

Energy Policy, the 2008 US Presidential Campaign, and What it may Mean?

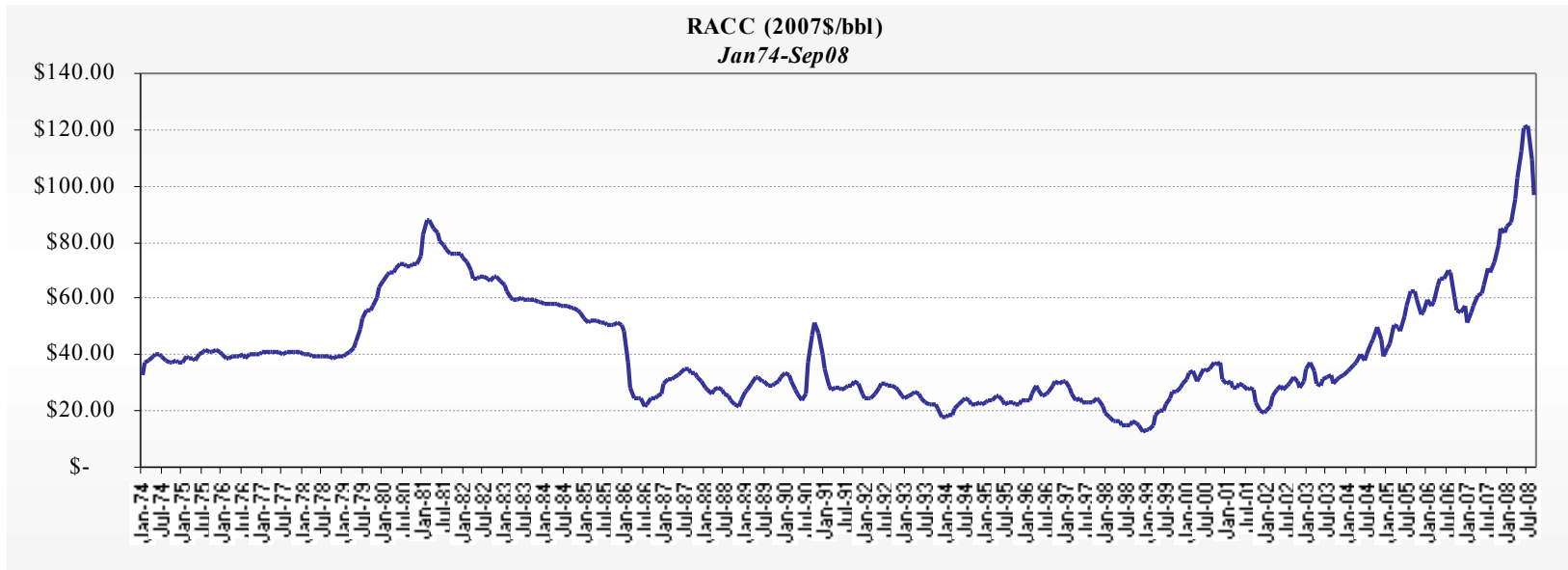
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Price and Public Sentiment

- The price of oil is on people's minds
 - It directly effects the price of refined products, such as gasoline, making it a very politicized topic. People want to know what can be done about high prices!

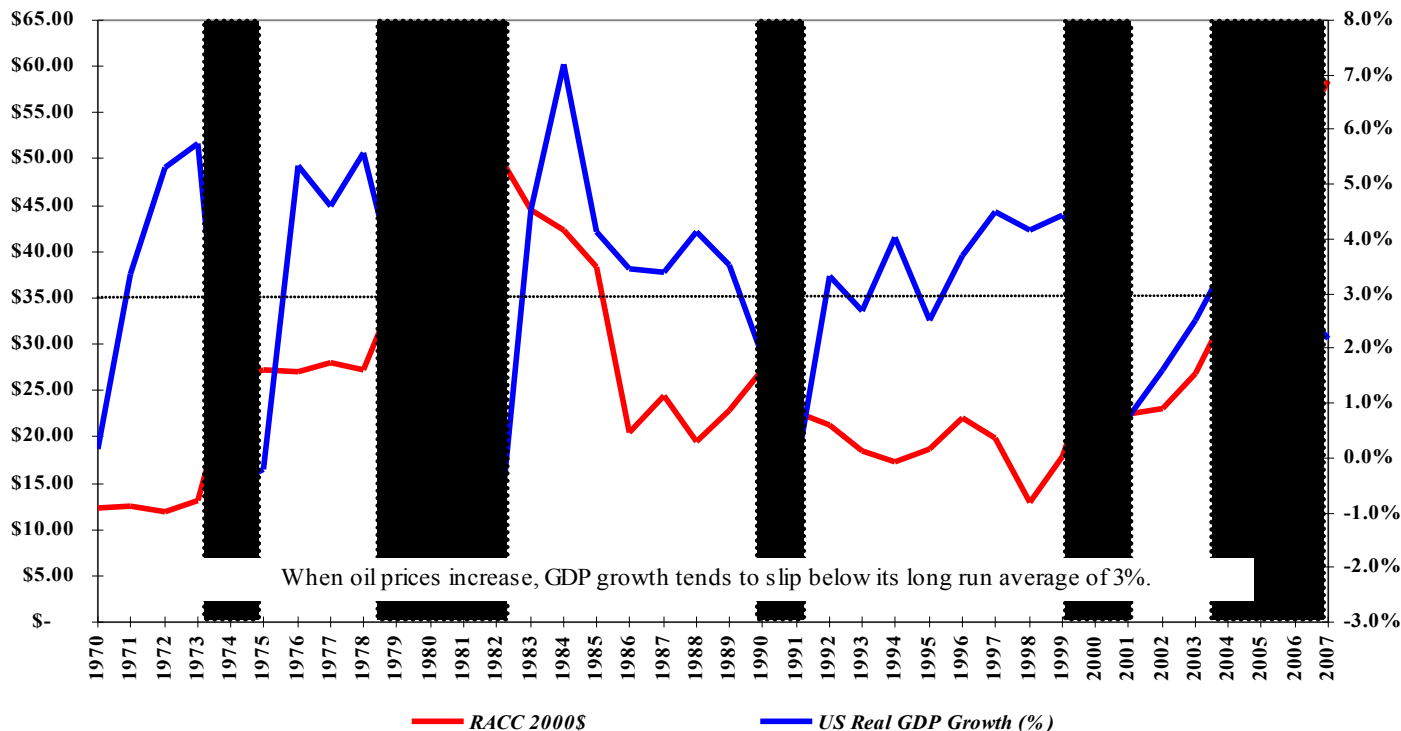


- We must first remember that oil is a global commodity. It's price is influenced by many factors, many of which are not under our control.
- Given this, we must think about flexibility through diversity, especially if we are serious about energy security... this is a very *general* statement!

Factors often blamed for “\$100 oil”...

- “Big oil”: Lack of investment
 - Jaffe and Soligo (2007) found that investment expenditures were flat to lower from 1998-2006. Identified possible explanations for this observation.
- National oil companies gaining increasing control of global conventional oil resources (BIPP study 2007: “The Role of the National Oil Company”)
 - Eller, Hartley and Medlock (2008) demonstrated empirically a distinct deficit in revenue efficiency of NOCs. Identified several non-commercial objectives that drive differences.
- “Peak oil”: Geology versus geopolitics
 - Renewed fervor to the idea that conventional oil production is nearing its peak. But, will lack of expansion in production capacity be the result of geology or is it the result of “above ground factors”?
- Rapid demand growth in China (India is increasingly being included)
 - Demand growth in China has been very strong because domestic consumers have been shielded from international price and economic growth is high.
 - An important point regarding climate policy: Chinese coal use is now double that of the US... it was roughly equal 6 years ago.
- A weak \$
 - \$ devaluation has contributed to a rising \$ price of oil.
- Speculation
 - Large increase in financial activity on NYMEX, ICE and OTC since 2003.

Oil price and the Macroeconomy



- First, correlation is not causation, but...
- Concerns about economic malaise motivate a variety of policy responses. These responses have, in the past, proven effective at altering energy demand growth (CAFE, for example). This, in turn, lowers economic sensitivity to subsequent price increases.
- Policies involving fuel diversification, tax-induced or mandated efficiency, and conservation have all been motivated on energy security grounds.
- What is the “optimal response”?

The Candidates' Policies

The Candidate's Policies: Barack Obama

- The New Energy America Plan

- “America has always risen to great challenges, and our dependence on oil is one of the greatest we have ever faced. It’s a threat to our national security, our planet and our economy. For decades, Washington has failed to solve this problem because of partisanship, the undue influence of special interests, and politicians who would rather propose gimmicks to get them through an election instead of long-term solutions that will get America closer to energy independence.

Our country cannot afford politics as usual – not at a moment when the energy challenge we face is so great and the consequences of inaction are so dangerous. We must act quickly and we must act boldly to transform our entire economy – from our cars and our fuels to our factories and our buildings.

Achieving this goal will not be easy. Energy independence will require far more than the same Washington gimmicks and continued dependence on costly and finite resources. It will require a sustained and shared effort by our government, our businesses, and the American people. But America has overcome great challenges before. With clarity of direction and leadership, there is no question that we possess the insight, resources, courage and the determination to build a new economy that is powered by clean and secure energy.”

» Source: The Obama-Biden official campaign website (<http://www.barackobama.com/>)

- Buzz words and sound bites... saying all the “right” things...

- “national security”, “cannot afford politics as usual”, “energy independence”, “build a new economy”, “clean”
- The first three bullets on the website are...
 - “5 Million Green Collar Jobs”
 - “A Bold New National Goal on Energy Efficiency”
 - “American Energy”

The Candidate's Policies: Barack Obama (cont.)

- Provide short-term relief to American families
 - Enact a Windfall Profits Tax to Provide a \$1,000 Emergency Energy Rebate to American Families.
 - Crack Down on Excessive Energy Speculation.
 - Swap Oil from the Strategic Petroleum Reserve to Cut Prices.
- Create Millions of New Green Jobs
 - Ensure 10 percent of Our Electricity Comes from Renewable Sources by 2012, and 25 percent by 2025.
 - Deploy the Cheapest, Cleanest, Fastest Energy Source – Energy Efficiency.
 - Weatherize One Million Homes Annually.
 - Develop and Deploy Clean Coal Technology.
 - Prioritize the Construction of the Alaska Natural Gas Pipeline.
- Eliminate Our Current Imports from the Middle East and Venezuela within 10 Years
 - Increase Fuel Economy Standards.
 - Get 1 Million Plug-In Hybrid Cars on the Road by 2015 – cars that are built in America
 - Create a New \$7,000 Tax Credit for Purchasing Advanced Vehicles.
 - Establish a National Low Carbon Fuel Standard.
 - A “Use it or Lose It” Approach to Existing Oil and Gas Leases.
 - Promote the Responsible Domestic Production of Oil and Natural Gas.
- Reduce greenhouse gas emissions 80 percent by 2050.
 - Implement a cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050.
 - Make the U.S. a Leader on Climate Change.
- Address the role of speculation (“Closing the Enron Loophole”)

The Candidate's Policies: John McCain

- The Lexington Project: An All of the Above Energy Solution
 - “Our nation's future security and prosperity depends on the next President making the hard choices that will break our nation's strategic dependence on foreign sources of energy and will ensure our economic prosperity by meeting tomorrow's demands for a clean portfolio. John McCain has made the necessary choices - producing more power, pushing technology to help free our transportation sector from its use of foreign oil, cleaning up our air and addressing climate change, and ensuring that Americans have dependable energy sources. John McCain will lead the effort to develop advanced transportation technologies and alternative fuels to promote energy independence and cut off the flow of oil wealth to repressive dictatorships like Iran.”
 - » Source: The McCain-Palin official campaign website (<http://www.johnmccain.com/>)
- Buzz words and sound bites... saying all the “right” things...
 - “nation’s future security”, “strategic dependence”, “economic prosperity”, “clean”, “technology”, “energy independence”, “Iran”

The Candidate's Policies: John McCain (cont.)

- **Expand Domestic Oil And Natural Gas Exploration And Production**
 - Promote and expand the use of our domestic supplies of natural gas.
 - No windfall profits tax
- **Breaking Our Dependency On Foreign Oil By Reforming Our Transportation Sector**
 - Clean car challenge
 - \$300 million prize to improve battery technology for plug-in hybrid and electric vehicles
 - Flex-fuel vehicles should play a greater role in our transportation sector
 - Alcohol-based fuels is an alternative to gasoline that expands consumers' choices
 - Tariffs and special interest subsidies are not moving us toward an energy solution
 - Enforce existing CAFE standards
- **Investing In Clean, Alternative Sources Of Energy**
 - The U.S. must become a leader in a new international green economy
 - Commit \$2 billion annually to advancing clean coal technologies
 - Construct 45 new nuclear power plants by 2030 with the goal of constructing 100 new plants
 - Establish a permanent tax credit equal to 10% of wages spent on R&D
 - Encourage the market for alternative, low carbon fuels such as wind, hydro and solar power
- **Protecting Our Environment And Addressing Climate Change: A Sound Energy Strategy Must Include A Solid Environmental Foundation**
 - A cap-and-trade system that sets limits on greenhouse gas emissions while encouraging the development of low-cost compliance options, thus allowing for a gradual reduction of emissions
- **Promoting Energy Efficiency**
 - Greening the federal government a priority of his administration
 - Move the United States toward electricity grid and metering improvements to save energy
- **Address Speculative Pricing Of Oil**

Comparing the Candidate's Policies

- Both “visions” are riddled with similar language.
 - Obama: “**national security**”, “cannot afford politics as usual”, “**energy independence**”, “**build a new economy**”, “**clean**”
 - McCain: “**nation’s future security**”, “strategic dependence”, “**economic prosperity**”, “**clean**”, “technology”, “**energy independence**”, “Iran”
- So, there are similarities, although the proposed method of implementation is often different...
 - the climate change arena
 - the stance on tax credits for renewables
 - the role of conservation measures.
- But, there are also substantial differences...
 - offshore drilling
 - windfall profits tax
 - ethanol subsidies
 - approach to transportation fuel efficiency
 - the role of the SPR.

Comparing the Candidate's Policies

- Both candidates seem to be using a lot of “buzz” words.
- Both candidates seem to be focusing on solutions that will take us well beyond the next 4-8 years.
 - This is likely necessary, but each seems to think there is something magic about the number 10. In fact, this number appears in another rather famous proposal (the Pickens’ Plan).
- It is very unlikely that many of the features of either plan can be implemented in large scale in a 10 year time frame, although progress can be made.
 - Notion of energy independence
 - 45 nukes, and how does that exactly “get us off oil”?
 - Eliminate our imports of oil up to the current amount imported from Middle East and Venezuela (about 3.3 million bbl/d).
 - Roughly 16-17 million unit sales each year on a base of 280 million. Not all unit sales are new technologies... how long will it take to get there?
 - Deploying clean coal... but the DOE can’t even get its own pilots done?
 - Smart metering
- Some features may be more likely to have a quicker impact...
 - A cap-and-trade program for CO₂, but don’t expect it in short order

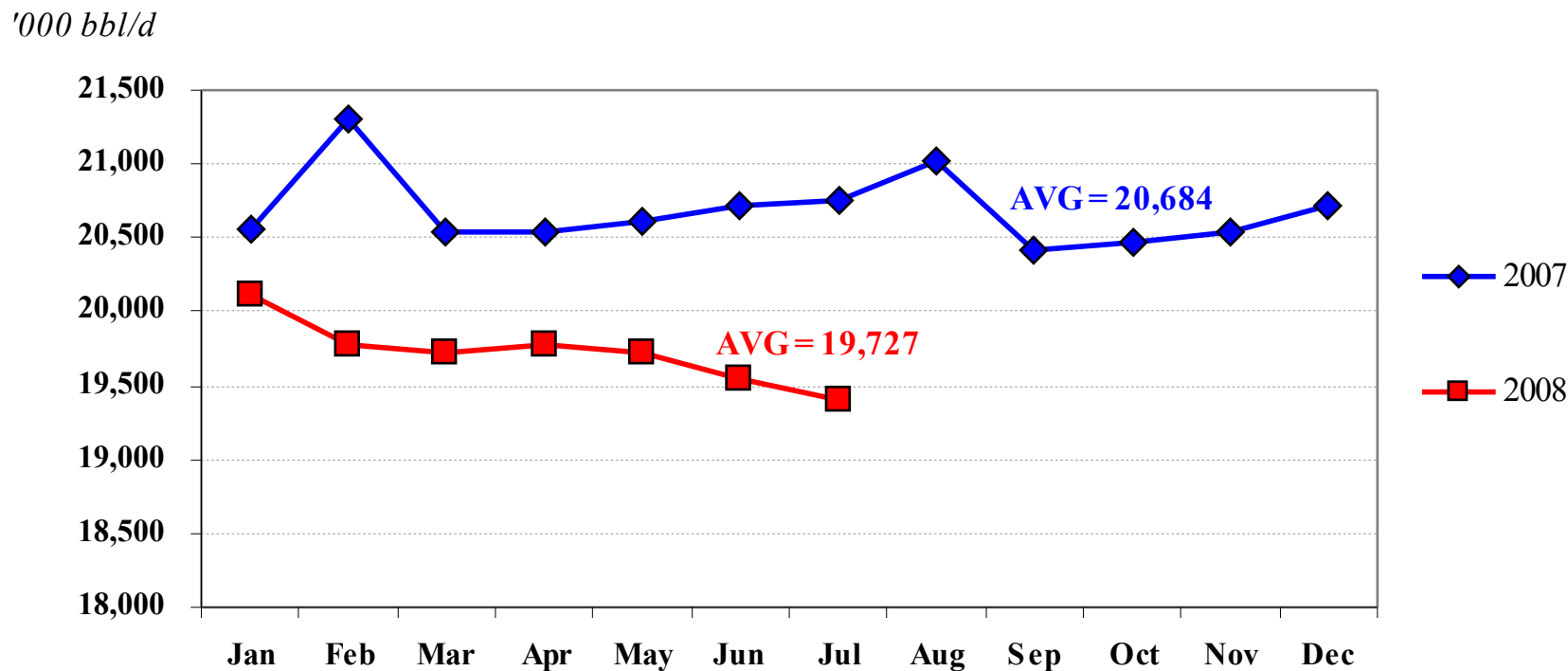
Some Select Issues

The Varied Responses to High Prices

- **High prices beget responses at many margins.**
 - Efficiency, conservation, exploration and development, alternatives
- Policy aimed at efficiency has proven very effective, and it may yet again.
- Consumer focus changes – this is reflected in advertising.
- In the US, the issue of access restrictions regarding the development of domestic resources has been hotly debated.
 - With the 2005 Energy Policy Act, the MMS was ordered to inventory the nation's resources, but this is not a new issue.
- Potential sources of energy supply have expanded into new frontiers.
 - Shale gas is being re-assessed as technology has improved.
 - Oil sands production is growing.
 - Ethanol, wind and other renewables are the fastest growing supply sources.
 - The Pickens' Plan
- An important point: Concern about price has motivated policies that are pitched as serving both climate and energy security goals. But, these apparently complementary objectives may, in fact, not be complements
 - see Hartley and Medlock (2008)

US Oil Demand: The Response

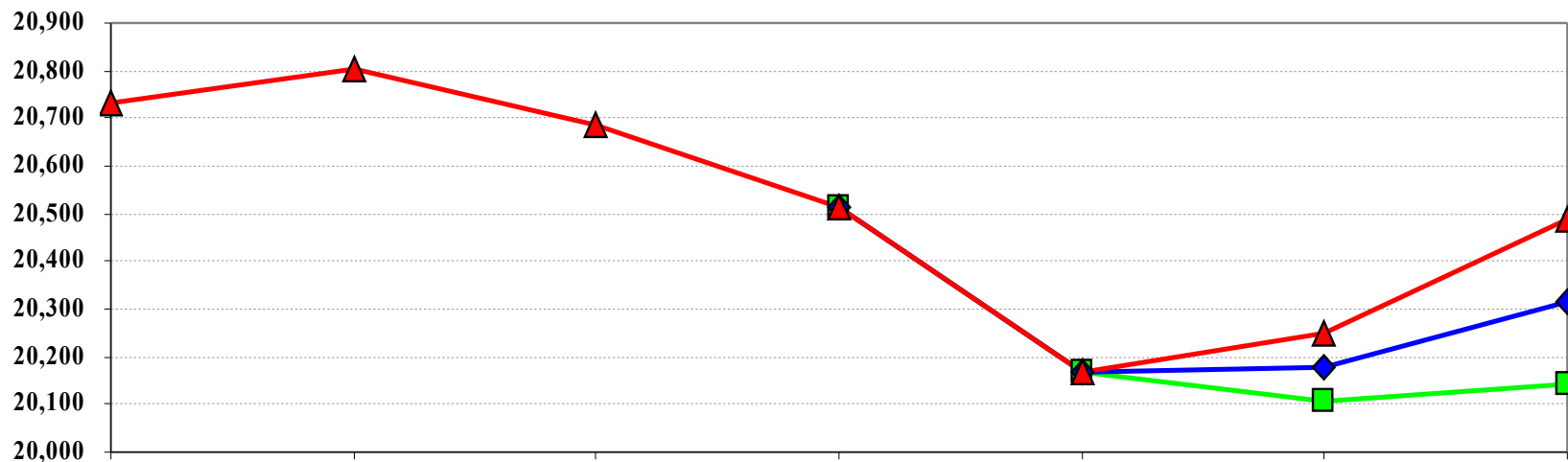
- Year on year demand is lower.
 - Demand in July 2008 was especially lower, despite it being peak driving season. Demand was down by 6% relative to July 2007, reflecting consumer response to oil prices that were nearly double the prior year, but also an economic slowdown.



US Oil Demand: The Response (cont.)

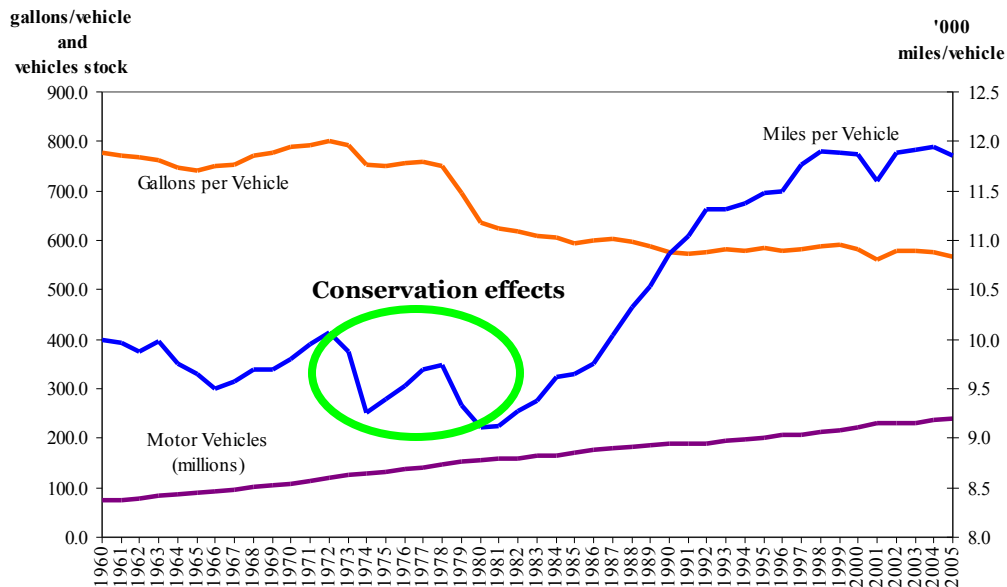
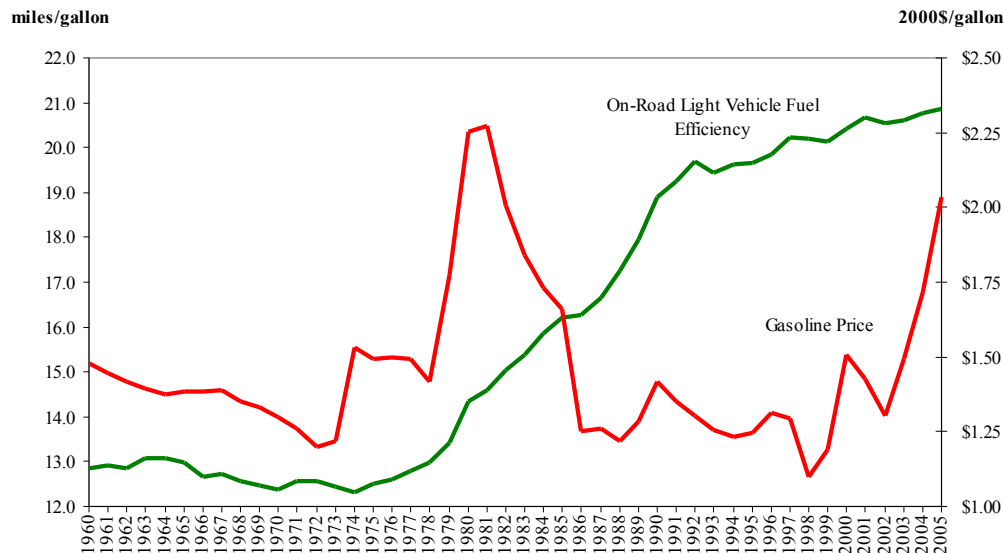
- Demand is influenced by a number of factors.
 - Income, Price, Weather (heating load), Vehicle efficiency
 - Short run elasticities estimated as:
 - Price = -0.0508 ... Thus, a 1% increase in price would result in a decline in demand of 0.05%.
 - Income = 0.3518 ... Thus, a 1% decline in GDP would result in a decline in demand of 0.35%.
 - Fuel Efficiency = -0.7906 ... Thus, a 1% increase in efficiency would result in a decline in demand of 0.79%.
 - HDD = 0.1654 ... Thus, a 1% increase in HDD (colder weather) would result in an increase in demand of 0.17%.
 - Majority of adjustment occurs within a decade (lag coefficient = 0.4567)
- The last four years and what we might expect for 2008-2010...

'000 bbl/d



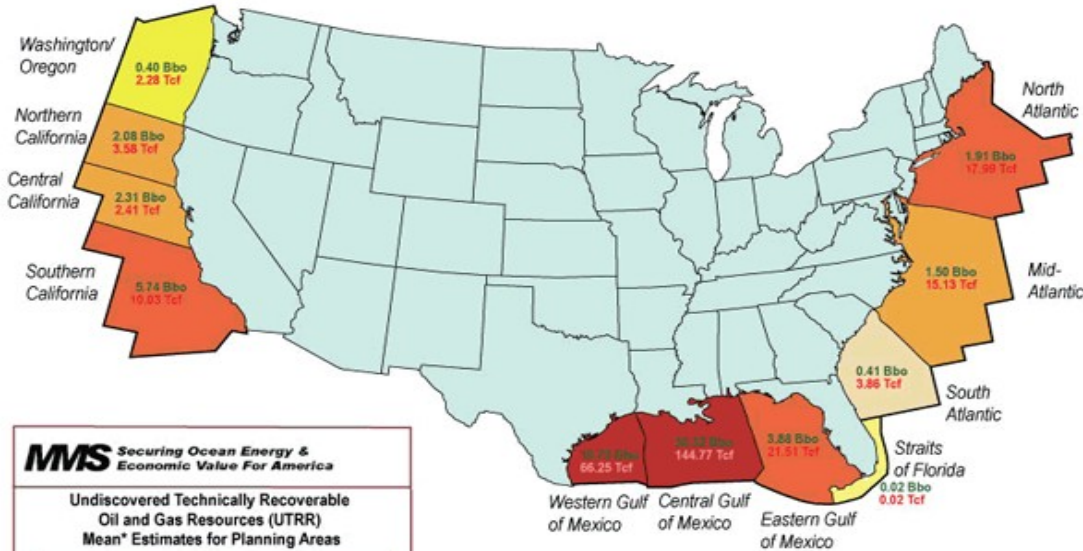
	2004	2005	2006	2007	2008	2009	2010
GDP growth ...	3.64%	2.94%	2.78%	2.03%	0.5%	2%, 1%, 0%	3%, 2%, 1%
Price	\$ 33.80	\$ 44.56	\$ 51.78	\$ 56.77	\$ 90.79	\$ 86.34	\$ 83.20
HDD	4290	4315	3996	4255	4463	4463	4463
Fuel Eff	17.1 mpg	17.1 mpg	17.2 mpg	17.4 mpg	17.5 mpg	17.5 mpg	17.6 mpg

The Role of Efficiency: The US Auto Example



- Since the last oil shock, vehicle efficiency has increased considerably.
- From 1975-1990, efficiency rose from 12.5 mpg to 20.0 mpg. A reduction in price contributed to an increase in miles driven as well. But, efficiency gains kept miles driven relatively flat.
- The point: efficiency gains act as a *virtual source* of supply.
- Have we come full circle?

Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2006



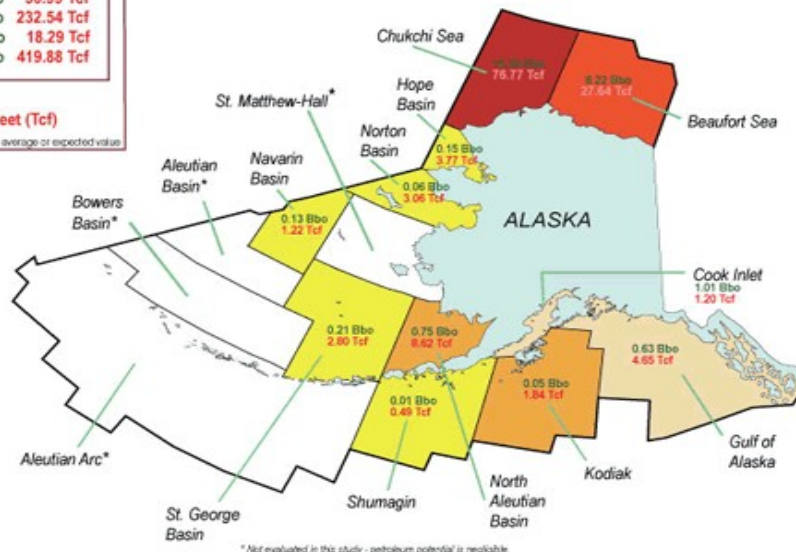
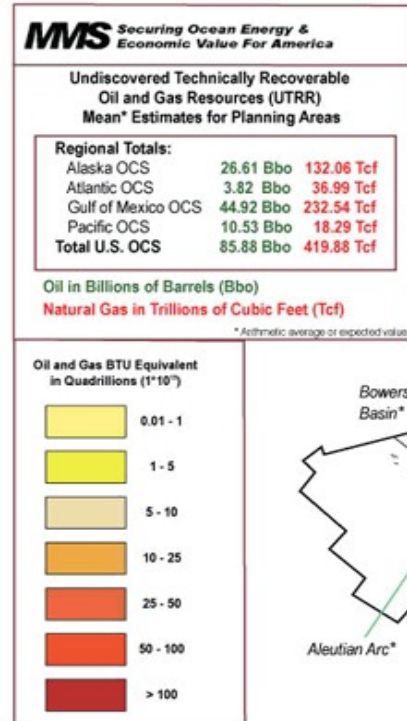
Access restrictions: A new call or greater awareness?

- Access restrictions have been lamented in NPC literature for well over a decade
- Lower 48 OCS effected resource (mean est.)
 - 18 billion bbl oil
 - 76 tcf natural gas

Natural Gas impacted by restrictions

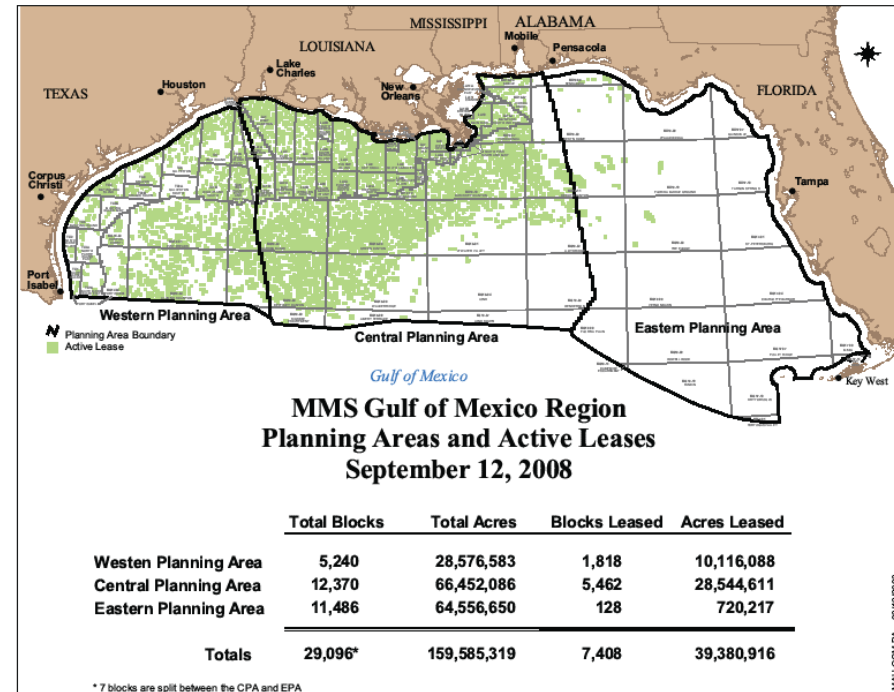
Planning Region/Basin	Resource Off-limits (Tcf)
Montana	9.4
Wyoming Thrust Belt	0.8
Rocky Mountains	39.5
Green River	6.0
Powder River	8.4
Uinta-Piceance	5.3
San Juan	5.3
Total Lower 48 (incl. OCS)	146.8
Alaska	8.6
ANWR	8.6
North Aleutian Basin	8.6
Total	164.0

Data Sources: NPC2003 Supply Task Group Report, MMS, Hartley and Medlock (2007)



The “offshore drilling” debate

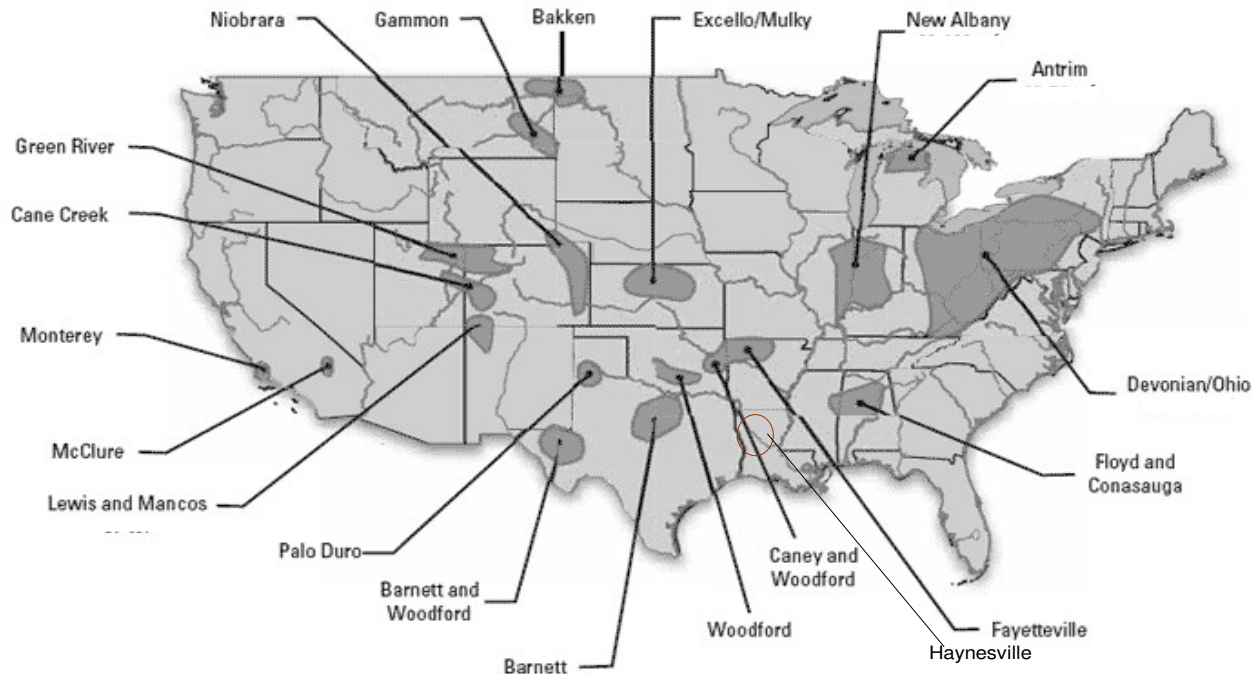
- Common objections are:
 - (1) Don’t use all of the 68 million acres that are leased
 - (2) Not that much oil anyway
 - (3) Shortage of equipment and personnel
 - (4) Impact is in the distant future and, according to EIA, not substantial
 - (5) Offshore drilling is environmentally detrimental
 - (6) Does not help to eliminate our addiction to oil
- Are these good arguments?
 - (1) Prospect size and promise, and it is only 39 million acres that are leased
 - (2) Assessments are filled with uncertainty... there could be more, or there could be less. If there is nothing there, no drilling will occur anyway.
 - (3) Short run phenomena
 - (4) Expectations and modeling
 - (5) Only 0.001% of all oil drilled in the OCS has been spilled (NAS)
 - (6) Could serve as a bridge to the future, if policy is done right



- The debate ignores natural gas potential. This will be ever more important as we move into the future!
 - Many studies have estimated substantial increases in natural gas demand in the wake of pending CO₂ legislation.

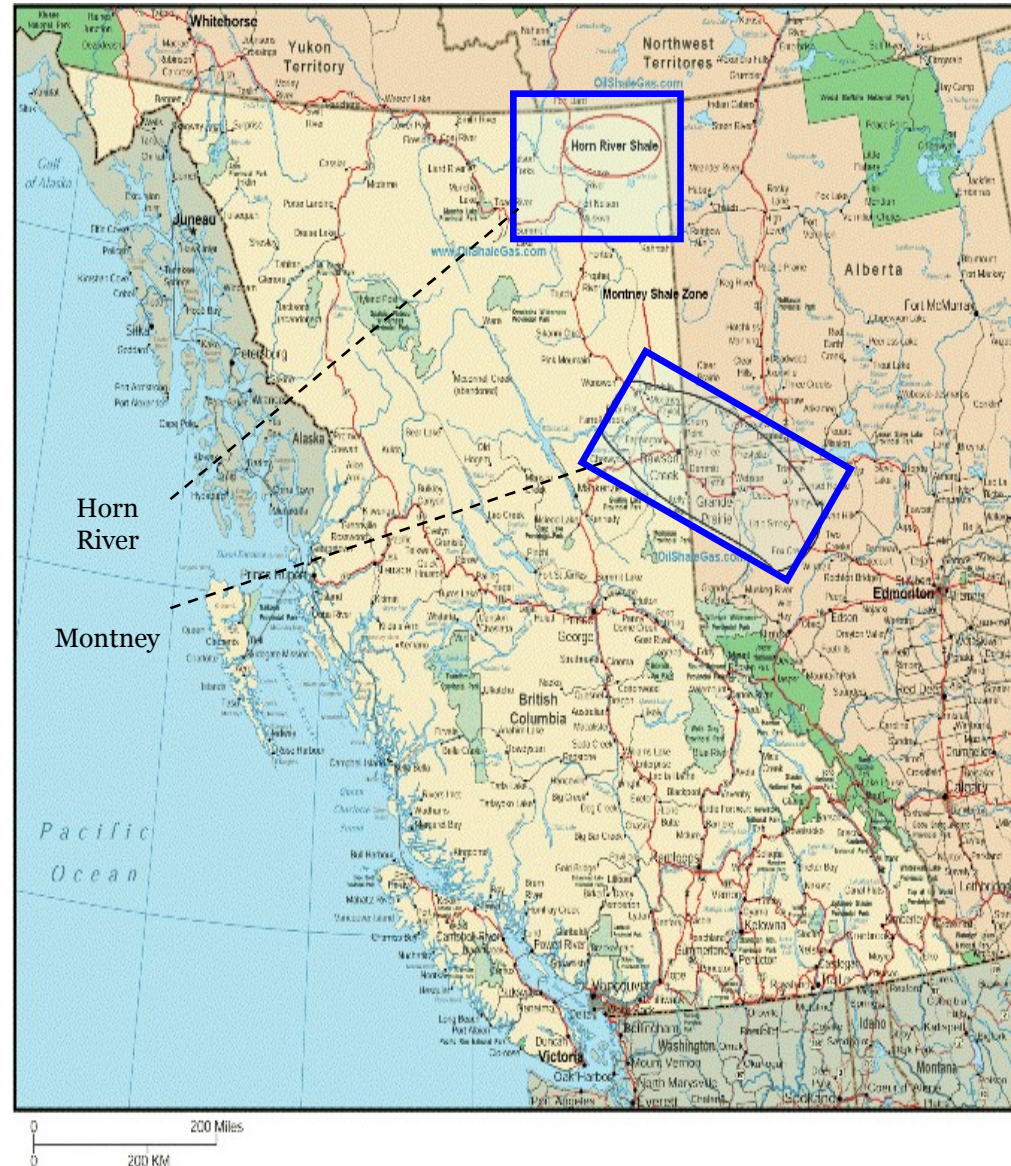
Developments in Shale Gas

- Very active area of exploration and development
 - NCI assessment indicates 275-840 tcf of technically recoverable shale gas
 - Differences driven primarily by producer reports for the Haynesville and Marcellus.
 - Even low end is higher than EIA's 125 tcf (AEO2008) or the 131 tcf cited by PGC (2006)
 - *Do not* include Canada (Montney, Horn River).
 - These are *technically* recoverable estimates. Costs may be an impediment.
 - Breakeven estimated at roughly \$6-7/mcf in most plays.
 - Other studies are ongoing.



Developments in Shale Gas (cont.)

- Shale plays in Canada are also being developed.
- Most active areas are in the Horn River and Montney plays in BC and Alberta.
- Supply potential in BC, in particular, has pushed the idea of LNG exports targeting the Asian market
 - Asia is a premium market.
 - Competing projects include pipelines from Russia and the Caspian States, as well as LNG from other locales.
- BC is a basis disadvantaged market, but selling to Asia could provide much more value to developers.
- Utica Shale in Quebec has been compared to the Barnett in Texas, and price is even more favorable.



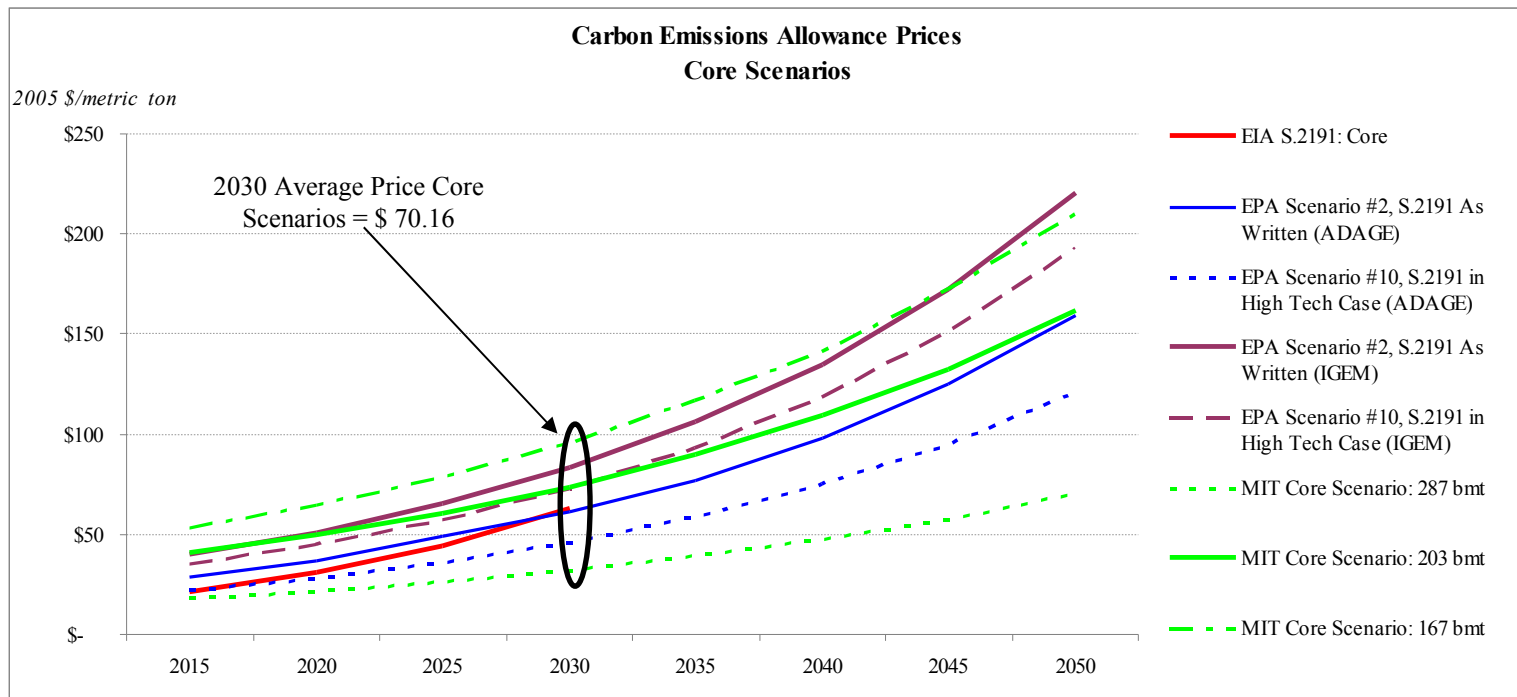
The Pickens' Plan: A role for shale and more

- Goal is to “reduce foreign oil dependence by harnessing domestic energy alternatives, and buy us time to develop even greater new technologies.”
- This is to be accomplished (in 10 years!) by
 - Displacing natural gas in power generation with wind
 - Displacing oil in transportation with natural gas
- The plan requires
 - Massive investment in electricity transmission
 - Large scale deployment of wind turbines
 - Rapid adoption of natural gas fueled vehicles
- Is this the most efficient use of capital and domestic resources?
 - Idea of facilitating energy independence is timely.
 - An overhaul of the electricity distribution network has additional benefits, even if wind is not deployed at the scale required.
 - Costs are likely enormous.
 - Efficient electricity storage is needed... this does not necessarily favor wind.
 - Will consumers really buy NGVs? Will station owners install NG facilities?
 - Why not plug-in hybrids, using natural gas to generate power?

A Change in the way the US approaches the Climate Change issue may be the soonest to come. So, how might Climate Policy affect things?

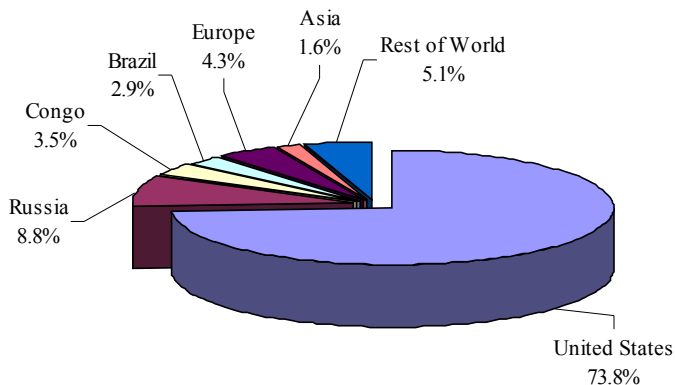
Energy Security Policy vs. Climate Policy: “Two sides of the same coin?”

- There is tremendous uncertainty in the price of carbon in a tradable permit scheme. This tends to increase the “option value” of waiting to make future investments.
 - Waiting can shrink reserve margins... this is not an “energy security”-type interest.
- Carbon prices in core scenarios range across models.
 - Generally prices increase with restrictions, and technology assumptions are crucial



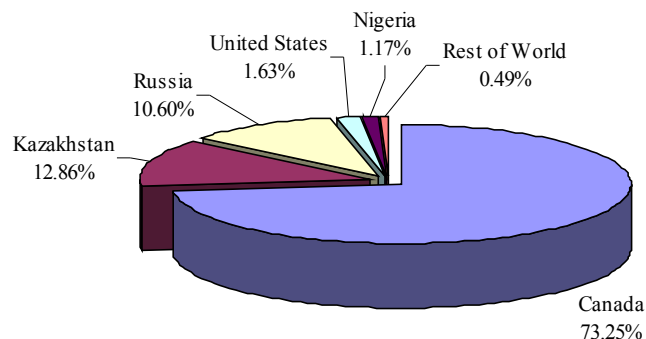
Energy Security Policy vs. Climate Policy: “Two sides of the same coin?” (cont.)

Shale Oil Resource



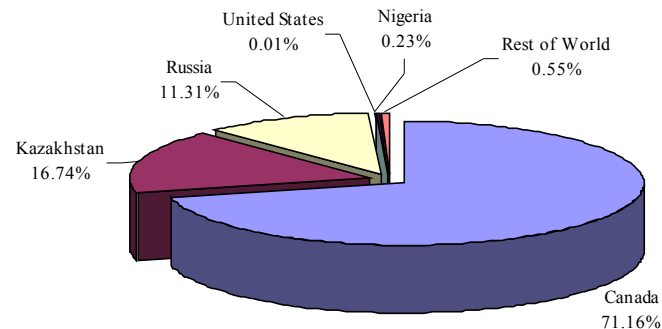
Total = 2.83 trillion barrels

Bituminous Oil Resource in Place



Total = 3.27 trillion barrels

Bituminous Oil Reserves

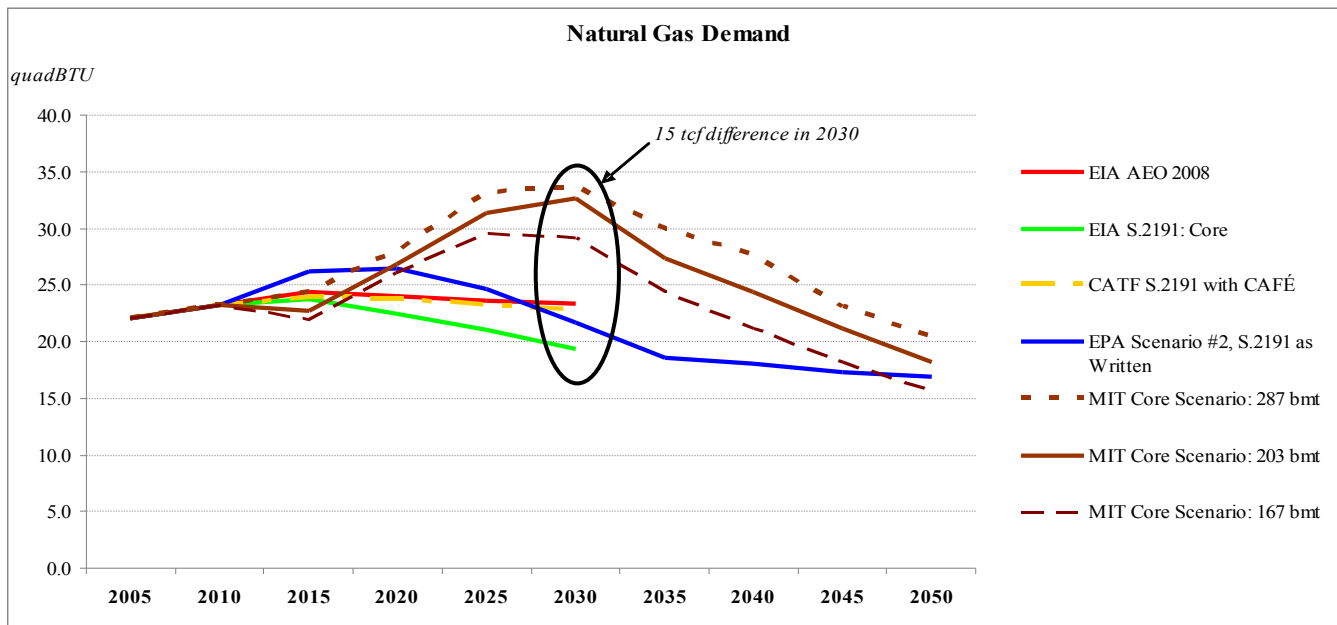


Total = 251 billion barrels

- Some responses are not complementary, especially in given the distribution of resources
 - Coal is heavily weighted toward US, which holds 27% of proved reserves (not pictured)
 - Unconventional oil is even more heavily weighted toward North America.
 - Accelerated unconventional developments and expanded use of coal are not “carbon friendly”, but they are beneficial to energy security.

Energy Security Policy vs. Climate Policy: “Two sides of the same coin?” (cont.)

- Many studies predict dramatic increases in natural gas demand.
 - Strong relationship between natural gas demand, CCS technology availability and assumptions regarding nuclear power.



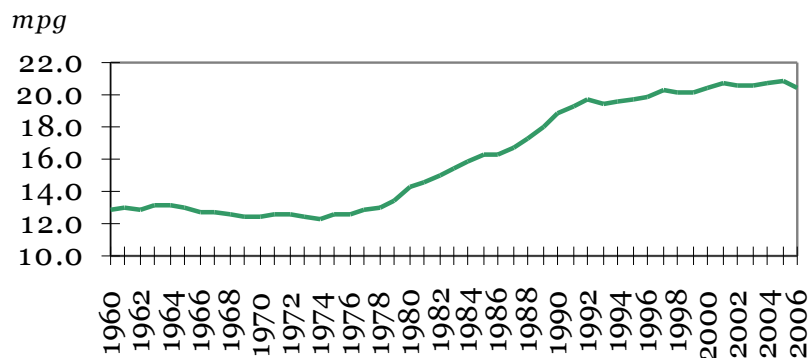
- More binding constraints actually accelerate NG demand to a point. Modeling with the RWGTM indicates an increase in LNG imports in participating countries. The biggest beneficiary: Iran.
 - Recall lines at gasoline stations in 1970s... now couple this with rolling blackouts!

Energy Security Policy vs. Climate Policy: “Two sides of the same coin?” (cont.)

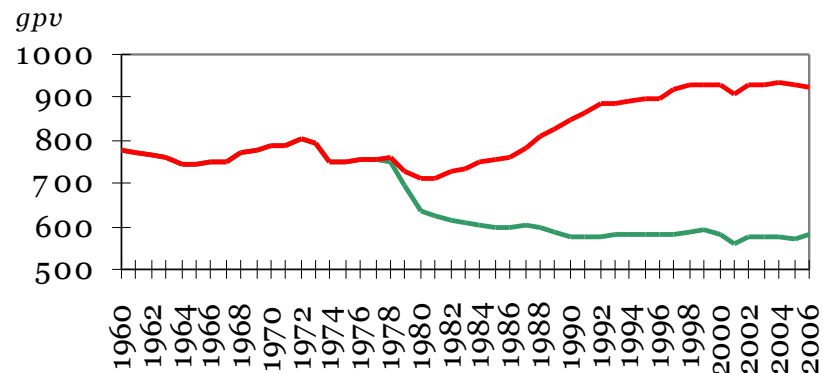
- There are complementary areas that policy can address
- The transportation sector is an obvious area for policy to effect oil demand
 - New technologies can displace oil demand
 - Hybrids, Plug-in hybrids, Biofuels can all displace oil requirement
 - Efficiency is a virtual source of supply
- BIPP research indicates a net savings of about 5 million b/d from new CAFE standards by 2030. Study accounts for rebound effect and income growth, allowing for modest diffusion rates determined by vehicle sales and turnover.
- Reducing demand through efficiency accomplishes both goals.

Historical Data with Simulations

On-Road Fuel Efficiency of Light Duty Vehicles



Fuel Use (Actual and Simulated at 1977 Fuel Efficiency)



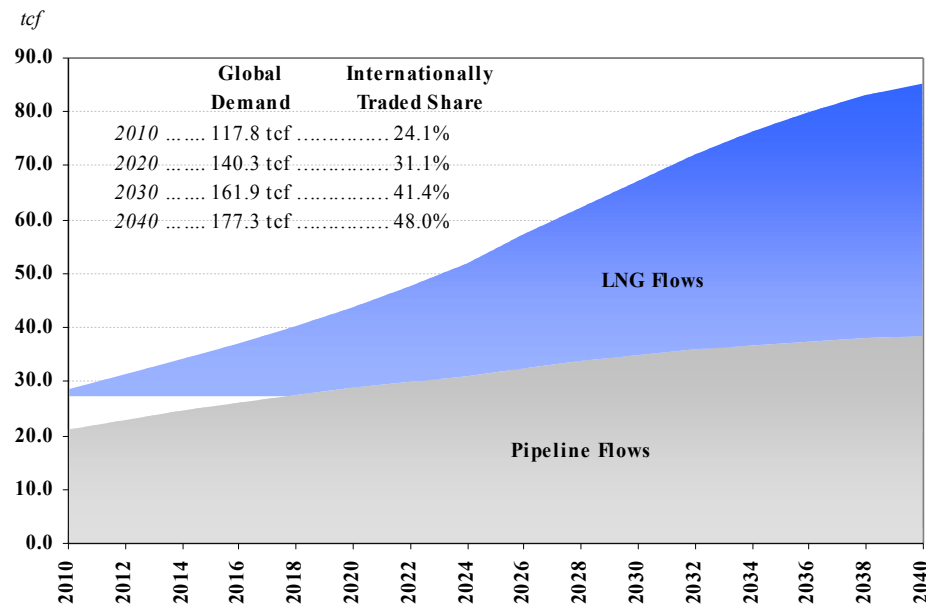
Closing Remarks

Closing Remarks

- Oil and gas will remain important for the foreseeable future, but high prices can induce **rapid** change with respect to *consumer behavior*.
- Geopolitical pressures can exacerbate concerns about energy security, and prompt **rapid** change with respect to *policy*.
- Energy efficiency and conservation reduce demand growth.
 - Efficiency gains resulted in a large demand-side response in the 1980s..
 - As “low hanging fruit” is picked, however, the marginal cost of further efficiency improvements rises. This opens the door for new technologies, which, once adopted, can result in market share of traditional technologies being lost.
- Climate policy is a major X-factor with regard to what fuels are ultimately favored in the energy mix.
- Carbon policy could limit fuel choice, especially in power generation
 - Favors natural gas, penalizes coal and oil, among the hydrocarbon options.
 - Favors nuclear, wind, and solar.
- Carbon intensive industry relocation may be a natural outcome
 - “Carbon leakage” could create opportunities in non-carbon regulated regions of the world for secondary and tertiary product supply – rather than export crude oil, could export plastics, petrochemicals, petroleum products, etc.

Closing remarks (cont.)

- North America is part of a global market! What we do here will influence developments elsewhere.
 - Energy policy is more “topical” now than at any other time in the last 30 years.
 - Broader economic impacts (i.e.-”carbon leakage”)
- Active area of research at BIPP
 - Over 280 demand regions and 100 supply regions. Develops resources and infrastructure to meet demand. Alternative supplies can penetrate
 - Recent study of the effect of access restrictions indicates substantial benefit to removing barriers, even beyond the US.
 - Currently conducting a study on the effects of carbon policy.
- Policy can really screw things up, or it can provide good direction. In this case, I think we are seeing a lot of proposals that amount to “spinning the wheels”.



Source: Papers and presentations available at www.rice.edu/energy