

FOURTEEN THINGS TO KNOW ABOUT THE NATURAL GAS SECTOR

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14 Things To Know

1. We are not running out of natural gas or facing a natural-gas shortage problem.
2. For at least the next few years, natural gas prices will likely remain high and volatile.
3. Price volatility has become an inherent feature of natural gas markets, making hedging activities essential.
4. Financial derivatives increasingly have become an important tool for managing price risks in natural gas markets.

14 Things To Know -- continued

5. Natural gas is highly price inelastic in the short run but, higher gas prices have caused some demand erosion.
6. Starting in the 1980s, energy conservation has significantly curtailed the use of natural gas.
7. The tightening of domestic gas supplies from conventional sources, in addition to new gas-fired electric facilities, has contributed to the rise in natural gas prices over the past several years.
8. Natural gas supplies in the U.S. will increasingly come from outside North America.

14 Things To Know -- continued

9. Gas utilities have proposed new rate designs and ratemaking mechanisms and will continue to do so.
10. A national debate over the urgency to expand new sources of natural gas supplies and to promote energy conservation is taking place and will continue in the future, as long as natural gas prices remain high.
11. Retail access for small gas customers, while arguably more successful than for electricity and local exchange telephone service, has regressed over the past few years in some service areas.

14 Things To Know -- continued

12. For various reasons, restructuring the natural gas sector has occurred with less problems than restructuring the electric sector.
13. “High” natural gas prices, while having only a minimal effect on the general economy (unlike oil prices), they can have a major effect on gas-intensive industries and low-income households.
14. State commissions, along with gas utilities, have taken various initiatives to mitigate the effect of high and volatile natural gas prices, especially to small consumers

DISCUSSION

Summary of Recent Market Developments in the Natural Gas Sector

- Spot gas prices so far in 2007 ranged between \$6.50-\$8.00, which is generally higher than last year's prices
- Over the next several months, pressure for lower spot prices because of high storage levels, record LNG imports, a rise in domestic production and a rebound in imports of Canadian gas
- But prices could also rise because of hurricanes and a hot summer driving up the demand for gas by power generators

Summary of Market Developments-- continued

- Much drilling activity and well completions, but the productivity of gas wells has fallen sharply over the past several years (the number of gas-directed rigs 8% higher than last year)
- As of the end of April 2007, storage levels were about 18% above the five-year average for that time of year but below last year's level (strong incentive for storage last year because of the wide spread between prevailing spot prices and the winter strip price, e.g., NYMEX futures price)

Summary of Market Developments-- continued

- Domestic gas production expected to increase incrementally over the next few years, mostly from unconventional sources
- Industry experts concur on the need for LNG to help fill the “supply gap” until the end of the decade and beyond to meet future demand needs
- Growing gas supplies in the future from LNG imports and unconventional domestic production (coalbed methane, tight sandstones and gas shales)

Summary of Market Developments-- continued

- Natural gas prices in the short term are extremely sensitive to various factors, making price projections highly vulnerable to error (even by highly paid hedge fund managers)
 - Storage levels
 - Weather
 - Gas production
 - Oil prices
 - General economic conditions
 - Regional pipeline capacity (e.g., bottleneck event)
 - Fuel switching

Summary of Market Developments -- continued

- Experts disagree on longer-term natural gas prices – specifically, over when and how much prices will start to decline this decade from levels of the past several years
- Since the mid-1990s, domestic gas production has bumped up close to gas productive capacity (an omen of tough days ahead)

Summary of Market Developments-- continued

- Short-to mid-term supply/demand options to alleviate the tight gas-supply situation
 - Expansion of existing LNG facilities and addition of new facilities
 - Increase in the capacity of dual-fuel electric generating units
 - More aggressive energy-efficiency initiatives
 - Increase in gas production from deeper waters in the Gulf and from the Rocky Mountains area

Summary of Market Developments-- continued

- Overall, the outlook for the gas market over the next few years is difficult to predict, as several factors will influence price and market conditions
- Current conditions in the gas market resemble the oil market during the 1970s

EIA's Short-Term Projections, as of April 2007

- **Wellhead price:** averaged \$7.27 and \$6.41 (per Mcf) in 2005 and 2006; projected at \$6.92 for 2007 and \$7.28 for 2008 (the 2004 price was \$5.49)
- **Consumer prices:** residential prices projected to be about 5.6% lower in 2007 than in 2006
- **Consumption:** demand projected to increase by 2.5% in 2007 and by 1.7% in 2008
- **Supply: moderate growth in 2007**
 - Above-average storage levels thru 2008
 - Domestic production slightly up in 2006
 - Large percent increase in LNG imports over 2006-2008

EIA's 2007-2008 Projections and Actual 2005 and 2006 (as of April 2007)

	2005	2006	2007	2008
LNG Imports (Bcf)	630	580	750	1,040
Average Wellhead Price (\$/Mcf)	\$7.27	\$6.41	\$6.92	\$7.28
Average Henry Hub Price (\$/Mcf)	\$8.86	\$6.94	\$7.83	\$8.11
Residential Gas Price (\$/Mcf)	\$12.84	\$13.76	\$12.99	\$13.66

Liquefied Natural Gas (LNG)

- **Recapitulation of the current and future gas-supply situation in the U.S.**
 - Tight supplies for the foreseeable future
 - Increasing gap between domestic demand and domestic supply plus Canadian imports
 - Wholesale gas prices expect to be around \$6-8 for the next few years
 - Over the last several years, domestic gas supplies have tighten largely because of falling productivity from existing North American natural gas fields

LNG -- continued

- **Gas-supply situation** – continued
 - According to the latest forecast of the Energy Information Administration (EIA), *AEO2007*, the demand for natural gas in the U.S. will rise from about 22.0 trillion cubic feet (Tcf) in 2005 to about 26.3 Tcf in 2025 (i.e., an AAGR of 0.9%)
 - DOE also predicts that, over the same period, domestic gas supplies will increase from 18.3 Tcf to 20.7 Tcf (i.e., an AAGR of 0.6%)
 - Thus, an increased gap of 1.9 Tcf by 2025, which means additional foreign supply sources (namely, LNG) will probably be needed
 - Increase in domestic demand for gas over the next two decades largely because of new gas-fired electric generation

LNG -- continued

- **The role of new gas supplies including LNG**
 - A “filler” in closing the growing gap between domestic demand and domestic supplies
 - Some analysts see geometric growth in LNG imports to the U.S. – short-term modest growth in percentage contribution of supply coming from LNG (2005-2010), but long-term rapid growth (2010-2030)
 - EIA projects an increase of LNG imports from 0.58 Tcf in 2006 to 1.81Tcf in 2010 and 4.38 Tcf by 2025 (17% of domestic natural gas consumption)

LNG -- continued

- **What is LNG?**

- LNG is gas cooled to below -261 degrees Fahrenheit, where it changes into a liquid state that can be stored as a boiling liquid in insulated tanks.
- LNG is transported at atmospheric pressure in specially built ships
- At the destination point, LNG is unloaded from ships to receiving terminals; these terminals store and regasify LNG for distribution to pipelines, marketers, and end-use consumers

LNG -- continued

- **What is LNG?** – continued
 - The traditional LNG project is often described as a “supply chain” with four major links: (1) gas field development, (2) the liquefaction process, (3) tanker transportation, and (4) the receipt/regasification terminal
 - Each stage of the chain is capital-intensive with investments typically front-loaded, with revenues not flowing until the completion of the project (most of the capital expenditures are for field development and liquefaction)

LNG -- continued

- **What is LNG?** -- continued
 - Unlike most conventional gas sources, LNG projects are international ventures, subject to the laws and regulations of other countries
 - Currently, LNG arrives in the U.S from Trinidad and Tobago (75%), Qatar, Algeria (16%), Nigeria, and Oman
 - In the U.S. there are four onshore LNG regasification terminals that are operational; these terminals have a total capacity of about 3.8 Bcf per day
 - Several additional LNG projects are being proposed (about 40 in North America alone) – but, it is expected that most of these will not be built

LNG -- continued

- **The history of LNG in the U.S. gas market**
 - Promising source of gas in the U.S in the 1970s and early 1980s
 - But as gas prices started to fall, LNG became uneconomical
 - Specifically, the first LNG imports into the U.S. occurred in 1972, with LNG sales collapsing to low levels during the 1980s and 1990s, returning to their 1979 peak only in 2000
 - Overall, starting in the early 1980s, LNG was not considered an economical source of natural gas in the U.S. market until almost 20 years later when natural gas prices started to rise in 2000-2001 and growing domestic demand (especially for new gas-fired power plants) started to spark renewed interest in LNG
 - In 2006, imports of LNG met about 2.7 percent of U.S. natural gas consumption

LNG -- continued

- **The prospects for LNG**
 - Over the last few years, the natural gas industry has acknowledged that conventional gas supplies are not likely to keep pace with growing demand – it is expected that tight gas supplies will continue to hold prices up for the foreseeable future
 - One caution is that the U.S. is competing with other countries for LNG

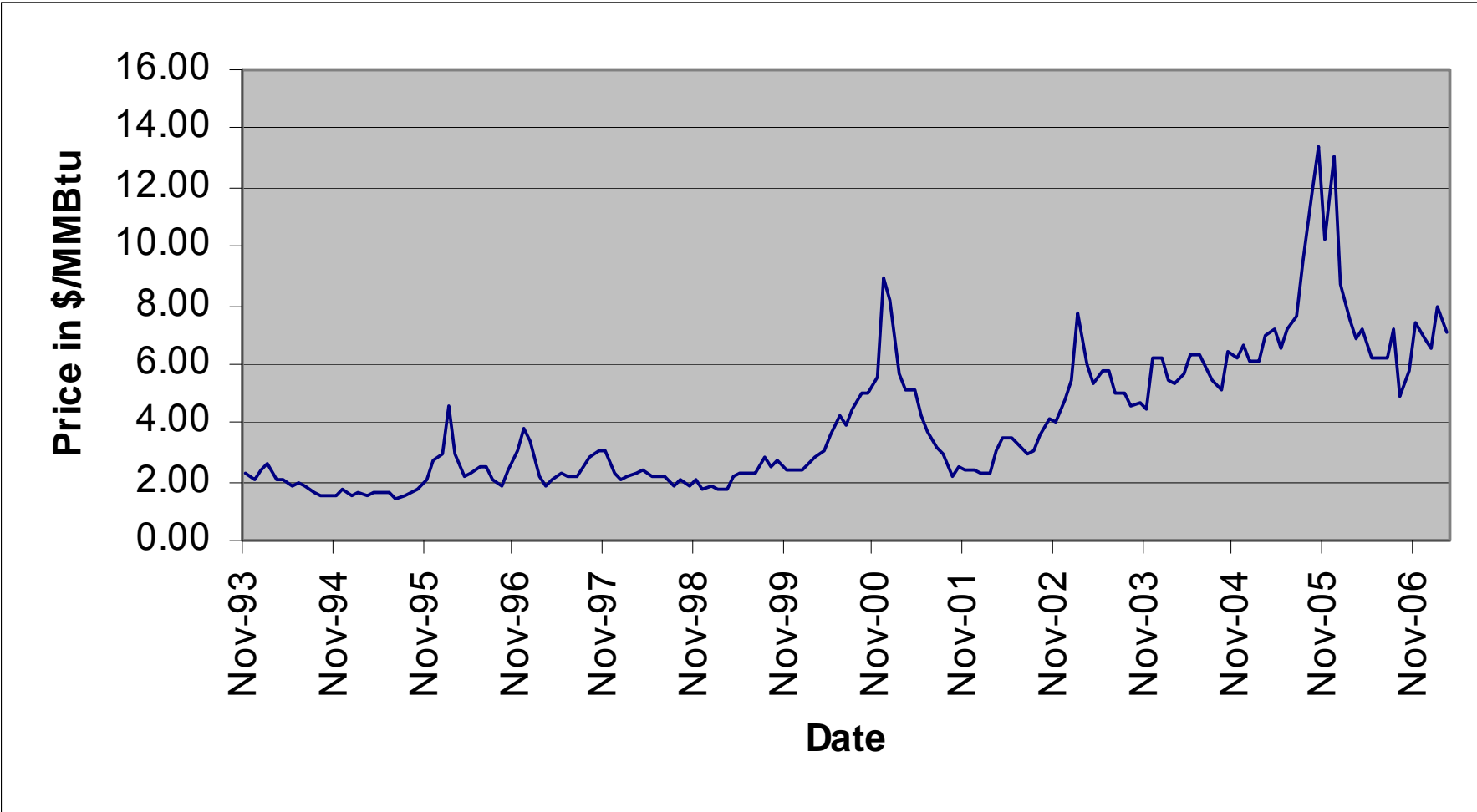
LNG -- continued

- **Current consensus**

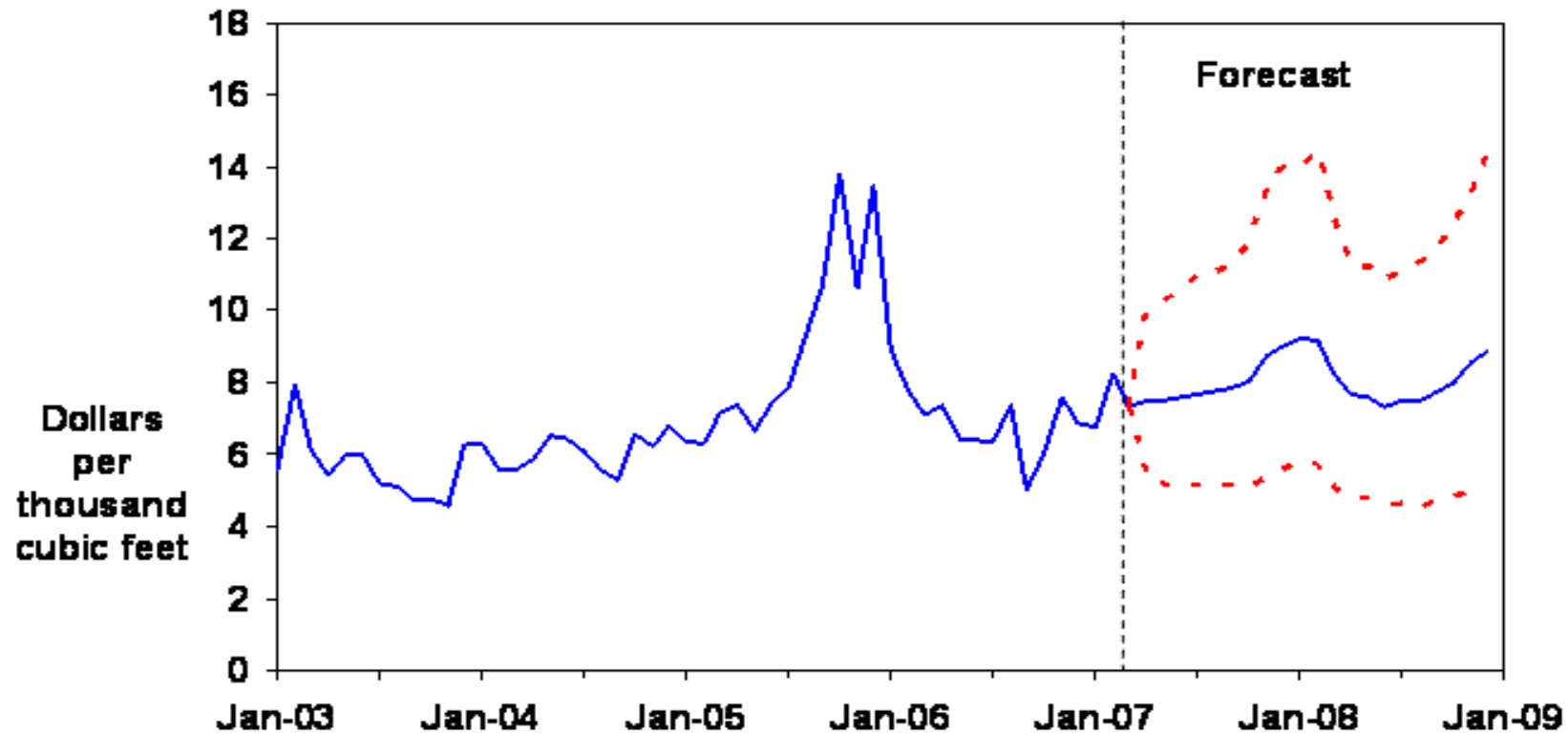
- LNG has a bright, although somewhat uncertain, future in the U.S market but barriers and public concerns (“NIMBYism”) could hamper its development
- As the supply gap increases, supplemental forms of gas will be needed to meet expected demand growth – one being LNG, which seems to be competitive under current price forecasts for domestic and Canadian gas
- Question of whether existing import terminals will be able to handle additional quantities of LNG imports; while international supplies of LNG are plentiful, capacity of U.S. import facilities limits the amount of gas that can be received and re-gasified
- LNG import price will correspond to the domestic wellhead price (i.e., what the market will bear)

STATISTICS AND OTHER INFORMATION

Historical Series for the Henry Hub Price

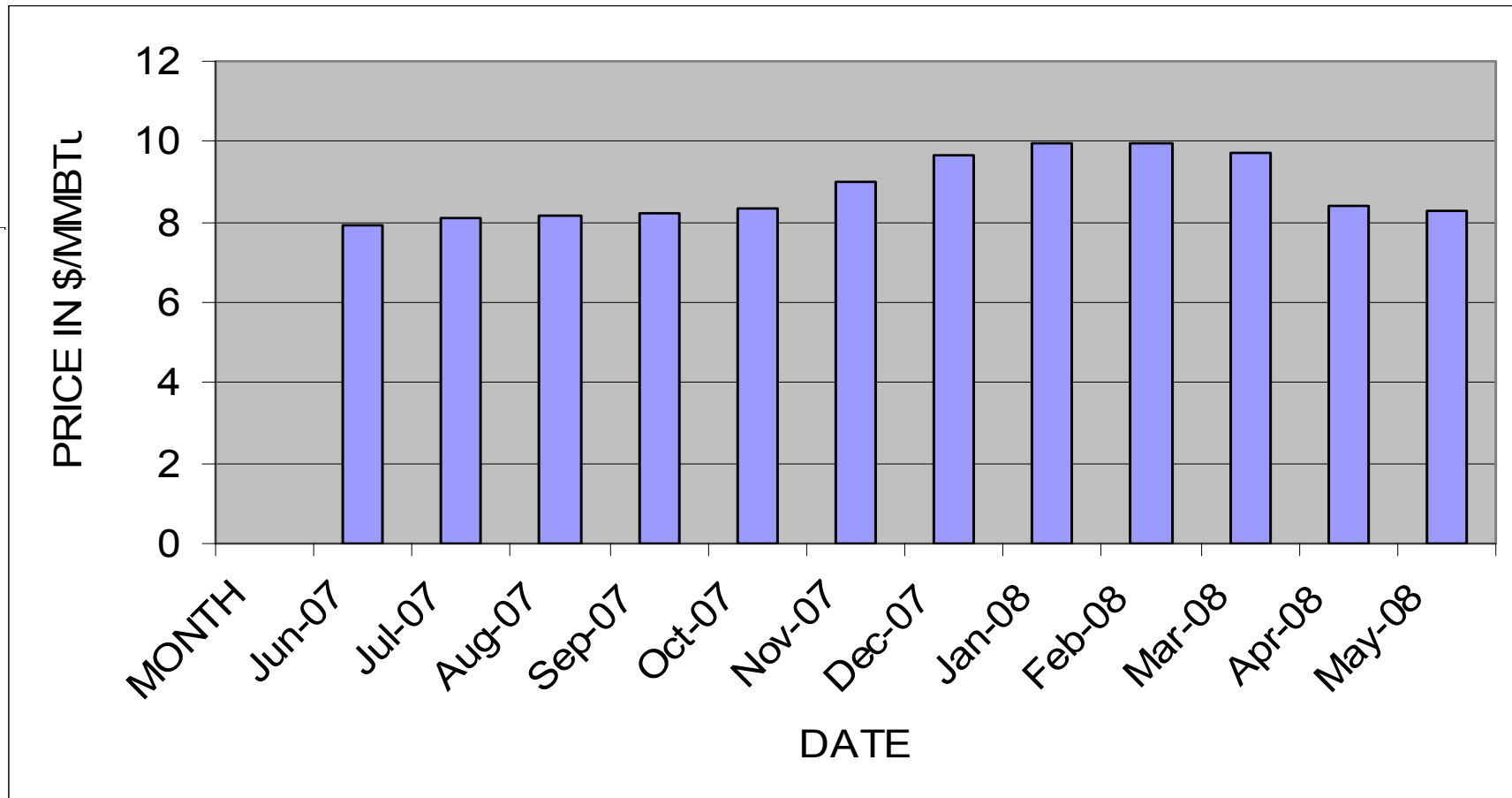


Natural Gas Henry Hub Spot Prices (Base Case and 95% Confidence Interval*)

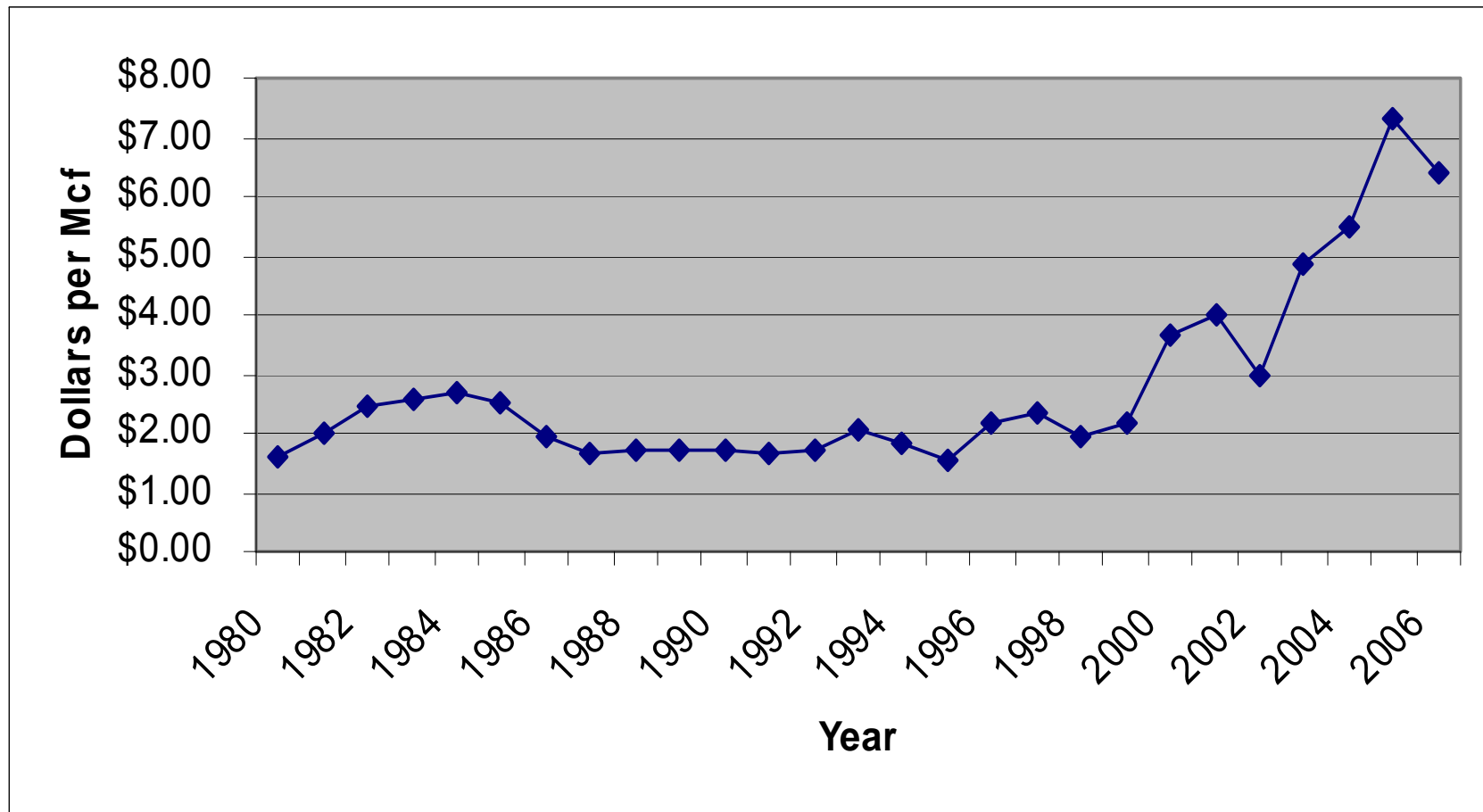


*The confidence intervals show ± 2 standard errors based on the properties of the model.

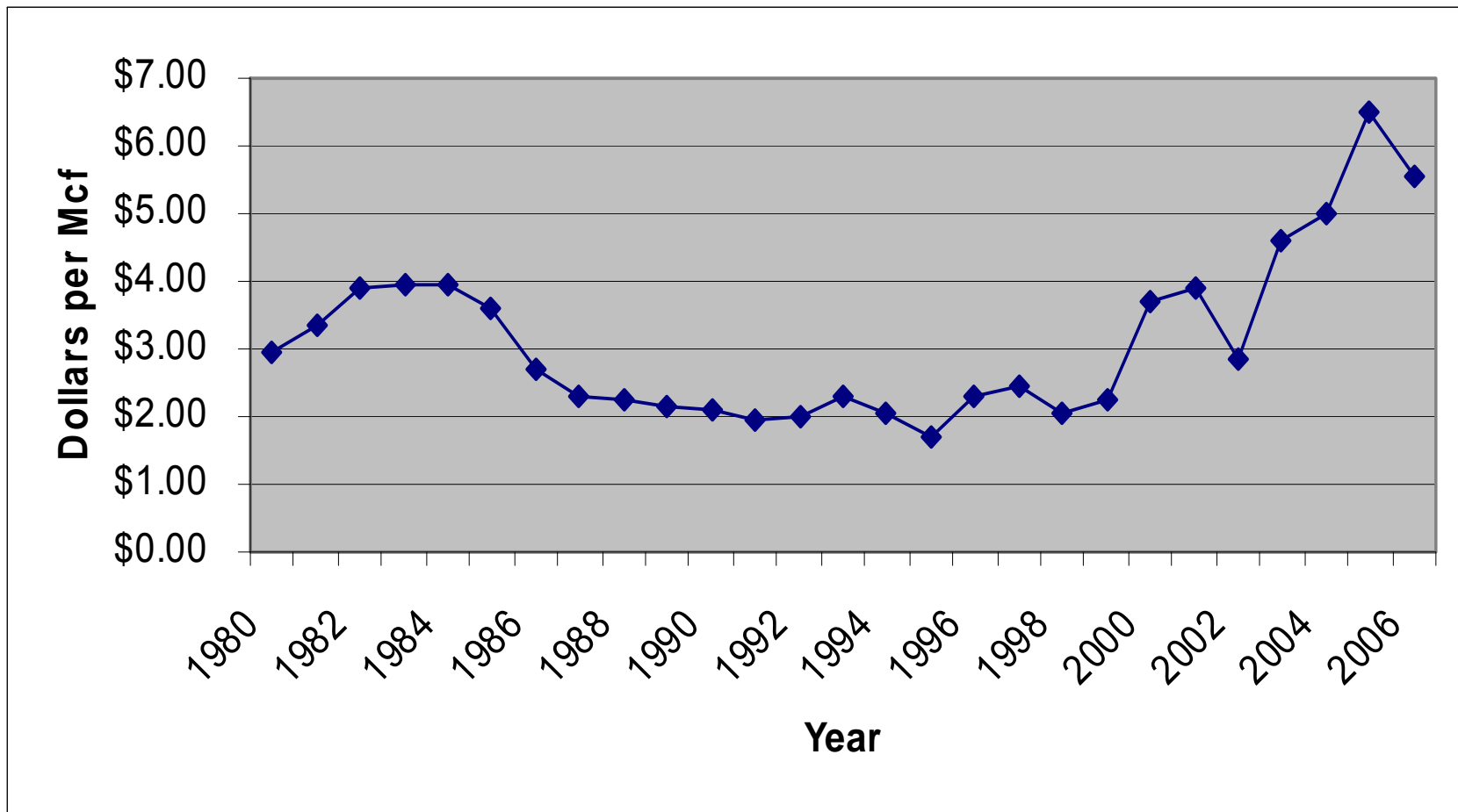
NYMEX Futures Natural Gas Prices, as of May 4, 2007



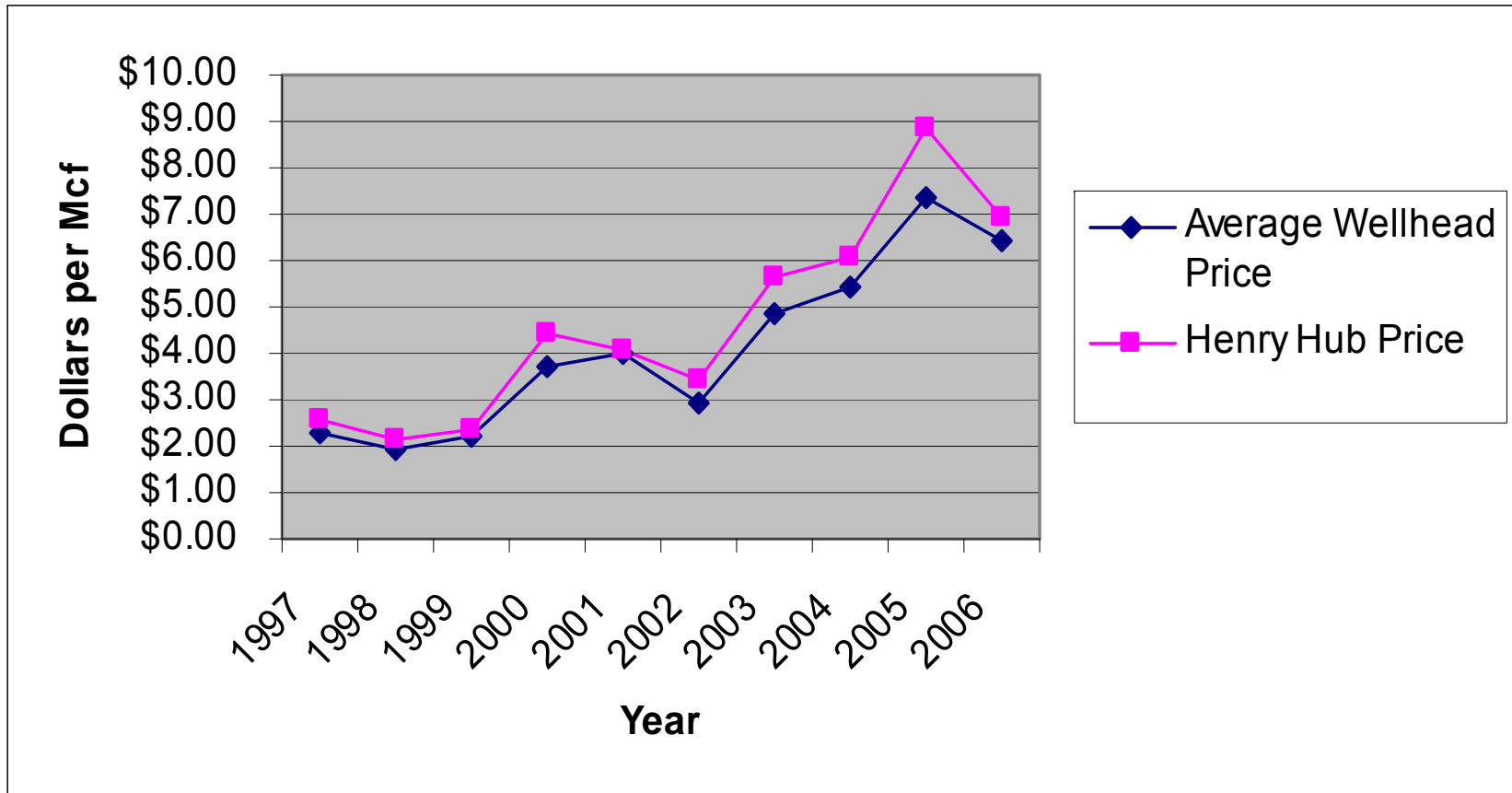
Wellhead Natural Gas Prices, 1980-2006



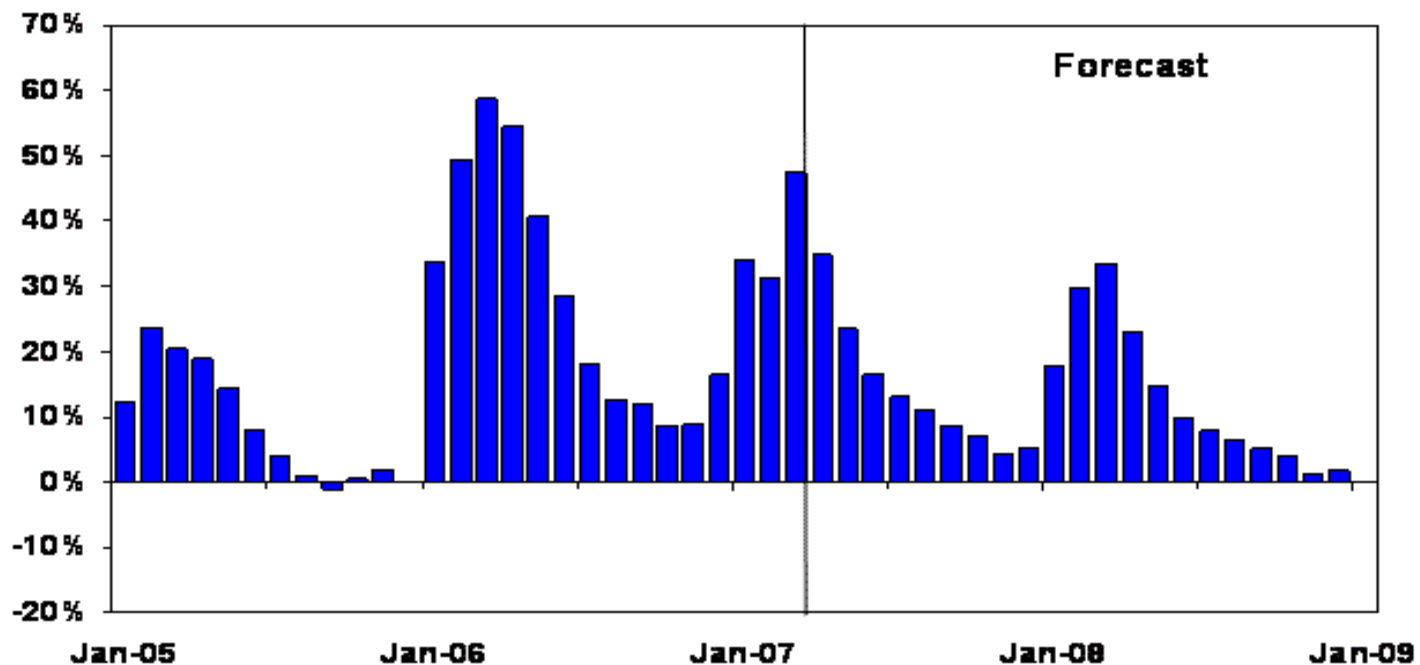
Wellhead Natural Gas Prices in Constant Dollars, 1980-2006



High Correlation between the Average Wellhead Price and the Henry Hub Price, 1997-2006



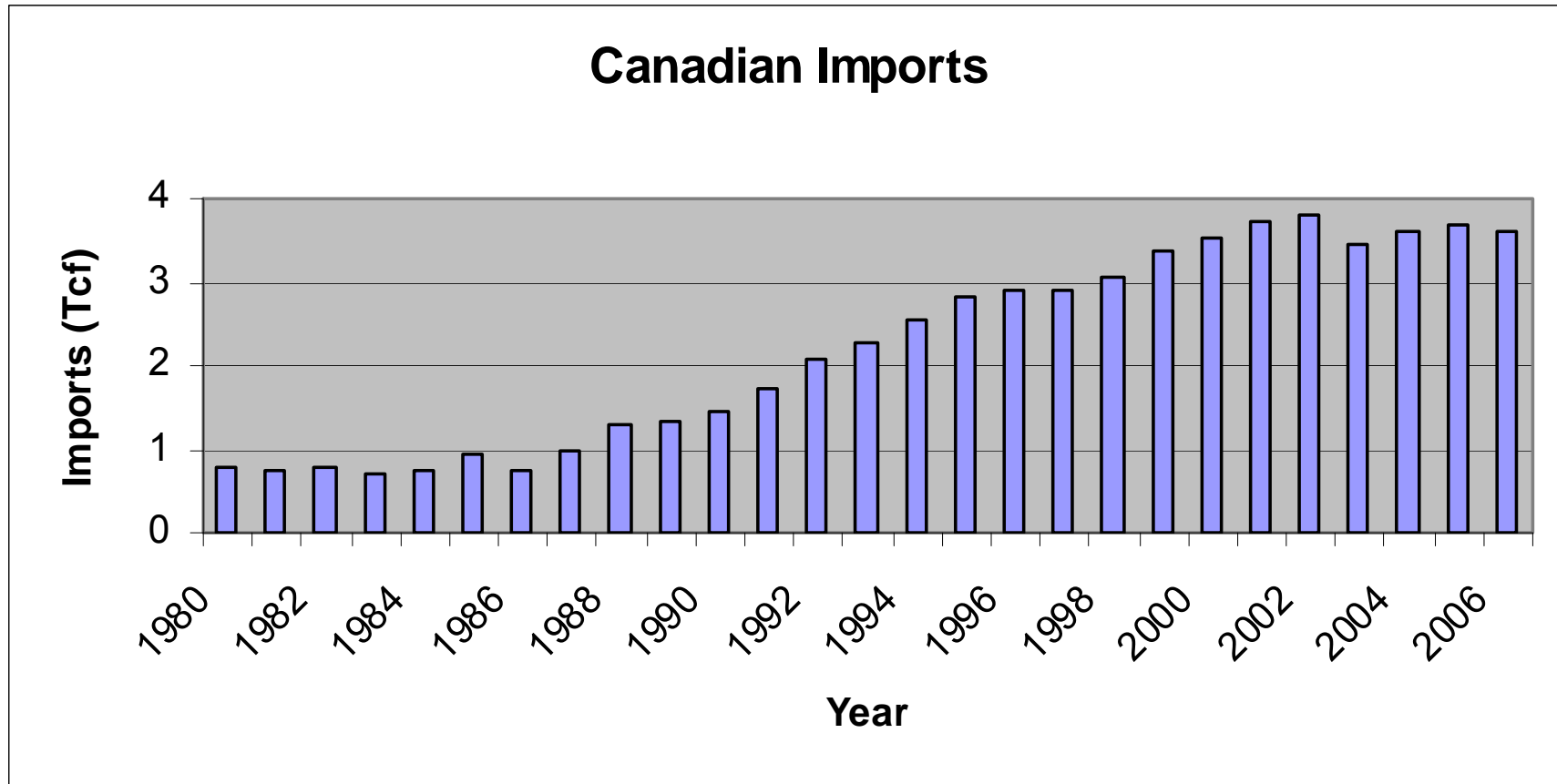
U.S. Working Natural Gas in Storage (Percent Differences from Previous 5-Year Average)



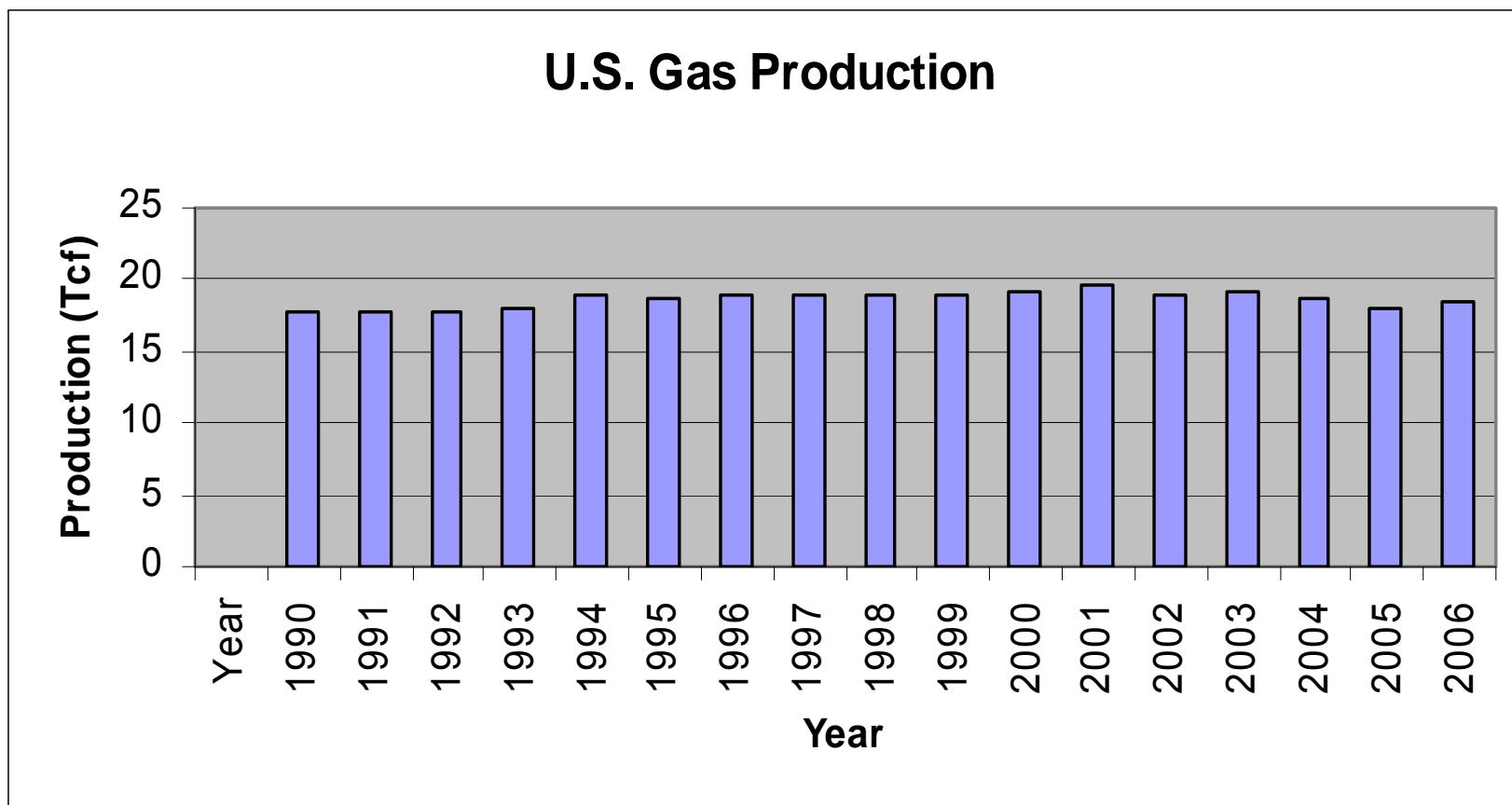
Short-Term Energy Outlook, April 2007



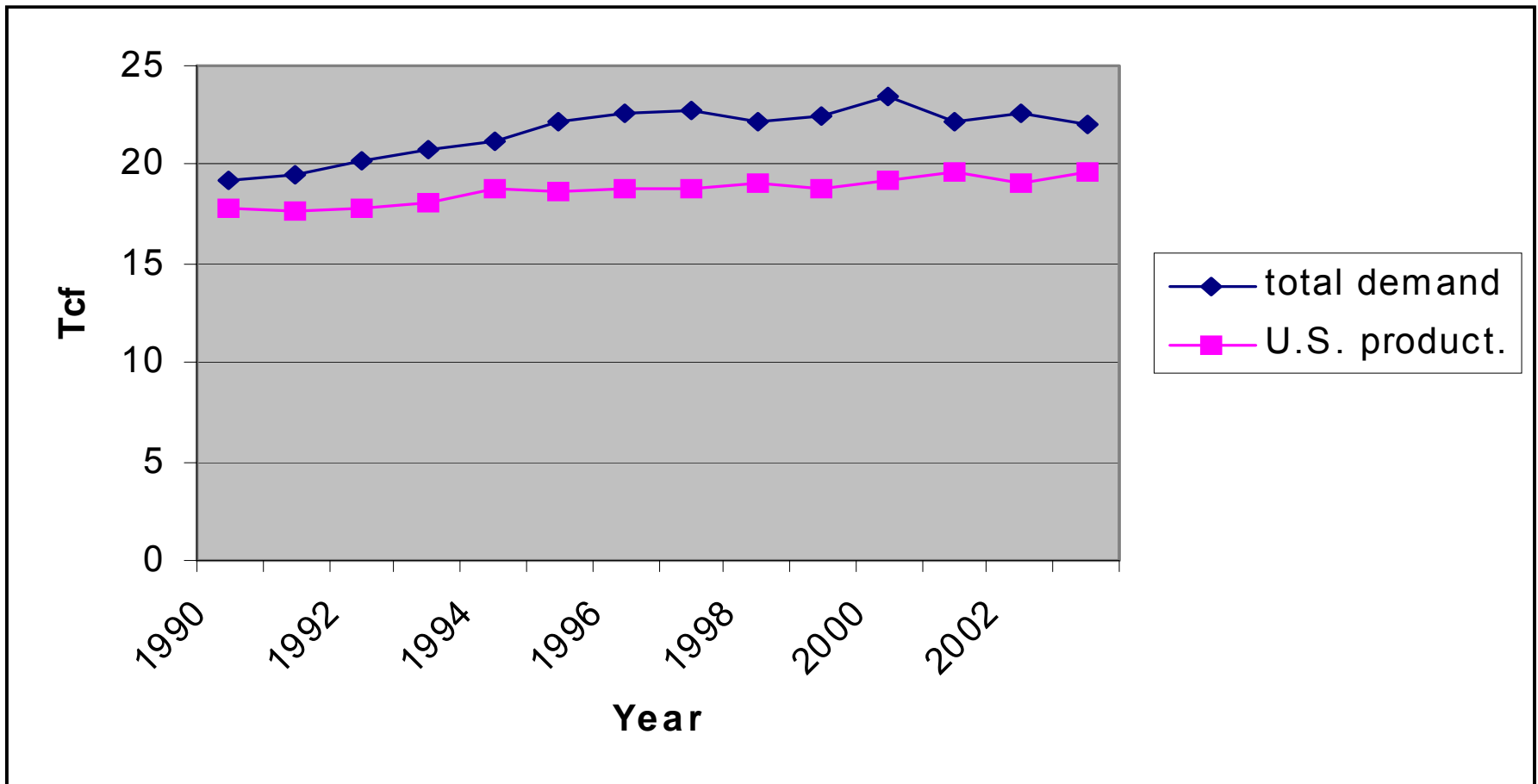
Canadian Natural Gas Imports, 1980-2006



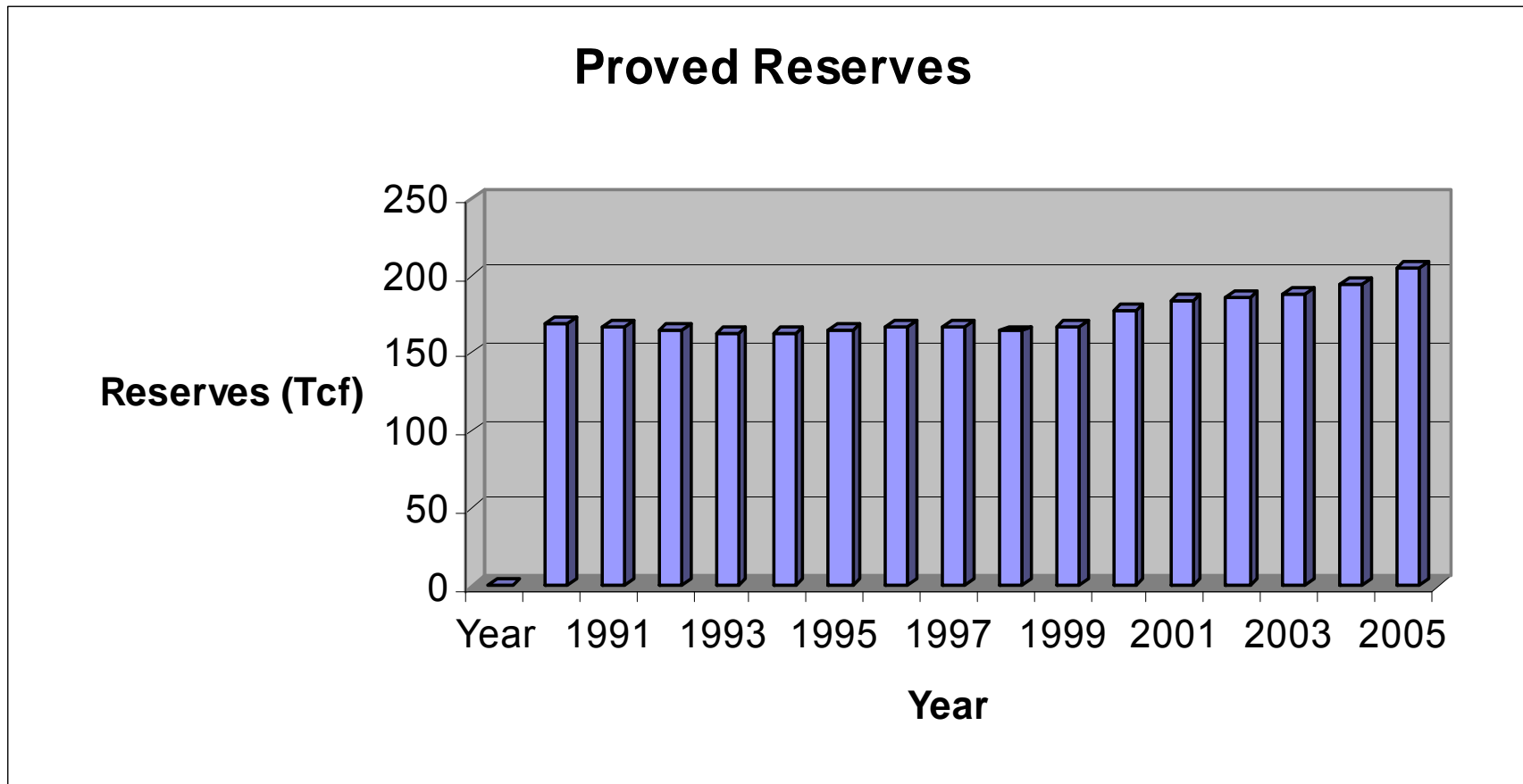
U.S. Dry Natural Gas Production, 1990-2006



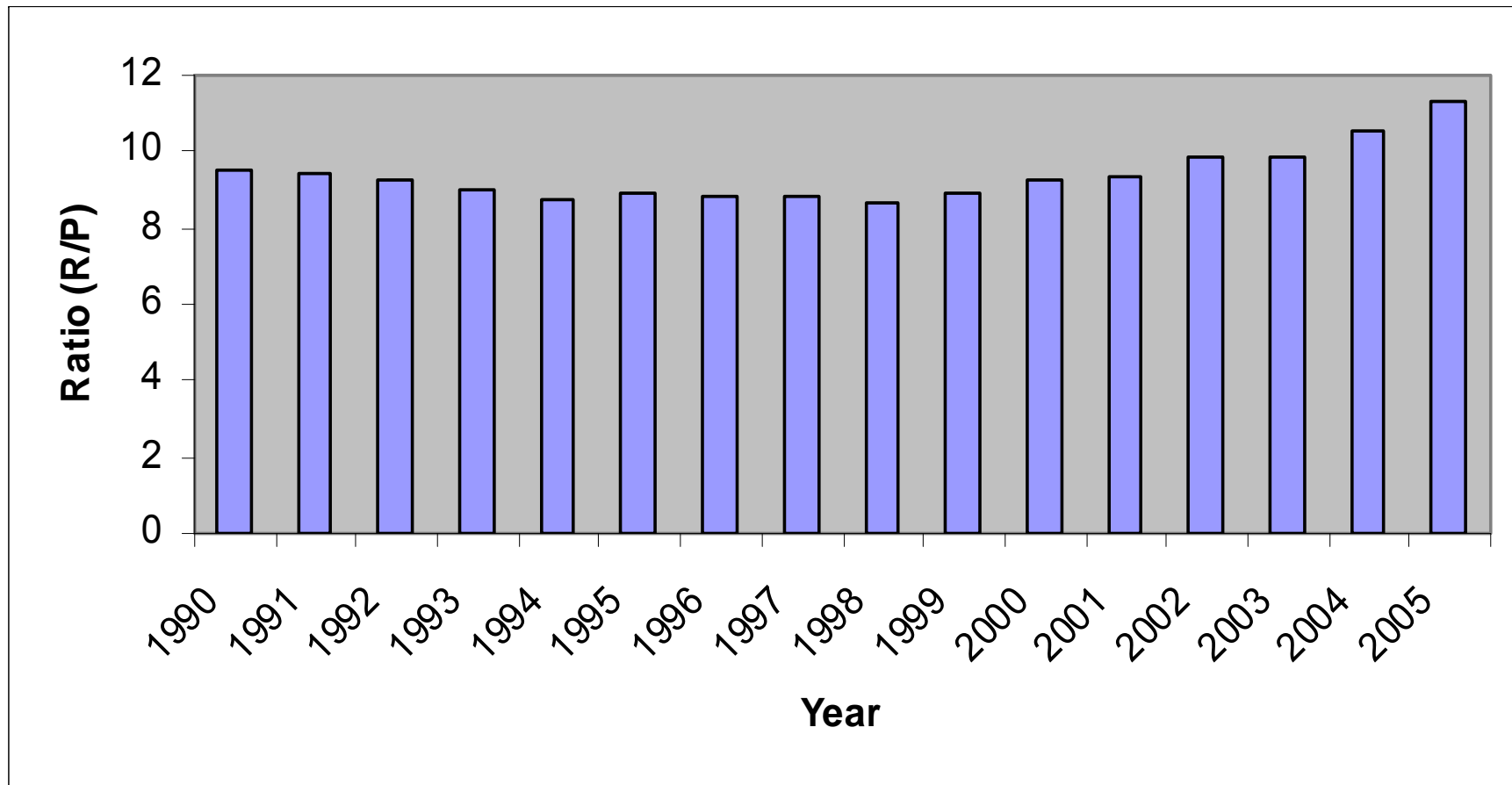
High Correlation between Year-to-Year Domestic Production and Consumption



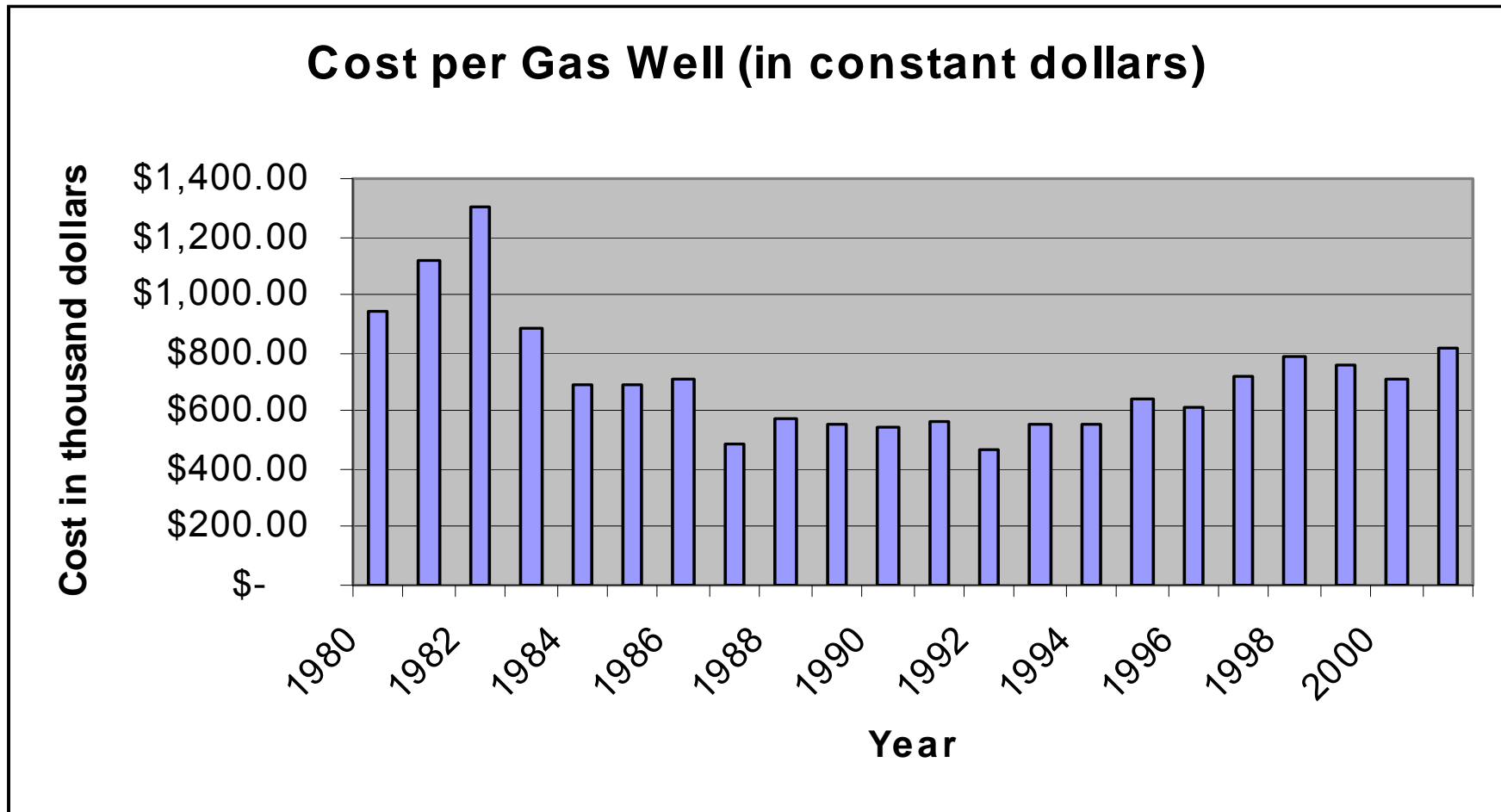
Total U.S. Natural Gas Proved Reserves, 1990-2005



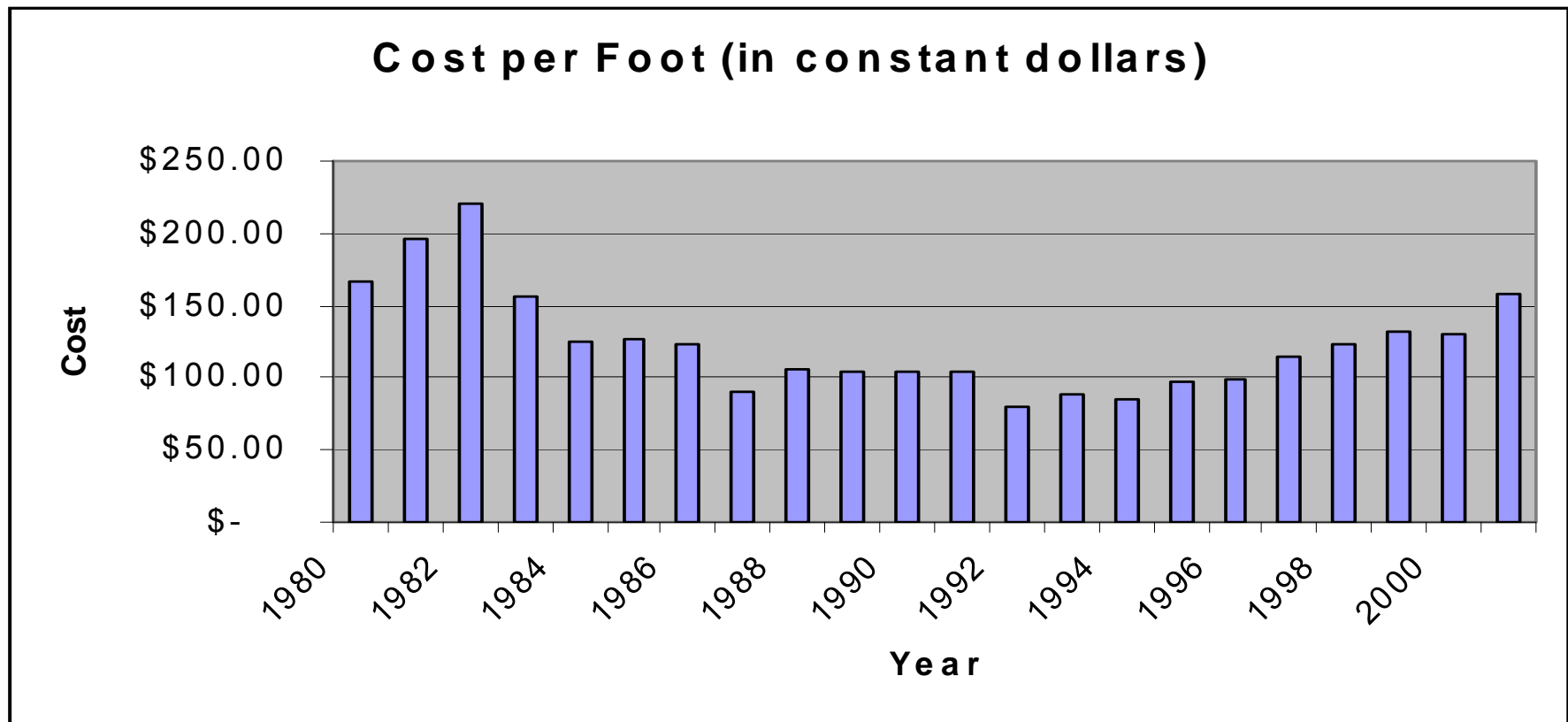
Proved Reserves/Production Ratio, 1990-2005



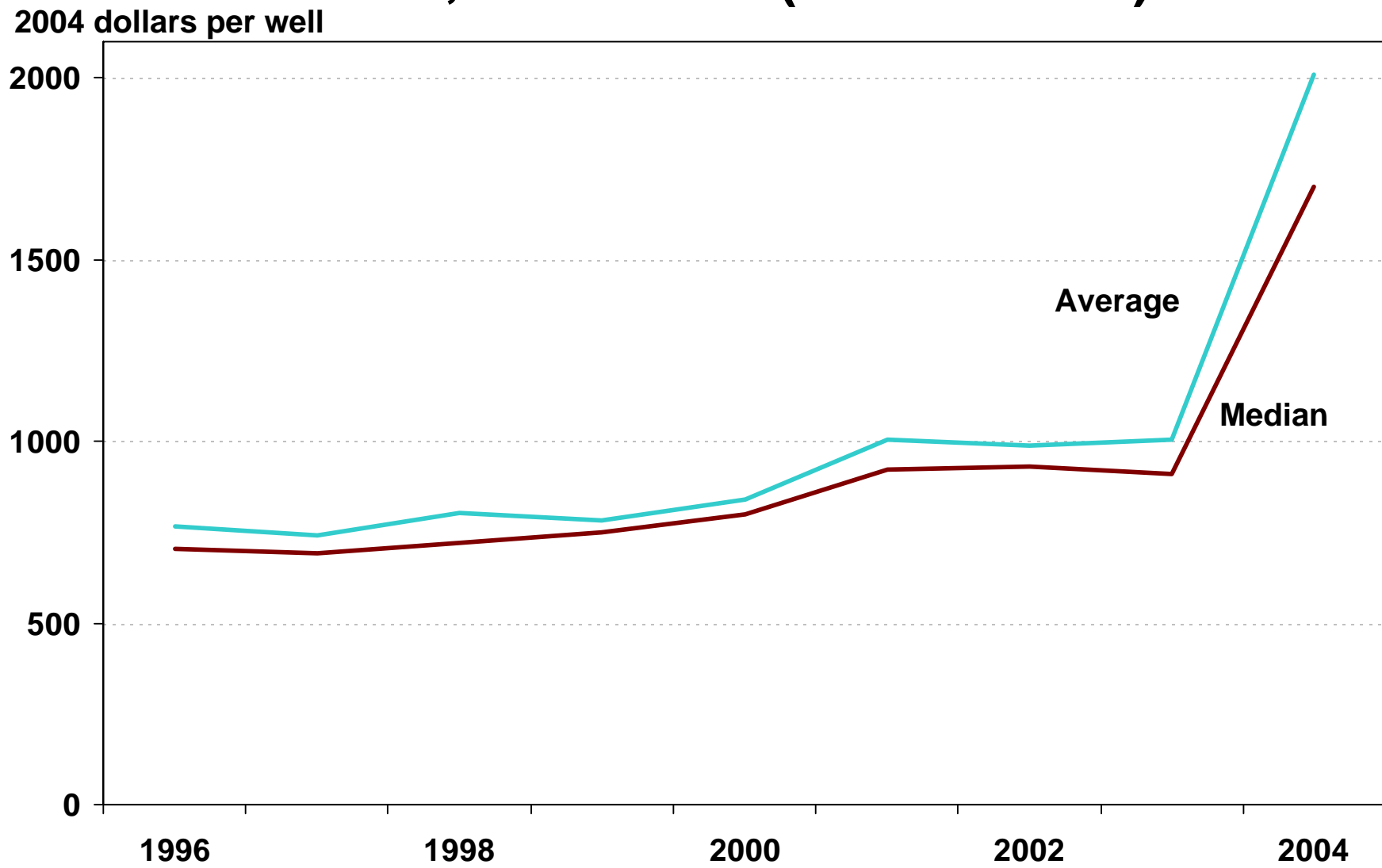
Cost per Natural Gas Well, 1980-2001



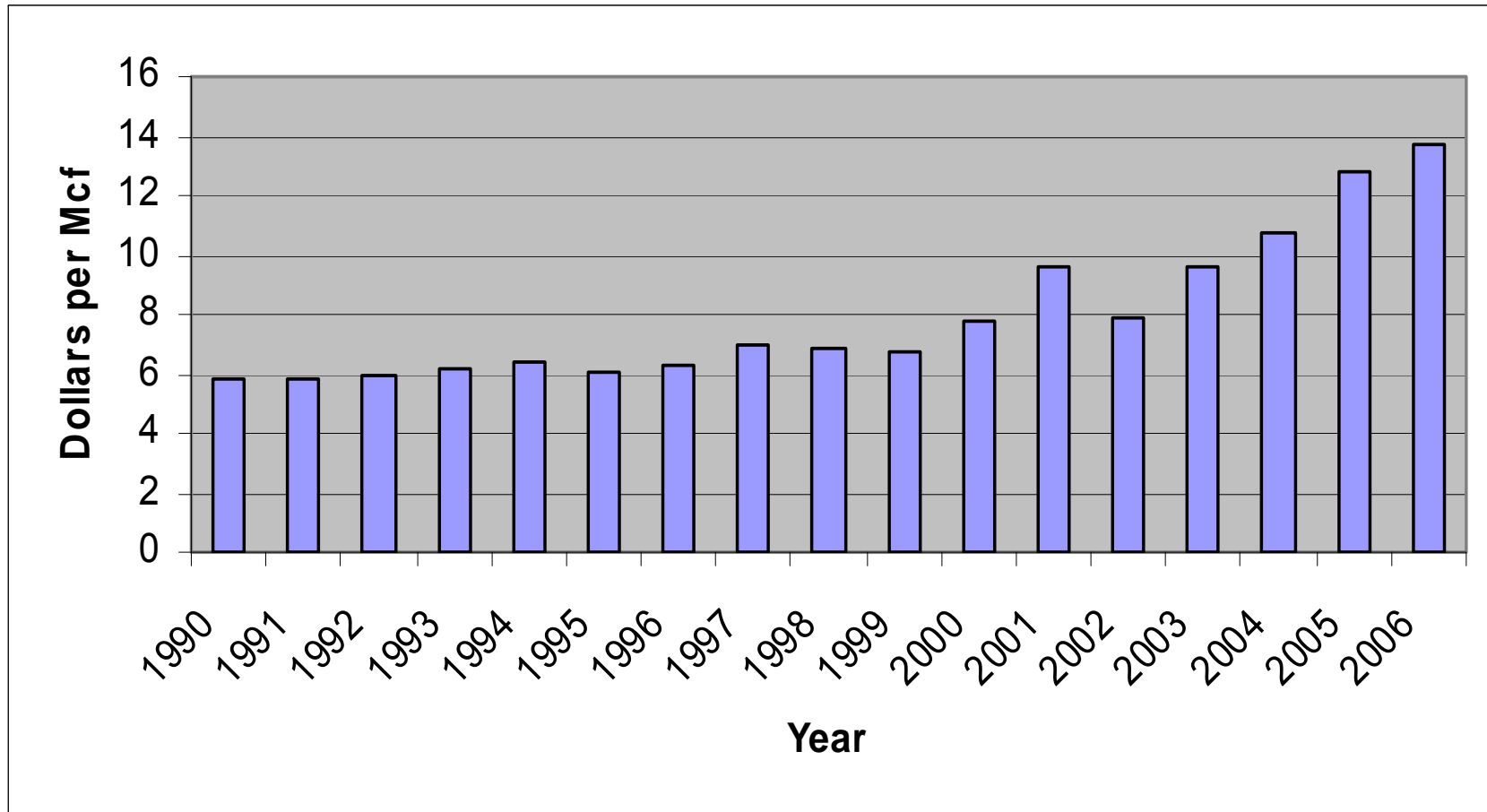
Cost per Foot for Natural Gas Wells Drilled, 1980-2001



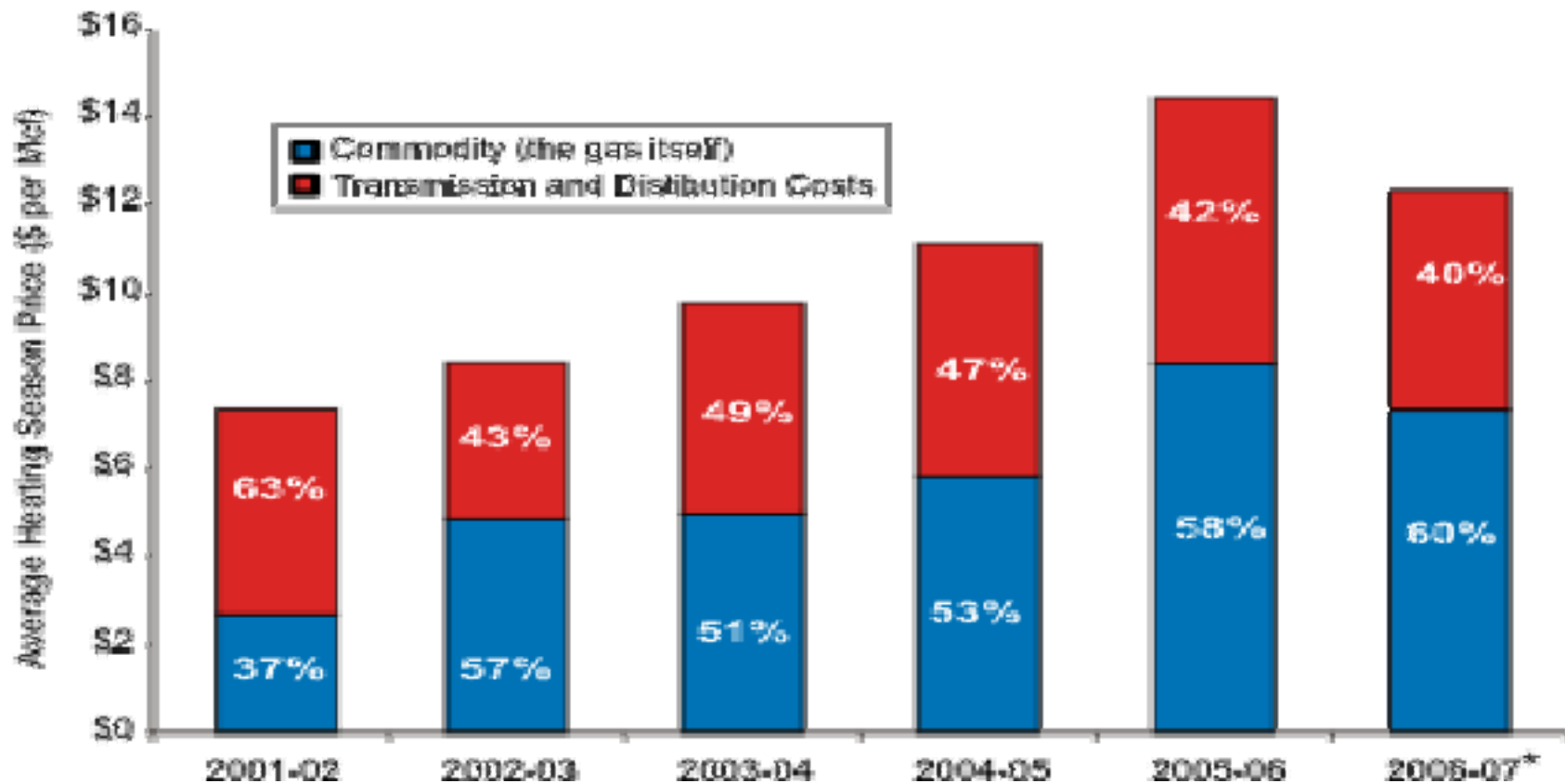
Drilling Costs for Onshore Natural Gas Development Wells at Depths of 7,500 to 9,999 Feet, 1996-2004 (Source: EIA)



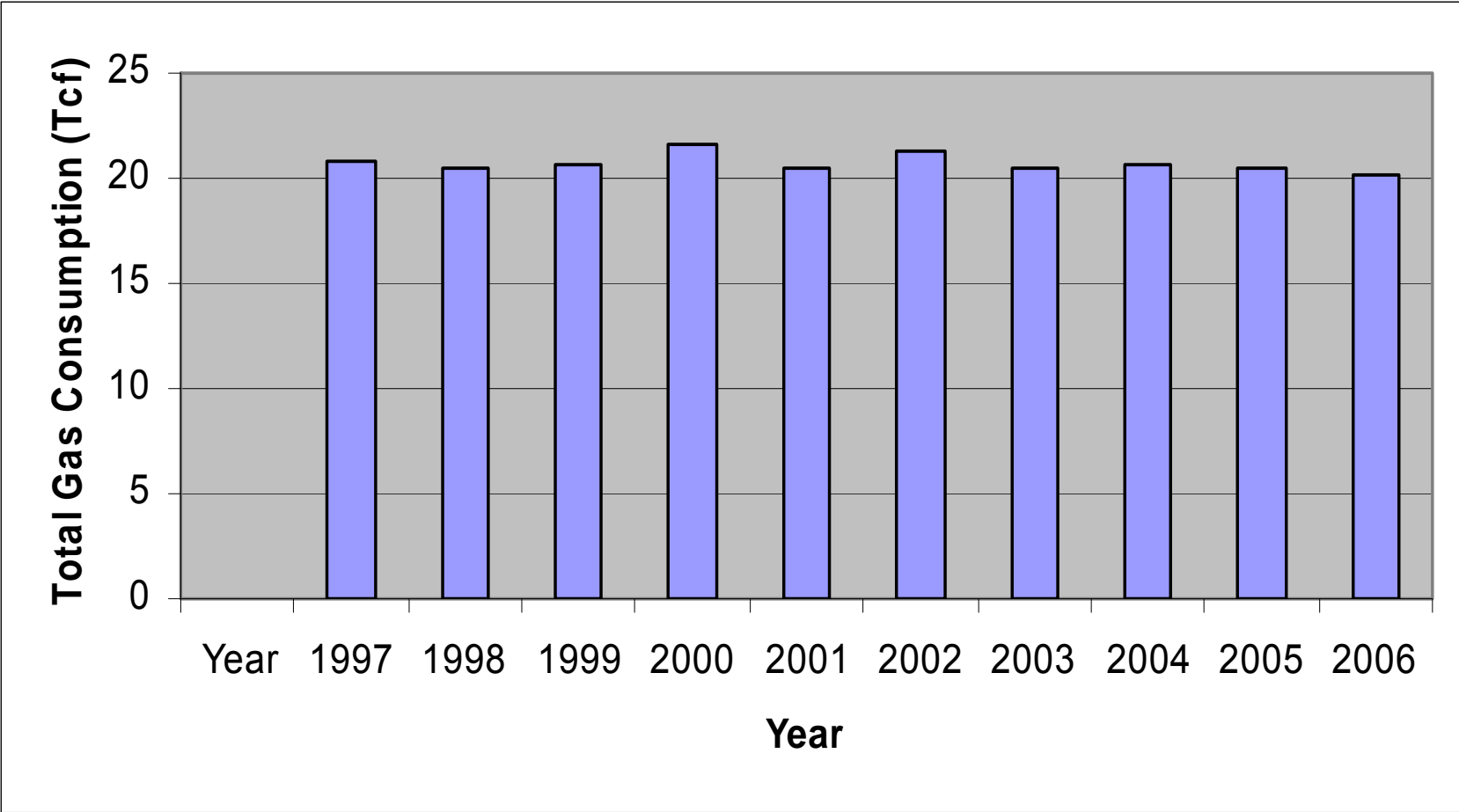
Residential Gas Prices, 1990-2006



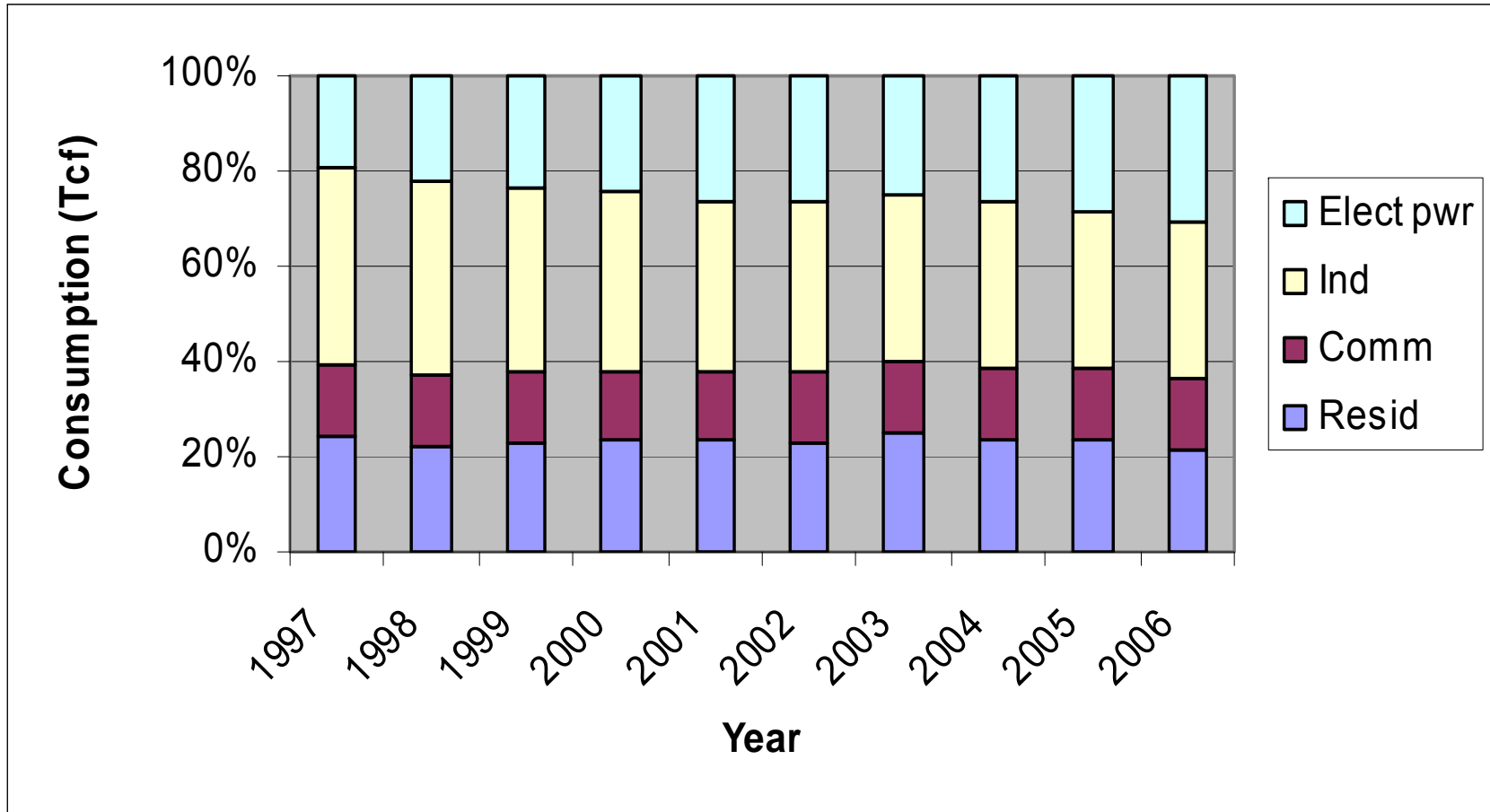
Composition of Natural Gas Prices Paid by Residential Consumers During the Heating Season (Source: EIA)



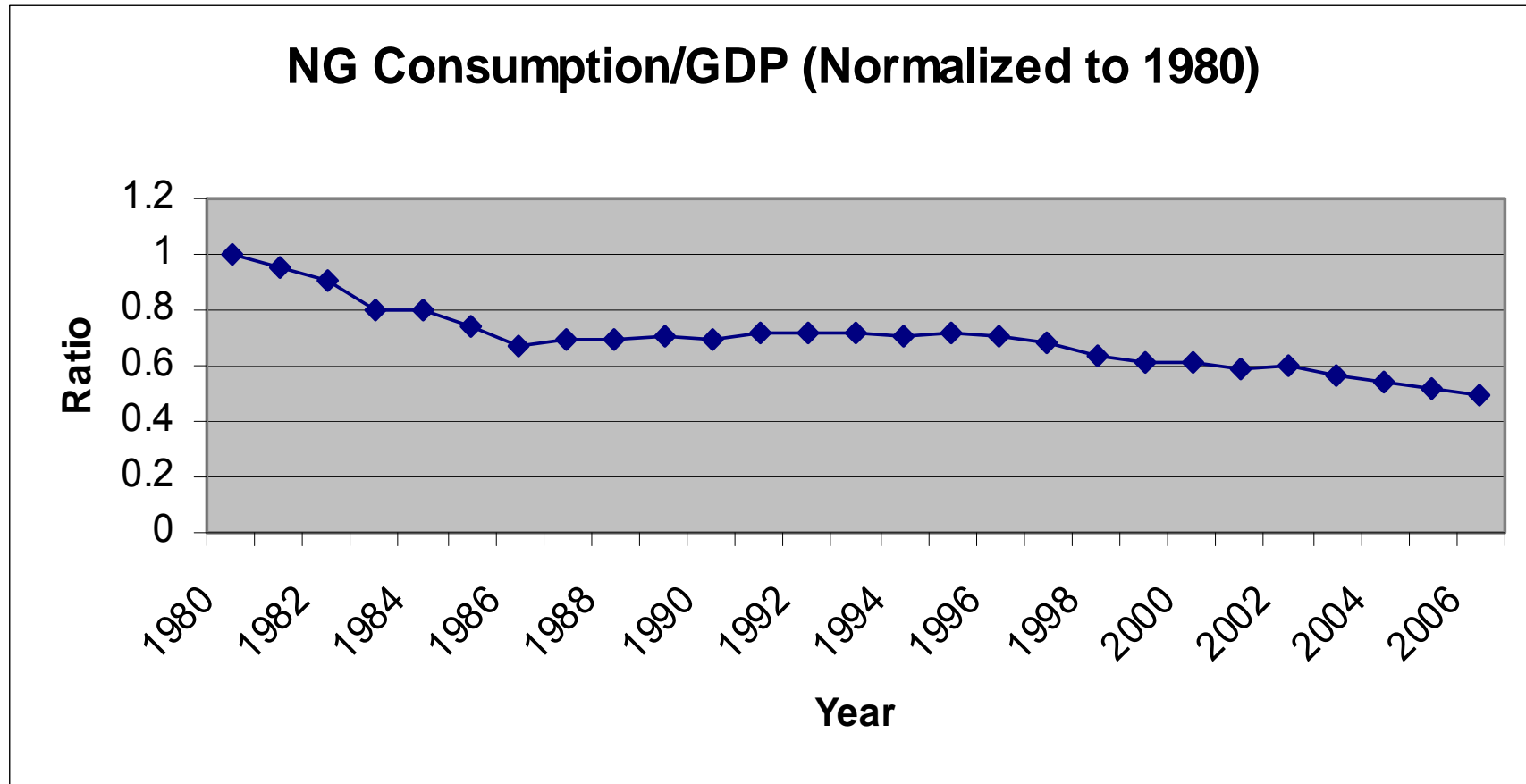
Total U.S. Gas Consumption, 1997-2006



Composition of Gas Consumption by Sector, 1987-2006



Declining Ratio of Natural Gas Consumption to Economic Activity, 1980-2006

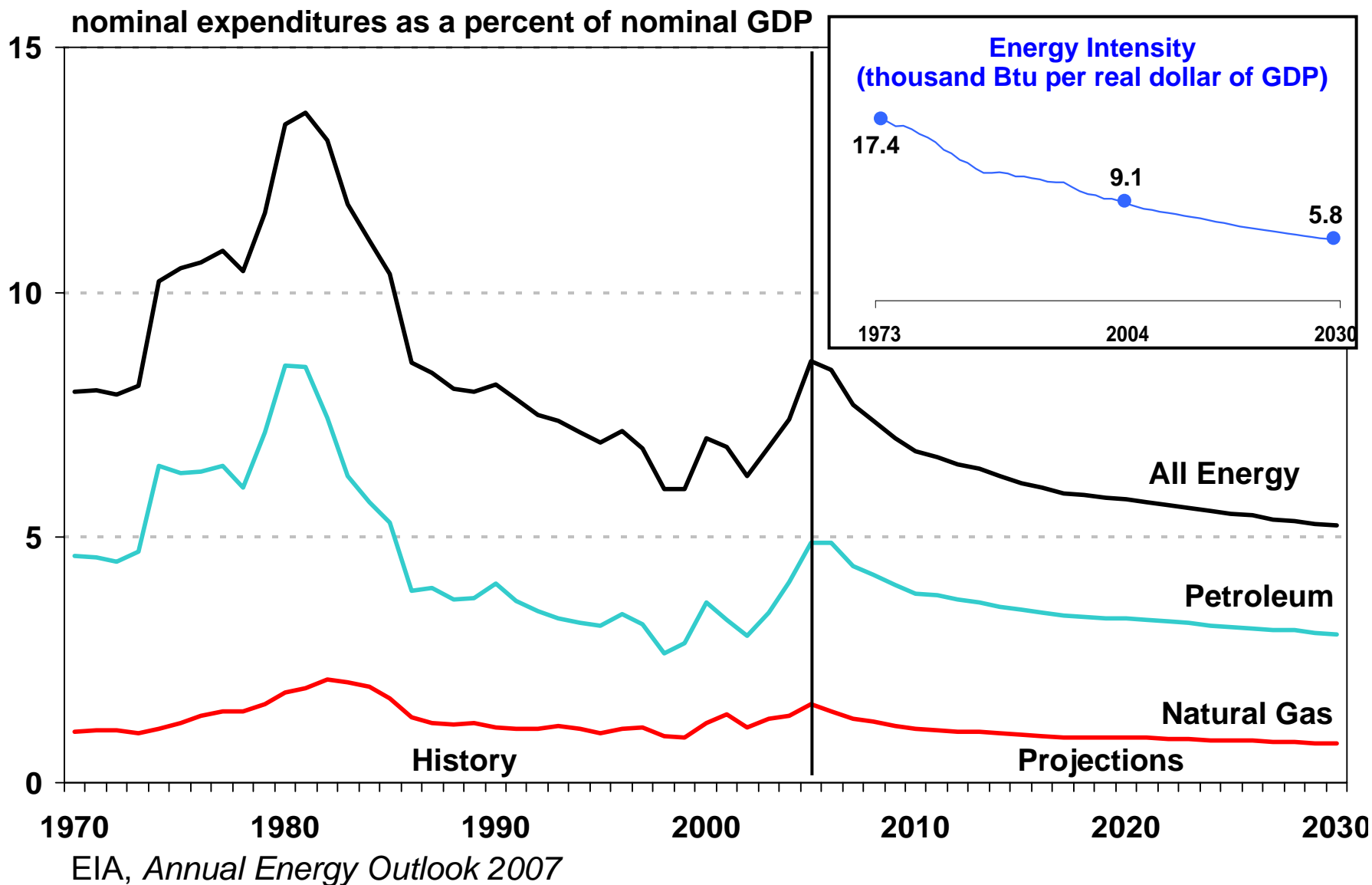


Total Natural Gas Expenditures, 1997-2006 (in billions of nominal dollars)*

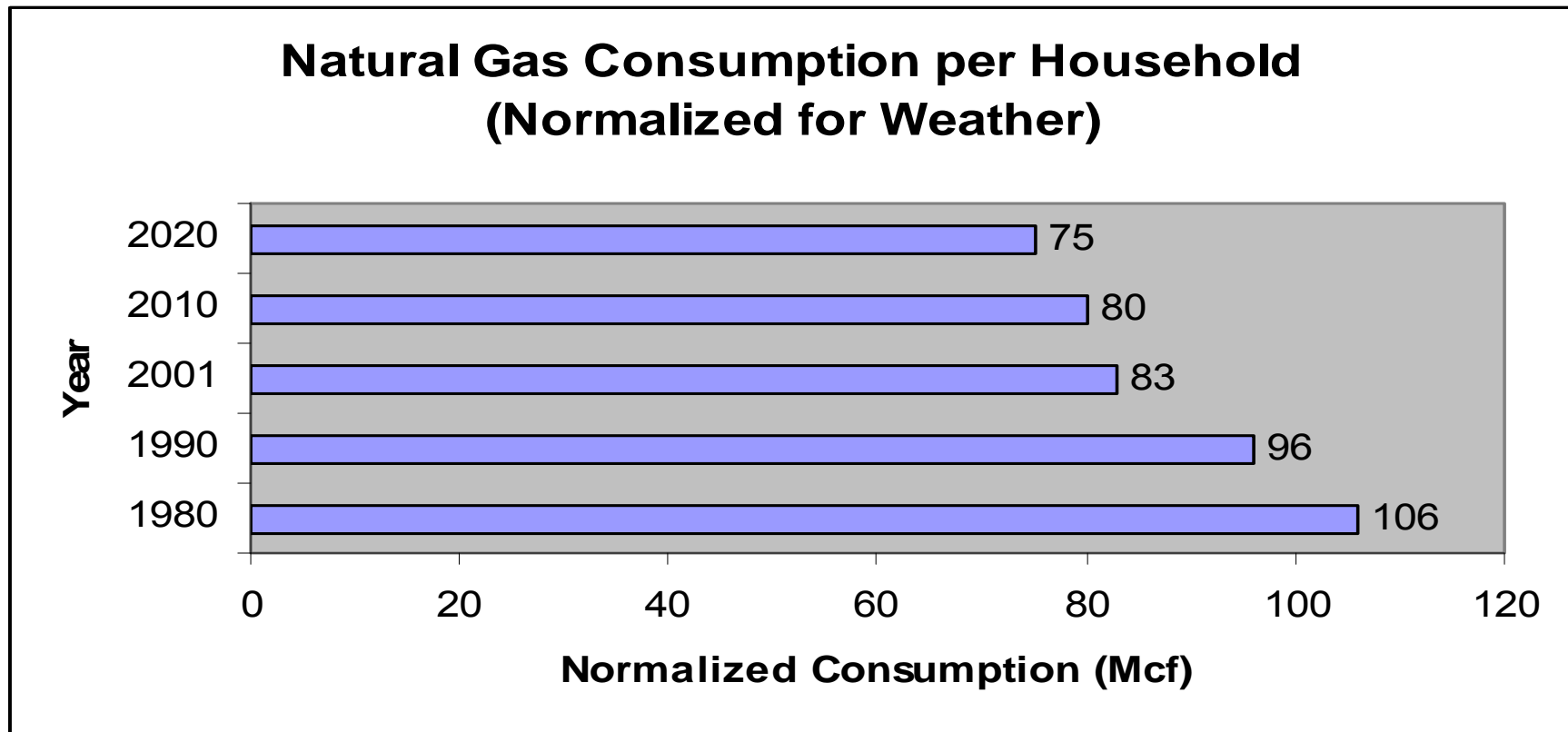
Year	Total Natural Gas Expenditures
1997	\$95.02
1998	84.41
1999	85.68
2000	118.80
2001	134.47
2002	110.46
2003	146.38
2004	164.84
2005	204.70
2006	190.06

* For residential, commercial, industrial and electric power customers

Energy Expenditures as a Share of Gross Domestic Product, 1970-2030

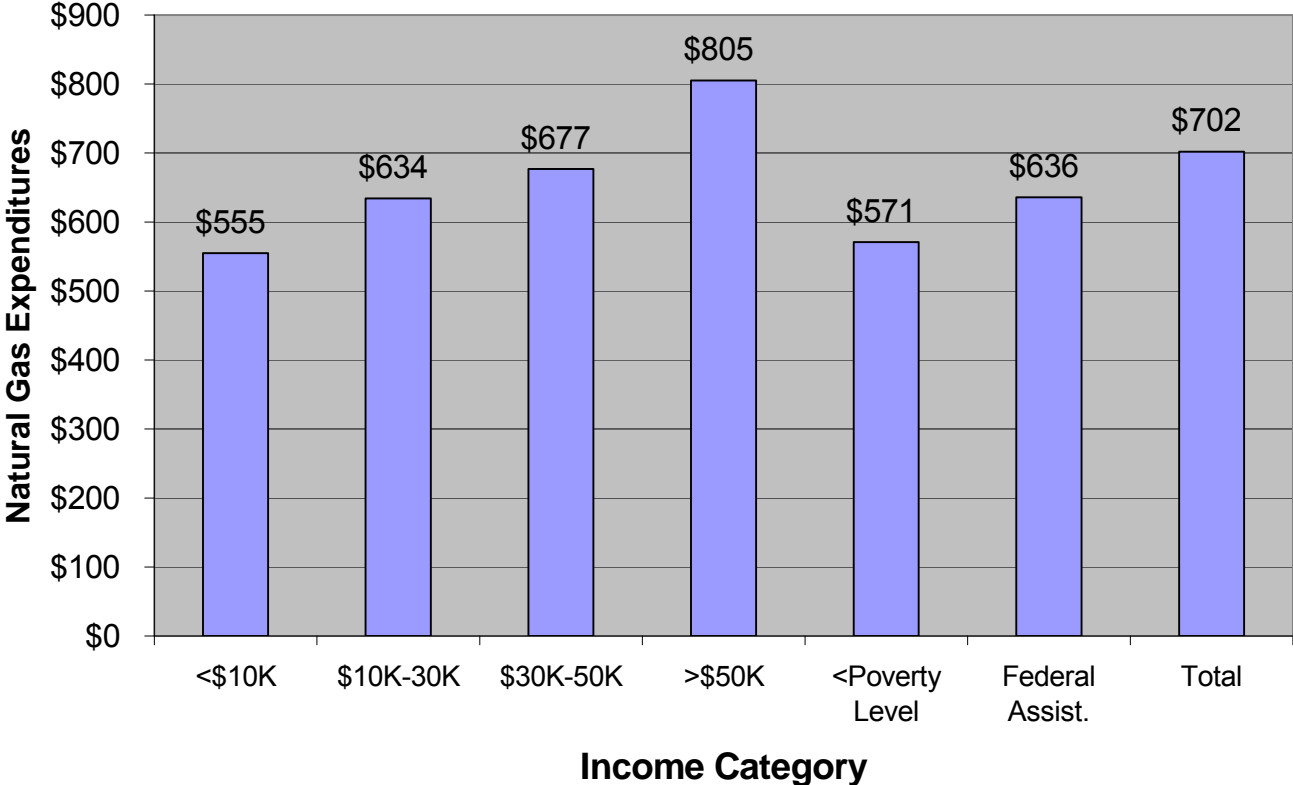


Declining Gas Consumption per Household since 1980 (source: AGA)



Natural Gas Expenditures by Income Category, 2001

Natural Gas Expenditures by Income Category, 2001



Energy Costs by Income, 2004

(source:BLS)

Income	Energy Costs	% of Budget
< \$5K	\$1,460	28%+
\$5K-9.99K	\$1,554	15-31%
\$10K-14.99K	\$1,954	13-20%
\$15K-19.99K	\$2,215	11-15%
\$20K-29.99K	\$2,556	9-13%
\$30K-39.99K	\$2,905	7-10%
\$40K-49.99K	\$3,231	6-8%
\$50K-69.99K	\$3,689	5-7%
>\$70K	\$4,645	≤7%

Annual spending on gasoline, motor oil, natural gas, electricity, fuel oil and other fuels

THE LONG TERM

The National Petroleum Council (NPC) 2003 Natural Gas Study

- Underlying premises regarding the U.S. natural gas industry
 - A fundamental shift in the supply-demand balance has caused natural gas prices to rise and become more volatile
 - North America is moving to a new era in which it will no longer be self-reliant in meeting its growing natural gas needs as production from traditional U.S. and Canadian basins has leveled
 - Government policy encourages the use of natural gas but does not adequately address the corresponding need for additional supplies

The NPC Study -- continued

- Four general categories of recommendations for government initiatives
 - Improve demand flexibility and efficiency
 - Increase supply diversity
 - Sustain and enhance infrastructure (e.g., pipelines, storage facilities)
 - Promote efficiency of markets (e.g., more transparency, monitoring of possible market manipulation)

The NPC Study -- continued

- Highlights of the study
 - Advocates an aggressive gas-supply-expansion initiative in addition to increasing the responsiveness of gas consumers to changing market prices
 - Estimates that natural gas costs will fall by some \$1 trillion over the next twenty years (which averages out to \$50 billion per year, or about 25 percent of the current total natural-gas expenditures in the U.S.) from a balanced future of **(1)** increased energy efficiency, **(2)** immediate development of new natural gas resources, and **(3)** flexibility in fuel choice
 - The savings would be \$300 billion from increasing access to U.S. natural gas resources alone

Relevant Questions for the NPC Study

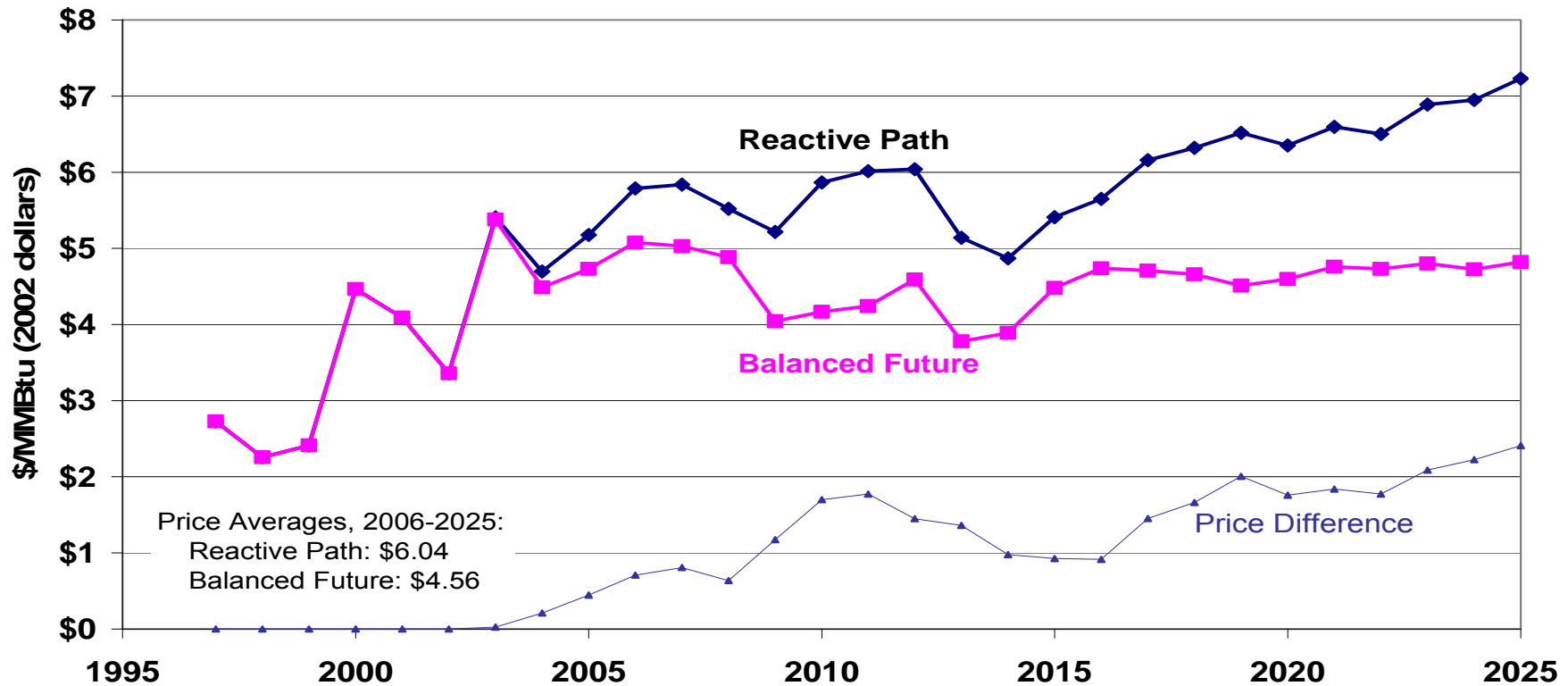
- What lessons can be drawn from past U.S. energy policies that have attempted to increase domestic energy supplies, especially oil?
- What were the major assumptions made in the NPC study?
- Did the study include a comprehensive and valid cost-benefit analysis?
- What are the major problems addressed by the NPC study?

Relevant Questions for the NPC Study-- continued

- Why do we need to act now?
- What would be the net societal costs if we do not act immediately?
- What can go wrong in terms of adding to societal costs if we pursue the policies and other initiatives recommended by the NPC study?
- What more than anything should be taken away from the NPC study?

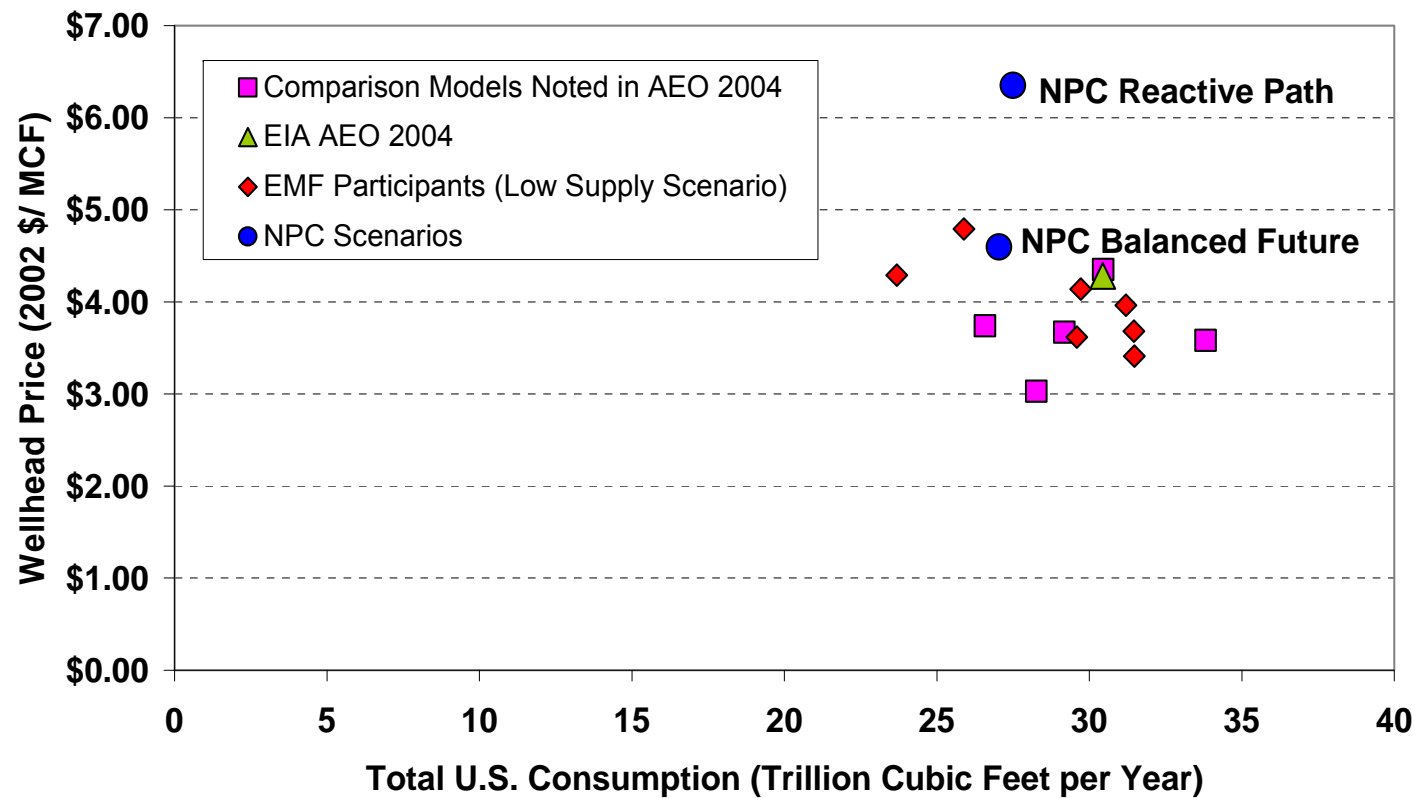
Henry Hub Price Difference under the Two NPC Scenarios

Reactive Path and Balanced Future Scenarios



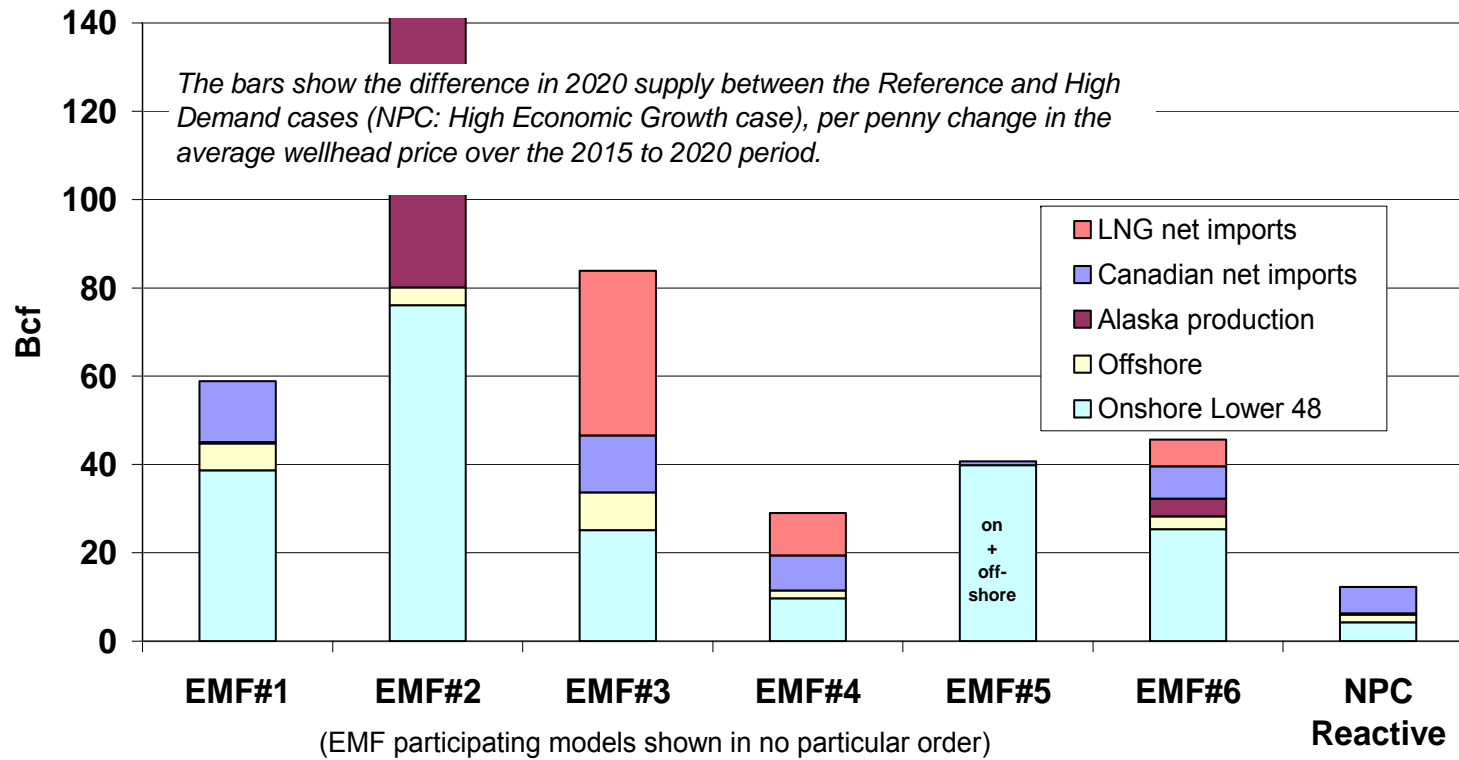
Different Projections for 2020

Comparison of Natural Gas Outlooks, 2020



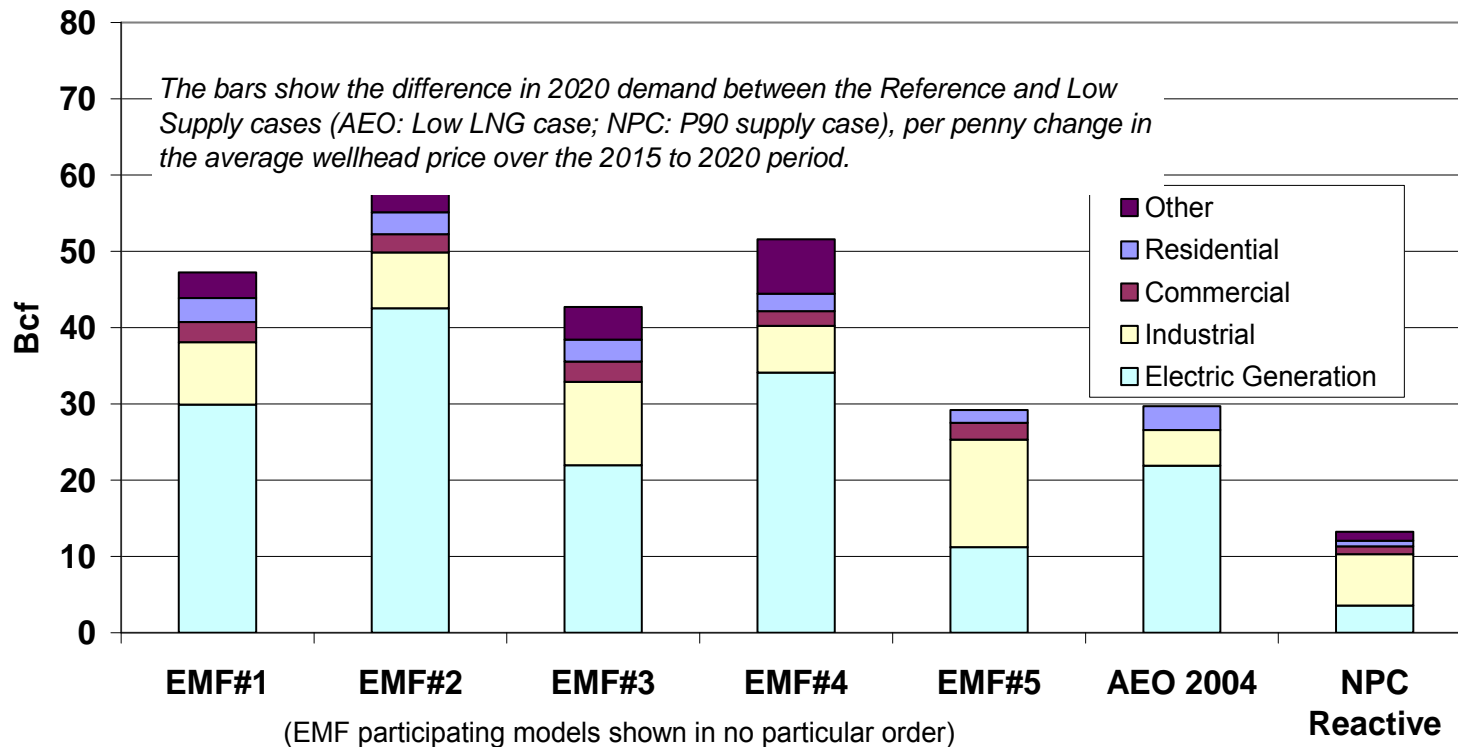
Comparison of Estimated Supply Response to Price

Supply Response to Higher Prices, 2020



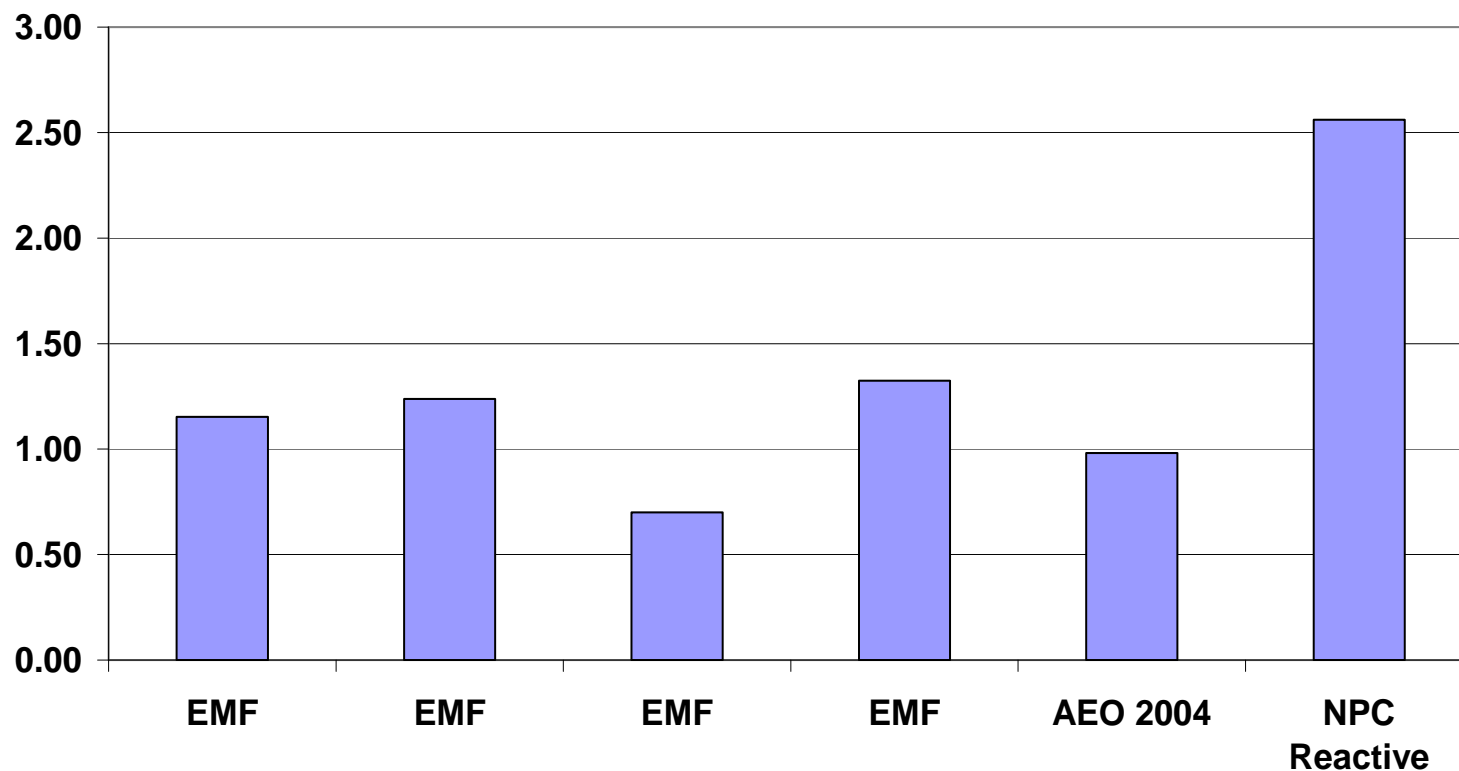
Comparison of Estimated Demand Response to Price

Demand Response to Higher Prices, 2020



Another Anomaly with the NPC Projections

Ratio of Natural Gas to Crude Oil Price, 2020



Message of NPC Study for State Commissions

- Encourage increased energy-efficiency through market-oriented initiatives and consumer education
- Provide regulatory certainty by maintaining consistent cost recovery and contracting environment wherein roles and rules are clearly identified and not changing
- For example, remove regulatory barriers to long-term capacity contracting
- Encourage collaborative research into more efficient and less expensive infrastructure options by allowing cost recovery of collaborative research

Message of NPC Study for State Commissions -- continued

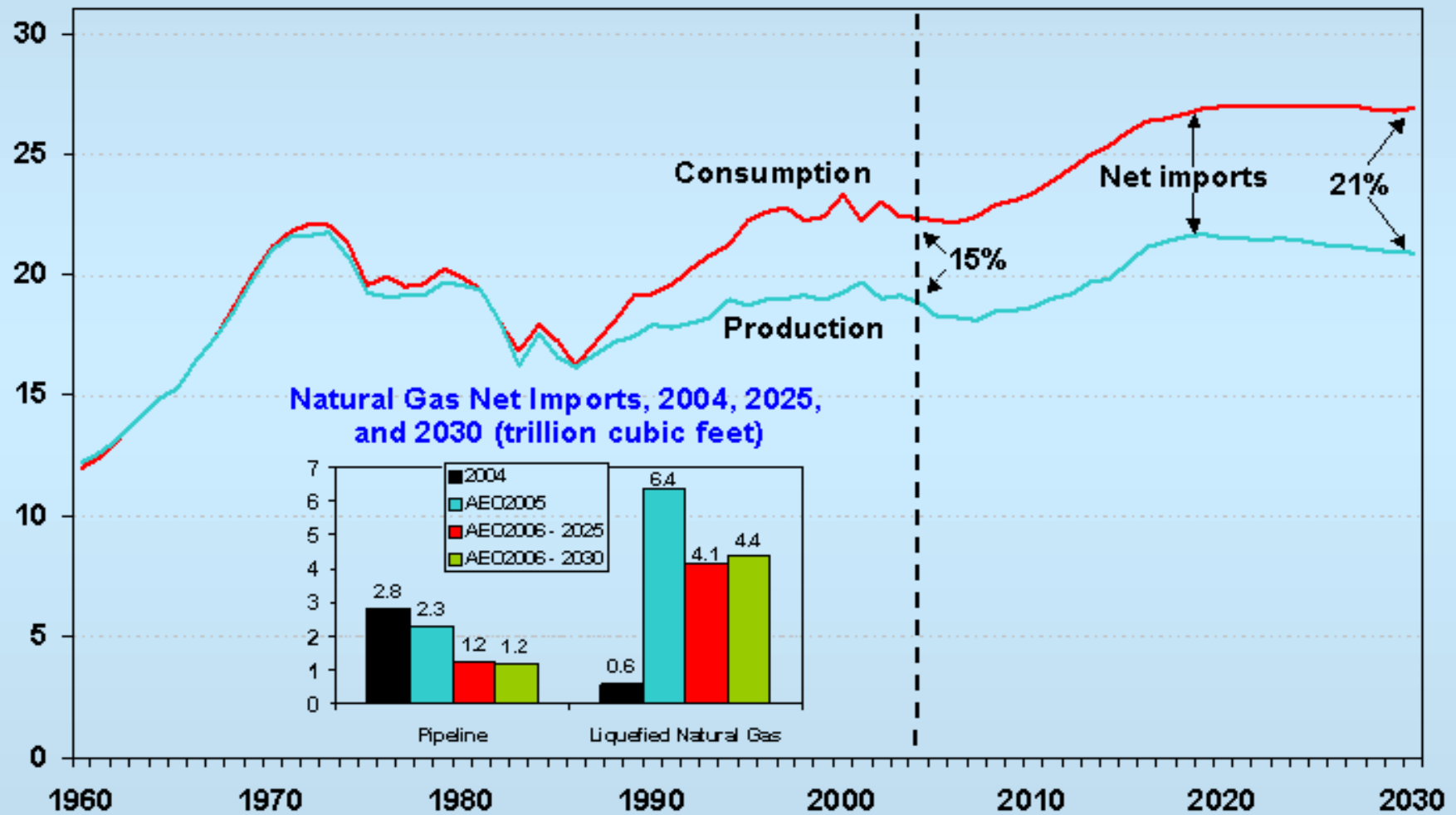
- Consider ways to mitigate price volatility: (1) contracting for firm transportation and storage, (2) financial hedging, (3) switching to lower-cost alternative fuels, and (4) contracting under long-term fixed price agreements
- Improve demand flexibility and efficiency by (1) ensuring non-gas fuel considerations in the integrated resource planning (IRP) process, (2) allowing recovery of switching costs, (3) supporting fuel backup, and (4) incorporating fuel-switching considerations in power-market structures

Shift in Long-Term Supply Perspectives since 1999

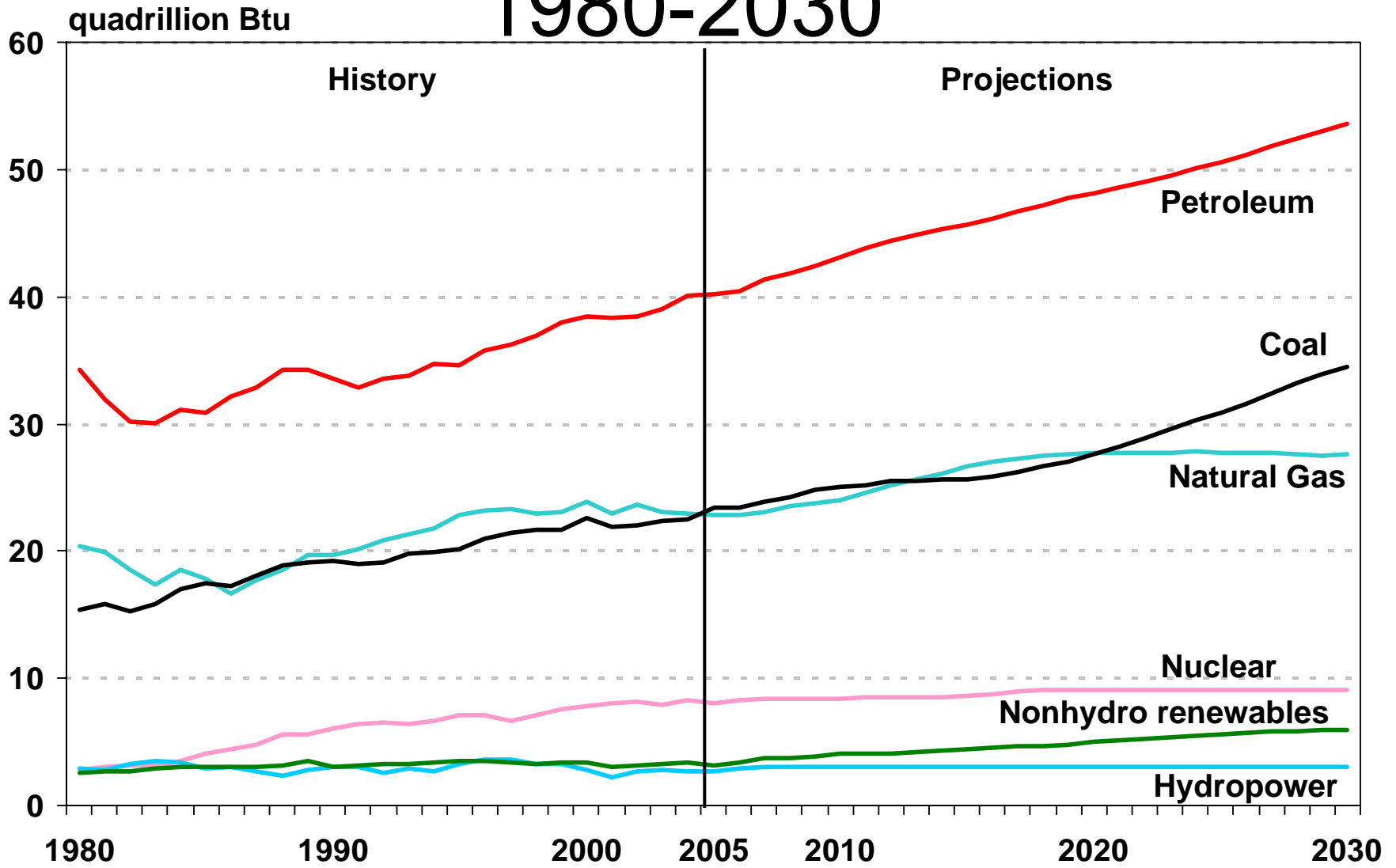
Projections of Lower 48 Natural Gas Production (Tcf)

	2010	2015
AEO 1999	23.09	25.40
AEO 2004	19.90	20.98
AEO 2005	20.49	20.85
AEO 2006	18.65	20.44
AEO 2007	19.42	19.67
NPC 1999	24.60	26.00
NPC 2003	18.90	19.70

Natural Gas Production, Consumption, and Imports, 1960-2030 (trillion cubic feet)

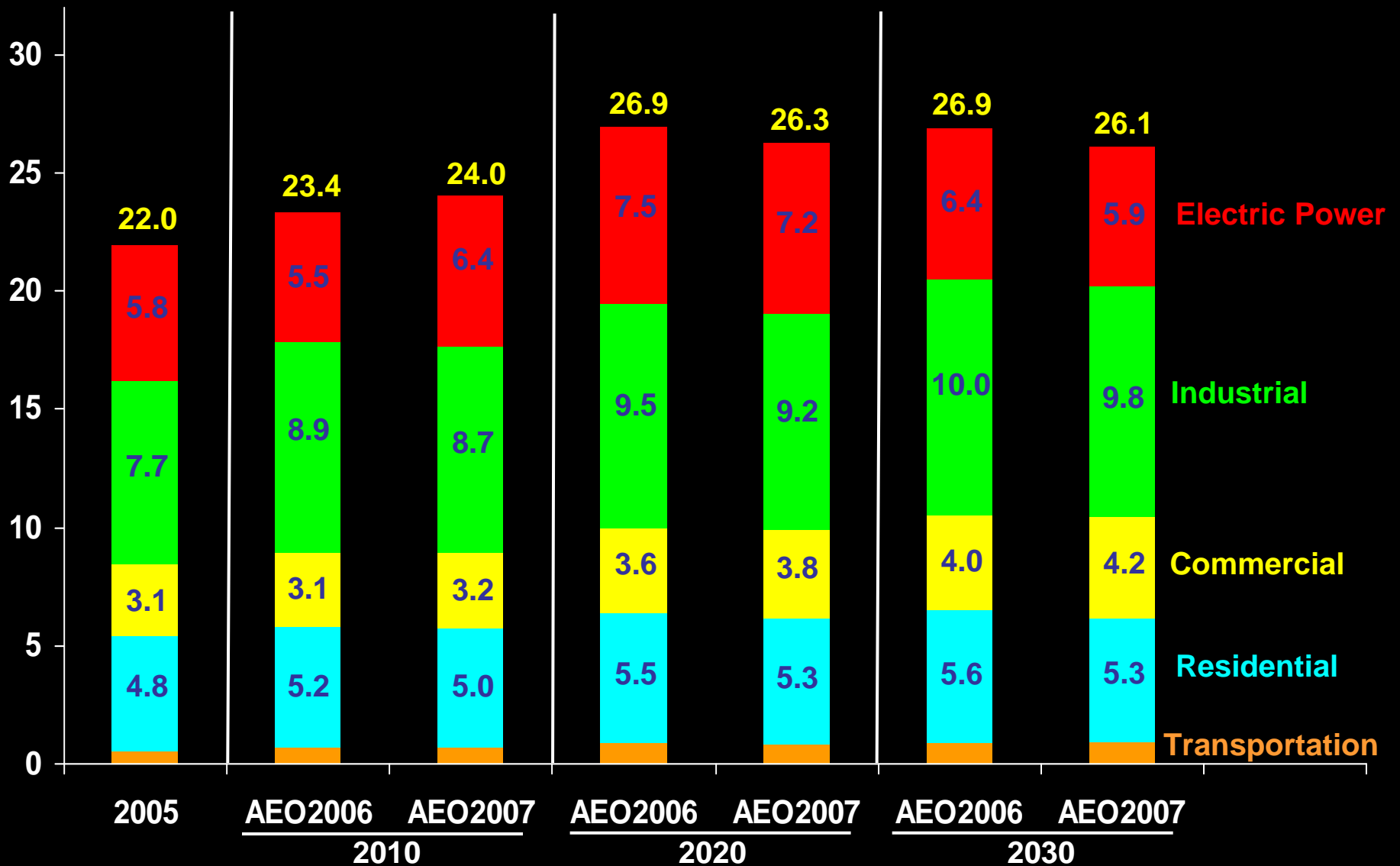


Energy Consumption by Fuel, 1980-2030



EIA, *Annual Energy Outlook 2007*

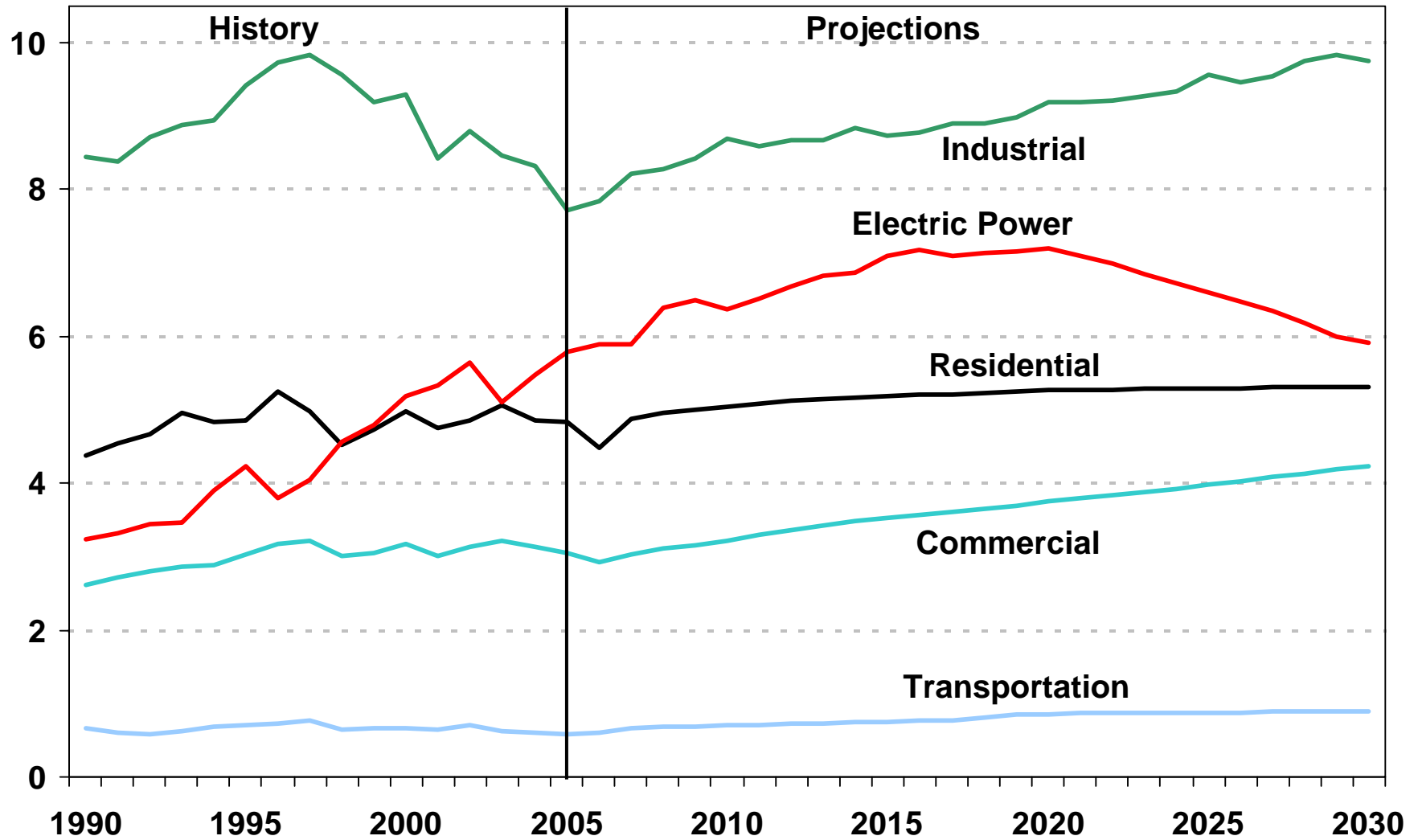
U.S. Natural Gas Consumption by Sector, 2005, 2010, 2020, and 2030 (trillion cubic feet)



Annual Energy Outlook 2006 and 2007

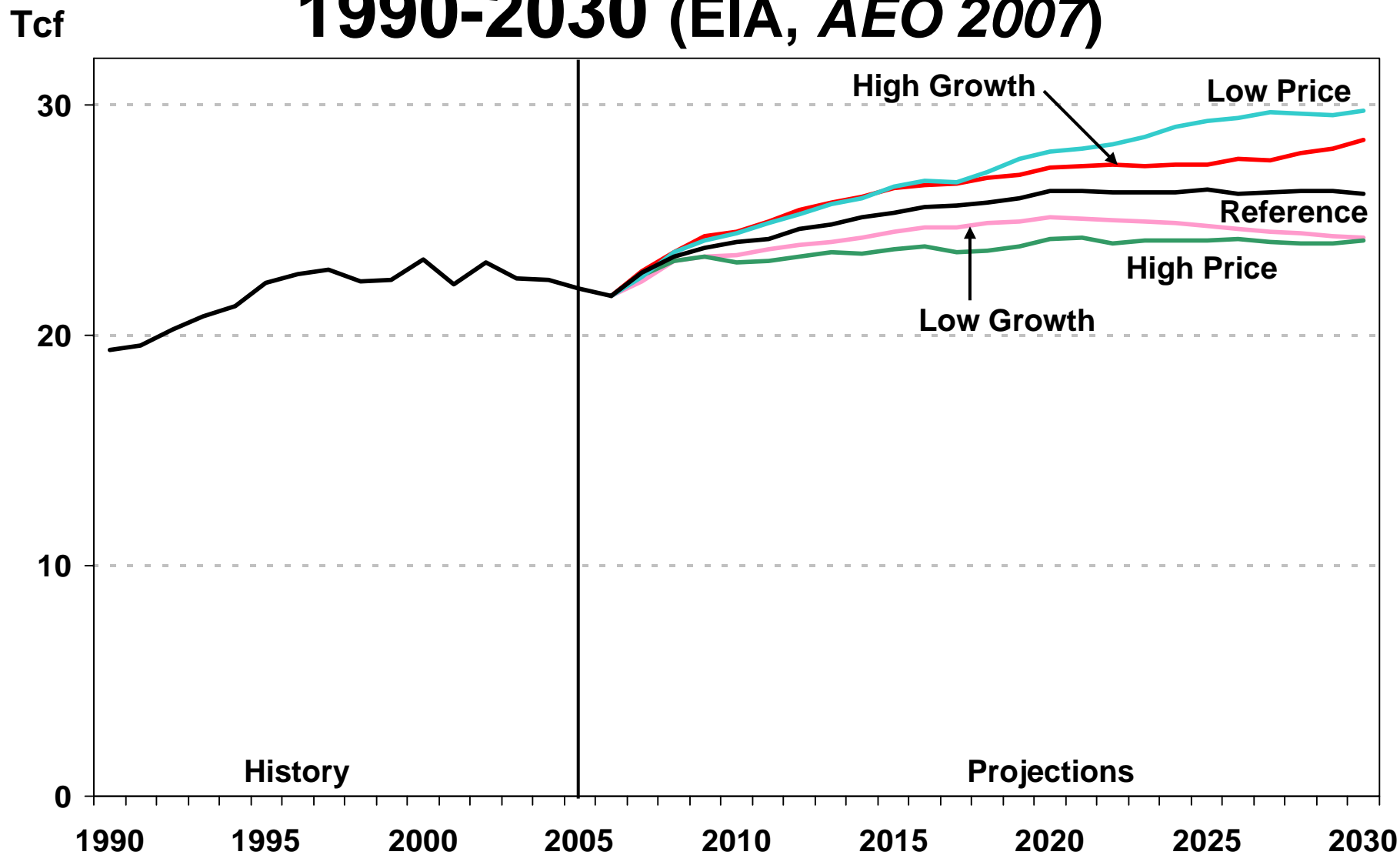
Natural Gas Consumption by Sector, 1990-2030

Tcf

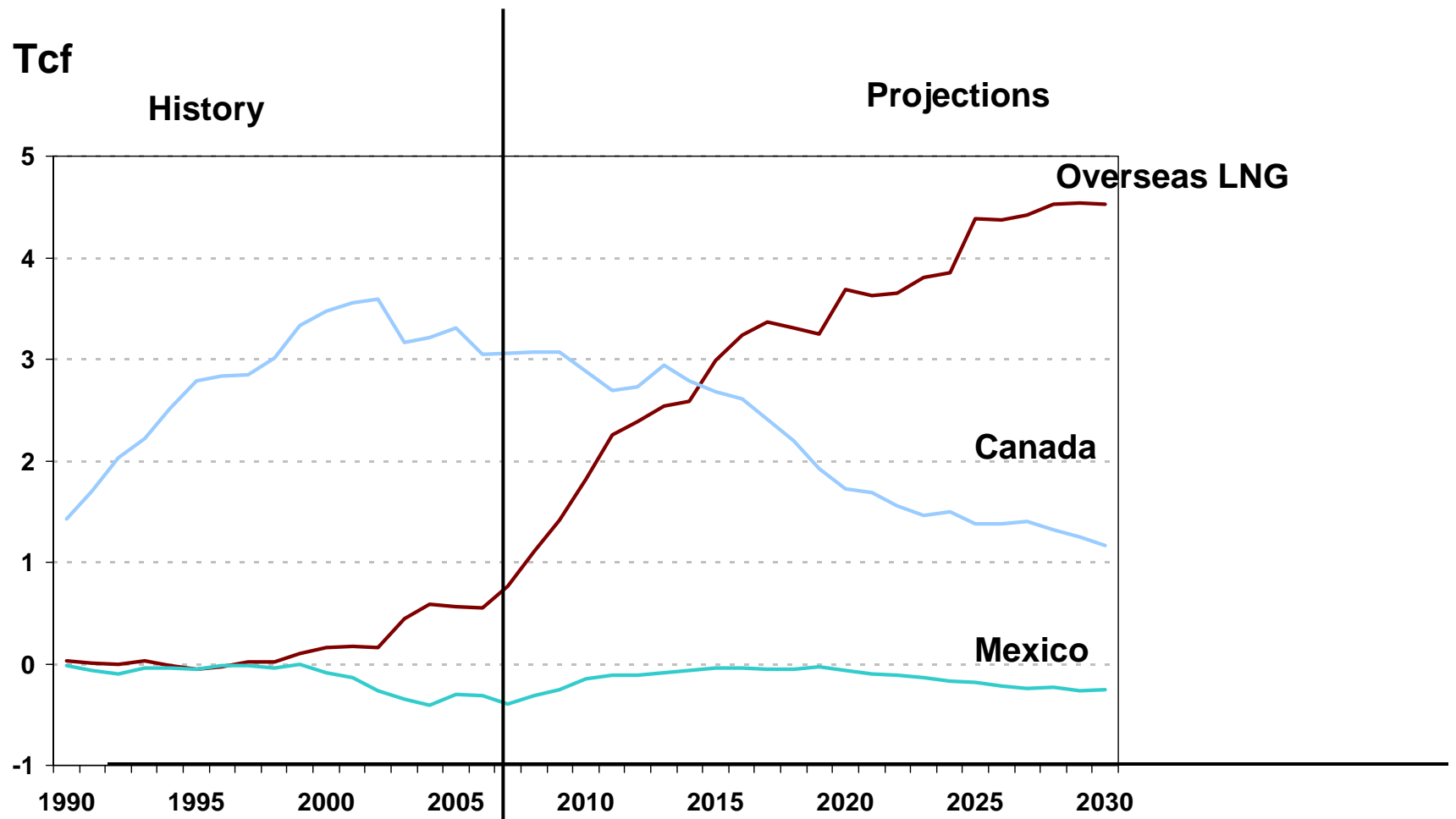


EIA, *Annual Energy Outlook 2007*

Total Natural Gas Consumption, 1990-2030 (EIA, AEO 2007)

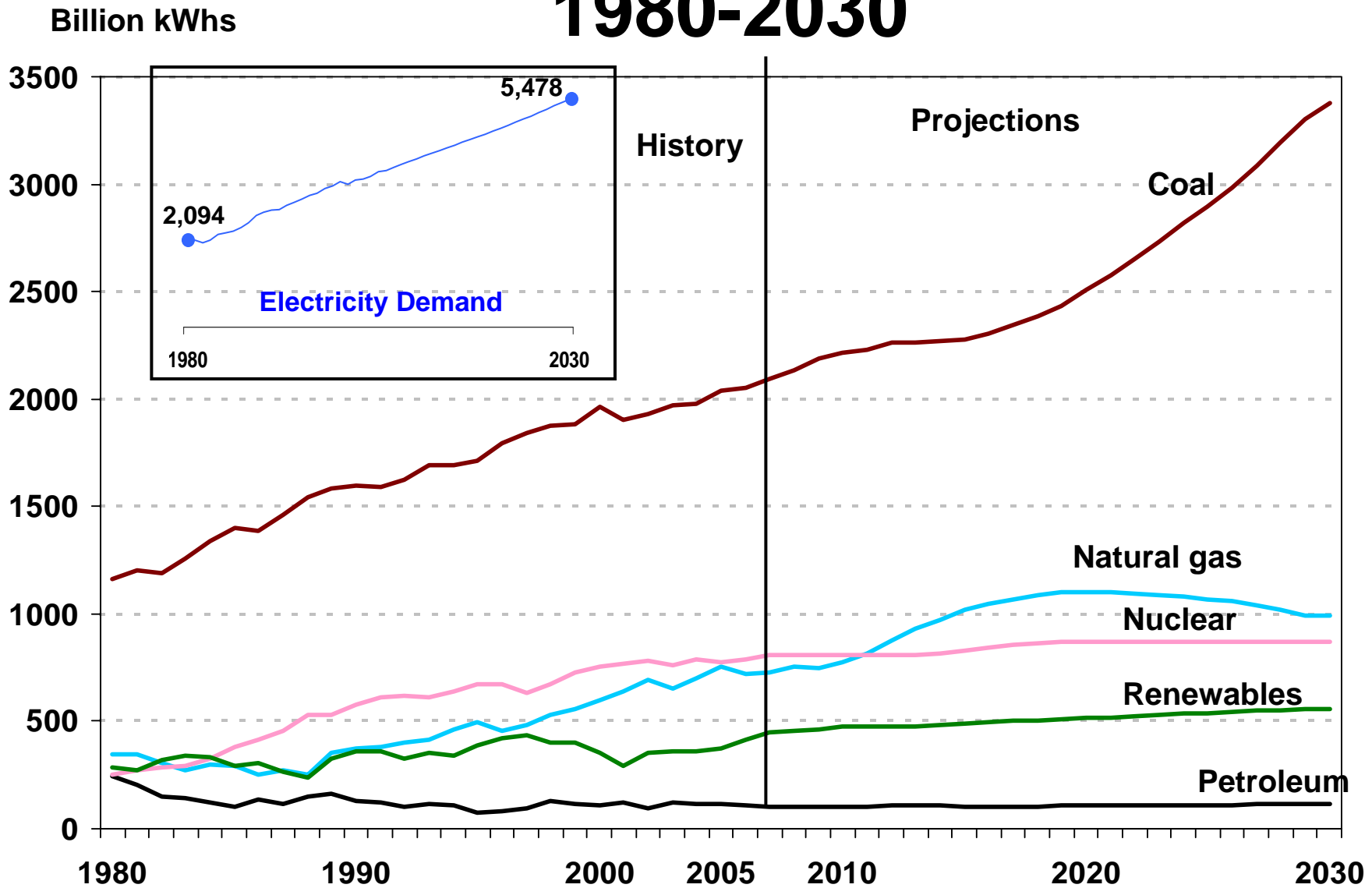


Net U.S. Imports of Natural Gas by Source, 1990-2030



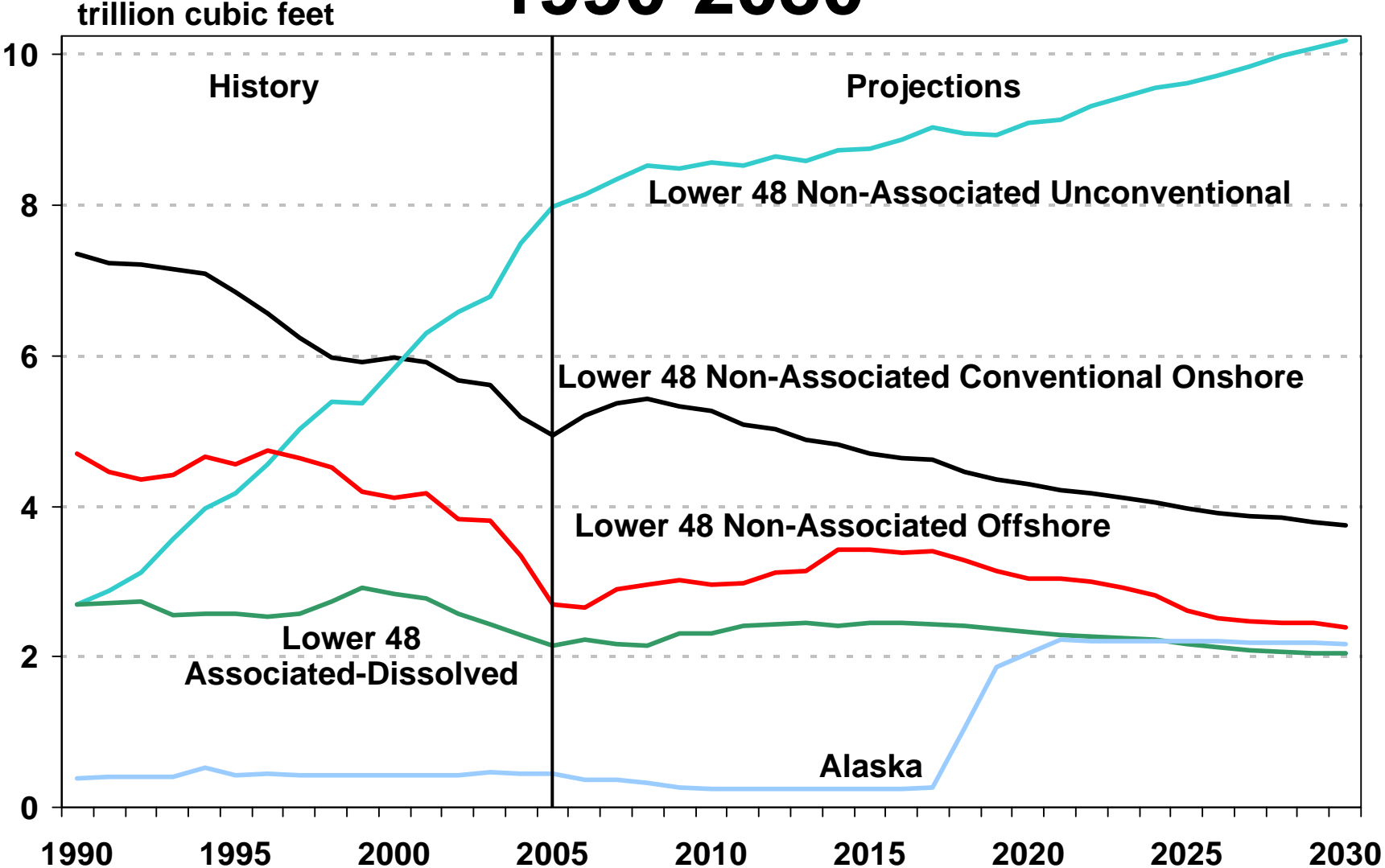
EIA, *Annual Energy Outlook 2007*

Electricity Generation by Fuel, 1980-2030



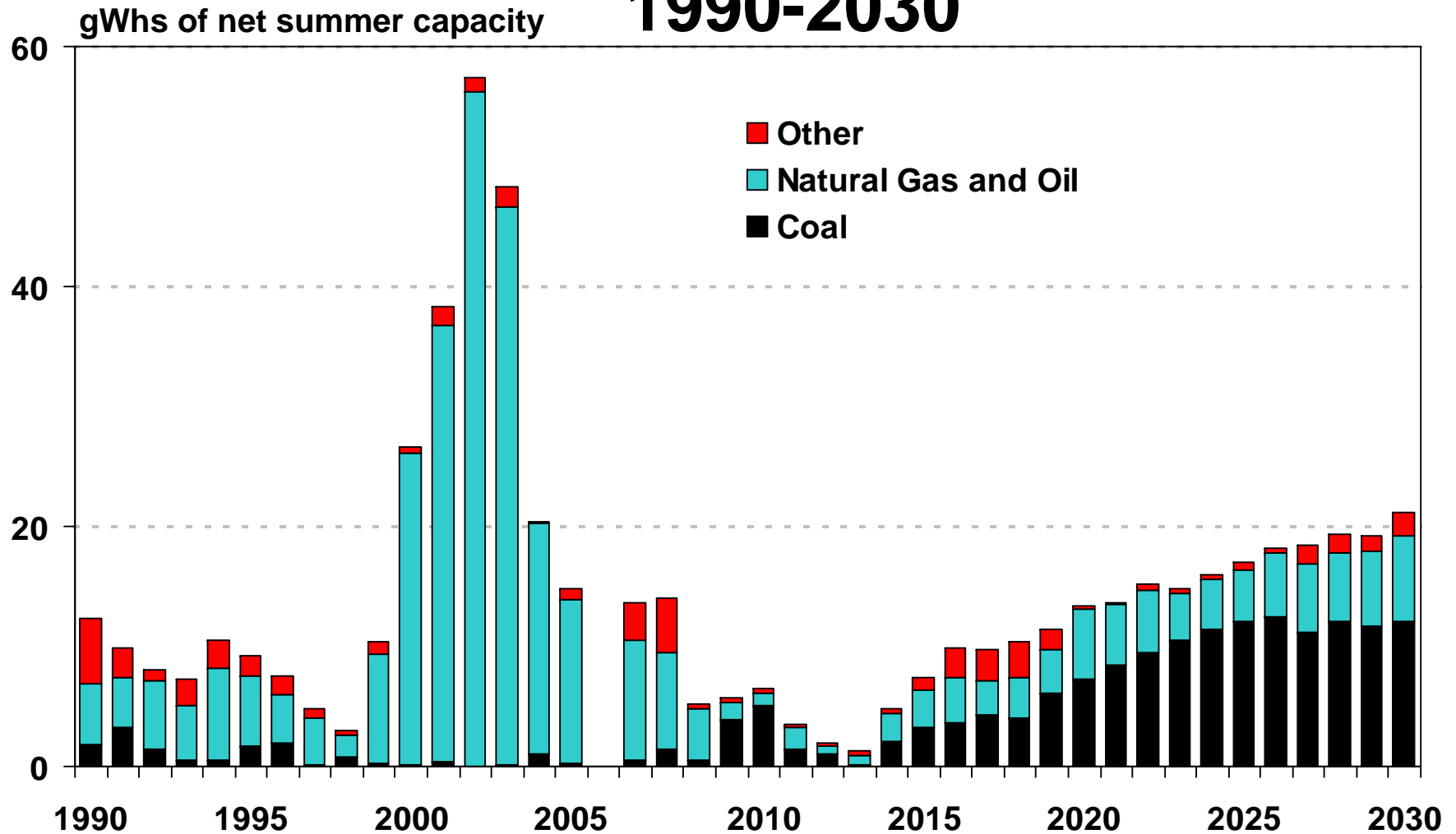
EIA, *Annual Energy Outlook 2007*

Natural Gas Production by Source, 1990-2030



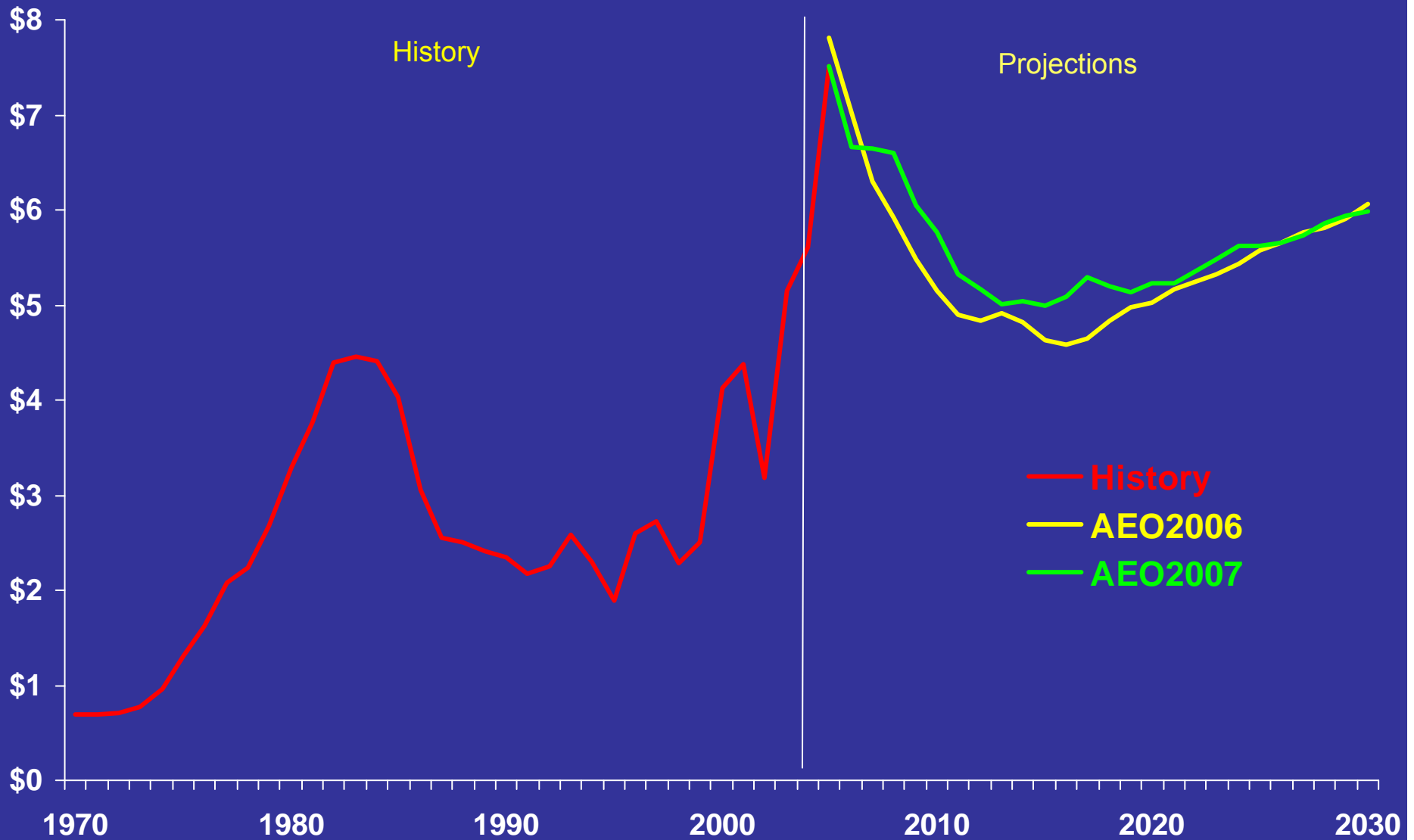
EIA, Annual Energy Outlook 2007

Additions to Electricity Generation Capacity in the Electric Power Sector, 1990-2030



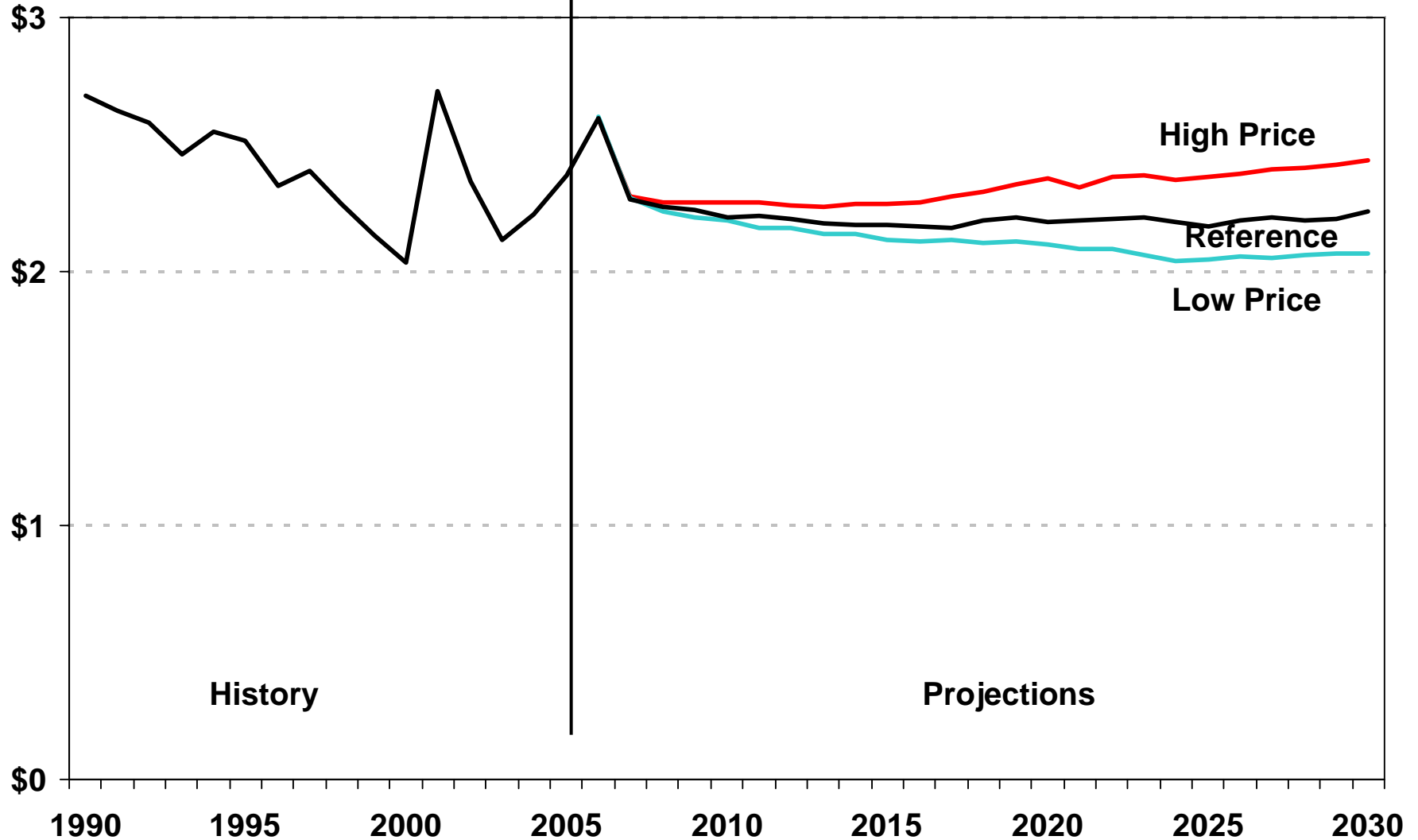
EIA, *Annual Energy Outlook 2007*

U.S. Natural Gas Wellhead Price, 1970-2030 (2005 dollars per thousand cubic feet)



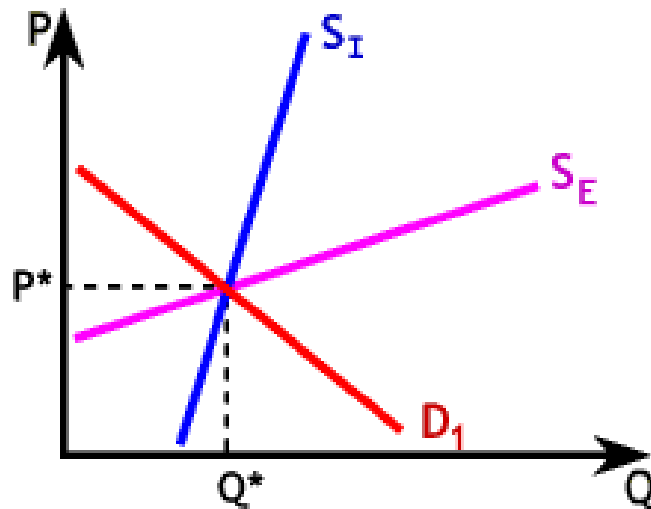
Average Natural Gas Transmission and Distribution Margins in Three Cases, 1990-2030 (EIA, AEO 2007)

2005 dollars per Mcf



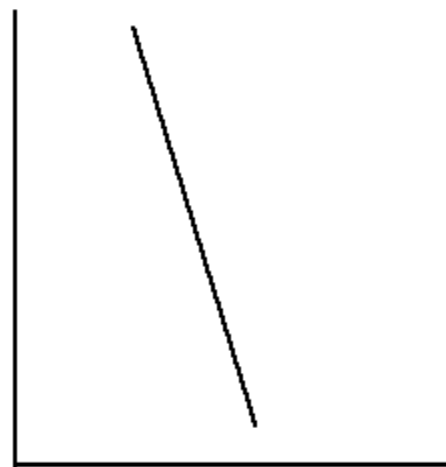
The Importance of Price Elasticities

- The effect of price elasticity of supply on price

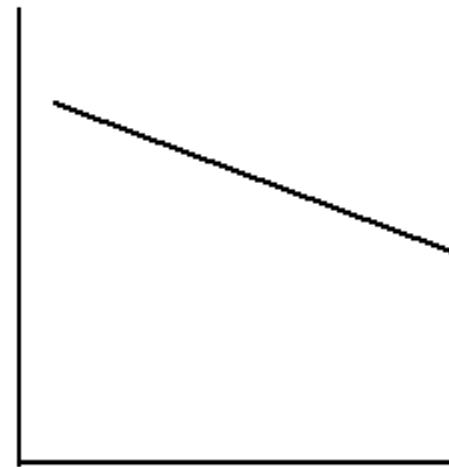


The Importance of Price Elasticities -- continued

- Price elasticity of demand

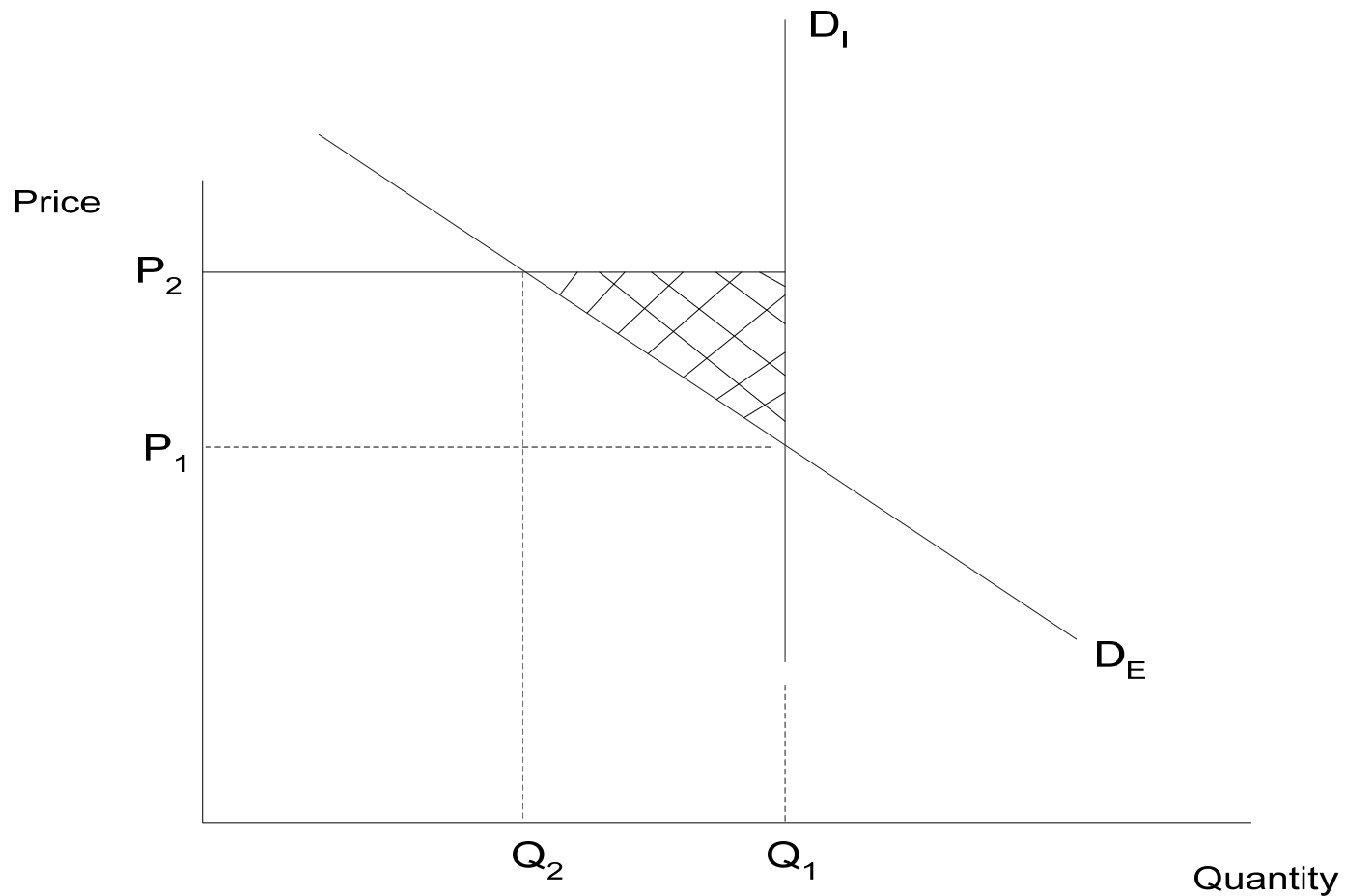


INELASTIC DEMAND



ELASTIC DEMAND

Illustration: The cross-hatched area represents the additional economic welfare loss to a price-inelastic customer from an increase in price



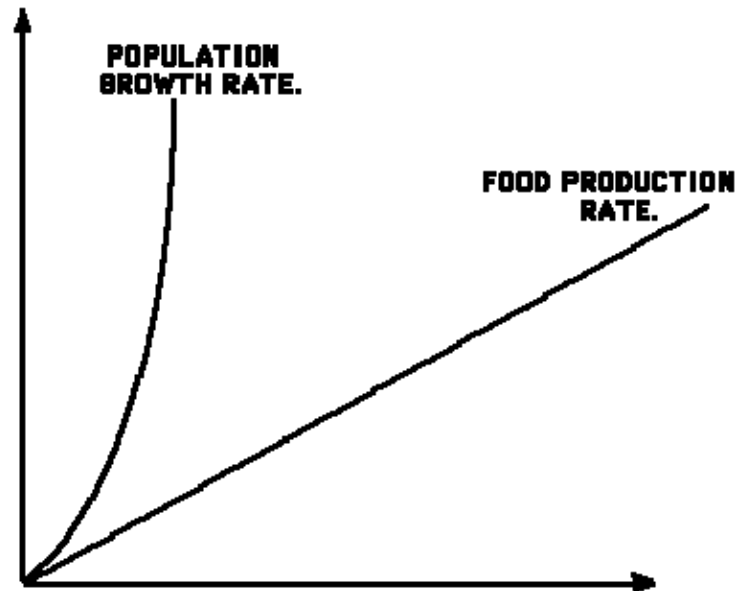
Malthusian Bias?

- The Reverend Thomas R. Malthus – A glum chap



Malthusian Bias?-- continued

- Malthusian prediction: demand growing faster than supply



Why Easier to Restructure the Natural Gas Industry Than the Electricity Industry

- Reforms over a longer period of time
- Difficulty in storing electricity
- Externality problem in electric transmission
- Limited interconnection capacity for electric transmission
- Local market power (e.g., load pockets with “must run” generation facilities)
- Highly vertically-integrated electricity industry
- Difficulty in siting new electricity transmission lines
- Large amounts of stranded-cost recovery from electricity consumers
- Real-time balancing requirements for electricity
- Electricity prices highly vulnerable to price spikes (even more than natural gas) because of little storage capability and short-run highly price-inelastic demand and supply

Gas Choice Programs

- **Background**

- Currently, 21 states and D.C. have legislation or programs in place allowing for small-customer choice
- Over 55% of residential customers in the U.S. are eligible to choose their supplier
- As of December 2006, 4.2 million residential customers participated or about a 12% participation rate (a decline from 20% for 2001 but a slight rise from 2005)

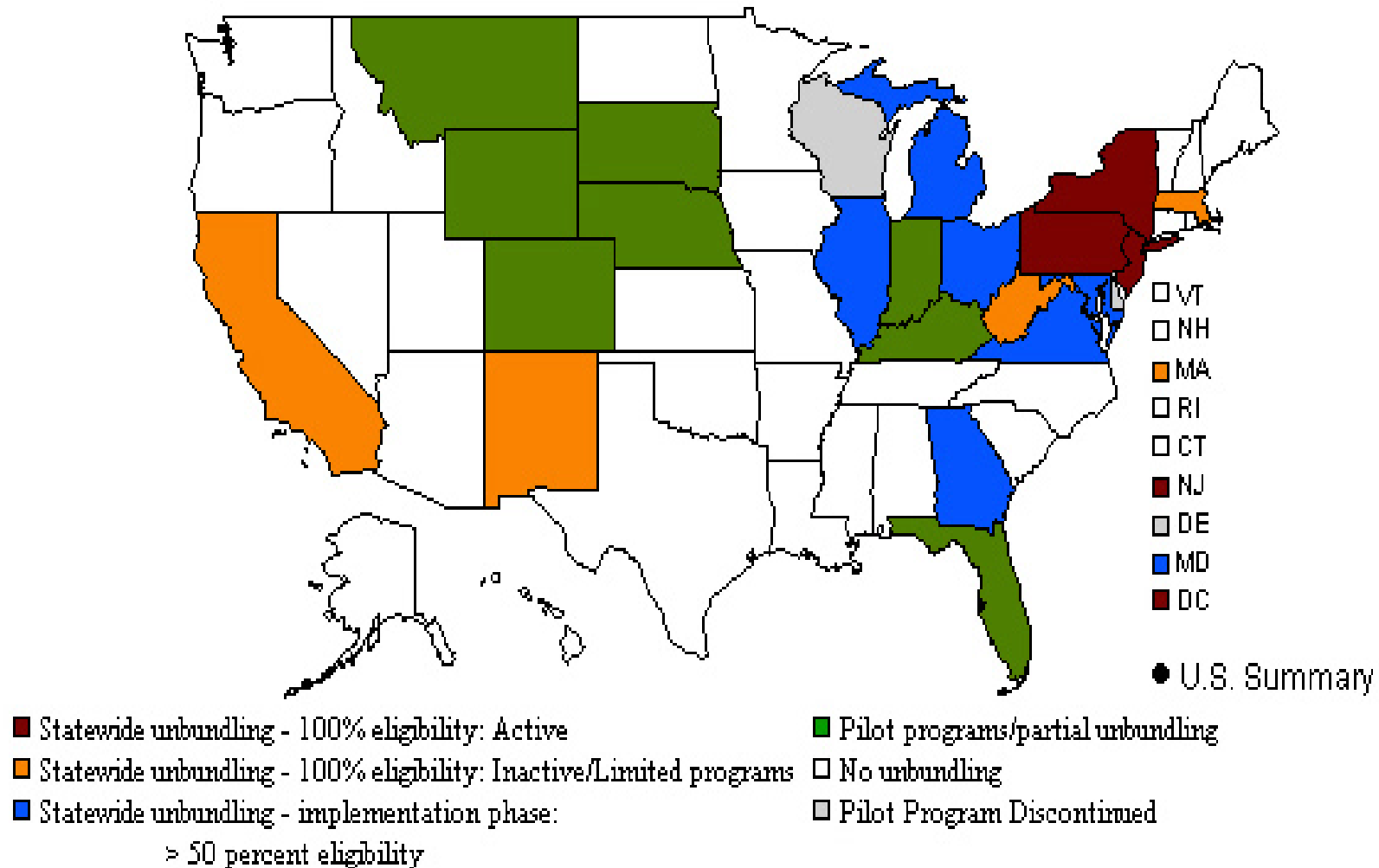
- In some states, programs are inactive or have extremely low participation (California, Massachusetts, New Mexico and West Virginia)
- A few cases of pilot-program terminations – namely, Delaware and Wisconsin
- Most publicized program—Atlanta Gas Light (AGL), which by itself has about 35% of the total residential participants in gas choice programs across the U.S.

Gas Choice Programs -- continued

- Background – continued
 - Evolving program changes in terms of size, scope, design, and implementation – a learning process for gas utilities, marketers, and regulators (e.g., program expansions in Indiana during 2006)
 - For various reasons, declining number of marketers serving residential customers over the past few years – a 21% percent decrease in active marketers since 2002
 - Since 2001, stagnant, or negative, growth, (e.g., DC, Maryland, New Jersey, Pennsylvania), in participation rates for several programs
 - Highly uneven participation rates across programs

Gas Choice Programs -- *continued*

Status of Programs, as of December 2006 (source: EIA)



Participation Rates for Selected States with Gas Choice Programs (2006 and 2002)

State	Participation Rate
District of Columbia	9.4% (2006), 19.5% (2002)
Illinois	7.5, 6.8
Maryland	11.5, 17.1
Michigan	6.7, 23.2
New Jersey	1.5, 4.3
New York	9.1, 7.5
Ohio	44.3, 40.1
Pennsylvania	7.0, 8.5

Gas Choice Programs -- continued

- Not easy for marketers to make money in the mass retail market
 - High costs for marketers in advertising, other marketing activities, and back-office operations
 - Marketers purchase gas and upstream transportation in essentially the same markets that gas utilities do
 - Difficult to offer value-added services – retailing gas, at least so far, has been a low value-added activity
 - Recently, stricter regulations and rules have imposed higher costs on marketers

Gas Choice Programs -- continued

- Most residential customers aren't really interested
 - Why bother to switch?
 - Seems rational for most residential customers to stay with their utility, given small savings and the transaction costs associated with switching
 - For the average middle-class household, any realized savings would be a small percentage of its income

Gas Choice Programs -- continued

- Wide variation of participation across programs attributable to several factors, with the price of utility gas probably being the major one, but other factors important as well
- Roughly speaking, customers seem to require savings of 5-10% off their gas bills to seriously consider switching

Gas Choice Programs -- continued

- Small customers less inclined to switch than large customers – fundamental differences between the “mass market” and the market for large customers
- Participation rates for individual programs do not necessarily increase over time – somewhat of a surprise
- The benefits of gas choice programs to small retail customers have not been as great as some industry observers had hoped for

Protecting Consumers from High Gas Prices

- From the perspective of an increasing number of state commissions and gas utilities, “consumer protection” requires the combination of (1) adequate gas supplies, (2) “reasonable” prices, and (3) “moderate” price stability
- The biggest challenge lies with protecting consumers from “high” market prices during the winter heating season
- High and volatile prices essentially caused by tight gas supplies relative to market demand
- Many PUCs and gas utilities have recognized that protecting consumers may involve shifting some of the risk associated with market prices away from consumers via hedging and other gas-utility initiatives

Protecting Consumers -- continued

- From an economist's perspective, protection means minimizing consumer economic-welfare losses from high or rising gas prices – for most markets, this is normally achieved by consumers reducing their consumption
- This is difficult to do in the case of gas consumed by small customers, who consider natural gas as essential with little opportunities for substitution in the short run
- It is because of this feature of the gas market that attention has been paid to protecting consumers
- As mentioned before, supply shortages are not an imminent problem as long as prices are allowed to vary in response to changed supply and demand conditions – not like the period prior to the 1980s

Protecting Consumers -- continued

- Since 2000, questions have centered around (1) whether consumers want price stability, (2) the kind and degree of price stability they want, (3) how much they are willing to pay for price stability, (4) the assurance of affordable gas to low-income households, and (5) demand-side actions that consumers can take
- **Price caps at the retail level poses problems --** look at what happened in California with regard to electricity restructuring
- Also, problematic is the notion of setting prices at the **lower** of market and contract/hedged price

What Have State PUCs and Gas Utilities Been Doing to Cope with High Natural Gas Prices?*

- Educating the general public on the current gas-market situation/developing a communications strategy
- Implementing a moratorium on winter disconnects
- Structuring PGAs to avoid rapid run-up of prices
- Redesigning rates to reallocate fixed costs away from volumetric billing elements
- Offering fixed-price tariffs

* See the *Natural Gas Information "Toolkit"*, prepared by the NARUC Natural Gas Task Force, November 2003.

What Have State PUCs and Gas Utilities Been Doing? -- *continued*

- Encouraging energy efficiency
- Increasing low-income energy assistance
- Implementing/considering revenue decoupling/weather normalization mechanisms
- Developing portfolio/hedging strategies for gas procurement
- Encouraging fuel diversity for electric generation
- Promoting budget or levelized billing

A New Game For Gas Utilities Since the Early 1990s

- New responsibilities and risks for gas utilities with respect to
 - Commodity gas procurement
 - Interstate pipeline transportation
 - Price-risk management
- More choices of services and providers
- More transparent price information
- Availability of a wide array of financial instruments
- Recent focus on achieving an “optimal” balance between minimum prices, reliable supply, and moderate price volatility

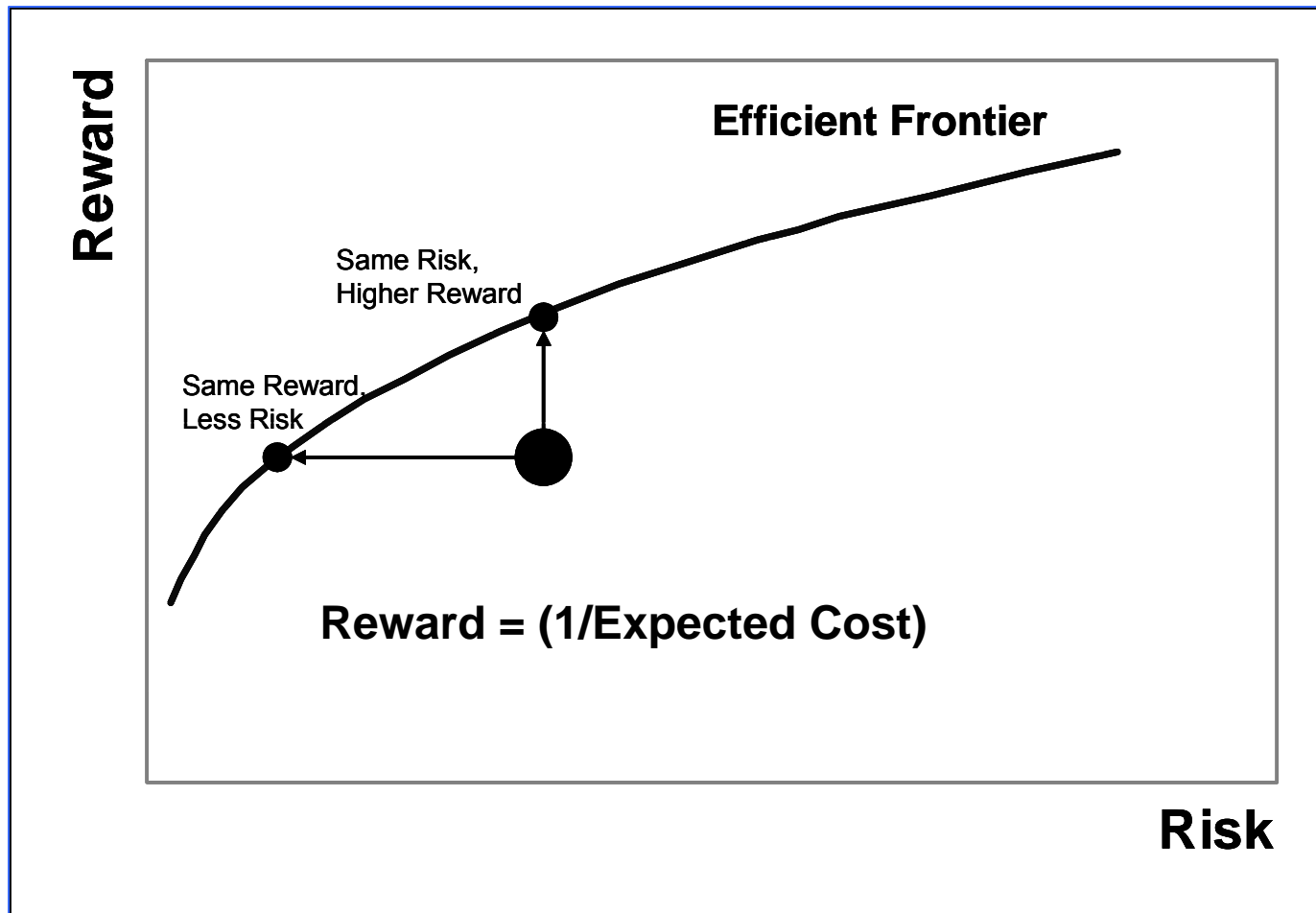
Objectives of a Gas Procurement Strategy

- Reliable supplies delivered to the city gate
- Commodity and capacity costs compatible with market conditions
- Development of a portfolio to achieve “reasonable” costs and to support reliability
- Balancing of “reasonable” costs and moderate price stability (as well as price predictability)

Objectives of a Gas Procurement Strategy -- *continued*

- Using futures contracts and other financial derivatives, in addition to traditional hedges such as storage and physical contracts
- Structuring an efficient portfolio that (1) minimizes expected cost for any given level of risk or, equivalently, (2) minimizes risk for any given level of expected cost

Portfolio Analysis



Hedging Component

- Physical hedges
 - Storage
 - Physical contracts
- Financial hedges
 - Futures/options
 - Over-the-counter/bilateral financial instruments
- Each hedging option has advantages and disadvantages
- Long-term tradeoff between achieving more price stability and lower gas costs

Some Thoughts on Hedging

- Hedging attempts to control price risk by moderating the consequences of high or increasing natural-gas prices caused by market forces
- Its purpose is to provide *price stability and predictability*
- Insurance-type activity that is not expected to reduce the average cost of purchased gas over time
 - Risk-averse activity in an uncertain environment
 - Risk-shifting activity that requires the payment of a “premium” by the gas utility
- Hedging often results in higher costs after-the-fact, but still can be considered a prudent activity (analogous to buying car insurance without ever filing a claim)

Some Thoughts on Hedging -- *continued*

- Strong economic support for hedging by gas utilities, including financial instruments, in times of fragile and tight market conditions
 - Price volatility has become an inherent feature of the gas commodity market
 - Financial instruments may have lower costs and more liquidity than physical hedges (storage, forward contracts)
- Beginning in the winter of 2000-2001, state commissions have increasingly conveyed to gas utilities that buying gas in the spot market can no longer be assumed prudent

Some Thoughts on Hedging -- *continued*

- Hedging of commodity gas is now recognized by most gas utilities and regulators as an integral component of a gas management strategy in times of volatile gas prices
- State commissions vary in their involvement (both upfront and after-the-fact) in hedging activities
- State commissions still seem more comfortable with physical hedges than with financial hedges

Some Thoughts on Hedging -- *continued*

- Most state commissions allow hedging, including financial instruments, and some are even encouraging it
- So far, gas utilities have rarely been penalized for hedging, but the lack of regulatory guidance has likely discouraged some from hedging efficiently and at greater levels

Illustrations of a Gas Portfolio

- Utility X
 - Purchase of fixed-price contracts for price stability
 - Purchase of indexed contracts for the winter months
 - Purchase of monthly and daily spot gas to displace more expensive swing transactions, fill summer load, and cover shortfalls

Illustrations of a Gas Portfolio -- *continued*

- Utility Y
 - Storage meeting one-third of winter demand
 - Physical contracts meeting another third
 - Spot transactions meeting the last third
 - Financial hedging covering a portion of spot purchases

Illustrations of a Gas Portfolio -- *continued*

- Utility Z
 - Storage meeting 70% of the winter requirements
 - Remainder met by long-term contracts indexed to regional spot prices
 - No financial instruments
 - No spot purchases

Recent Trends in Gas Procurement

- Application of the principles of portfolio theory to the procurement and pricing of gas supplies and transportation
- Price stability and predictability as an explicit objective
- Increased use of financial instruments (e.g., futures contracts, options, swaps) for hedging
- Use of storage for additional functions (e.g., parking, balancing, arbitrage opportunities)
- Shorter-term pipeline service transactions

Recent Trends in Gas Procurement -- *continued*

- Movement away from multi-year commodity gas transactions
- Competitive bidding process for procuring gas supplies
- Submittal of annual gas supply plans for regulatory review

Revenue Decoupling (RD): How It Works

- “Baseline” sales determined at last rate case = 10 million therms
 - Actual sales = 9.5 million therms (5% less than “baseline” sales)
 - Distribution margin (or base rate) = 30 cents per therm
 - Revenues at “baseline” sales = 30 cents X 10 million = \$3 million
 - Actual revenues = (30 cents X 9.5 million = \$2.85 million
 - Shortfall = \$150,000
 - Revenue decoupling would automatically adjust rates to eliminate this shortfall
- Specifically, it does this by the following:
 - $\Delta\text{Price} \times 9.5 \text{ million} = \$150,000$, or
 - $\Delta\text{Price} = \$150,000 / 9.5 \text{ million} = 1.579 \text{ cents}$ (which increases the distribution charge by 5.3%)
 - In other words, by increasing the base rate to *31.579 cents per therm* (from 30 cents), the utility would achieve the same revenues of \$3 million as if sales were at the “baseline” level

Revenue Decoupling -- *continued*

- ***RD under different labels***
 - Conservation margin tracker
 - Conservation-enabling tariff
 - Conservation tariff
 - Conservation rider
 - Conservation and usage adjustment tariff
 - Innovative ratemaking
 - Conservation tracker allowance
 - Incentive equalizer
 - Delivery margin normalization
 - Usage per customer tracker
 - Customer utilization tracker
 - Trial billing determinant adjustment clause rider

Revenue Decoupling -- *continued*

- Gas utilities with RD

- Baltimore G&E
- Washington Gas Light (MD)
- Southwest Gas (CA)
- Northwest Natural (OR)
- 3 major California gas utilities
- Piedmont Natural Gas (NC)
- Public Service of New Mexico

- New Jersey Natural Gas
- South Jersey Gas
- Questar Gas (UT)
- Avista Utilities (WA)
- Cascade Natural Gas (OR,WA)
- Vectren Energy Delivery (OH,IN)

Revenue Decoupling -- *continued*

➤ Several proposals pending in

- Arizona
- Arkansas
- Colorado
- Delaware
- District of Columbia
- Kentucky
- Michigan
- Minnesota
- New York
- Virginia

Revenue Decoupling -- *continued*

- *Cases where an RD was rejected, withdrawn or discontinued*
 - Southwest Gas (NV, AZ)
 - Xcel (MN, ND)
 - Maine (electric utilities)
 - New York (electric utilities)
 - Washington (electric utilities)
 - PacifiCorp (WA)
 - Portland GE (OR)
 - Northwest Natural (WA)

Underlying Rationale for Revenue Decoupling

Energy efficiency can benefit consumers and society in both the short and long run	Given existing rate design, variations in sales directly affect a utility's net revenues or earnings
Current rate design creates disincentives for a utility to promote energy conservation	A small percentage change in sales can have a significant effect on a utility's earnings
Consumption per residential customer (adjusting for weather) has continuously declined over the past 25+ years in most parts of the country, and this trend is expected to continue in the future	Almost all of a gas utility's short-run non-gas costs are fixed, meaning they stay virtually constant when sales change
Rate structures encourage utilities to increase sales between rate cases (which may be contrary to state or commission policies)	Most of a utility's fixed costs are recovered through the volumetric charge
Determining future sales is a contentious part of a rate case	Full recovery of fixed costs depends on actual gas sales equaling sales levels calculated in the last rate case
Gas sales are highly volatile from year-to-year due to different factors, most of which are beyond a utility's control	Fixed costs recovered in the customer charge would reduce consumers' incentive to conserve

Expected Outcomes from Revenue Decoupling

Reduced overall risk to the utility	Little effect on incentives for customer-initiated conservation
Less incentive for utility to promote sales, and less disincentive to promote energy efficiency	Increased rate volatility (although minimal compared with the volatility of the gas commodity cost)
Base rates inversely related to actual sales between rate cases	Effect similar to shifting recovery of fixed costs to customer charge, except for possible intra-class subsidy effect
Base rates would tend to be higher (as the utility's average cost would increase, assuming lower sales), although some offset from a possible lower cost of capital	Uncertain of the risk and overall economic welfare effect on consumers

Arguments for Revenue Decoupling

Necessary, if not sufficient, for a utility's financial interest in effectively promoting energy efficiency	Reduced risks to customers and decline in a utility's overall risk
Strong utility profit motive under traditional ratemaking for promoting sales	Definite benefits to customers
Sales largely exogenous to a utility's control	A higher customer charge reducing incentive for customer-initiated energy efficiency
Historical decline in gas use per residential customer generally not taken into account in setting new base rates	More energy efficiency causing a decline in the market price of gas
High sales volatility from year-to-year causing possible significant deviations from targeted sales and earnings	Absolutely necessary for aggressive utility energy-efficiency initiatives
Short-run delivery costs largely fixed	Ease in implementation
Strong opposition to allocating all fixed costs to the customer charge	Necessary for a utility to earn its authorized rate of return
Potential for energy efficiency to benefit customers	One less contentious component of a general rate case

Arguments against Revenue Decoupling

Need to show special conditions for true-up recovery of revenues	Uncertainty over a future decline in use per customer
Inappropriate to single out revenues for true-up adjustments	Lower utility service quality
Less likelihood of addressing rate-design problem	More price volatility
More certainty of utility benefits than customer benefits	Reduced incentive for customer-initiated energy efficiency
Upward pressure on short-term prices, as a utility's average cost for delivery is likely to increase	Unequivocally increased customer risk
Incremental options should be considered	Preference for alternative ratemaking procedures
Possible legal/policy precedent issues	Preference for lost revenue adjustment (LRA) mechanism
Overly broad in addressing the problem at hand	

State Commission Arguments Rejecting RD

- In the absence of extraordinary circumstances, RD runs afoul of acceptable ratemaking
- Other mechanisms are better for stabilizing a utility's earnings
- No evidence that past gas usage trends placed the utility in financial jeopardy
- Not sure that declining use per customer will continue and adversely affect a utility's future earnings

State Commission Arguments

Rejecting RD -- *continued*

- RD shields the utility from sales risk by passing it on to consumers
- Don't need RD to promote utility-initiated energy efficiency
- Need to explore fully, in a broader investigation, the issue of usage volatility and margin recovery
- Concern over the possible future magnitude of surcharges from RD adjustments

Ex Post Evidence on RD: Generally Favorable but Limited

- Northwest Natural (OR)
- Baltimore G&E

The Big Issues Being Fought in the Trenches

- Specification and prioritization of the objectives of ratemaking methods
- The merits of RD relative to other ratemaking methods in satisfying the same objectives
- The appropriateness of RD as a tracker
- Utility commitment to promoting energy efficiency

The Big Issues -- *continued*

- The “risk” effect of RD on consumers and the utility
- The need for RD to promote utility-initiated energy efficiency
- The financial effect of declining usage per customer on a utility
- “Revenue assurance” effect versus conservation enhancement” effect of RD

The Big Issues -- *continued*

- The assessment of RD outside the context of a rate case
- RD structure and implementation (e.g., need for an annual rate-adjustment cap, cost of capital effect, frequency of rate adjustments, pilot or permanent)
- Overall effect on consumers

Straight-Fixed Variable Rate Design: Better than RD?

Advantages	Disadvantages
More compatible with sound economic (e.g., marginal cost) principles	Larger effect on low-usage customers, many of whom may be low income
More flexibility to a utility in competing with alternative fuel providers	Reduced incentives for customer-initiated energy efficiency
Elimination of intra-class subsidies	Possible noticeable increase in summer gas bills
Simpler to implement and for customers to understand	Likely stronger opposition from stakeholders and commission staff
How many capital-intensive services are priced	
Non-tracker with no periodic true-up or price changes between rate cases	
More stable gas bills	
More evenly allocates the recovery of fixed costs across seasons	

**The Natural Gas
Provisions
of *EPACT 2005***

Overview and Analysis

- Major objectives of natural gas provisions
 - Moderate future natural gas prices
 - Address projected growing gap between domestic demand and domestic gas supplies
 - Promote new gas supply sources
 - Reduce future gas demand growth

Overview and Analysis -- *continued*

- Most analysts now view the current tight gas market as structural in nature
 - Policy implication: need for major initiatives, in addressing a non-transient phenomenon, affecting both the demand and supply sides of the market
 - EPACT 2005 reflects this perspective, but falls short in the minds of many industry observers

Overview and Analysis -- *continued*

- The Act encompasses a variety of measures, many of which are designed to mitigate governmental barriers on both the supply and demand side
- Gas provisions, to a large extent, are compatible with initiatives proposed in recent studies

Overview and Analysis -- *continued*

- What can we expect?
 - No immediate or, even short-term, effect on natural gas prices
 - In the longer-term, unclear how natural gas prices will be affected
 - Expect downward pressure on natural gas prices
 - No one provision seemingly will have a major impact
 - Some provisions are substitutes for others – diminishing the potential benefits of individual provisions

Overview and Analysis -- *continued*

- Some of the provisions may not be socially desirable even if they lower natural gas prices (How can this be?)
- The most controversial provision (at least for the coastal states) relates to the siting of LNG terminals – the Act clarifies FERC's exclusive authority in siting

Overview and Analysis -- *continued*

- Unlike the electricity subtitle of the Act, few mandates imposed on State regulators
- Several mandates for FERC
- Mandated studies require lead federal agency to confer with the states

Major Natural Gas Provisions

- FERC jurisdiction over permitting of LNG terminals (*sec. 311*)
- Streamlined permitting of gas pipelines (e.g., setting of deadlines by FERC for input by federal and state agencies in certification proceedings, and expedited judicial-appeals process) (*sec. 313, 381 and 382*)
- **Repeal of PUHCA**, with expanded FERC merger authorization including generation acquisitions, and FERC/State PUC access to books and records of utility holding companies and their affiliates (*sec. 1261-1277*)

Major Natural Gas Provisions -- *continued*

- Market-based pricing of storage services under less stringent conditions, namely, the storage service operator does not have to show the absence of market power (*sec. 312*)
- Inventory and analysis of gas potential resources in the Outer Continental Shelf (*sec. 357*)
- Increased LIHEAP authorizations to \$5.1 billion (*sec. 121*), weatherization assistance (*sec. 122*) and State Energy Programs (*sec. 123*)

Major Natural Gas Provisions -- *continued*

- Promotion of energy efficiency (e.g., tax credits for home weatherization and energy-efficient appliances, higher efficiency standards for appliances) (*several sections*)
- Encouragement of fuel diversity in electric generation (e.g., PURPA-like standard of utilities developing diverse-fuel plans, financial incentives for nuclear power, clean coal technologies and renewable energy) (*several sections*)

Major Natural Gas Provisions -- *continued*

- Prevention of market manipulation regarding the purchase or sale of natural gas and its transportation (*sec. 315*)
- Assurance of market transparency (e.g., FERC rules for providing market information, FERC assessment of price transparency provided by current publications) (*sec. 316*)

LNG Siting (Section 311)

- Exclusive authority of FERC
- Requirement of FERC to consult with states and localities on safety and environmental issues
- Deadlines on state/local intervention
- Overriding objective is to facilitate the permitting process for LNG terminals

LNG Siting (Section 311) -- *continued*

- “NIMBYism:” The rationale for Section 311 (and some other provisions of EPACT 2005 as well)
 - What is it?
 - How can it be a problem?
 - What are the alternatives to overcome it?