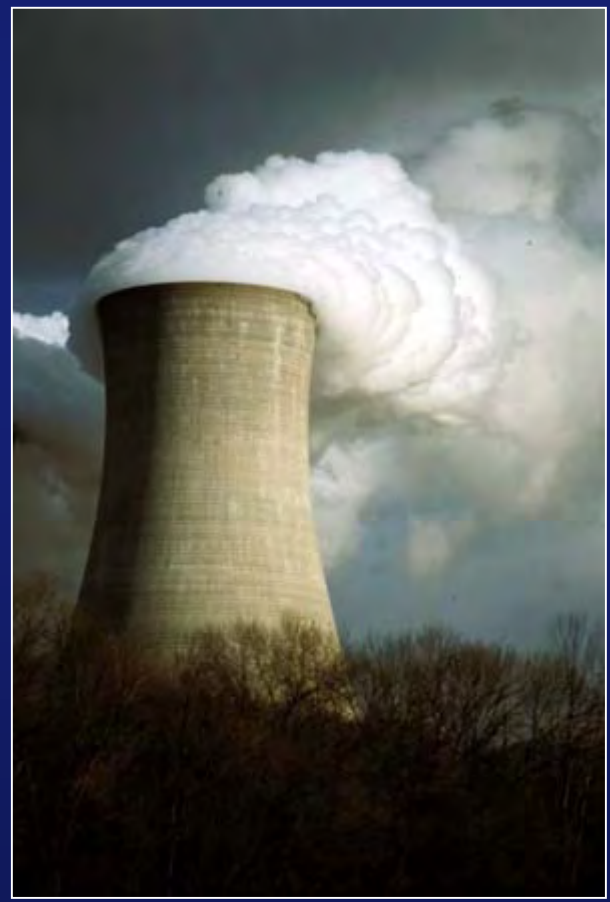


The Energy Policy Act: Removal of barriers to entry for development

- **Lack of information: Oil/gas in Outer Continental Shelf**
- **Permitting issues:**
  - **Streamlining permitting for drilling on federal lands**
  - **Reducing royalty fees on drilling on federal lands**
  - **Clarifying and/or consolidating jurisdiction**
    - Federal v. state (e.g., FERC authority re: LNG
    - Agency v. agency (e.g., FERC hydrolicensing)
  - **Prioritizing "critical national" corridors and facilities**
    - Electric transmission
    - gas & oil pipelines
    - renewable projects

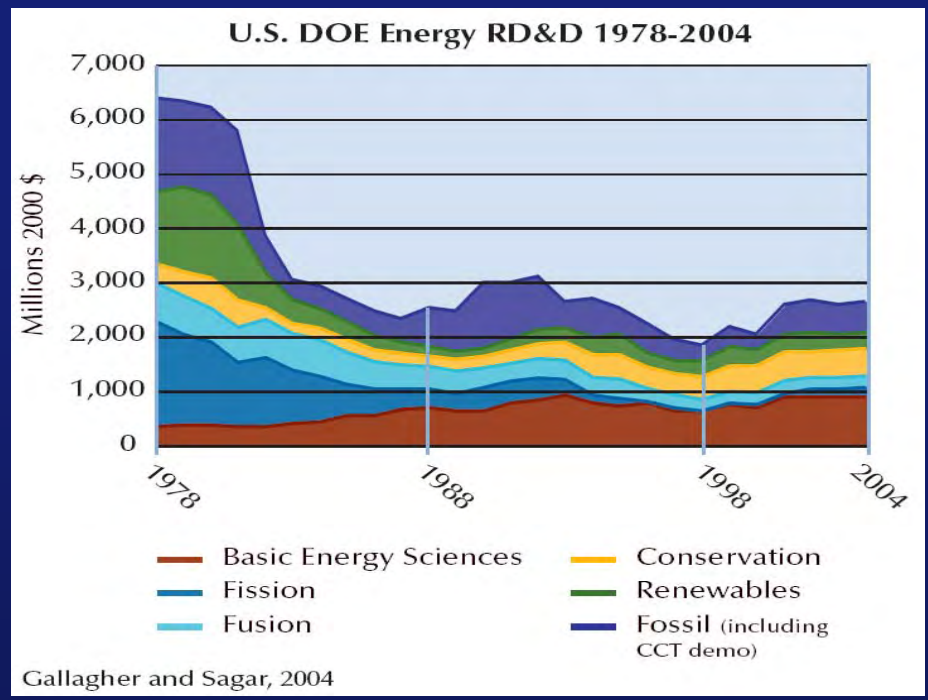
The Energy Policy Act: "Proof of Concept" for Advanced Energy Technologies

- **<u>Funding/financing support for initial projects of next-generation technologies</u>.**
  - IGCC – coal (loan guarantees, R&D $)
  - Advanced nuclear (risk insurance, production tax credit)
  - Renewable fuels & technologies (production tax credit, innovative technology R&D)



The Energy Policy Act: Federal energy R&D authorizations

- **DOE authorized $1.25 billion to build a "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**



National Commission on Energy Policy, 2004. Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges.

Recall re: federal funding

- **Remember the difference between:**
  - **Appropriations** (discretionary budget funding decisions to allow spending)
  - **Authorizations** (approval of possible spending but still require appropriation action in later years)
  - **Direct spending programs** ("automatic" expenditures under certain statutory provisions)
  - **Tax provisions** (allow action by eligible entities, with impact on revenues to federal treasury)

The Energy Policy Act: Purchase requirements and standards

- **Renewable motor vehicle fuel**
  - **RPS (biofuels) – 7.5 billion gallons/year by 2012**
- **Federal agency renewable electric standard**
  - **RPS (wind, biomass, solar)**
- **Appliance efficiency standards**
  - **(15 appliances)**

The Energy Policy Act: Electric supply provisions

- **New reliability standards: new Electric Reliability Organization**
- **New "national interest T corridors," FERC siting back stop**
- **Requires FERC to establish incentives for T investment.**
- **Authorizes participant funding and native load protections for transmission assets.**
- **Allows federal power authorities under FERC RTOs.**
- **Repeals PUHCA.**
- **Modifies PURPA.**
- **Forbids price manipulation.**

Direct Consumer incentives

- **Alternative Fuel Vehicles: tax credit for purchase (e.g., up to $3,400 for purchase of a hybrid vehicle) $0.87 b[1]**
- **Installation of alternative fuel refueling property $0.01 b[2]**
- **Residential energy efficiency property purchase $0.03 b[3]**
- **Efficiency improvements - existing homes: ITC $0.56 b[4]**
- **Business purchase – fuel cells, microturbines: ITC $0.22 b[5]**
- **Commercial bldg – efficient design & build: ITC $0.24 b[6]**

1. Section - tax credits for automobiles and light trucks: Fuel cell vehicles, hybrids, advanced technology vehicles (e.g., lean-burn technology). Effective date – The provision applies to vehicles placed in service after December 31, 2005, in the case of qualified fuel cell motor vehicles, before January 1, 2015; in the case of qualified hybrid motor vehicles that are automobiles and light trucks and in the case of advanced lean-burn technology vehicles, before January 1, 2011; in the case of qualified hybrid motor vehicles that are medium and heavy trucks, before January 1, 2010; and in the case of qualified alternative fuel motor vehicles, before January 1, 2011. (Source: Tax bill summary, US Senate)
2. Applicable to homes or businesses of the taxpayer. 30% tax credit. (Source: Tax bill summary, US Senate)
3. credit for PV and solar water heating, fuel cells.
4. ITC for improvements to building envelope, furnaces, boilers.
5. Credit for m for purchase of fuel cell power plants, microturbine, solar energy

State and local energy programs

- **LIHEAP –** reauthorized to ’07 ($5.1 b/year, up from $2 b/year)
- **State weatherization grants –** reauthorized thru ’08 ($500 m for ‘05, $600 m for ‘07, and $700 m for ‘08)
- **State energy programs –** increases state efficiency goals from 10% to 25% by 2012. Authorizes $225 m (‘06-’08)
- **State building codes –** incentives ($25 m/year) to encourage states to adopt efficient residential and commercial bldg codes
- **Energy Efficient Public Buildings –** grants ($30 m/yr) to state energy conservation agencies to assist local governments to construct or renovate energy efficient buildings.
- **Low Income Energy Efficiency Pilots -** authorizes $20 m/yr for competitive grants.

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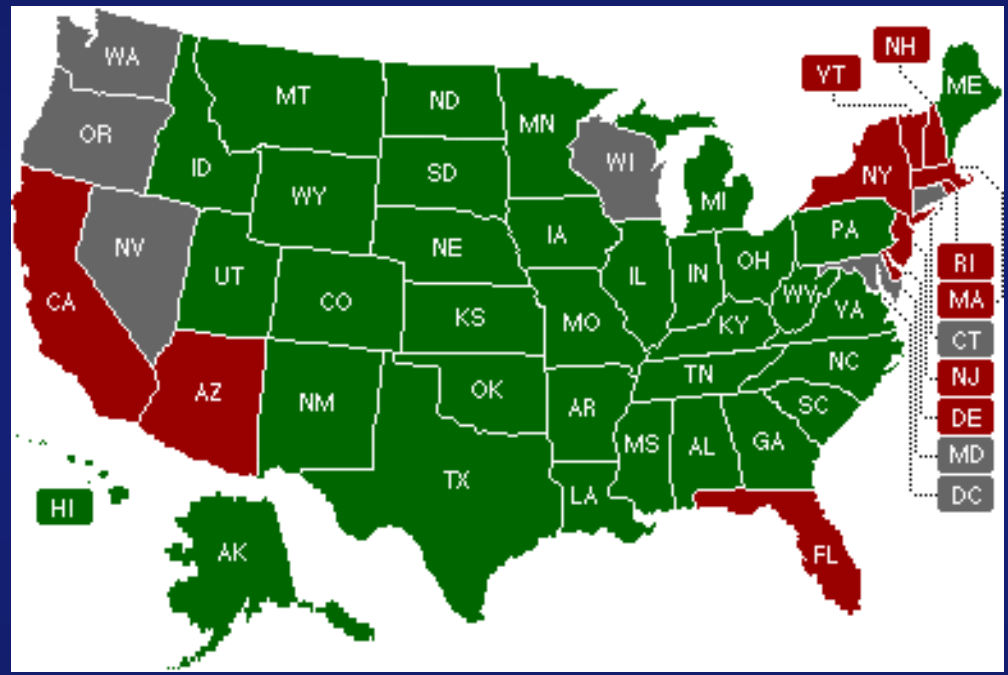
Rating the Energy Policy Act: Does it get us where we need to go?

Energy Policy Act - observations

- **Congress gave the President got the Act he wanted – not a lot more or less**
- **The bill has elements for producers and consumers**
- **But there's not enough for the high-cost coasts**
- **Much of the program depend on the will to appropriate funds – making it too fragile**



= Majority of state's delegation voted AGAINST

= Majority of state's delegation voted FOR

= Split delegation (equally # voted FOR and AGAINST)

http://www.congress.org/congressorg/issues/votes/?votenum=213&chamber=S&congress=1091

Energy Policy Act - Overview

- **What's not in it (recommended by NCEP)**
  - **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**

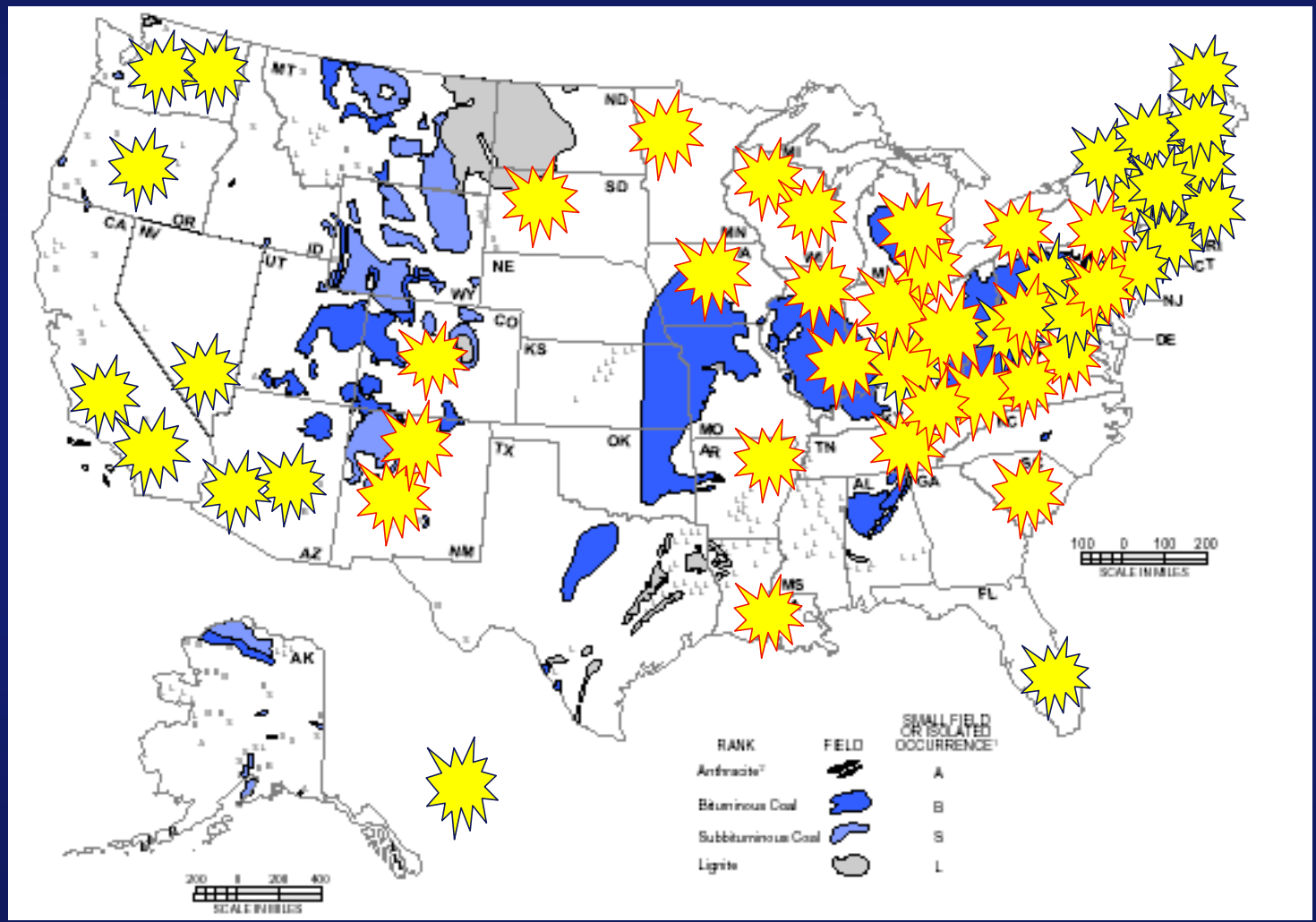
"It is the sense of the Senate that, before the end of the first session of the 109th Congress, Congress should enact a comprehensive and effective national program of mandatory, market-based limits on emissions of greenhouse gases that slow, stop, and reverse the growth of such emissions at a range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

Surprising votes on the Sense of Senate Climate Change Resolution

Supporting: 53

Opposing: 44

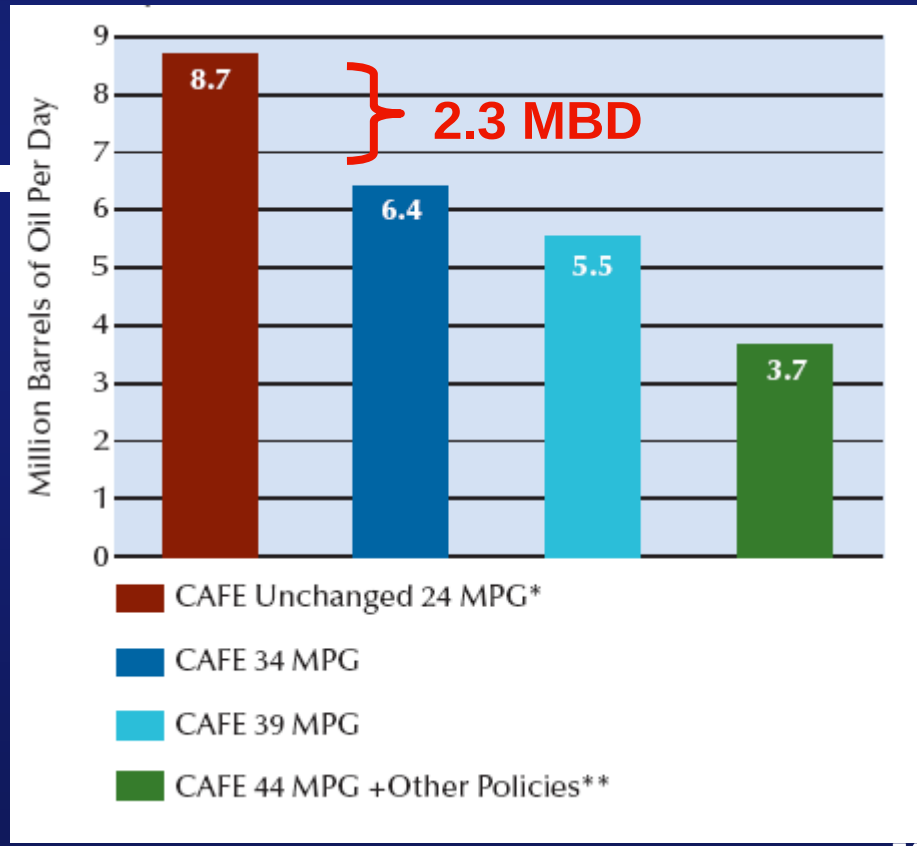
Not voting: 3



EIA, US Coal Reserves – 1997 Update, 1999

Energy Policy Act - Overview

- **What's not in it (recommended by NCEP)**
  - **Inadequate attention to reducing <u>oil use in motor vehicles</u>**
    - **Ethanol RPS is in**
    - **But no change in CAFÉ standards (same for decades)**
    - **Inadequate long-term support for renewable motor fuels (cellulosic biomass)**



Note ANWR is not in Energy Policy Act – but is still in budget:

Peak Production from ANWR: 1.0-1.3 MBD*

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

Rating the Energy Act versus NCEP recommendations

What's similar:

Recognize: no silver bullets

Electricity – structure, reliability

Electric Technologies

- **Renewables – PTC too short, insufficient R&D – especially in transportation fuels**
- **Coal – IGCC support**
- **Nuclear - Provide $2 b for 1-2 new advanced plants.**
- **Efficiency – appliance standards, consumer incentives for purchasing**

Natural gas: LNG = key

What's missing & needed:

Climate Change = energy issue

Need mandatory Climate Change policy

Much tighter fuel economy for vehicles

Funding platform for technology

Sustainable support for electric technologies:

- **Stable Renewable PTC**

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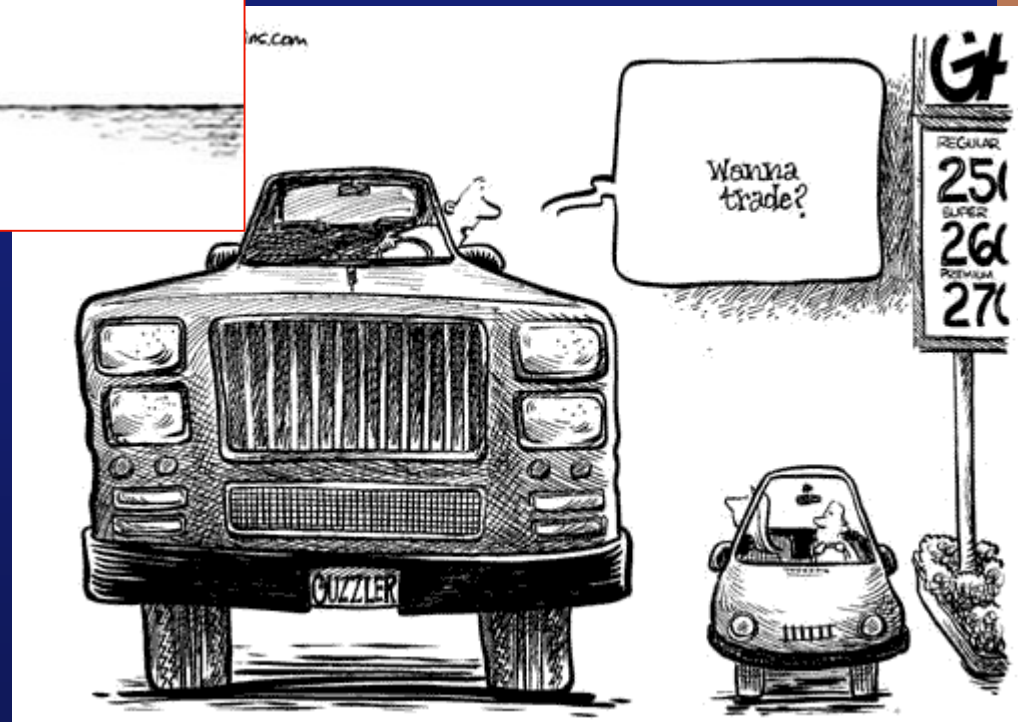
Remember the Good Old Days....
From the ridiculous to the sublime

"How sweet it was"…..
… $50/bl oil and $2.70/gal gasoline and "THE" Energy Act of this decade….



THE ENERGY DAILY

Thursday, September 8, 2005

Barton: Yes To Refinery Aid, No To CAFE

The Lessons of History.....

"We can no longer afford to ignore the reality that we have fixed resource boundaries, and that radical changes in our oil-based economy cannot be denied any longer. The era of cheap, abundant oil is over, and the sooner we accept this fact, the sooner we can get on with the task of developing alternative energy sources."

William Cohen, December 22, 1973

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