

Energy Market Outlook and Challenges

Presented at
Virginia Coastal Program
Northeast CZM Partners Workshop

Presented by
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Presentation Outline

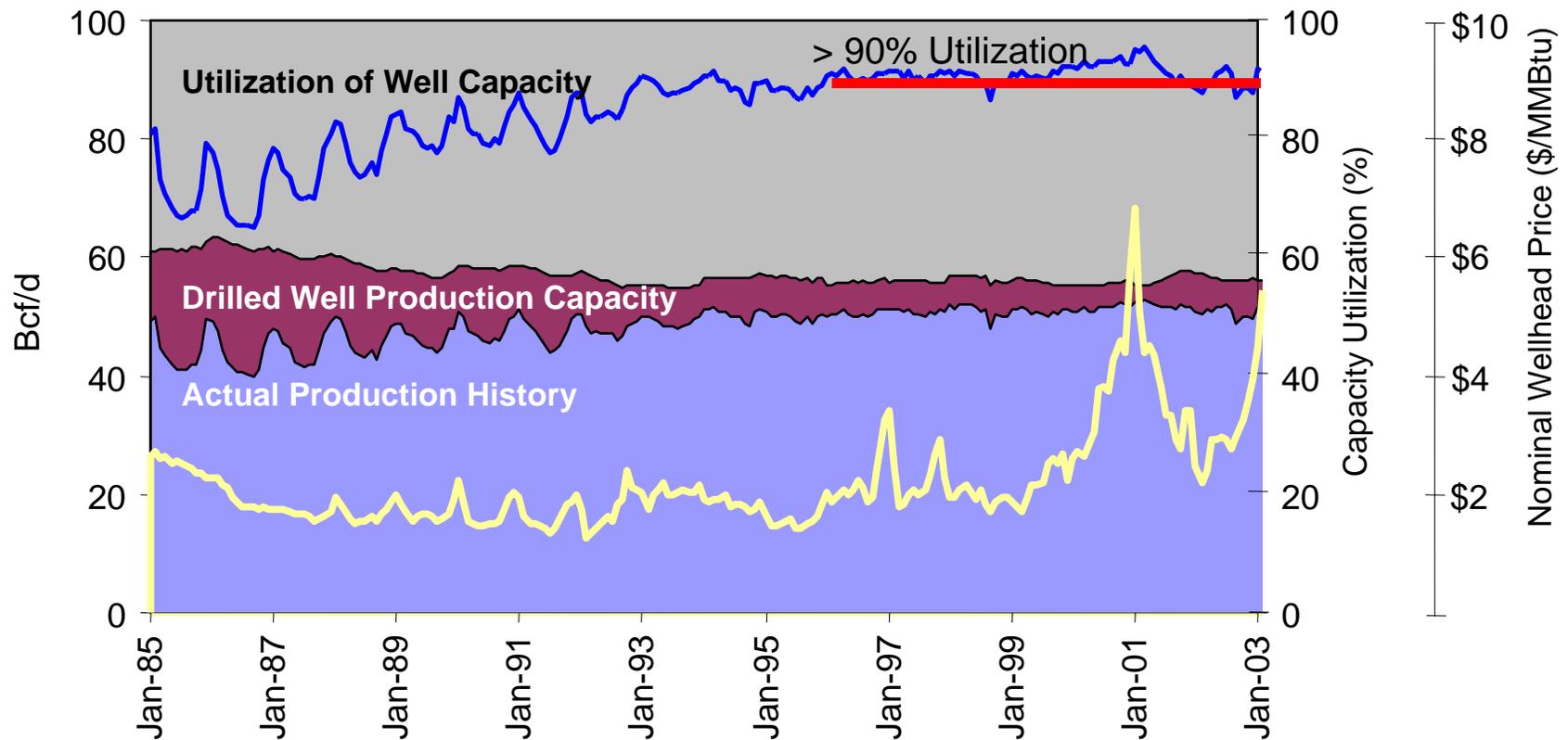
- ◆ Where are the energy markets today?
- ◆ How did the energy markets reach here?
- ◆ Where are the energy markets headed?
- ◆ What are the challenges?

Where are the energy markets today?

- ◆ Crude oil prices have more than doubled in past 24 months: from \$28/bbl in September 2003 to over \$65/bbl in September 2005.
- ◆ Wellhead natural gas prices have also been wilder; from \$4.46/Mcf in August 2003 to over \$7.68/Mcf in August 2005 (increase of 75%). Winter future strip for Henry Hub is over \$15/Mcf.
- ◆ Coal prices have also increased in past years. Central Appalachian basin prices have increased from \$30/ton in 2003 to over \$60/ton in 2005. Northern Appalachian, Uinta, Illinois and Powder river basins show similar increases.
- ◆ Retail electricity prices have also gone up. Electricity prices have gone up from 7.20 ¢/KWH in 2003 to 7.70 ¢/KWH in 2005. Utilization of natural gas fired plants that were built in the IPP boom have been down. Current question is new capacity build will be coal or natural gas?
- ◆ Spare productive capacity shrank in several key areas:
 - Wellhead capacity
 - Pipeline and tankers
 - Very high drilling rig utilization (almost Just-In-Time, JIT)
 - No spare refinery capacity
- ◆ Energy markets have impacted economic growth.

How did the energy markets reach here?

Tight natural gas supply = Price volatility

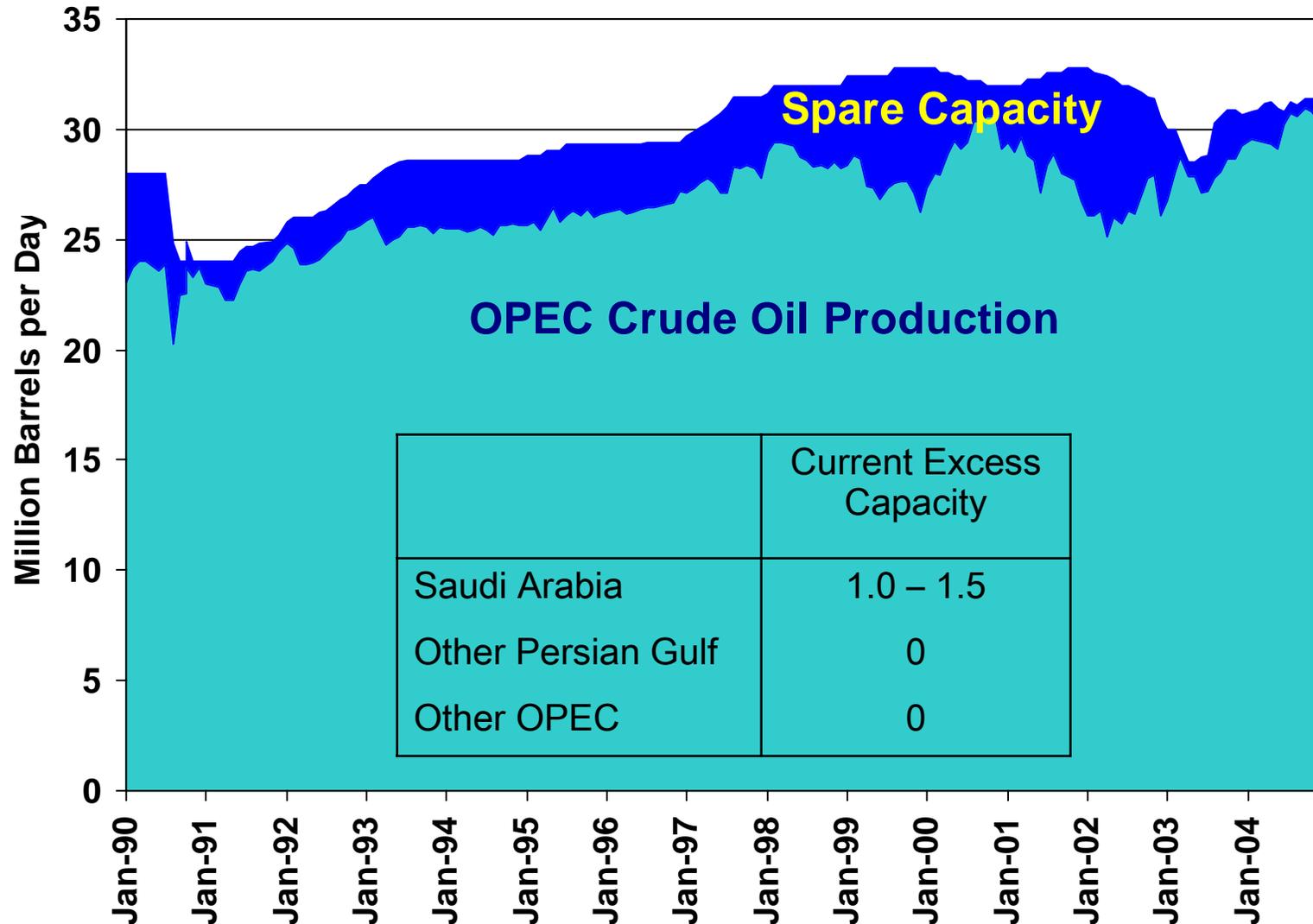


Source: Adapted from EIA, Office of Oil and Gas, Reserves and Production Division

http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/ngcap2003/ngcap2003.html

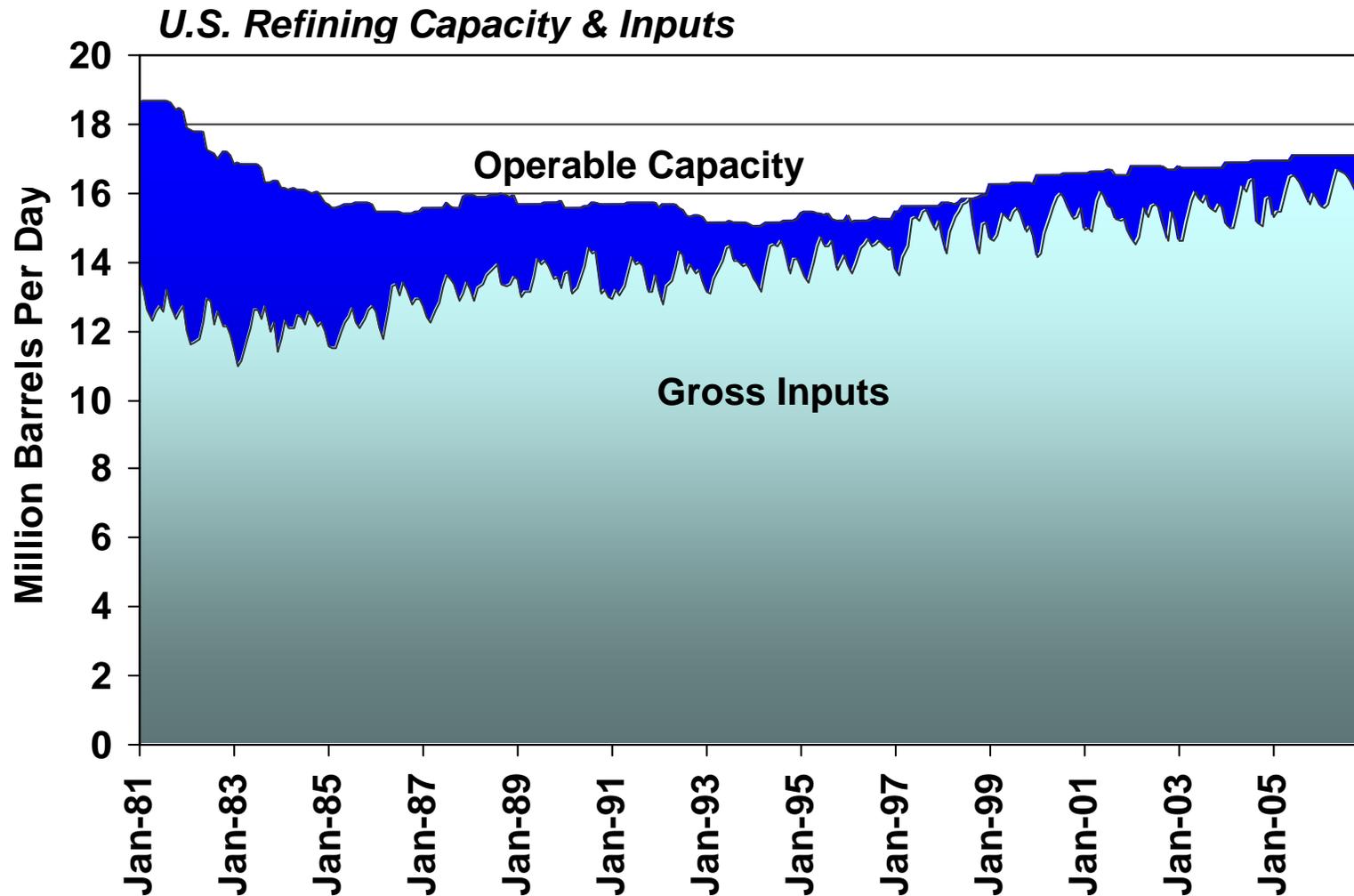
How did the energy markets reach here?

OPEC spare capacity is extremely tight right now



How did the energy markets reach here?

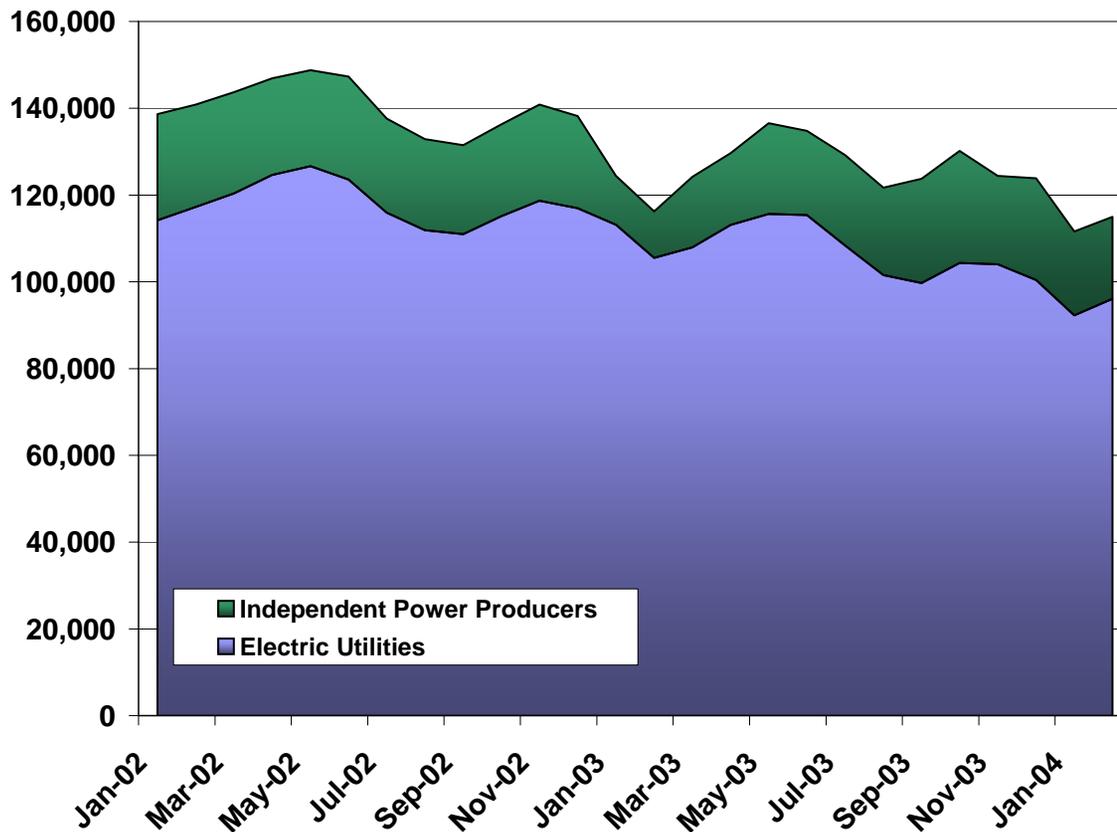
Refining capacity and inputs



How did the energy markets reach here?

Electric utility coal stock levels are dangerously low

**Electric Utility Coal Stock Levels
(Thous. Tons)**

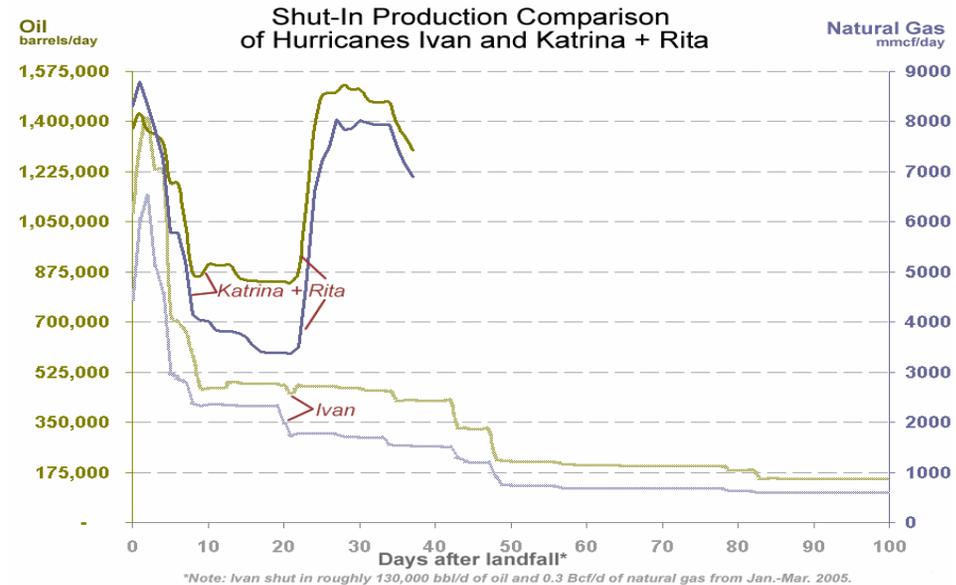
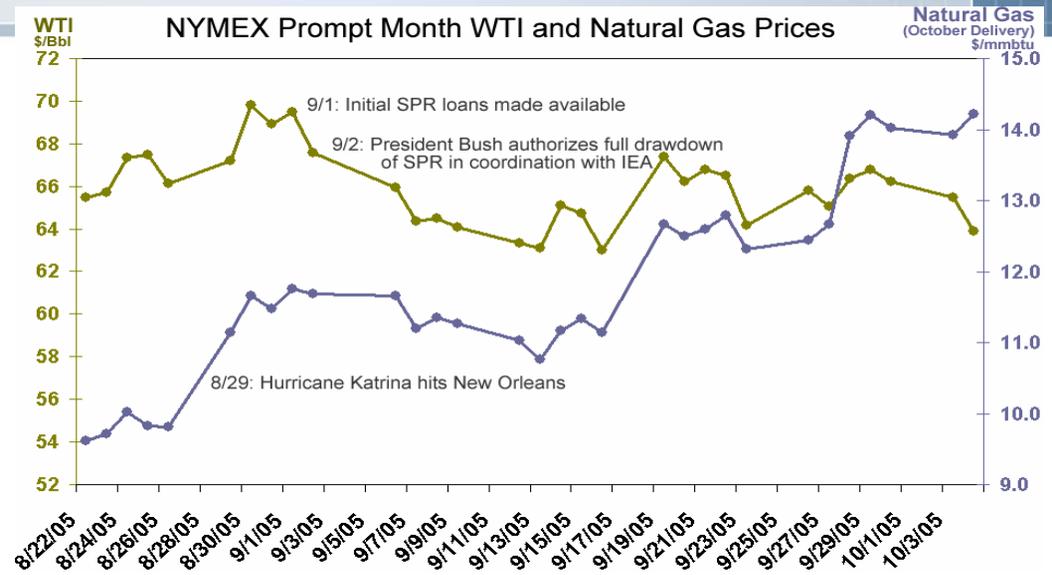


- ◆ Utility stock levels have been falling and have fallen to their lowest levels in over 2 years.
- ◆ The dwindling stock levels reflects utility reluctance to replenish inventory when prices are high, particularly in light of continued financial pressures on the industry.
- ◆ The low stock levels also resulted from rail delivery problems.

Where are the energy markets today?

Impact of hurricanes

- ◆ In year 2004, price were high – not due to fear and speculation – but due to fundamentals.
- ◆ There were no highly unusual events and markets behaved normally in 2004.
- ◆ But demand then grew too fast and supply did not - leading to supply tightness in 2004.
- ◆ In year 2005, supply tightness continued and has been exacerbated by supply disruptions due to Hurricane Katrina and Rita.
- ◆ Due to Hurricanes, the SPR has been tapped for oil and market area storage has been used for meeting demand in many parts of the US.



Where are the energy markets today?

Impact of hurricanes

- ◆ Currently 21 processing plants are offline. Ten with capacity of 5.4 Bcf/d are not active due to external factors, including lack of electric power or gas supplies. Remaining 11 plants (7.7 Bcf/d) are inactive because of damage to the facilities.
- ◆ Over 230 Bcf of natural gas is shut in. But the losses have been nearly offset by a loss of demand caused by the shutdown of gas-intensive petrochemical plants and electric power sector along the Gulf Coast.
- ◆ "The overwhelming, vast majority (of lost demand) is due to production capacity being shut in and not because of high gas prices.
- ◆ The loss in gas demand could be about 4 billion cubic feet a day. It is about half of the lost Gulf gas output.

Damage to GOM Oil & Gas Infrastructure
Ivan vs. Katrina vs. Rita

	Rita	Katrina	Ivan
Platforms Destroyed	65	46	7
Platforms Extensive Damage	32	20	20
Rigs Adrift	13	6	5
Rigs Extensive Damage	10	9	4
Rigs Destroyed	1	4	1
Rigs Unaccounted For	3	0	0
Number of Pipelines Damaged	23	21	102
Shut-in Production High	26-Sep	30-Aug	16-Sep
Gas (BCF)	8,623	9,418	6,515
Oil (bbls)	1,564,679	1,557,981	1,410,002
Cumulative (To Date)	Combined with Rita	8/26/05 - 10/05/05	9/13/04 - 02/14/05
Gas (BCF)	Combined with Rita	233,446	172,259
Oil (bbls)	Combined with Rita	47,756,987	43,841,245
Evacuation Highs			
Platforms	754	660	575
Rigs	107	89	
Platforms in the Path	1600	1300	150

- ◆ Around 400,000 customers are without power in TX and LA (as of 10/5).
- ◆ Four refineries are offline due to Katrina. Eight refineries are offline due to Rita; four will restart soon.

Where are the energy markets today?

Impact of hurricanes

- ◆ Industry needs to inject an average of 63 Bcf/week to reach fill storage by Nov. 1 of 3.2 trillion cubic feet. But average injections, are only in the high 50s this time of year.
- ◆ For the week of Sep. 2, net injection into storage was 36 Bcf, around 50% below five-year average injection.
- ◆ There is legitimate concern that consumer drawdown on storage may result in a deficiency of storage available for traditional winter use.
- ◆ If utilities want to reach a "safe" level of storage, they may need to outbid chemical companies that are now able to tolerate far higher prices. Since August, for example, U.S. ethylene prices have risen 42%, to 58 cents/lb.
- ◆ Houston electricity prices to rise by 14% and then again 10% in Jan 2006 due to Hurricanes.

Gulf of Mexico Oil & Natural Gas Facts
Energy Information Administration
Data as of June 2005 unless otherwise noted.

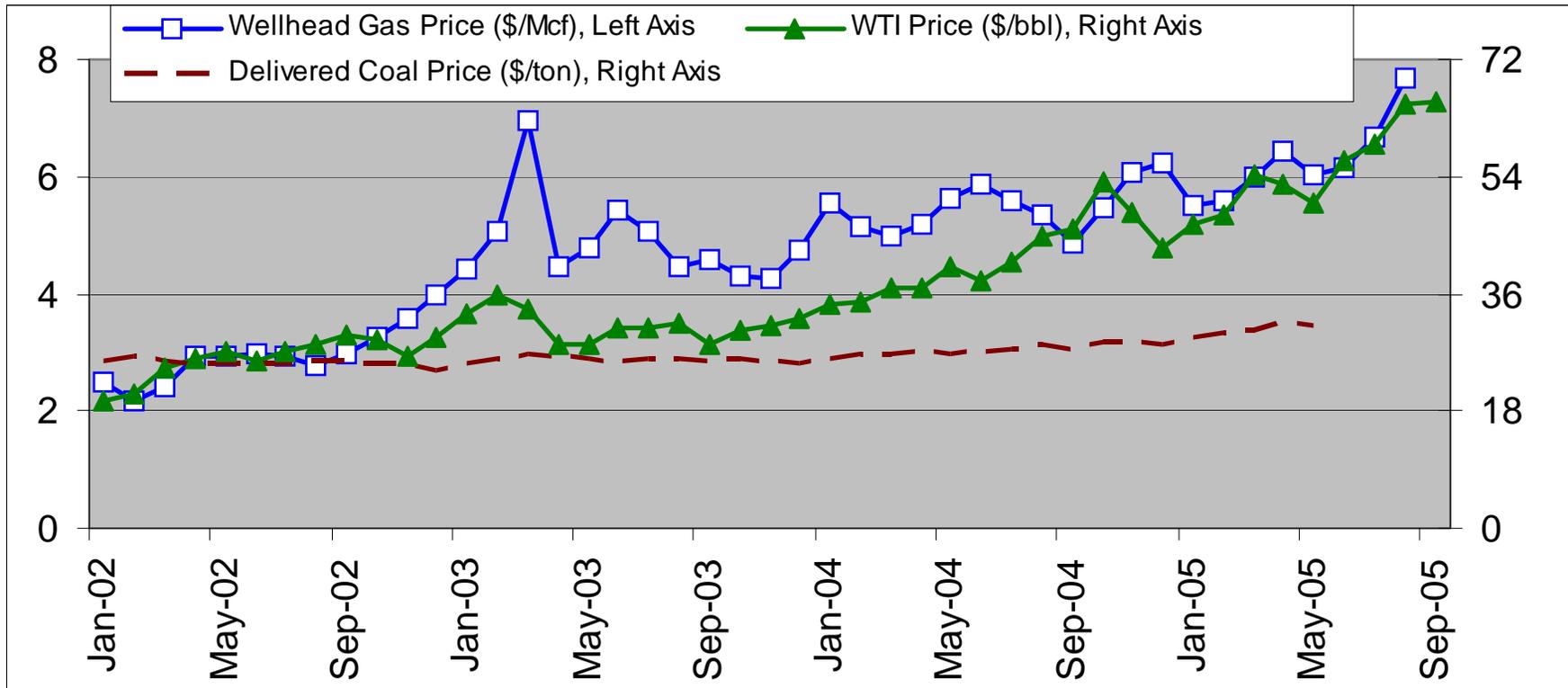
	Gulf of Mexico	Total U.S.	% from Gulf of Mexico
Oil (million barrels per day)			
Federal Offshore Crude Oil Production (4/05)	1,562	5,488	28.5%
Total Gulf Coast Region Refinery Capacity (as of 1/1/05)	8,068	17,006	47.4%
Total Gulf Coast Region Crude Oil Imports	6,490	10,753	60.4%
- of which into ports in LA, MS and AL	2,524	10,753	23.5%
- of which into LOOP	0,906	10,753	8.5%
Natural Gas (billion cubic feet per day)			
Federal Offshore Marketed Production (3/05)	10.4	54.1	19.2%

Shut-in Status

Date	Shut-in Oil (bbl/d)	% of Total Federal GOM	Shut-in Gas (mmcf/d)	% of Total Federal GOM
10/4/2005	1,349,617	86.4%	7,170	68.9%
10/3/2005	1,391,926	89.1%	7,495	72.1%
9/30/2005	1,467,577	94.0%	7,941	76.4%
9/29/2005	1,478,780	94.7%	7,980	76.7%
9/28/2005	1,511,715	96.8%	8,072	77.2%
9/27/2005	1,512,937	96.9%	7,857	75.5%
9/26/2005	1,527,630	97.8%	7,843	75.4%
9/24/2005	1,500,898	96.1%	7,488	72.0%
9/23/2005	1,486,877	95.2%	7,204	69.3%

Where are the energy markets today?

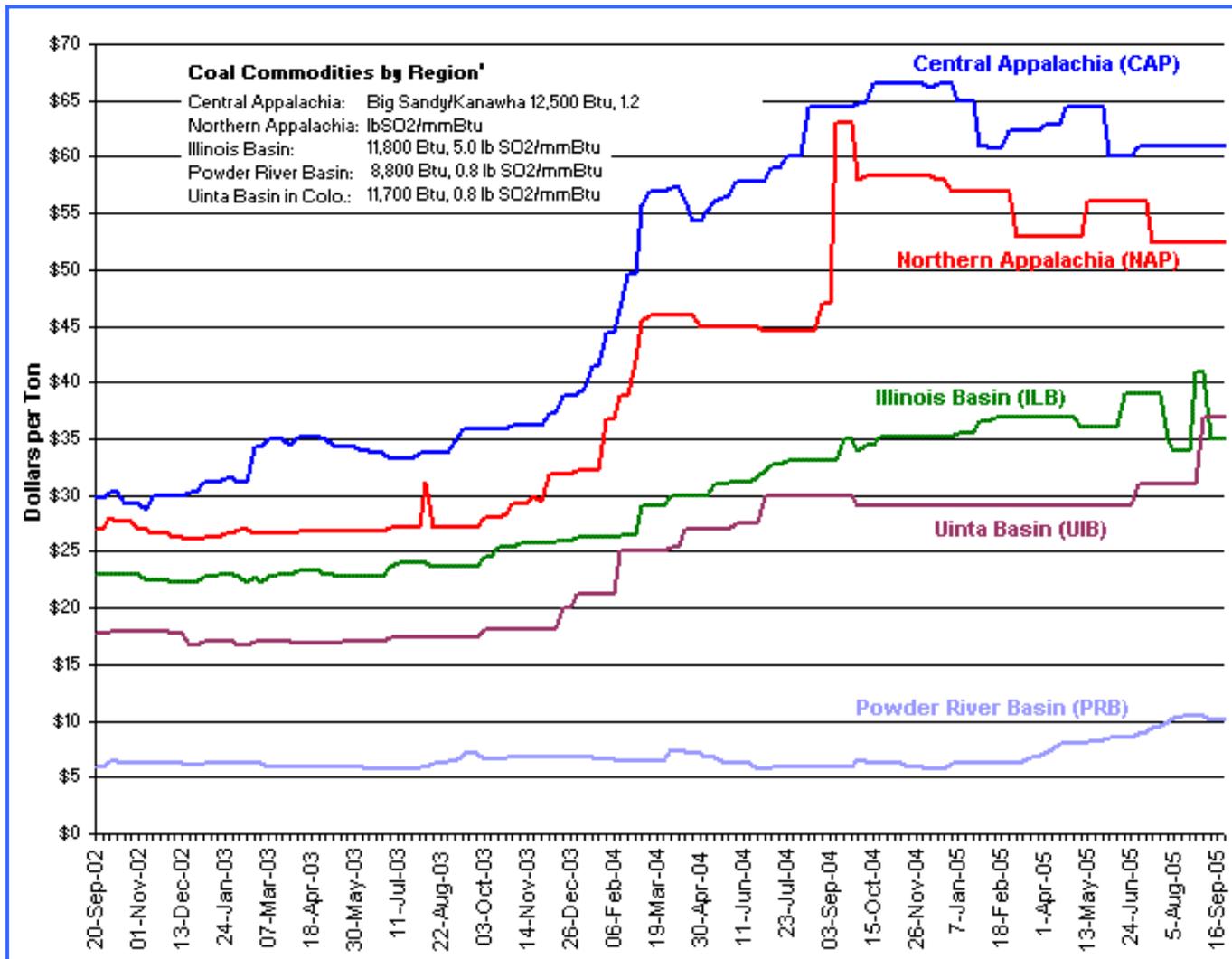
Natural gas, oil and coal prices are increasingly linked



- ◆ Natural gas and crude oil price correlation for 2002-2005 timeframe is 83%.
- ◆ Natural gas and coal price correlation for 2002-2005 timeframe is 65%.

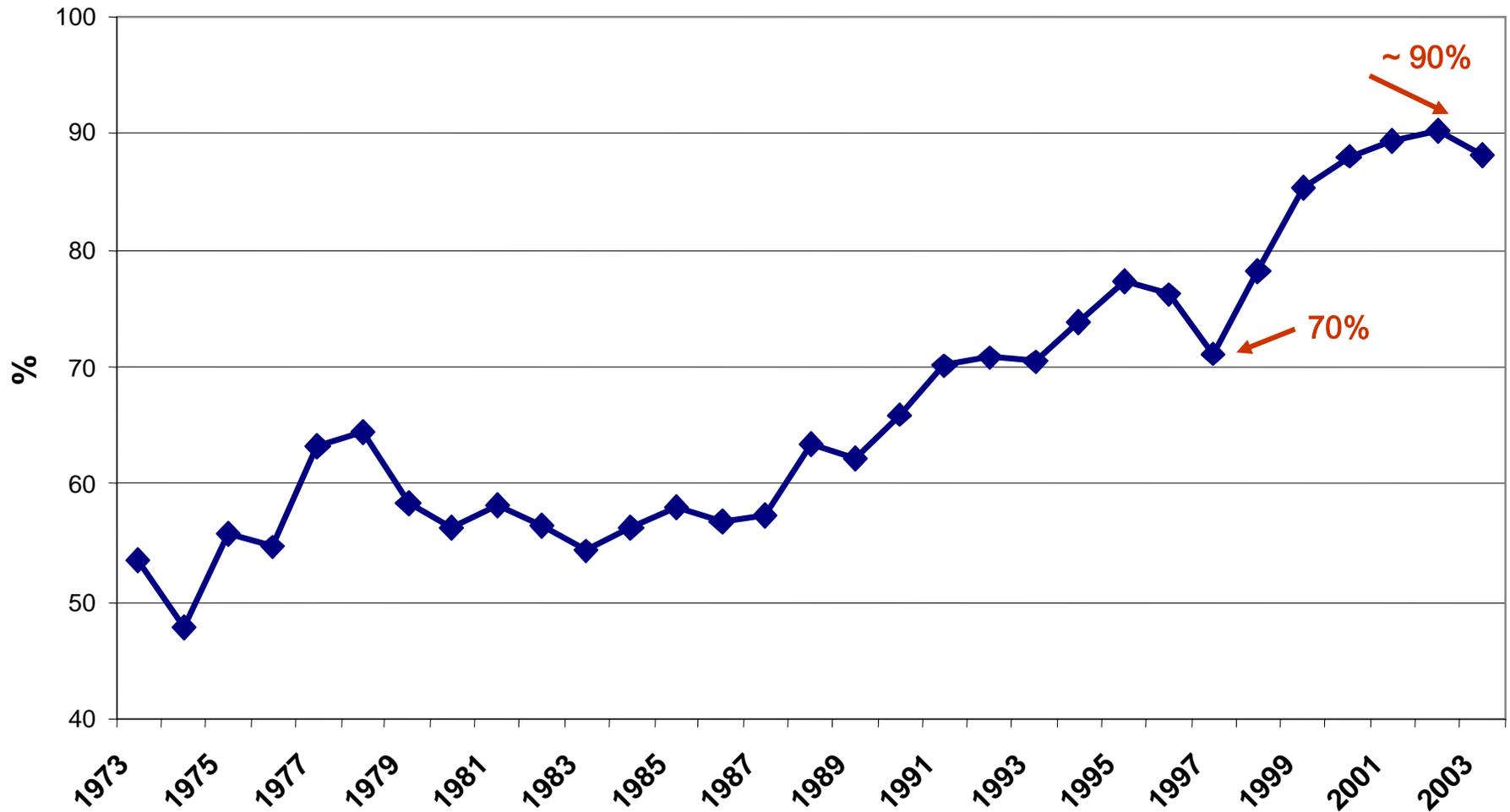
Where are the energy markets today?

Coal prices have been highly volatile



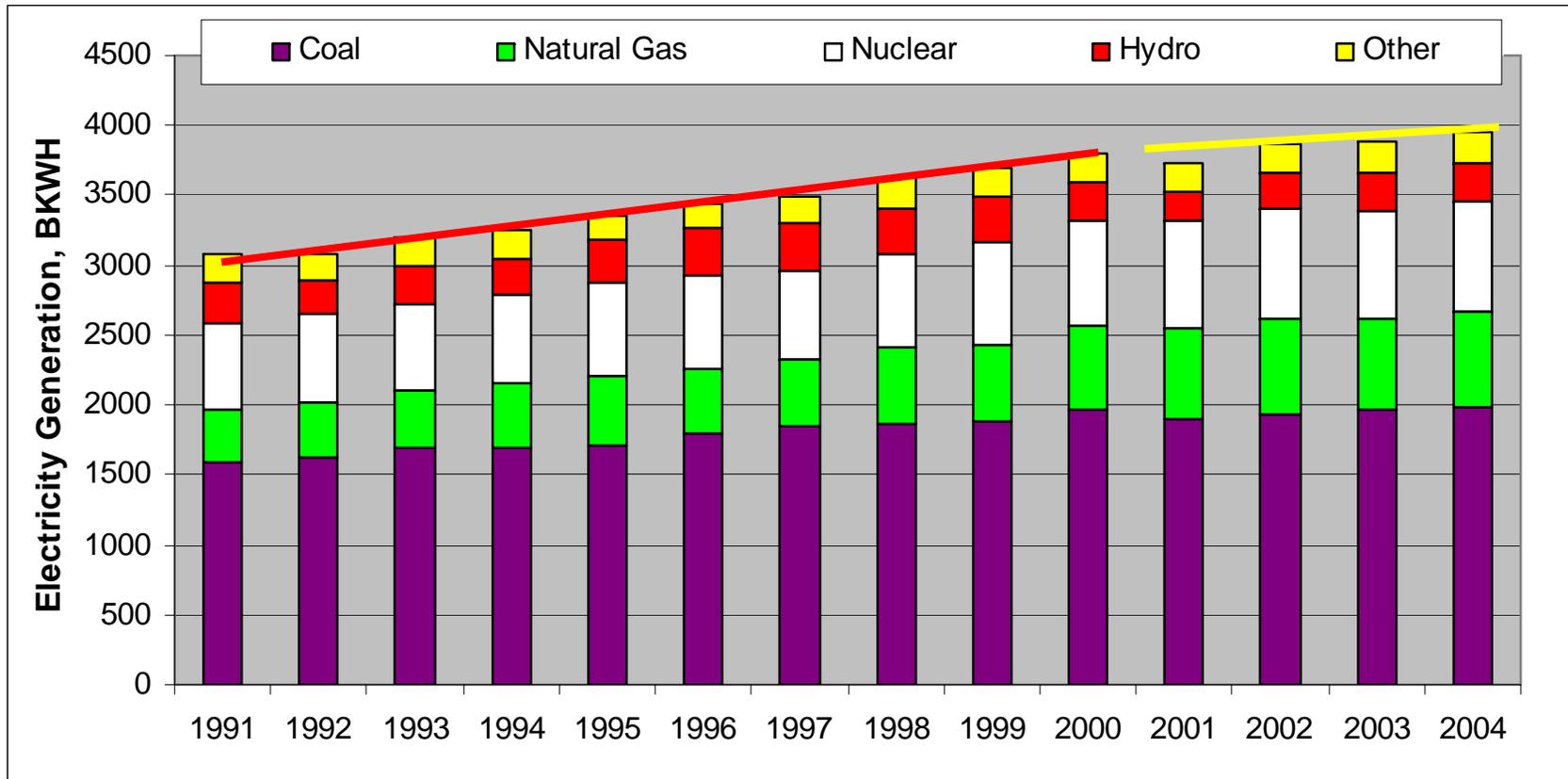
Where are the energy markets today?

Nuclear plant utilization has increased



Where are the energy markets today?

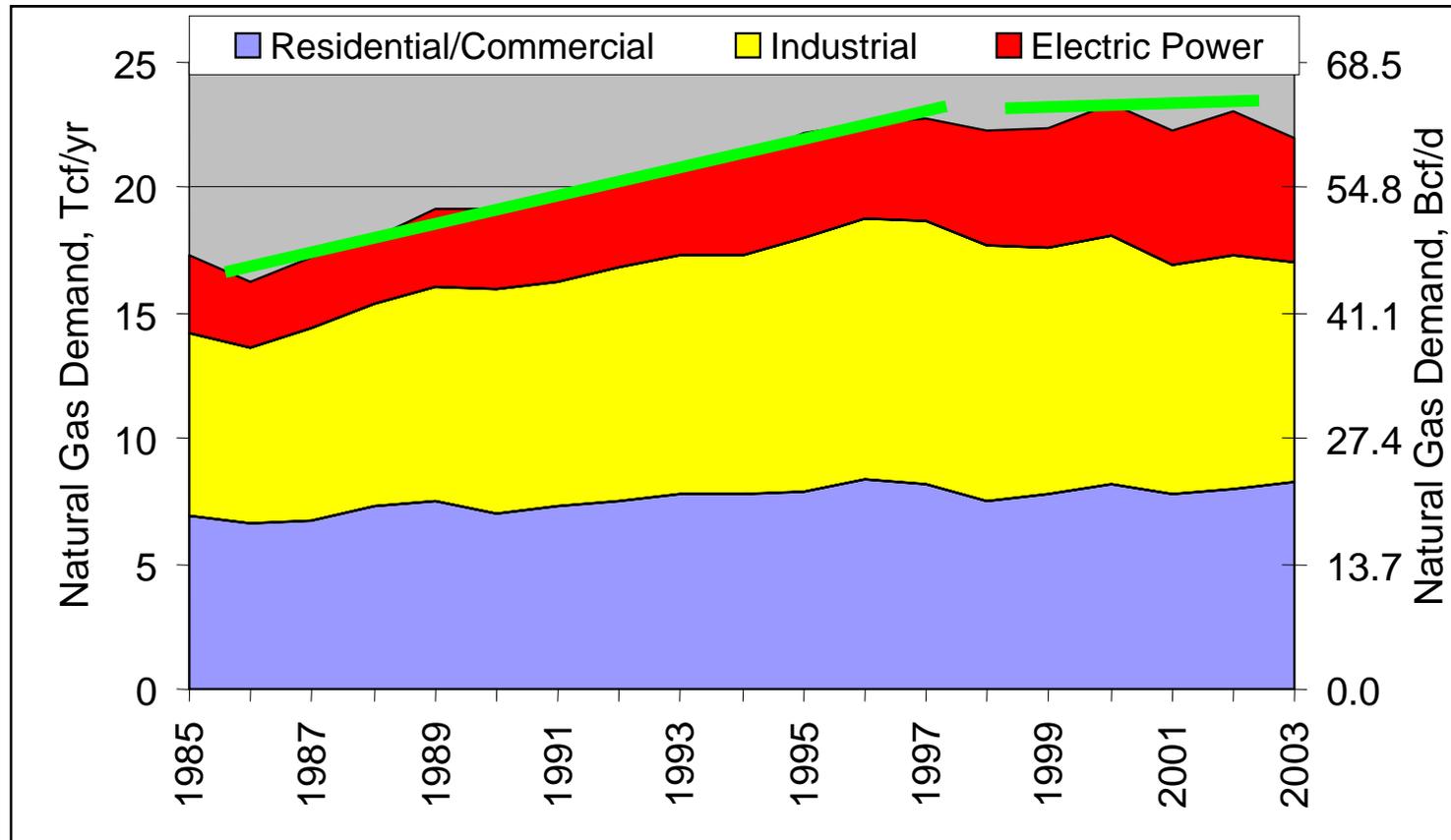
Electricity demand growth has lagged after 2000



- ◆ Electricity demand increased at 2.4% per year from 1991 to 2000 timeframe.
- ◆ After 2000, demand has grown by less than 1% per year (around 0.9%/yr).
- ◆ Gas fired generation has increased, coal and nuclear generation also has increased to a lesser extent.

How did the energy markets reach here?

Natural gas demand growth has flattened



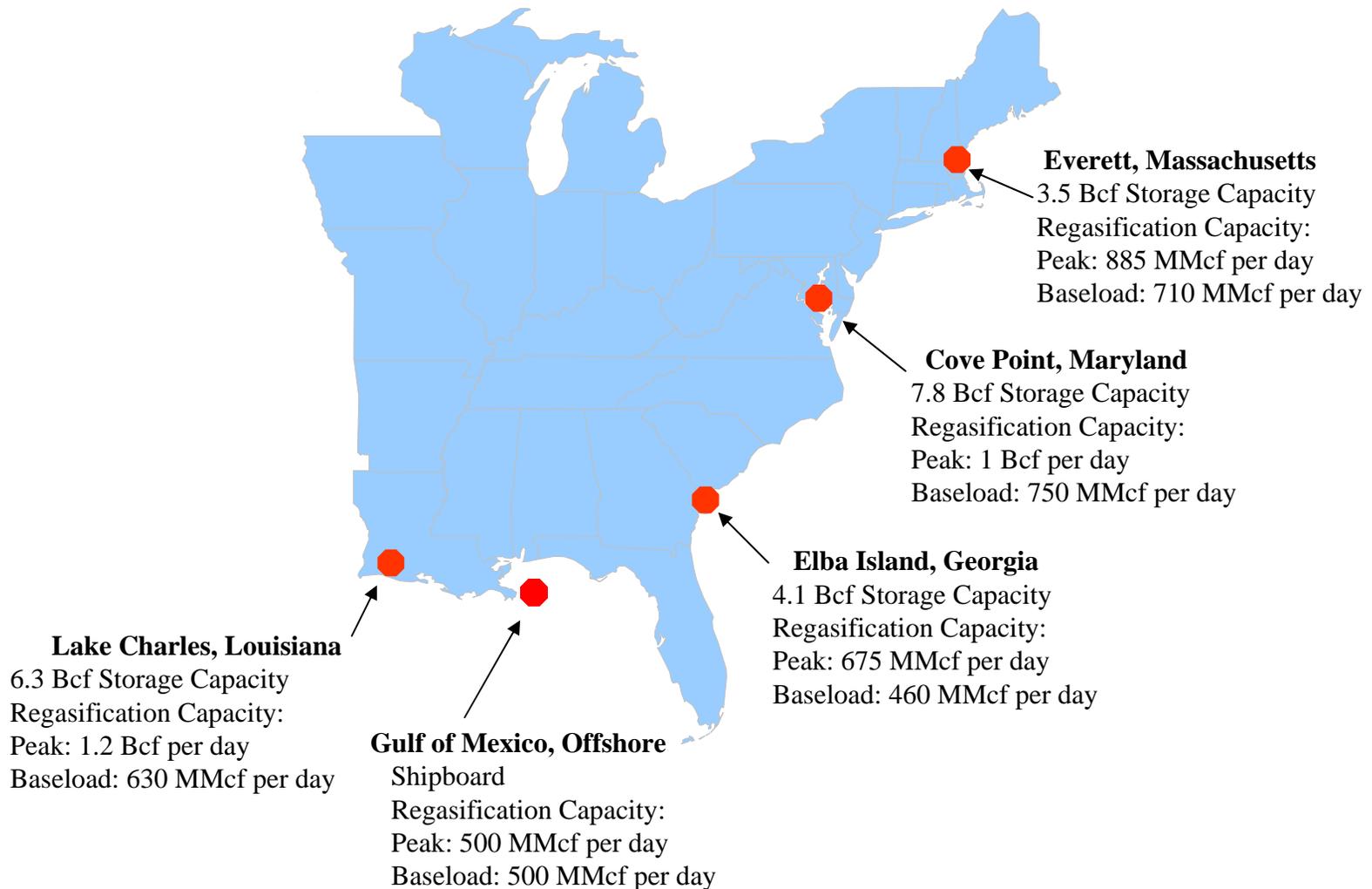
Where are the energy markets today?

LNG today: What is different than in the past?

- ◆ Stranded natural gas in large quantities around the world
 - Large gas finds have no local markets
 - Qatar, Nigeria, Trinidad-Tobago, Bolivia, Saudi Arabia
- ◆ Lower LNG costs from improved liquefaction, storage, shipping
 - Economies of scale
 - Competition among engineering firms, ship builders, better technology
- ◆ Strong gas demand in U.S. and world-wide making LNG investments attractive
- ◆ Gas consumption is highly price sensitive
 - Power markets drive gas demand
 - At prices above \$4.00/MMBtu, coal is competitive
 - At prices above \$10/MMBtu, putting costly pollution control devices such as scrubbers on coal plants can be competitive.
- ◆ **Bottom line:** LNG is a competitive supply source for North American markets
- ◆ **Question:** Can LNG supplies come to US markets given worldwide market for LNG in other countries; Can LNG be sited close to markets?

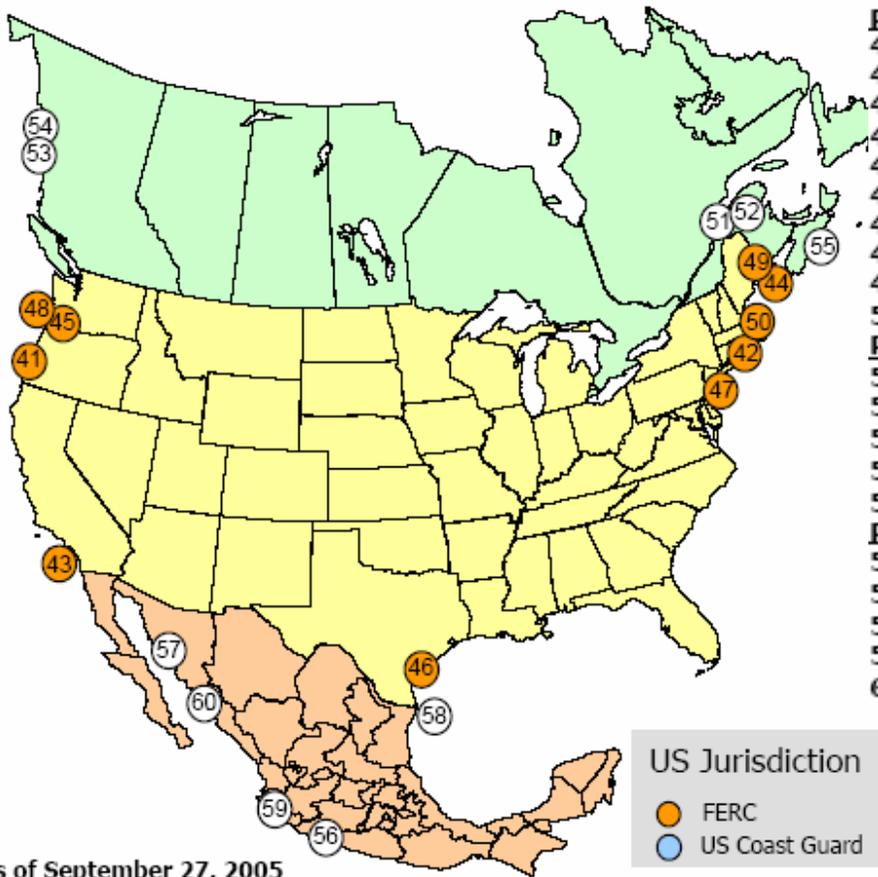
Where are the energy markets today?

Current US LNG terminals



Where are the energy markets today?

Potential LNG terminals



POTENTIAL U.S. SITES IDENTIFIED BY PROJECT SPONSORS

- 41. Coos Bay, OR: 0.13 Bcfd, (Energy Projects Development)
- 42. Somerset, MA: 0.65 Bcfd (Somerset LNG)
- 43. California - Offshore: 0.75 Bcfd, (Chevron Texaco)
- 44. Pleasant Point, ME : 0.5 Bcfd (Quoddy Bay, LLC)
- 45. St. Helens, OR: 0.7 Bcfd (Port Westward LNG LLC)
- 46. Galveston, TX: 1.2 Bcfd (Pelican Island - BP)
- 47. Philadelphia, PA: 0.6 Bcfd (Freedom Energy Center - PGW)
- 48. Astoria, OR: 1.0 Bcfd (Skipanon LNG - Calpine)
- 49. Robbinston, ME: 0.5 Bcfd (Downeast LNG - Kestrel Energy/Dean Girdis)
- 50. Boston, MA: 0.8 Bcfd (AES Battery Rock LLC - AES Corp.)

POTENTIAL CANADIAN SITES IDENTIFIED BY PROJECT SPONSORS

- 51. Quebec City, QC : 0.5 Bcfd (Project Rabaska - Enbridge/Gaz Met/Gaz de France)
- 52. Rivière-du- Loup, QC: 0.5 Bcfd (Cacouna Energy - TransCanada/PetroCanada)
- 53. Kitimat, BC: 0.61 Bcfd (Galveston LNG)
- 54. Prince Rupert, BC: 0.30 Bcfd (WestPac Terminals)
- 55. Goldboro, NS 1.0 Bcfd (Keltic Petrochemicals)

POTENTIAL MEXICAN SITES IDENTIFIED BY PROJECT SPONSORS

- 56. Lázaro Cárdenas, MX : 0.5 Bcfd (Tractebel/Repsol)
- 57. Puerto Libertad, MX: 1.3 Bcfd (Sonora Pacific LNG)
- 58. Offshore Gulf, MX: 1.0 Bcfd (Dorado - Tidelands)
- 59. Manzanillo, MX: 0.5 Bcfd
- 60. Topolobampo, MX: 0.5 Bcfd

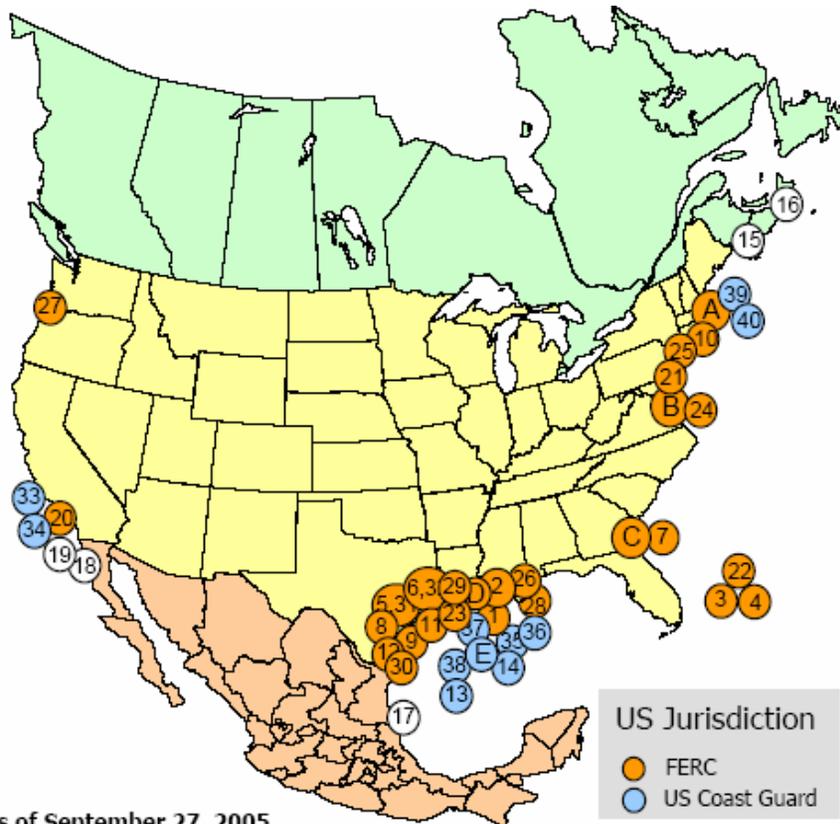
As of September 27, 2005

US Jurisdiction

- FERC
- US Coast Guard

Where are the energy markets today?

Existing and proposed LNG terminals



As of September 27, 2005

* US pipeline approved; LNG terminal pending in Bahamas

CONSTRUCTED

- A. Everett, MA : 1.035 Bcfd (Tractebel - DOMAC)
- B. Cove Point, MD : 1.0 Bcfd (Dominion - Cove Point LNG)
- C. Elba Island, GA : 0.68 Bcfd (El Paso - Southern LNG)
- D. Lake Charles, LA : 1.0 Bcfd (Southern Union - Trunkline LNG)
- E. Gulf of Mexico: 0.5 Bcfd, (Gulf Gateway Energy Bridge - Exceleerate Energy)

APPROVED BY FERC

- 1. Lake Charles, LA: 1.1 Bcfd (Southern Union - Trunkline LNG)
- 2. Hackberry, LA : 1.5 Bcfd, (Sempra Energy)
- 3. Bahamas : 0.84 Bcfd, (AES Ocean Express)*
- 4. Bahamas : 0.83 Bcfd, (Calypso Tractebel)*
- 5. Freeport, TX : 1.5 Bcfd, (Cheniere/Freeport LNG Dev.)
- 6. Sabine, LA : 2.6 Bcfd (Cheniere LNG)
- 7. Elba Island, GA: 0.54 Bcfd (El Paso - Southern LNG)
- 8. Corpus Christi, TX: 2.6 Bcfd, (Cheniere LNG)
- 9. Corpus Christi, TX : 1.0 Bcfd (Vista Del Sol - ExxonMobil)
- 10. Fall River, MA : 0.8 Bcfd, (Weaver's Cove Energy/Hess LNG)
- 11. Sabine, TX : 1.0 Bcfd (Golden Pass - ExxonMobil)
- 12. Corpus Christi, TX: 1.0 Bcfd (Ingleside Energy - Occidental Energy Ventures)

APPROVED BY MARAD/COAST GUARD

- 13. Port Pelican: 1.6 Bcfd, (Chevron Texaco)
- 14. Louisiana Offshore : 1.0 Bcfd (Gulf Landing - Shell)

CANADIAN APPROVED TERMINALS

- 15. St. John, NB : 1.0 Bcfd, (Canaport - Irving Oil)
- 16. Point Tupper, NS 1.0 Bcfd (Bear Head LNG - Anadarko)

MEXICAN APPROVED TERMINALS

- 17. Altamira, Tamulipas : 0.7 Bcfd, (Shell/Total/Mitsui)
- 18. Baja California, MX : 1.0 Bcfd, (Sempra)
- 19. Baja California - Offshore : 1.4 Bcfd, (Chevron Texaco)

PROPOSED TO FERC

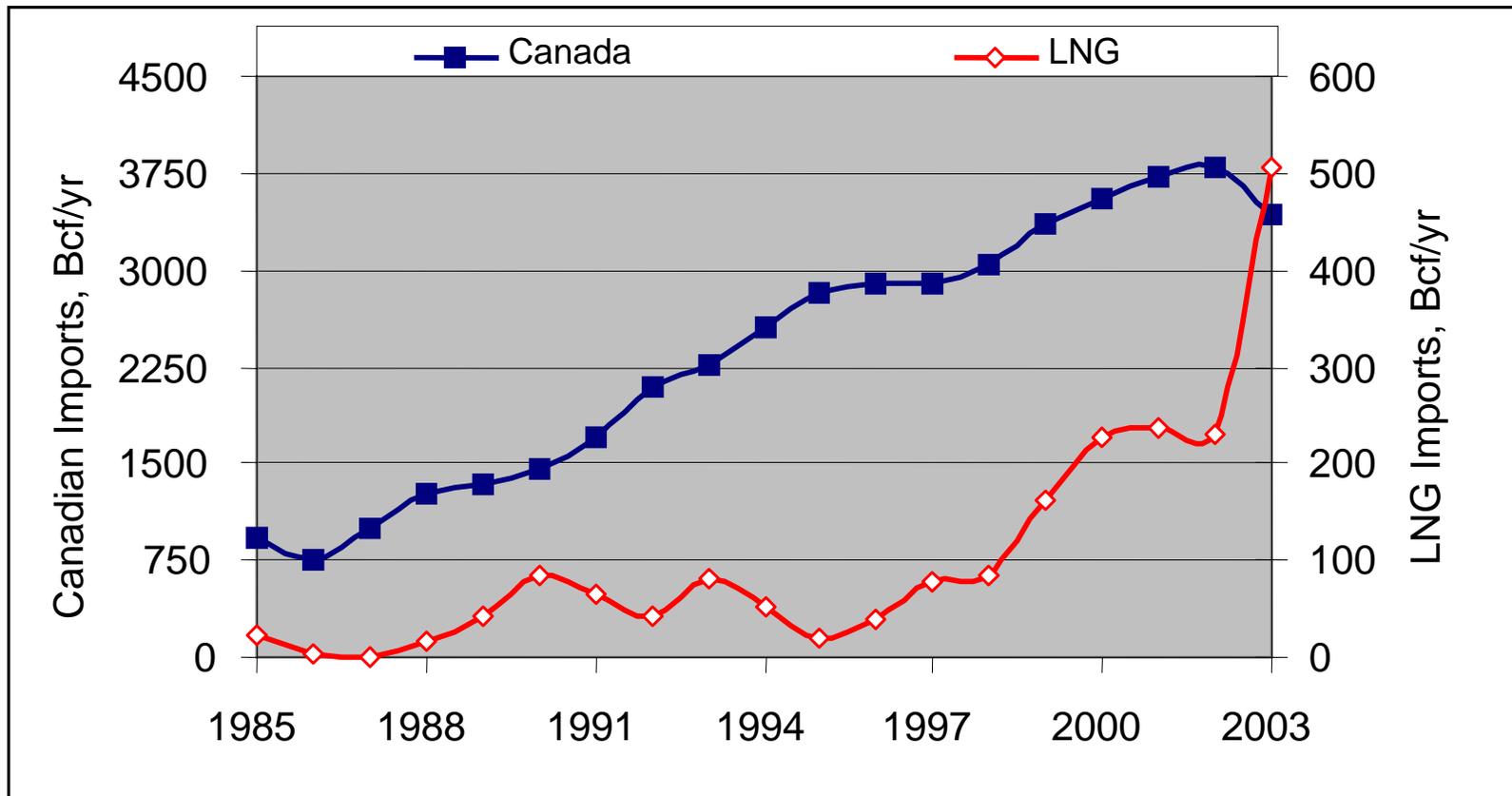
- 20. Long Beach, CA : 0.7 Bcfd, (Mitsubishi/ConocoPhillips - Sound Energy Solutions)
- 21. Logan Township, NJ : 1.2 Bcfd (Crown Landing LNG - BP)
- 22. Bahamas : 0.5 Bcfd, (Seafarer - El Paso/FPL)
- 23. Port Arthur, TX: 1.5 Bcfd (Sempra)
- 24. Cove Point, MD : 0.8 Bcfd (Dominion)
- 25. LI Sound, NY: 1.0 Bcfd (Broadwater Energy - TransCanada/Shell)
- 26. Pascagoula, MS: 1.0 Bcfd (Gulf LNG Energy LLC)
- 27. Bradwood, OR: 1.0 Bcfd (Northern Star LNG - Northern Star Natural Gas LLC)
- 28. Pascagoula, MS: 1.3 Bcfd (Casotte Landing - ChevronTexaco)
- 29. Cameron, LA: 3.3 Bcfd (Creole Trail LNG - Cheniere LNG)
- 30. Port Lavaca, TX: 1.0 Bcfd (Calhoun LNG - Gulf Coast LNG Partners)
- 31. Freeport, TX: 2.5 Bcfd (Cheniere/Freeport LNG Dev. - Expansion)
- 32. Sabine, LA: 1.4 Bcfd (Cheniere LNG - Expansion)

PROPOSED TO MARAD/COAST GUARD

- 33. California Offshore: 1.5 Bcfd (Cabrillo Port - BHP Billiton)
- 34. So. California Offshore : 0.5 Bcfd, (Crystal Energy)
- 35. Louisiana Offshore : 1.0 Bcfd (Main Pass McMoRan Exp.)
- 36. Gulf of Mexico: 1.0 Bcfd (Compass Port - ConocoPhillips)
- 37. Gulf of Mexico: 2.8 Bcfd (Pearl Crossing - ExxonMobil)
- 38. Gulf of Mexico: 1.5 Bcfd (Beacon Port Clean Energy Terminal - ConocoPhillips)
- 39. Offshore Boston, MA: 0.4 Bcfd (Neptune LNG - Tractebel)
- 40. Offshore Boston, MA: 0.8 Bcfd (Northeast Gateway - Exceleerate Energy)

How did the energy markets reach here?

LNG imports have increased significantly



Where are the energy markets headed?

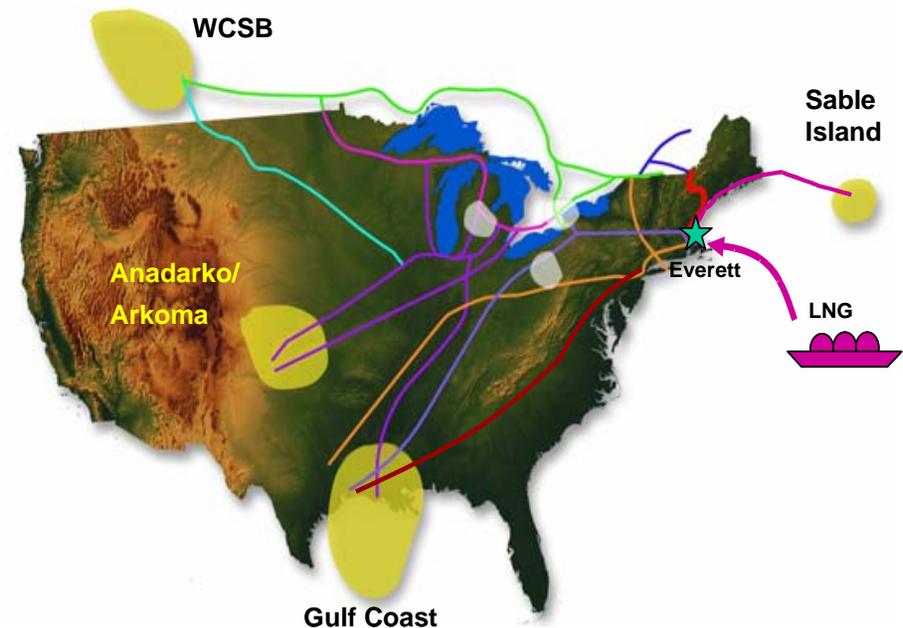
LNG markets may evolve into maturity in next 10 years

- ◆ **Start-up (1970 to Now)**
 - Stranded gas supply seeking markets
 - Bi-lateral trading regime supported by governments
 - Emphasis on long term commitments to secure markets and supply
 - Absence of flexibility in deliveries, takes, and pricing
- ◆ **Transition (Now to 2015)**
 - North America enters the market
 - Expanded markets, increased trade, more infrastructure
 - Opportunity costs of alternative trades begin to establish value
 - Beginnings of spot market in response to price signals
- ◆ **Maturity (After 2015)**
 - Resembles oil market with price transparency world wide

How did the energy markets reach here?

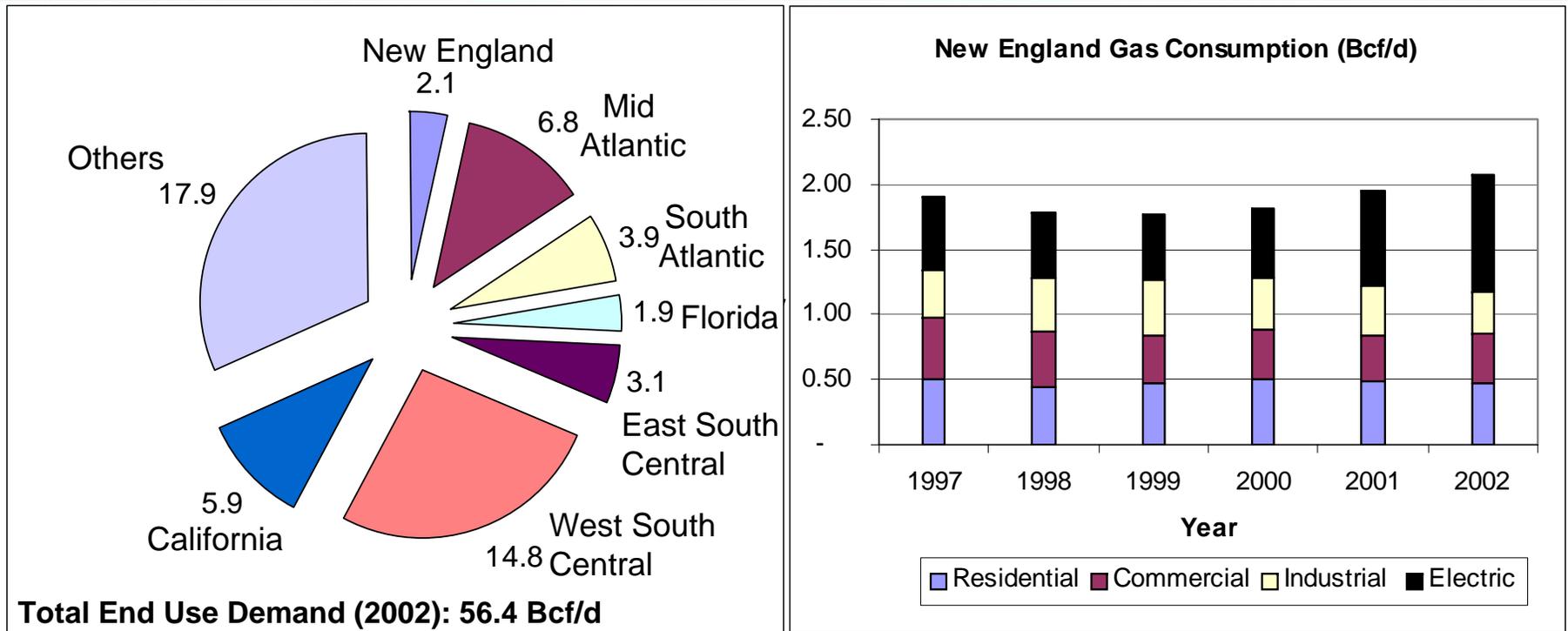
Drivers for New England, Mid Atlantic and Southeast

- ◆ General gas market price reflected at Henry Hub
- ◆ Regional demand growth – led by power sector demand for natural gas
- ◆ Pipeline and storage capacity – influences volatility
- ◆ New supply sources – LNG, Sable



Where are the energy markets today?

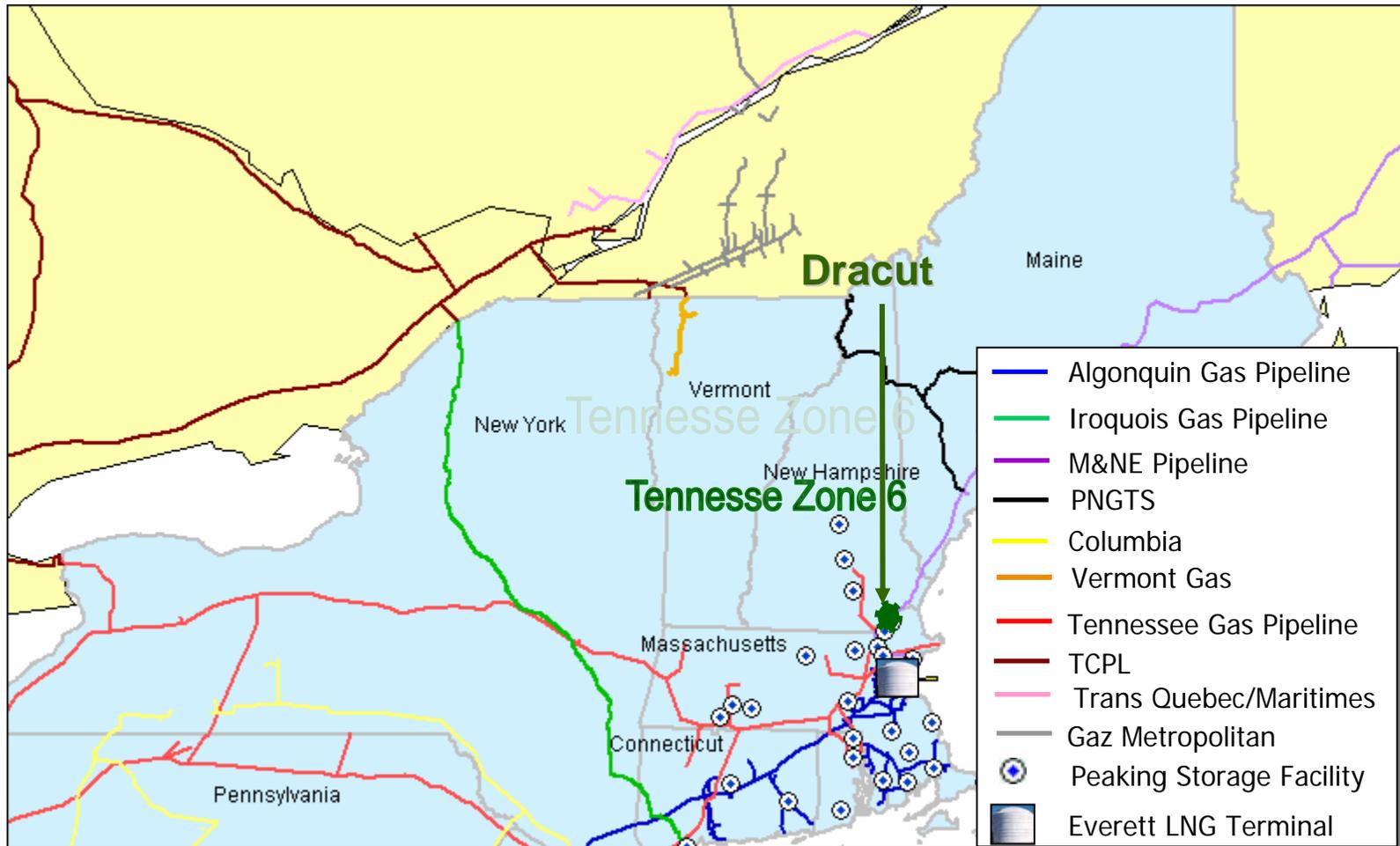
Regional Natural gas demand



- ◆ New England and Mid Atlantic are distant from producing areas and is a relatively small gas market. End-use demand was just above 2 Bcf/d in year 2002, concentrated in Massachusetts and Connecticut. Mid-Atlantic demand is 6.8 Bcf/d.
- ◆ Virginia demand for natural gas has increased from 0.68 Bcf/d (248 Bcf/yr) in 1997 to 0.72 Bcf/d (262 Bcf/yr) in 2003.

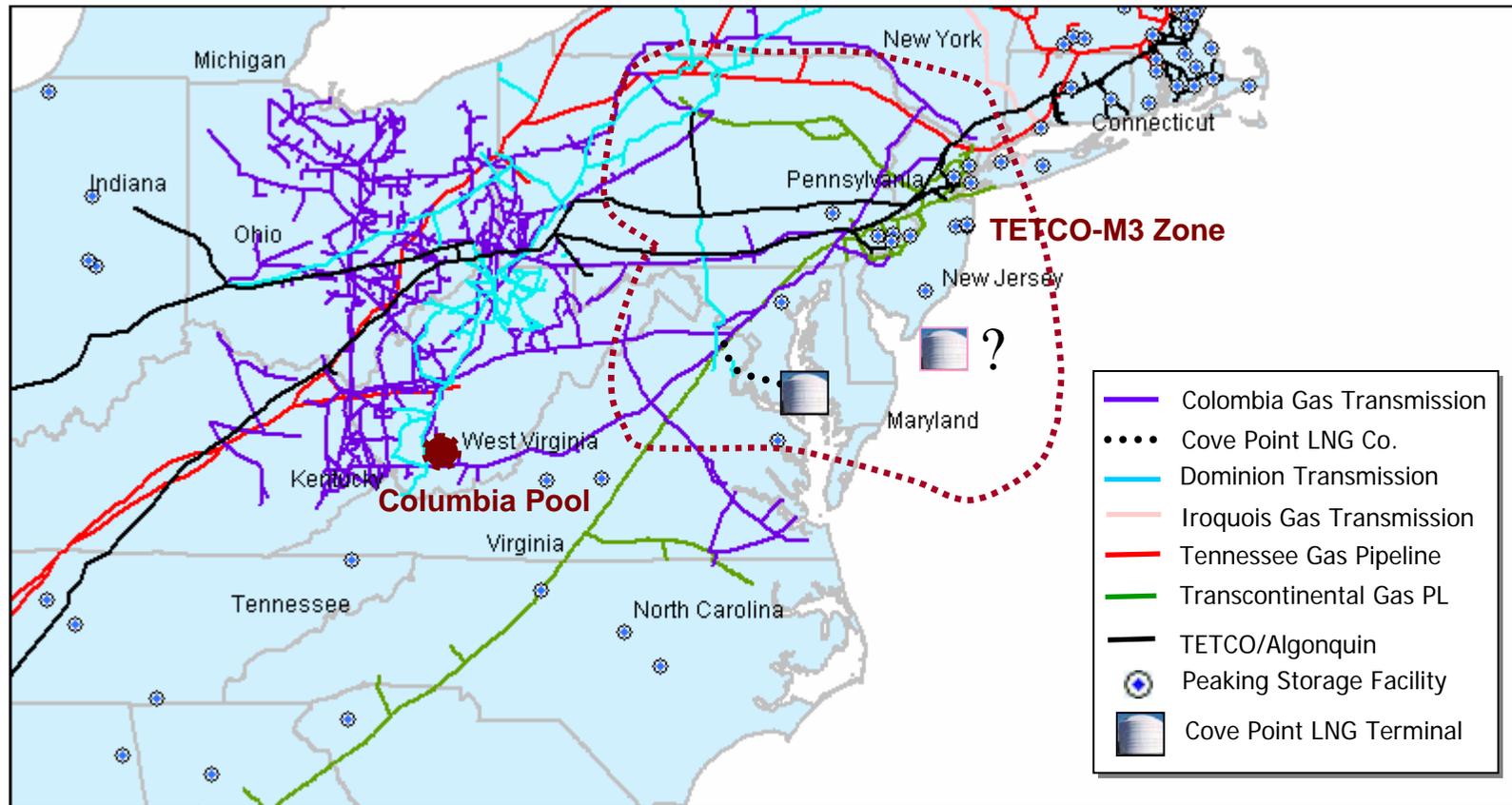
Where are the energy markets today?

LNG access to markets in New England: Everett



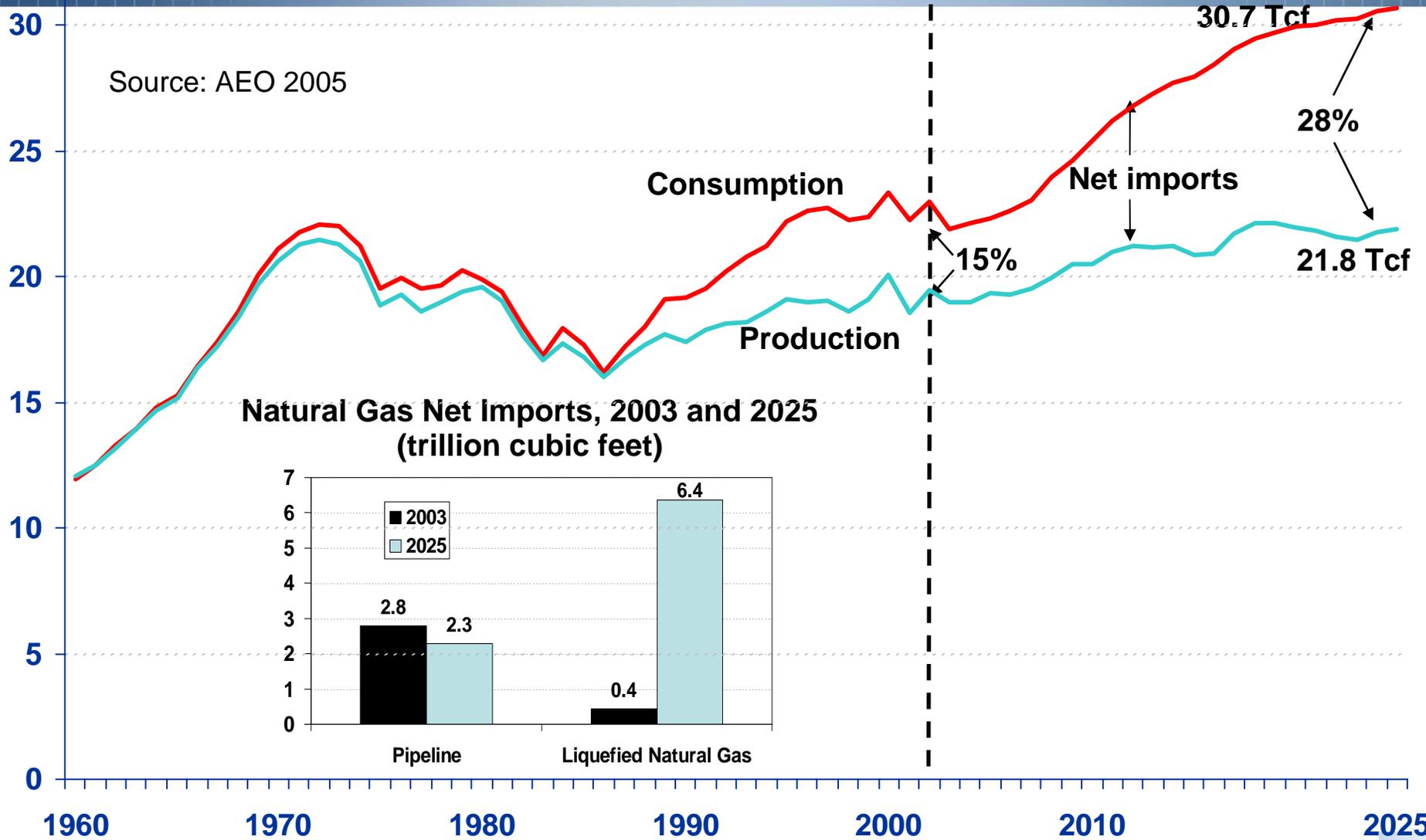
Where are the energy markets today?

LNG access to markets in Mid Atlantic: Cove Point



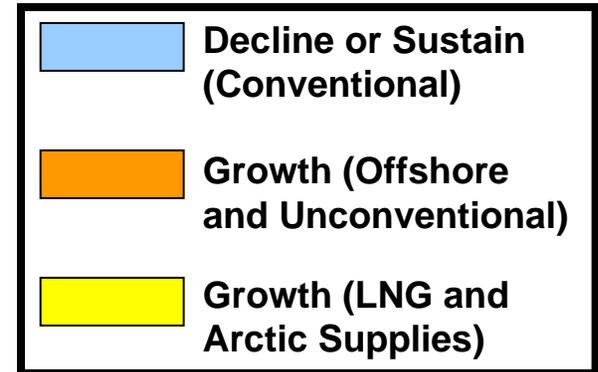
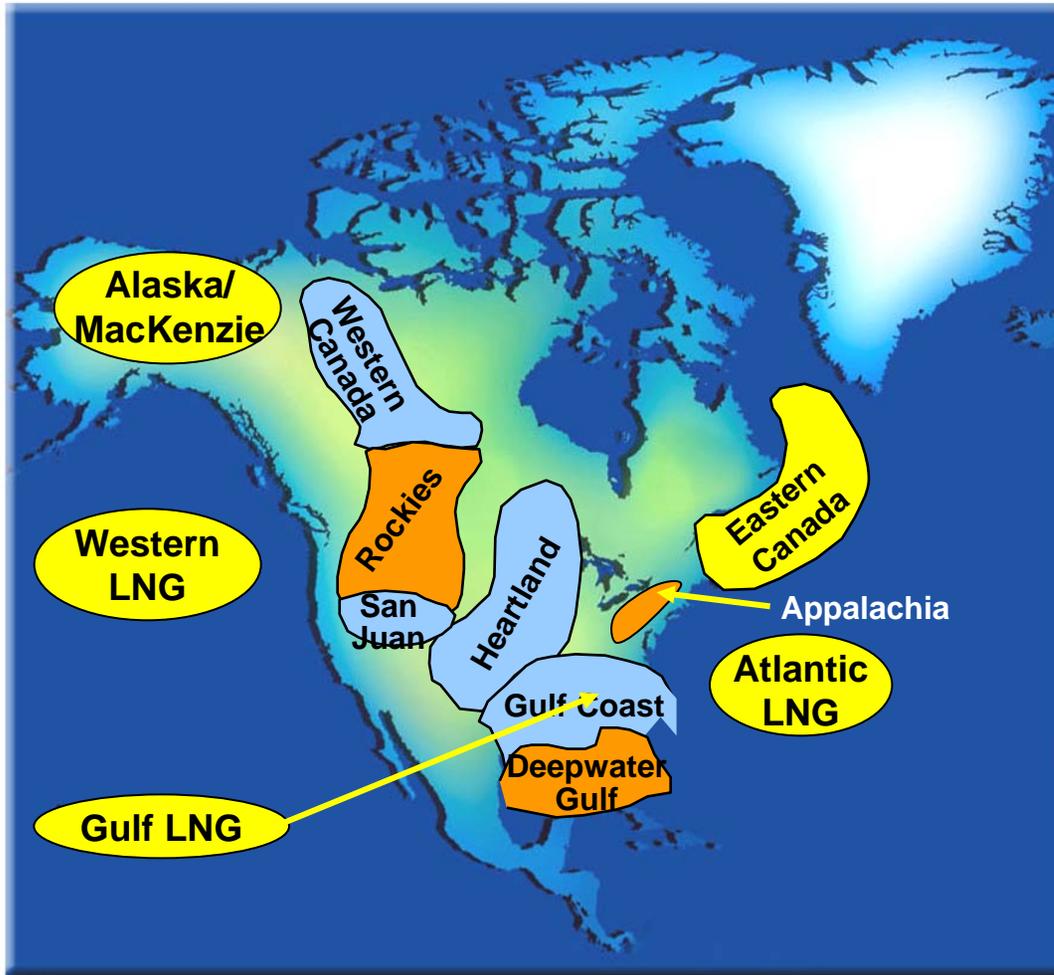
Where are the energy markets headed?

Natural gas production, consumption and imports



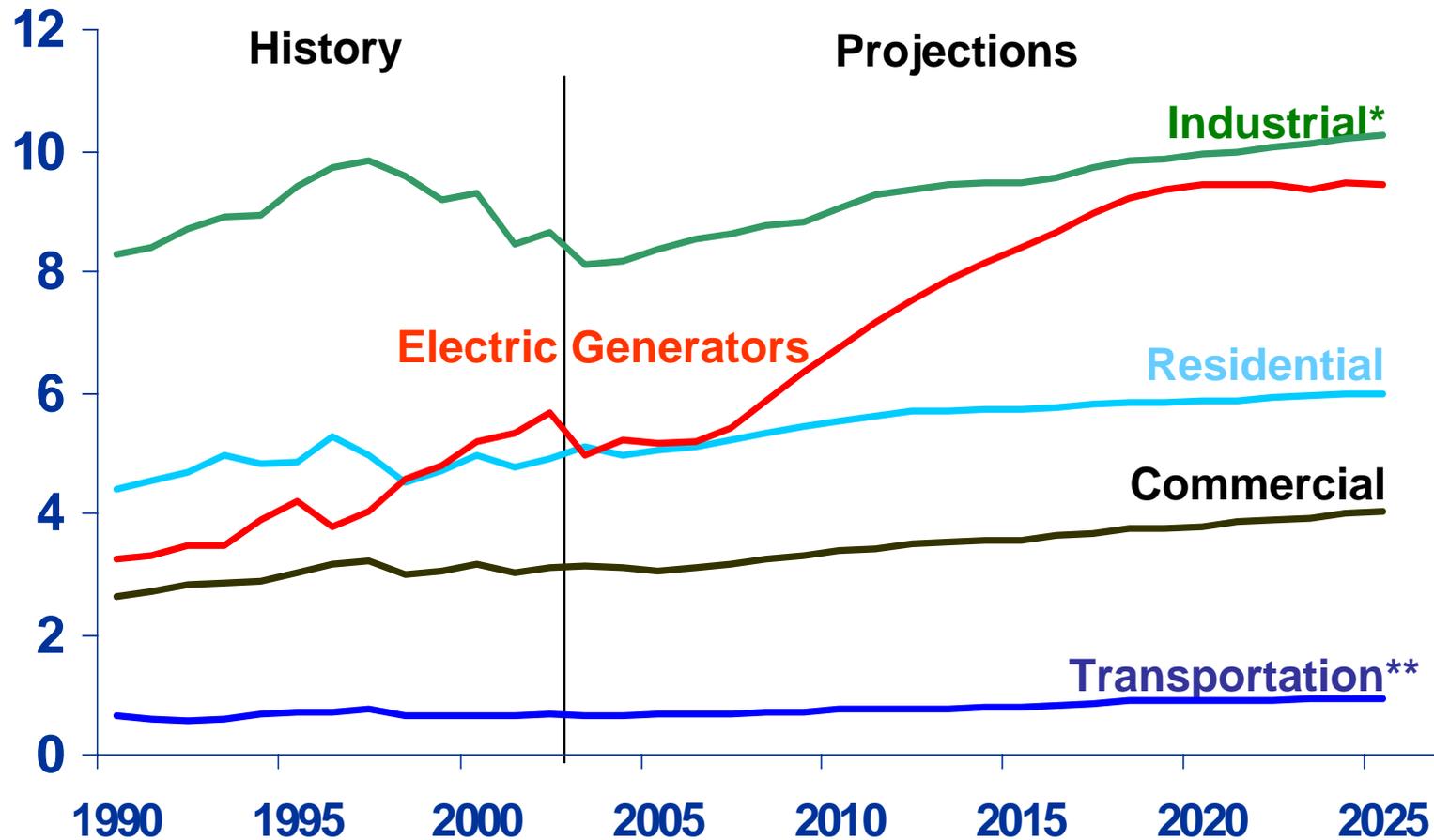
Where are the energy markets headed?

Natural gas supply sources are changing



Where are the energy markets headed?

Natural gas demand by sector



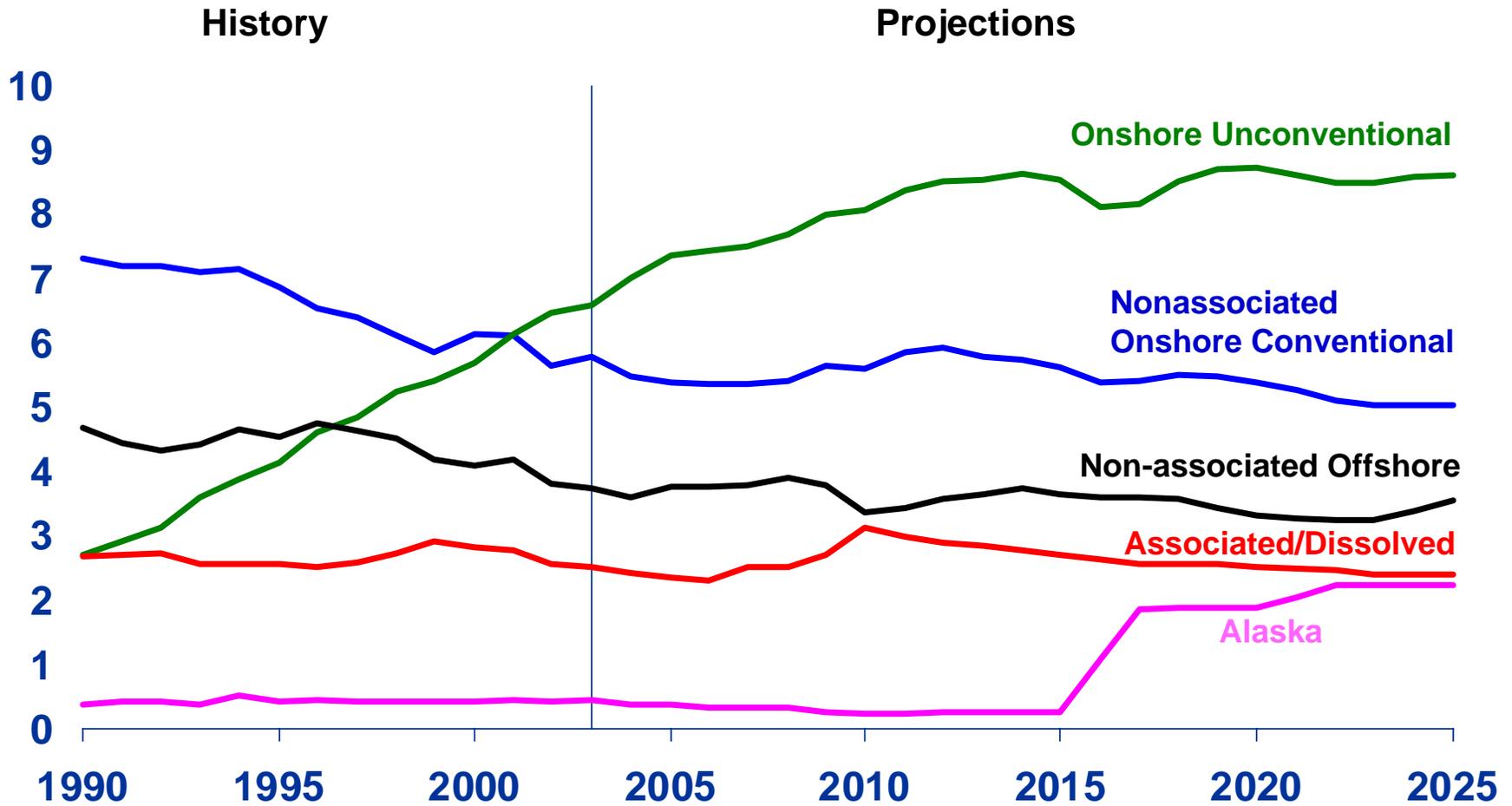
* Includes lease and plant fuel

** Includes pipeline fuel

Source: *Annual Energy Outlook 2005*

Where are the energy markets headed?

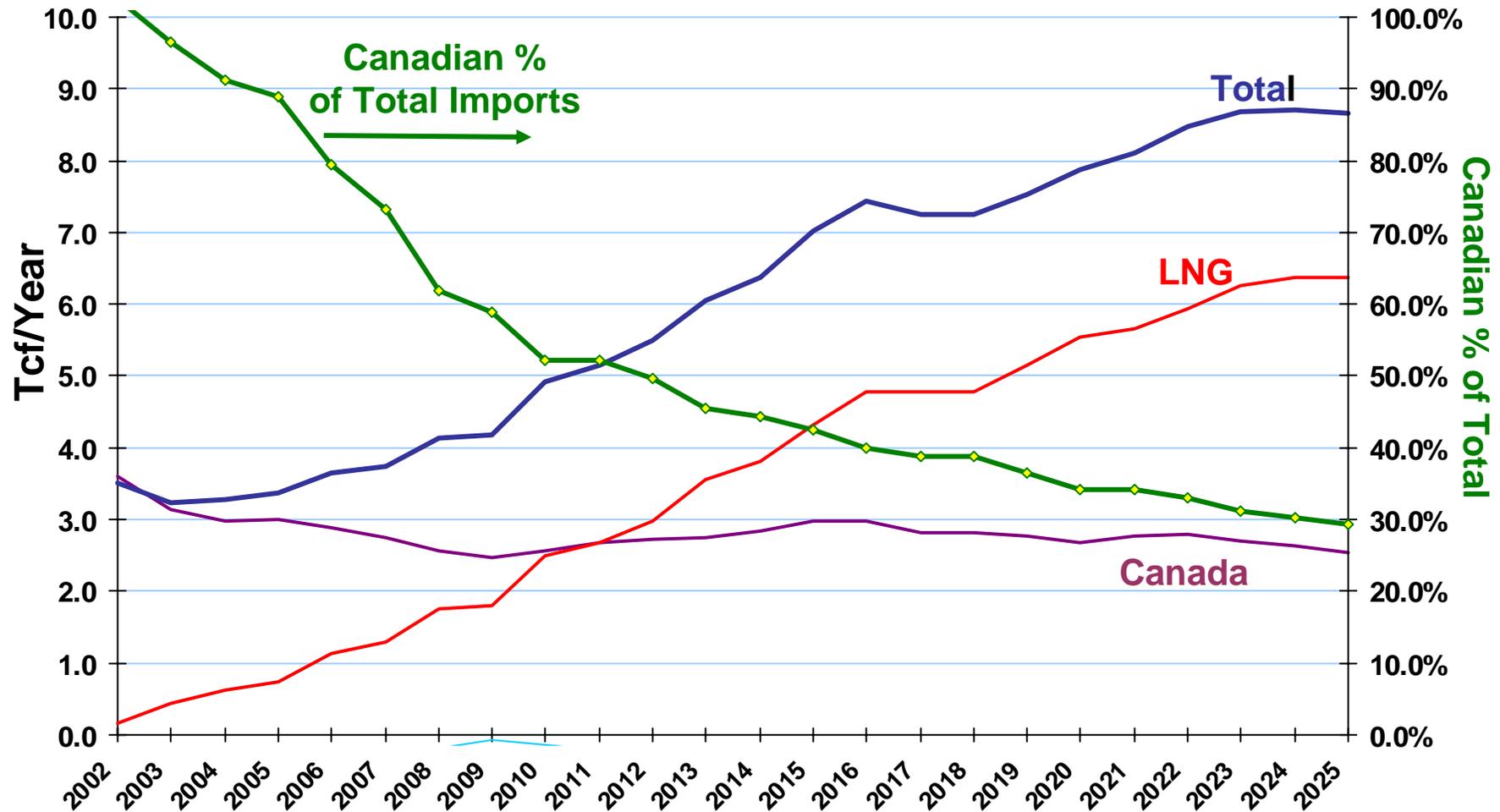
Natural gas production by category



Source: Annual Energy Outlook 2005

Where are the energy markets headed?

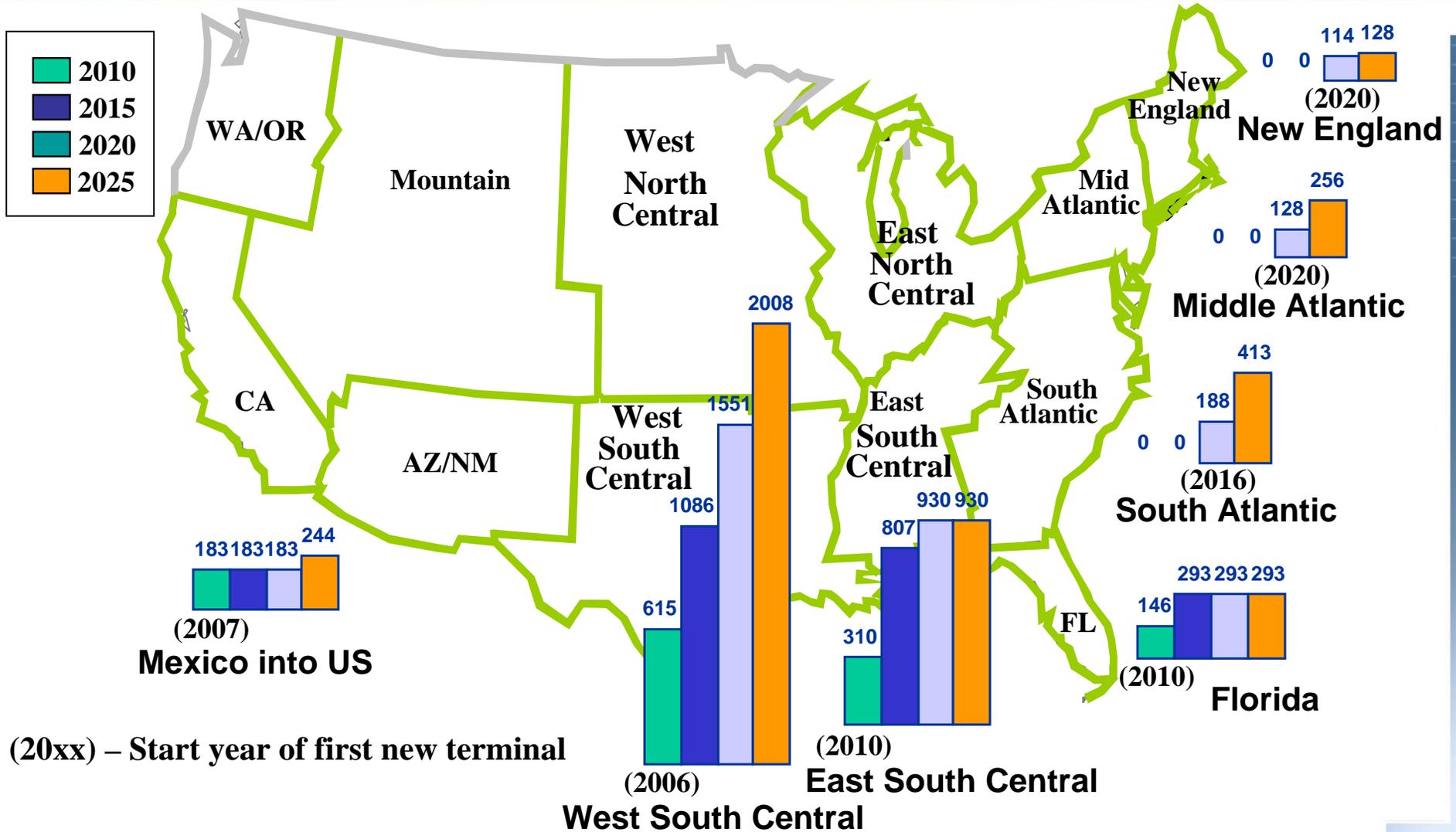
Natural gas imports



*Rapid Decline in Energy Security of Natural Gas Imports
One Half Originates from Outside North America by 2011*

Where are the energy markets headed?

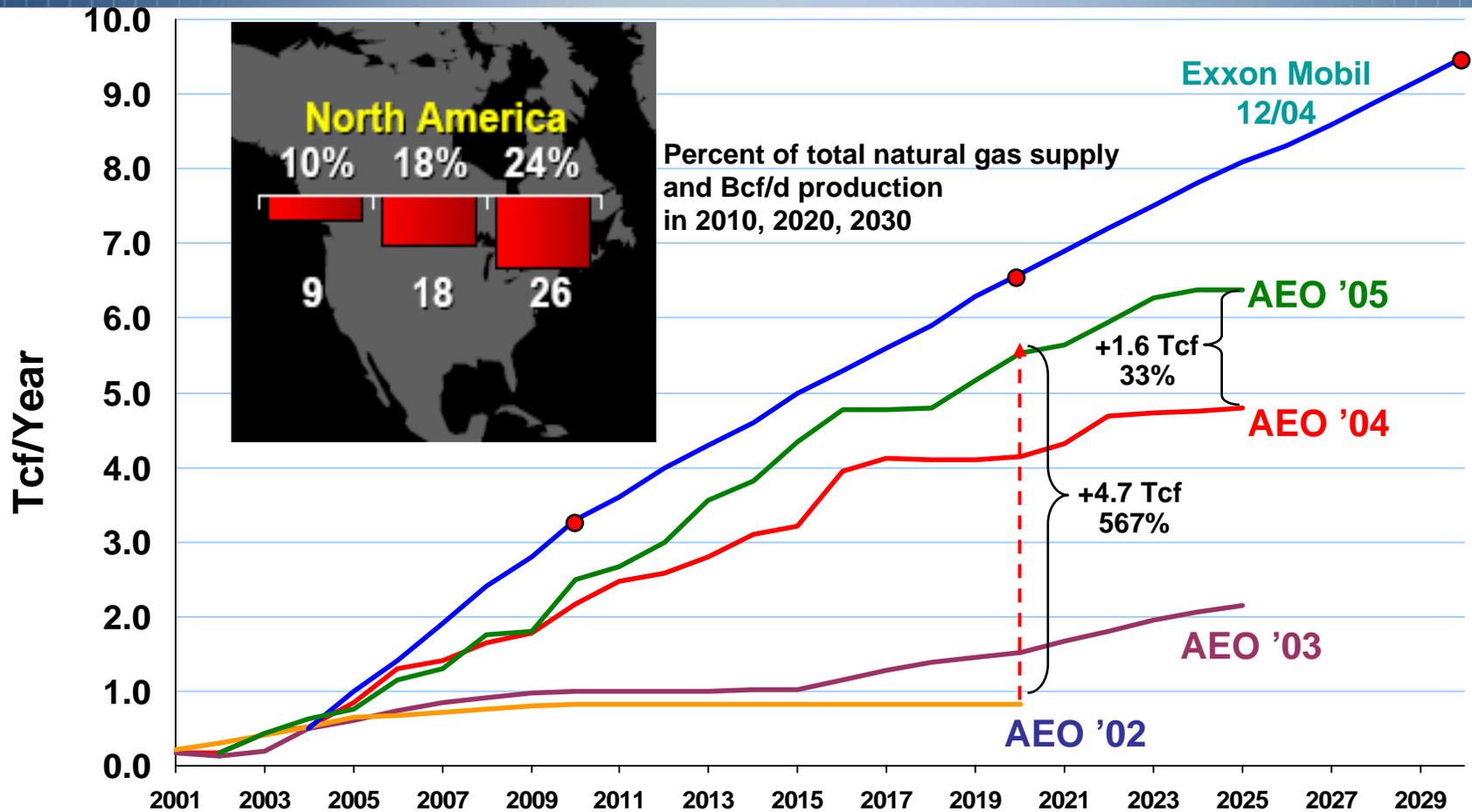
Regional LNG imports at new terminals



Source: EIA Annual Energy Outlook 2005

Where are the energy markets headed?

EIA and others have increased requirements dramatically

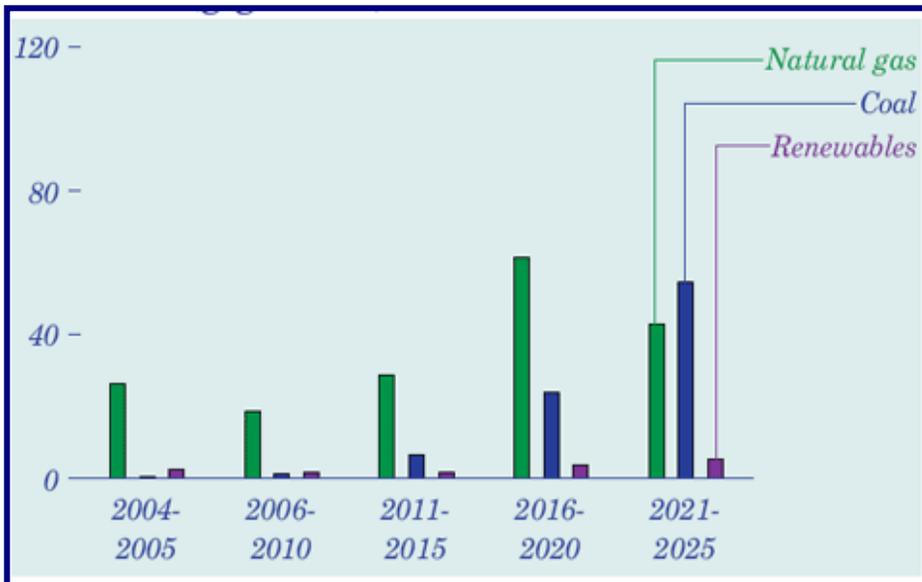


Developers' Perspectives More Aggressive

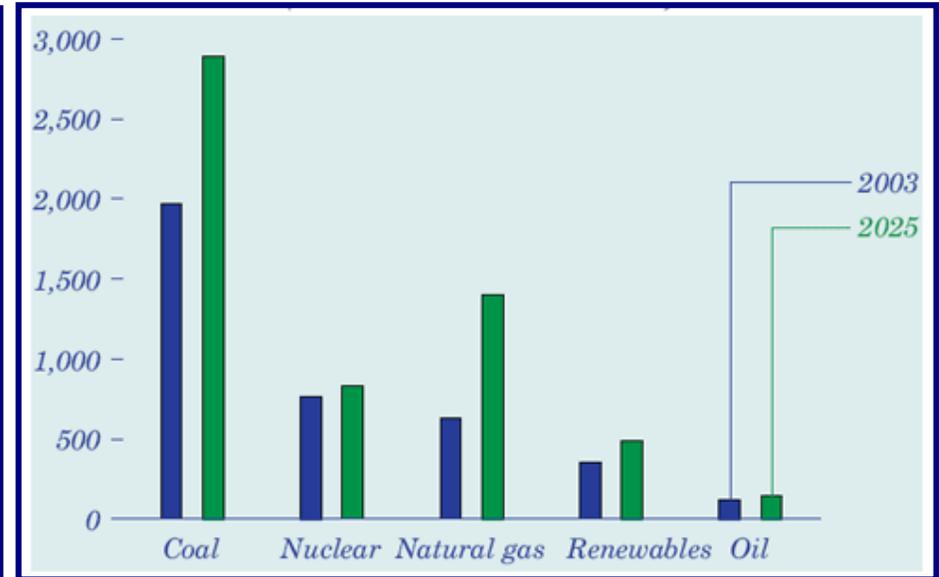
Where are the energy markets headed?

EIA's estimates of electric capacity and generation

New Electric Capacity Builds



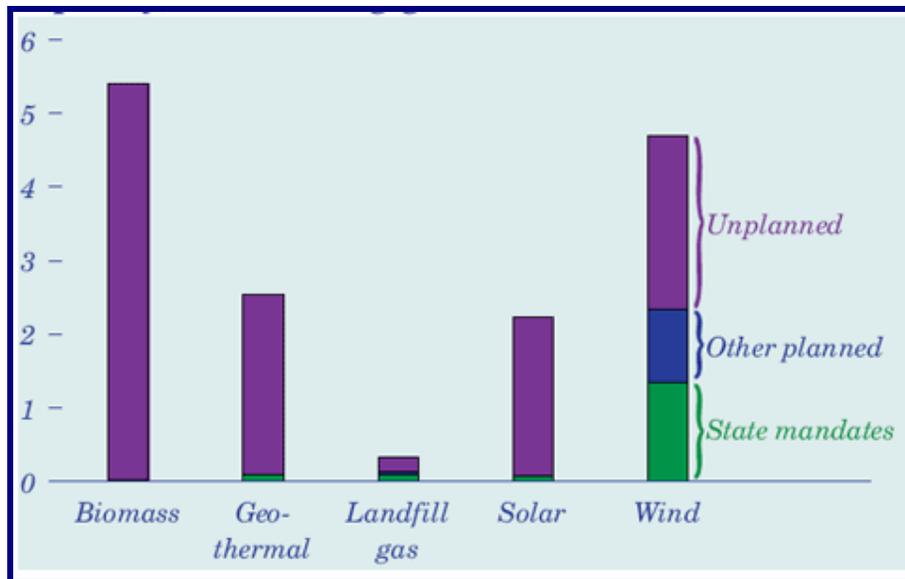
Generation fuel sources



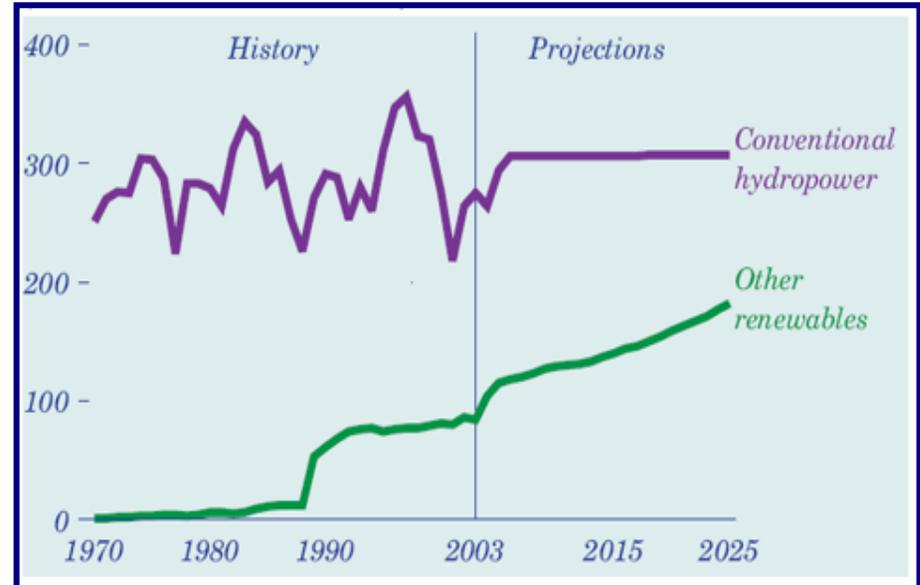
Where are the energy markets headed?

Renewable technologies penetration in electric sector

New Renewable Capacity Builds

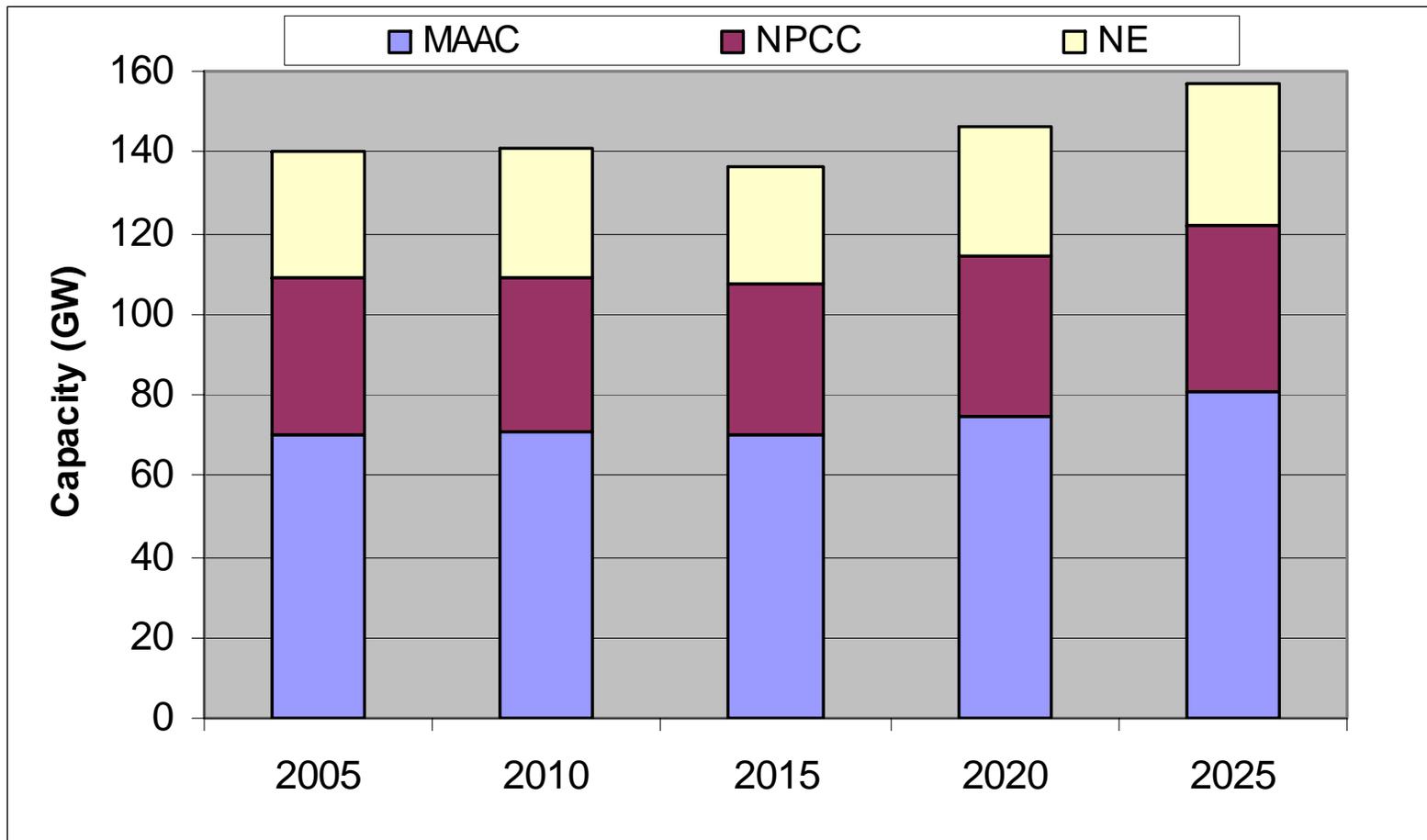


Generation by renewable sources



Where are the energy markets headed?

Electric capacity grows marginally in NE, NY and MA



What are the challenges?

Energy policy act of 2005

◆ LNG

- Clarifies that the Federal Energy Regulatory Commission (FERC), has the final authority to control the placement of LNG facilities. Directs FERC to consult with states about the safety of sites.
- May reduce regulatory barriers to LNG terminal development

◆ Oil and Gas

- Coastal impact assistance program
- Comprehensive inventory of offshore OCS oil and natural gas resources and mapping of existing offshore facilities.
- Provisions to reduce royalty payments to maintain or stimulate oil and gas development offshore and for marginal wells.
- Bill establishes a research program for oil and gas R&D in the area of ultra-deepwater and unconventional natural gas
- Tax incentives to producers

◆ Refinery

- Allows expensing of 50% of refinery investments that increase the capacity of an existing refinery by 5% or more.

What are the challenges?

Energy policy act of 2005

◆ Renewable Energy

- The bill did not include a national renewable portfolio standard (RPS) of any amount – eliminating the requirement for utilities to purchase a certain percentage of electricity from renewable sources.
- A two-year extension of production tax credit (PTC) of \$19/MWH for renewable resources on-line by Dec. 2007.
- Extension of PTC to include resources not previously covered, including incremental hydroelectric power at existing dams and wave, tidal, wind, biomass, landfill gas and ocean thermal energy.
- R&D and commercial implementation support for renewable energy in the amount of \$2.2 billion through 2009. Sets aside \$590 million for R&D in the area of biomass.
- Incentives for improving efficiency of existing hydro dams.

What are the challenges?

Energy policy act of 2005

◆ Electricity Transmission

- Accelerated depreciation schedule for 69 kVa and higher transmission lines to 15 years.
- DOE is granted \$750 million in R&D for new transmission technologies to enhance reliability, efficiency and performance of power lines.
- FERC has the authority to order the acquisition and permitting of the right-of-the-way for siting and approval.
- DOE to conduct a “national interest” transmission corridor study to help reduce congestion and increase reliability.

◆ Coal

- Bill authorizes \$200 million annually for years 2006-2014 for clean coal technology initiative (first few coal gasification projects have strong position to come to fruition)

What are the challenges?

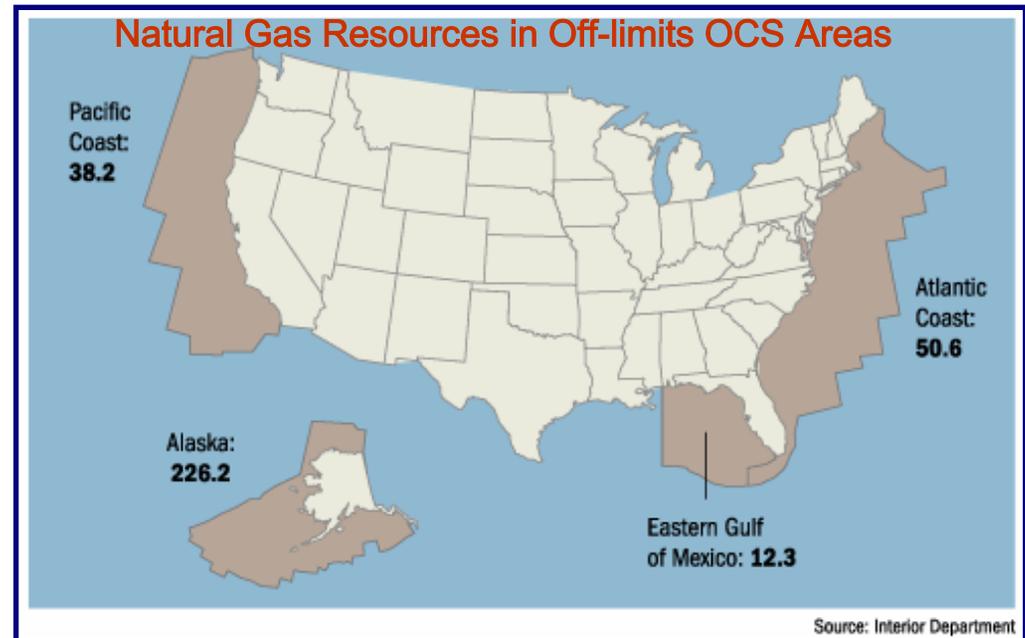
Energy policy issues prompted by Hurricanes

◆ Geographic Concentration

- Over reliant on Gulf production (28% of energy production is from Gulf)
- Renewed consideration for opening Outer Continental Shelf currently under moratoria may occur, VA is interested, FL, CA not
- Unconventional gas in onshore federal lands and ultra-deep gas (will require geographically dispersed processing)
- Increase energy diversity

◆ Strained Refining Capacity

- Before Katrina US 148 refineries operated at 95% capacity
- Much capacity restricted in the Gulf
- Gasoline price spike due to refinery constraints, crude oil price did not increase as much due to Katrina
- Build/upgrade refineries



◆ Energy Efficiency

- Technology advancements in energy efficiency can lead to lower demand
- Boost energy efficiency

What are the challenges?

- ◆ Major uncertainties about the U.S. market
 - How fast will the LNG infrastructure expand in the U.S.?
 - Whether suppliers be able to supply to the LNG terminals?
 - Will the upstream investment in LNG liquefaction and shipping be timely?
 - Outlook for domestic and Canadian supply – will high prices bring forth new supply?
 - Impact of technology on the resource base – who is doing the research to find the next big play?
 - Rate of development of Canadian resources and how much will remain in Canada?
 - How much demand loss has occurred – will it return?
 - What is the outlook in the power sector?
 - Would new refineries be built?
 - New power plants? Coal? Gas?

What are the challenges?

Big Questions and Challenges

- ◆ Where are the natural gas, crude oil and coal prices headed?
- ◆ What is the cost of new supply?
 - How much supply will higher prices make available from continental sources?
 - When and how much LNG and frontiers supply will enter the market?
 - Can the removal of barriers to drilling make a difference?
 - Can commercial quantities of unconventional oil (oil shale) be produced?
- ◆ How do the high prices affect the outlook for gas demand?
 - Is demand destruction real?
 - Will power generation demand for gas be as robust as many expect?
 - Will coal cap gas prices?

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