

# Fuel Strategies & Market Outlook

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# Why Understand the Market?

- An effective fuel strategy is best formulated with an understanding of the market and potential risk
- The conventional wisdom is usually wrong
  - Remember the price forecasts back in the 70's that said oil would cost \$100/bbl by 1980?
  - Remember the NPC study in 1999 that said the US natural gas industry could supply a 30 Tcf market, no problem?
  - Remember the rush to rely on spot gas contracts rather than maintain a portfolio approach?
- Watch 3 things:
  - TECHNOLOGY
  - Wall Street earning incentives
  - Number of wells to add 2 Tcf
  - Price dynamics work from where the market IS now

# Major Market Trends

2005 = 6.21 6.28 6.30 7.33 6.77 6.13 6.98 7.65 10.97 13.93 13.85 11.01

- Price platform first half of 2005 ~ \$6.40/ MMBtu
- Hot summer & higher world oil prices plus two devastating Gulf Coast hurricanes to ~ \$14/ MMBtu Sept - Oct and > \$11/ MMBtu gas average for Q4 2005
- Extraordinarily mild winter has pulled prices downward – but
  - NOT as far downward as they should be all else equal
  - oil prices keeping natgas high, hurricane fear
- U.S. has plenty of reserves – annual additions consistently match production - but is taking more new wells to keep production constant
  - Production per well is declining (depletion over life of well)
  - Real issue is that NEW wells producing less
  - Longer-term: slow declines in oil prices towards a \$40/bbl OPEC target coupled with increased drilling and LNG should pull prices downward toward \$4.50 to \$5.00 per MMBtu

11.54

8.23

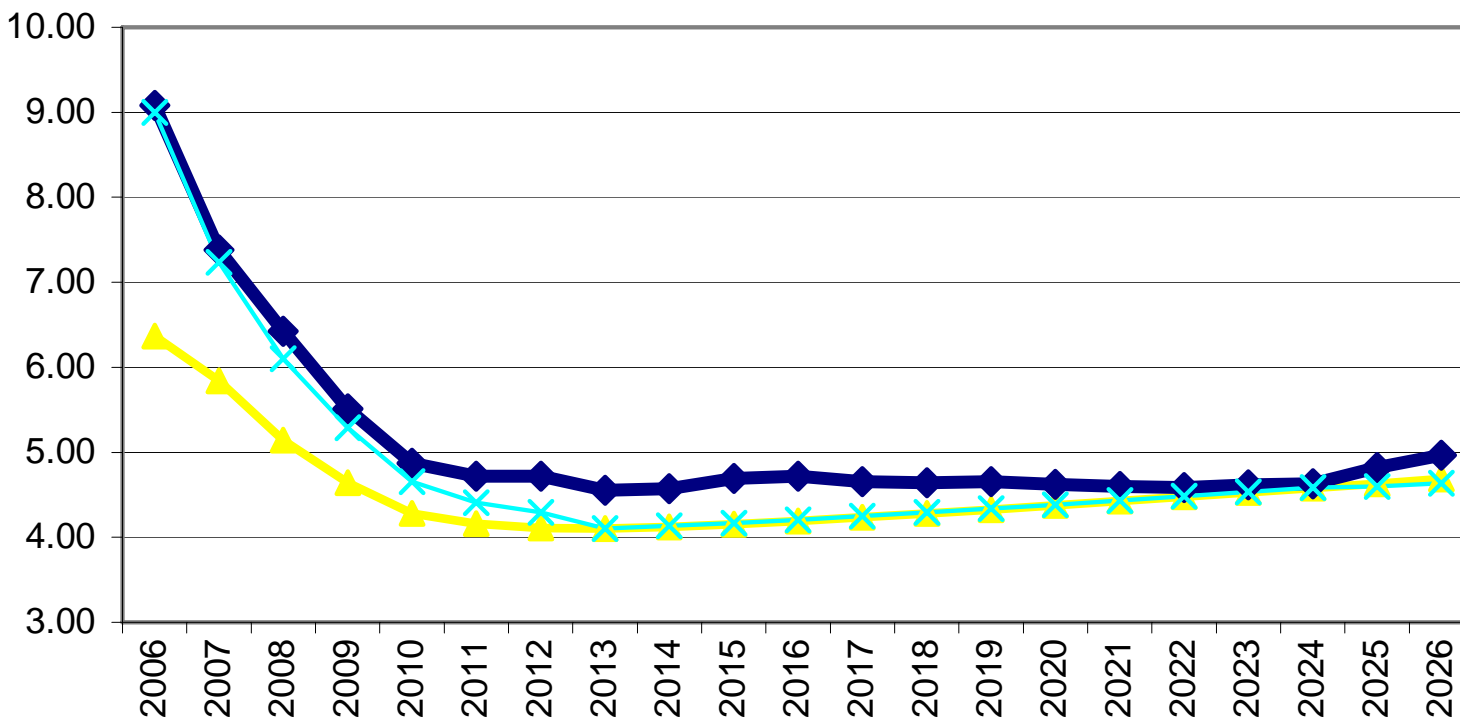
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# R. W. Beck Q1 & Q2 2006 Base Case

Beck forecasts an average annual FOM price for 2006 = \$9 per MMBtu; 2007 = \$7.40

- Q2 & Q3 Update
- Q1 Update
- Q4 Update

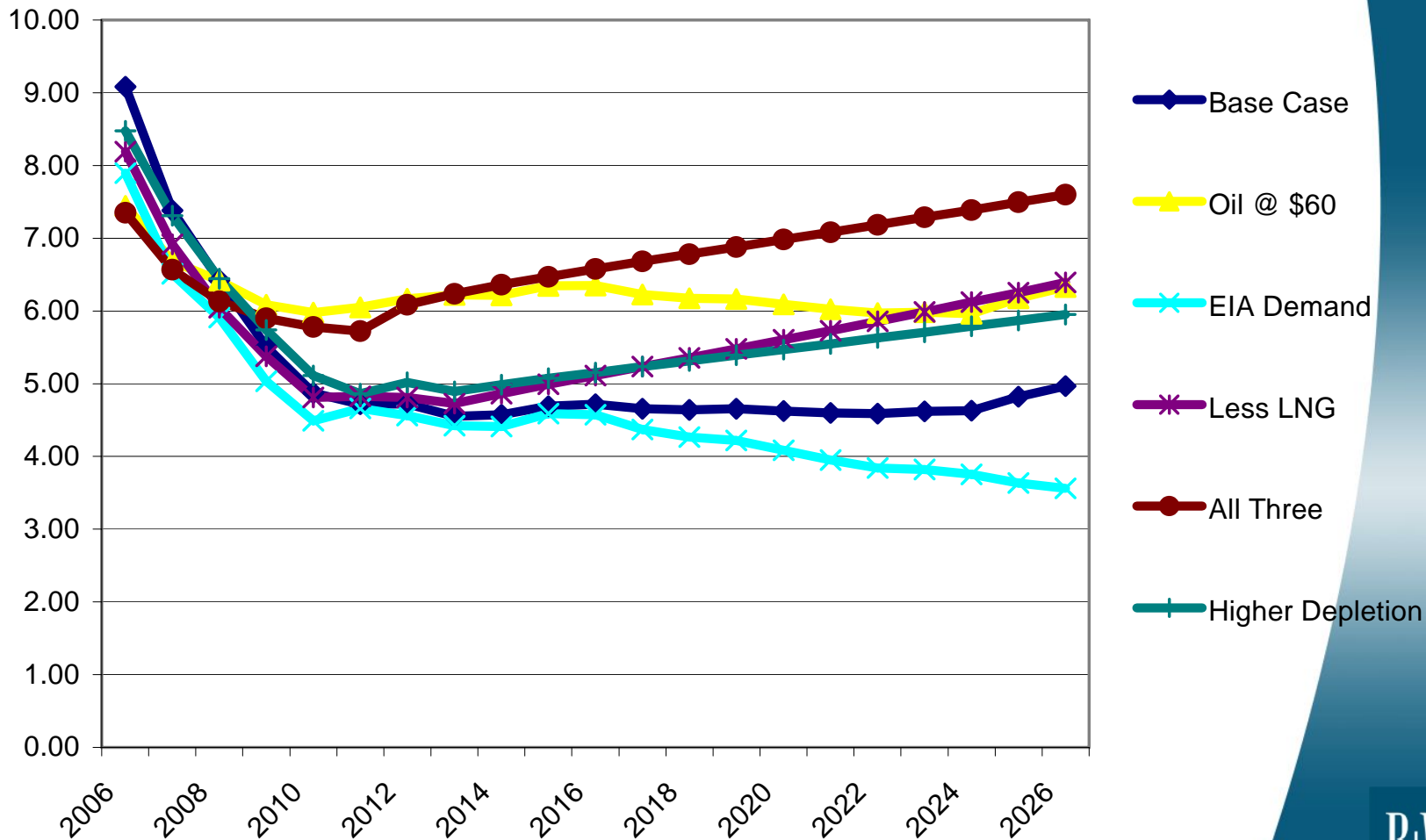
2006 \$ per MMBtu



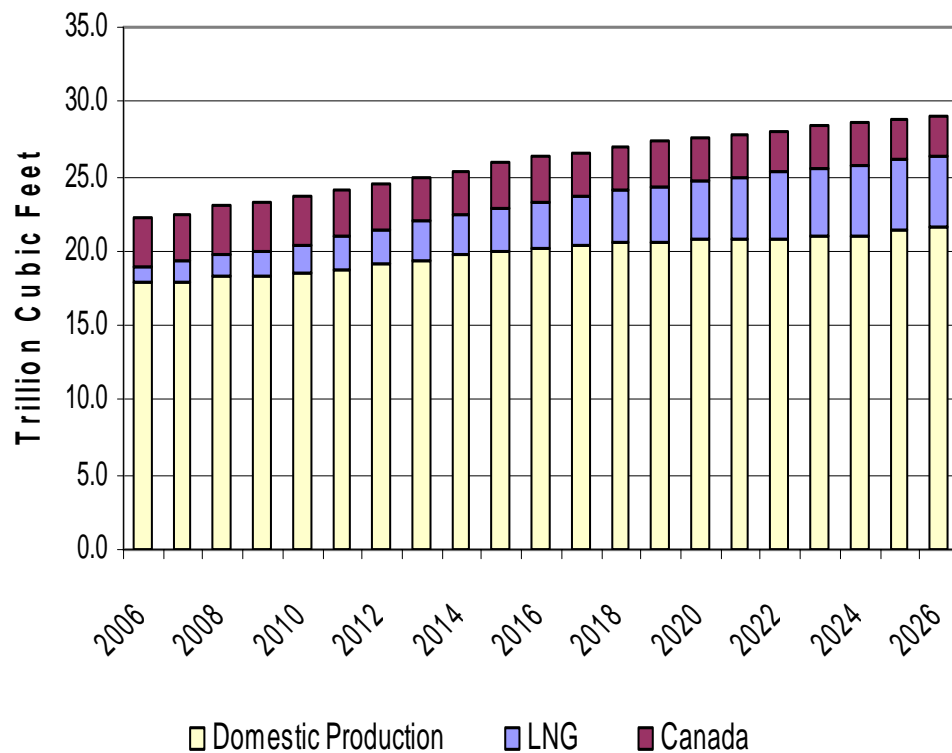
# Key Assumptions to Forecast

- 2006 demand set at 22.2 Tcf of demand; grows @ 1.4% per year
- Weather is assumed to be NORMAL
- 1 LNG terminal (delivering 1 Bcf per day) is added every other year
- 2006 supply is set at 17.7 Tcf
  - (0.5 Tcf, or 3.5 Bcf per day is assumed to be unavailable through winter 06-07 due to the combined effects of Hurricanes Katrina and Rita)
- Depletion is set at 11.4% annually (~ 2 Tcf/yr)
- Each new well adds 0.12 Bcf/yr (0.33 MMcfd)
- Oil prices start at \$65/bbl; slowly decline to \$40 by 2013
- Canadian supply to U.S. declines at 1% per year
- Canadian supply and LNG are baseloaded such that:
  - Demand – LNG – Canada = Domestic Supply Required***
- Model calculates number of new wells needed to meet *Domestic Supply Required*

# R. W. Beck Forecast Scenarios



# 2006 Outlook -- Supply Component Details

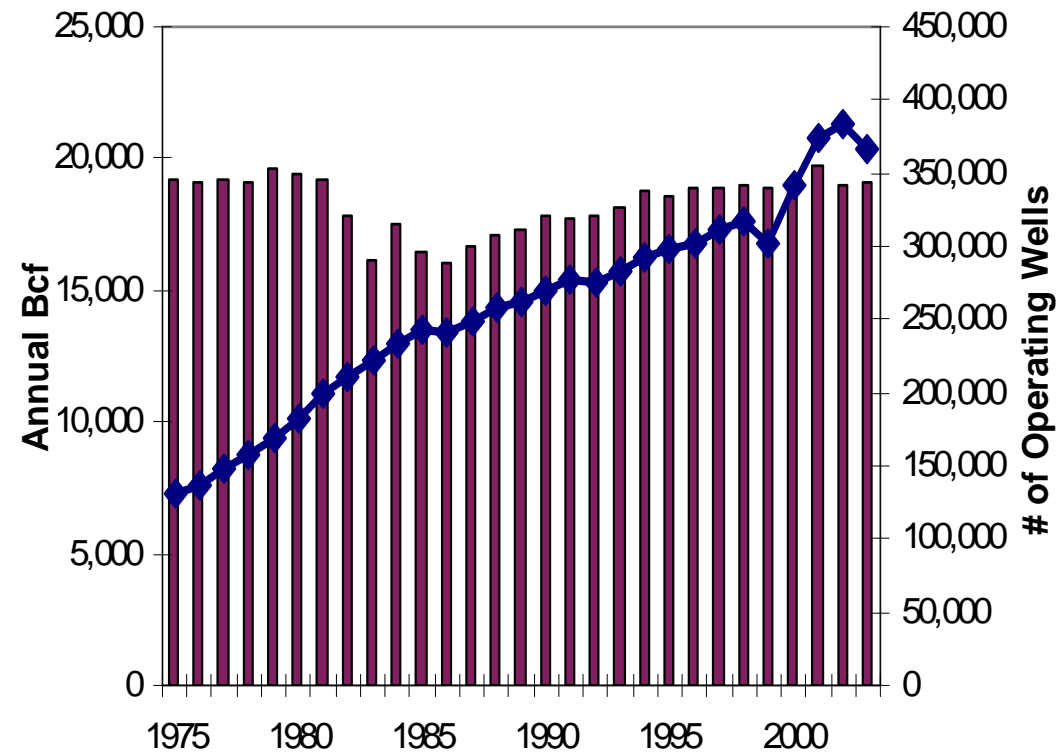


- Beck model determines what supply must be produced to meet demand

		Tcf
Last Year's Supply		17.7
Depletion	-	2
LNG	+	1.1
Canada	+	3.3
Subtotal Supply		20.1
Demand		22.2
Domestic Supply Req		2.1

- Most of the supply growth is from LNG

# Total Production Consistently ~ 19 Tcf

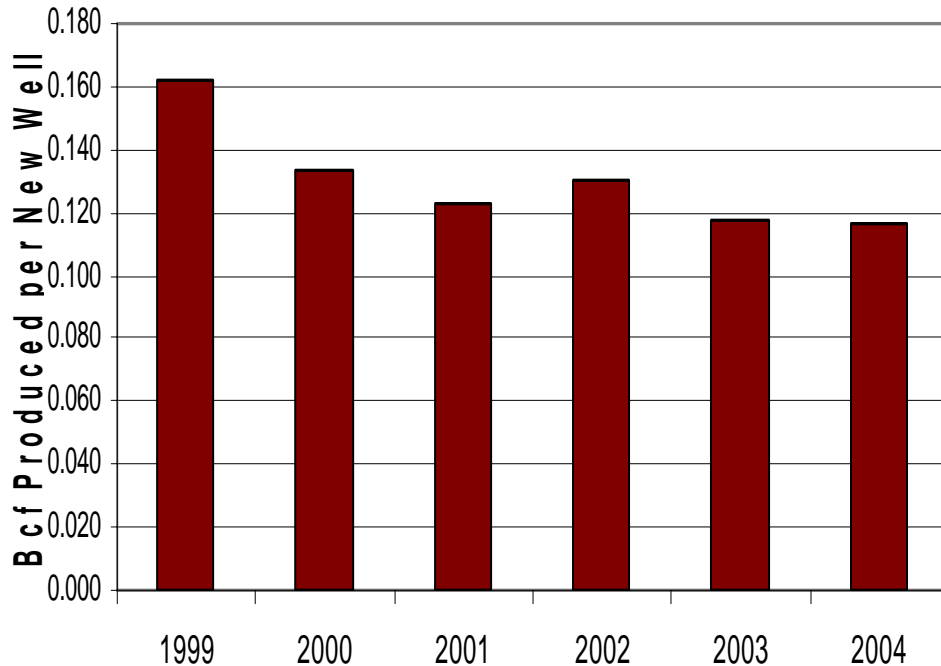


Source: EIA; R.W. Beck

- U.S. (dry) production maxed at 20 Tcf in 1978/79
- Fell with early 80's demand destruction
- Overall upward trend in production over last twenty years -- now back to ~ 19 Tcf – but flattening out.
- 2004 and 2005 production misleading: would have shown small increases but for Ivan, Katrina and Rita
- Wells needed to produce 19 Tcf have tripled: increasing from about 130,000 to 390,000

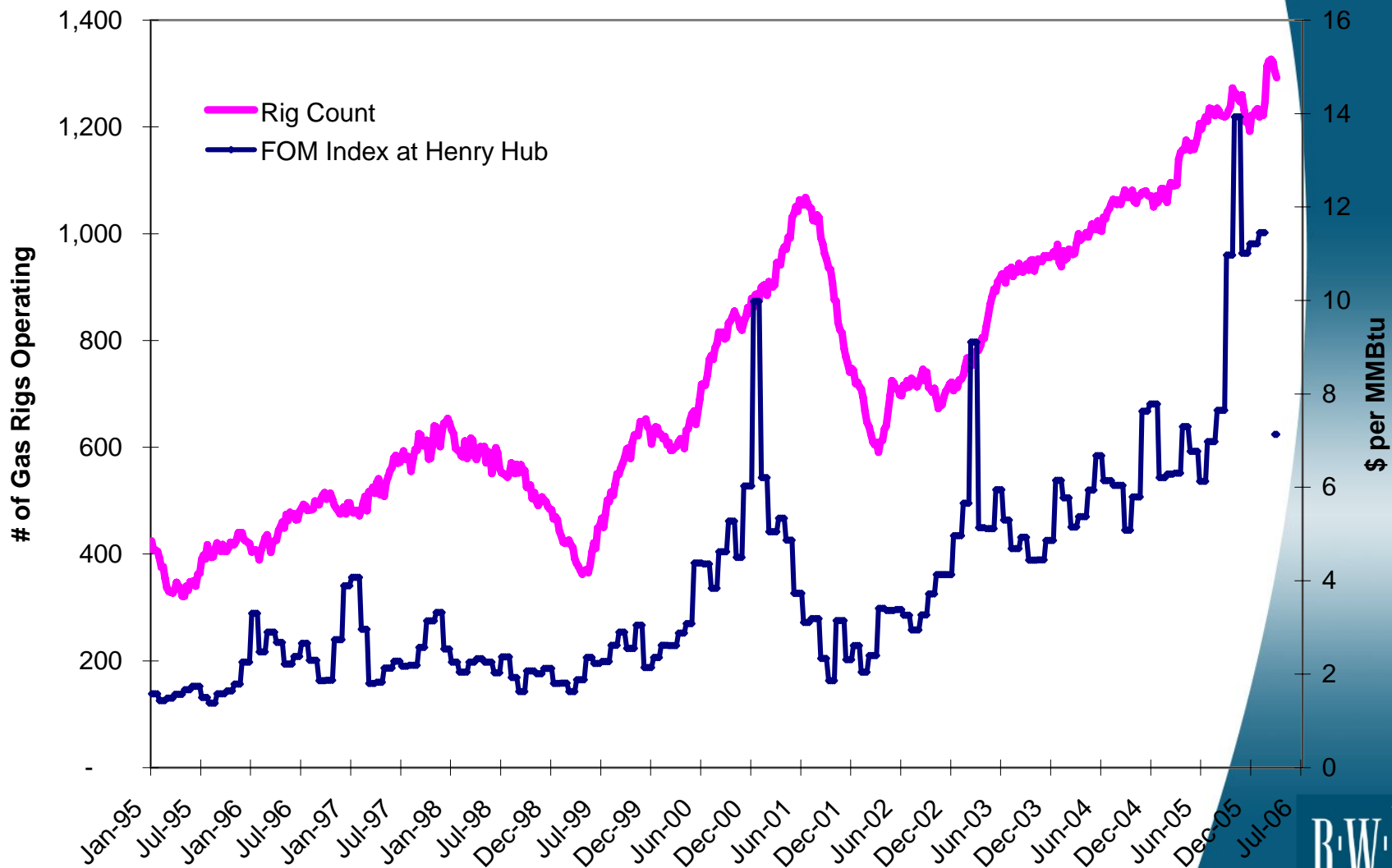


# New Wells Are Producing Less



- In 1999 added 2.5 Tcf of new production by drilling 15,400 new wells -- but by 2004 need 22,500 new wells to add 2.5 Tcf of new production
- ... *that's half again as many wells required in just five years!*
- Reality is that **new** wells are producing less – Why?
  - Drilling is into unconventional reserves – less concentrated – yield less per well
  - In-fill drilling
  - Despite the high rig count, producers are not investing every dime into drilling; better ways to increase earnings – acquisition, buying down debt
  - Slower **technology** growth & focus on drilling shallow, quick-return wells

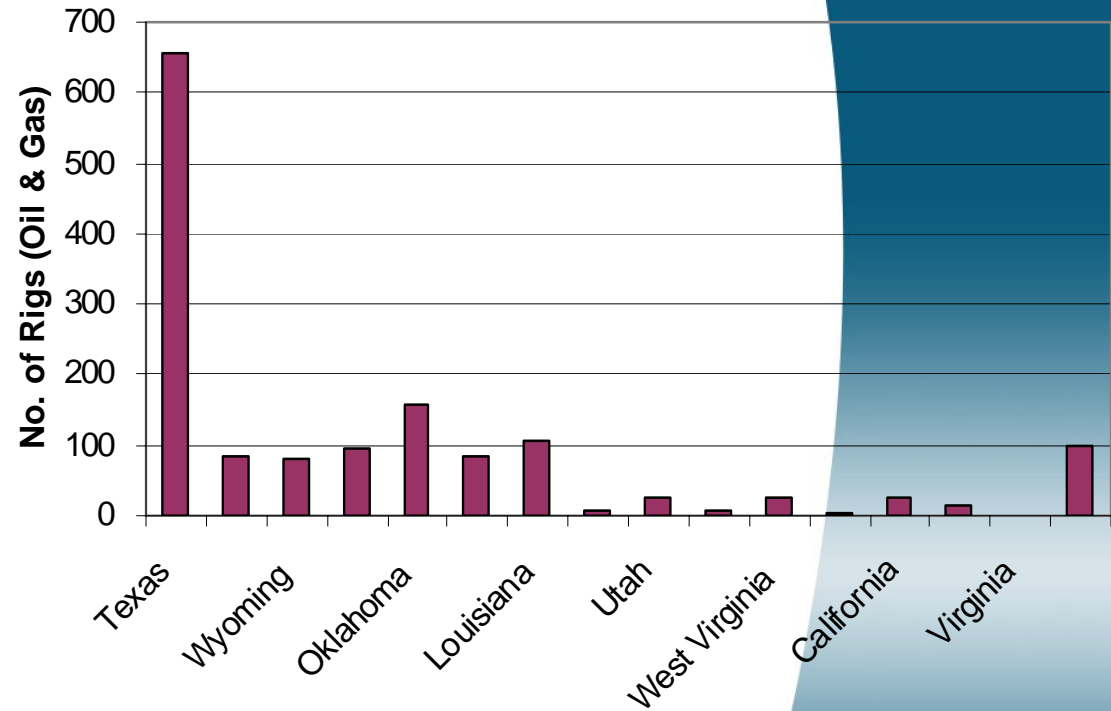
# Rig Count High and Increasing



# Drilling Concentrated in Texas ...

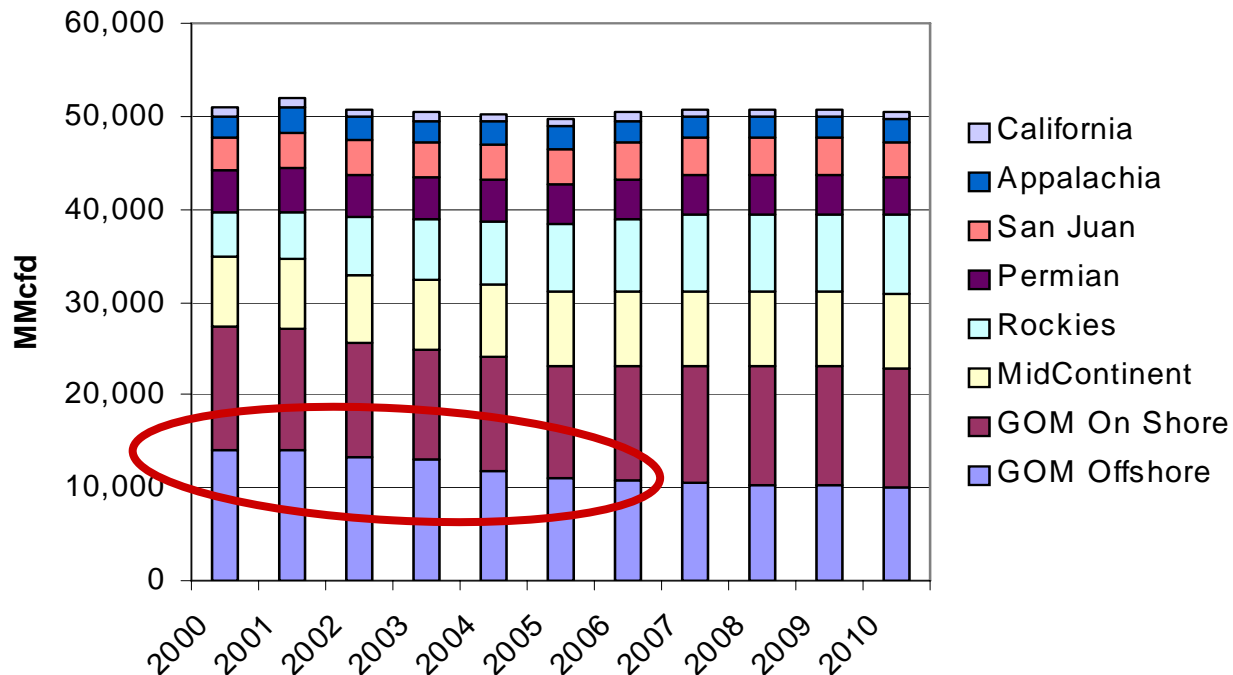
Rig Summary by State: October 14 20

Texas	657
GOM (offshore federal)	84
Wyoming	82
New Mexico	95
Oklahoma	156
Colorado	86
Louisiana	107
Kansas	7
Utah	25
Alabama	6
West Virginia	25
Michigan	2
California	27
Pennsylvania	14
Virginia	1
Other	98
Total	1472



**... but Gulf Off-Shore Produces More**

# Production by Region



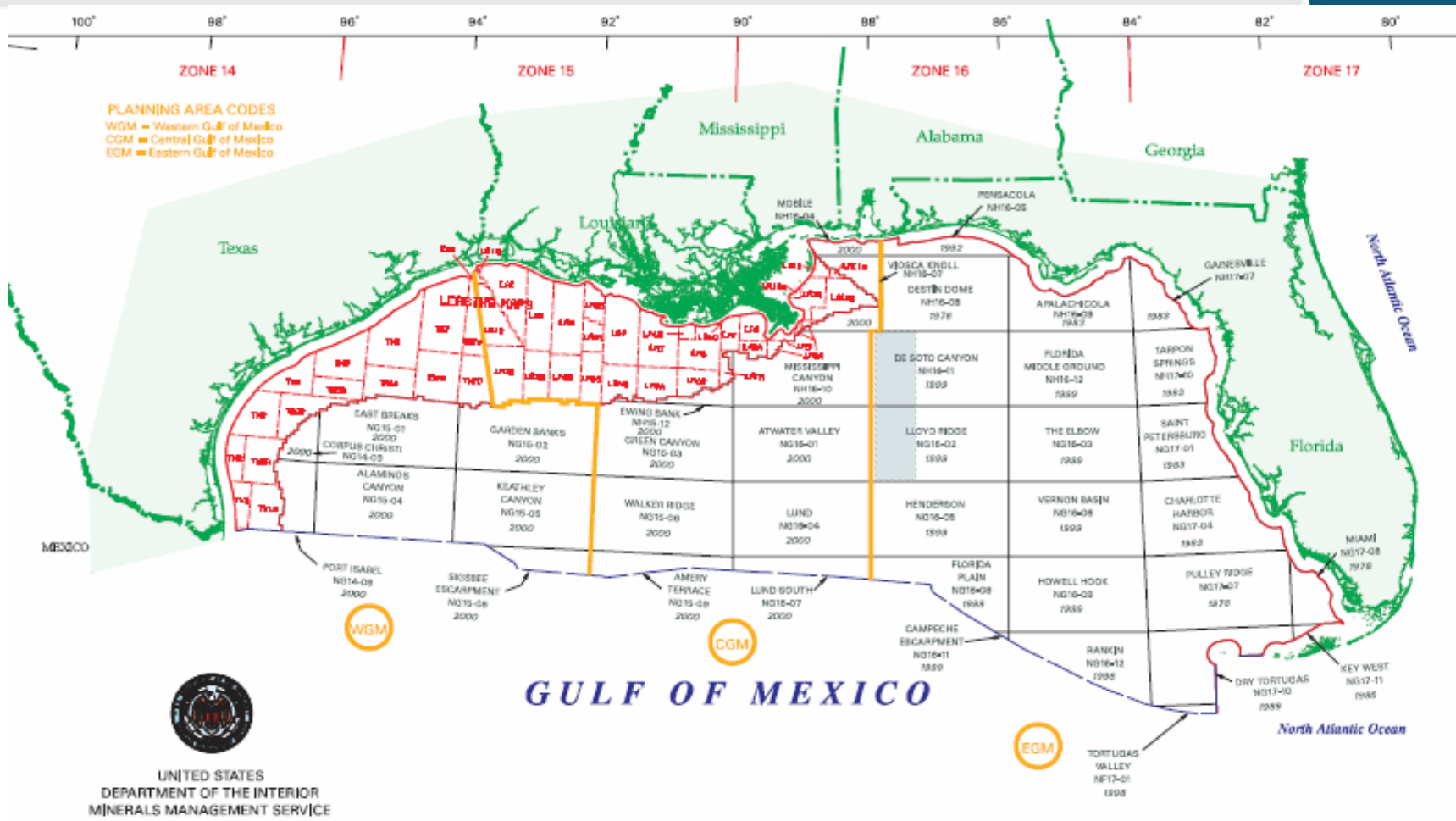
New MMS report required by EPACT 2005 says OCS resource larger than believed.

Keeping Off-Shore Production constant would significantly reduce need for LNG.

Offshore production in decline since peak of 14 Bcf per day -- most of the drop is from the shallow water & is due to reduced drilling.

Royalty incentives for deep gas implemented year ago  
MMS forecast – stabilizes production at 13 Bcfd after 2007 as new deep gas comes on

# Lease Area 181



MMS estimates Lease Area 181 to hold 5 Tcf of natural gas – portion up for lease in MMS 5-yr lease plan is shaded area.

# View on LNG and E&P

- Beck model adds ~0.5 Tcf of LNG every year -- equates to 1 new terminal adding 1.0 Bcf per day every other year
- Still good drilling prospects in US - Real issue has been that there have been “better” (i.e., more profitable) prospects elsewhere
  - So much better that can drill overseas and pay to move the gas here, take netback off US Henry Hub price, and still profit
  - LNG became economic at ~ \$3.50 due to efficiencies in shipping and liquefaction technology
- Majors are RETURNING to drill here after years of off-shore focus
- LNG cargoes will be **baseloaded**/constant flow/long-term deals
- Lower prices results because LNG reduces need for drilling, which pulls down the cost of the last well drilled in US
- LNG comes here because U.S. prices are higher than elsewhere in world and because market here is liquid and transparent

# LNG Projects Proceeding: Count to 10

- Existing capacity ~ 1.0 Tcf per year (close to 300 Bcf/d)
- Expansions at 3 existing terminals: Elba Island, Cove Point, Lake Charles already permitted
- Greenfield Terminals Approved by FERC and Proceeding
  1. Sempra Cameron 1.5 Bcf/d (under construction)
  2. Cheniere Sabine Pass 2.6 Bcf/d (under construction)
  3. Cheniere Freeport 1.5 Bcf/d (under construction)
  4. Louisiana Energy Bridge 0.5 Bcf/d accepting speculative spot cargos
  5. Cheniere Corpus Christi 2.6 Bcf/d
  6. Exxon-Mobil Sabine 1.0 Bcf/d
  7. Exxon-Mobil Corpus 1.0 Bcf/d
  8. Ingleside Energy Corpus 1.0 Bcf/d

# LNG isn't LNG isn't LNG

Btu content and miscellaneous components of methane  
vary by source

+

Europe has different appliance and pipeline standards than  
U.S. and Japan is different from both Europe and U.S.

=

U.S. cannot accept all LNG cargos

*... another reason why competition to attract spot  
cargos of LNG not the right paradigm for understanding  
the LNG market*

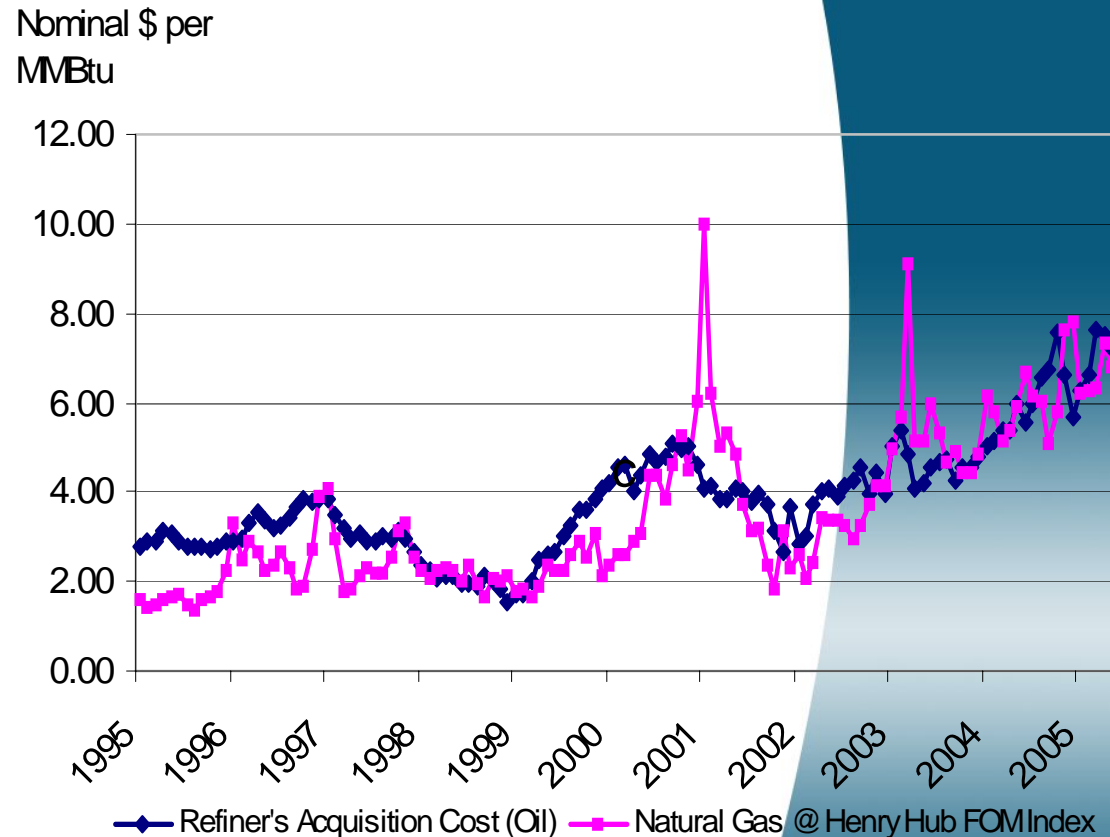


# Price Implications for Portfolio Planning

- LNG (or pipeline from Alaska) simply reduces number of wells to drill
- If it turns out that production per new well continues to fall, then the implication is that we have to drill a continually increasing number of wells per year ... result would be that prices in excess of \$6.00 per MMBtu are here to stay
- Even with current assumptions on LNG

# More Recent Oil Prices Have Stronger Effect

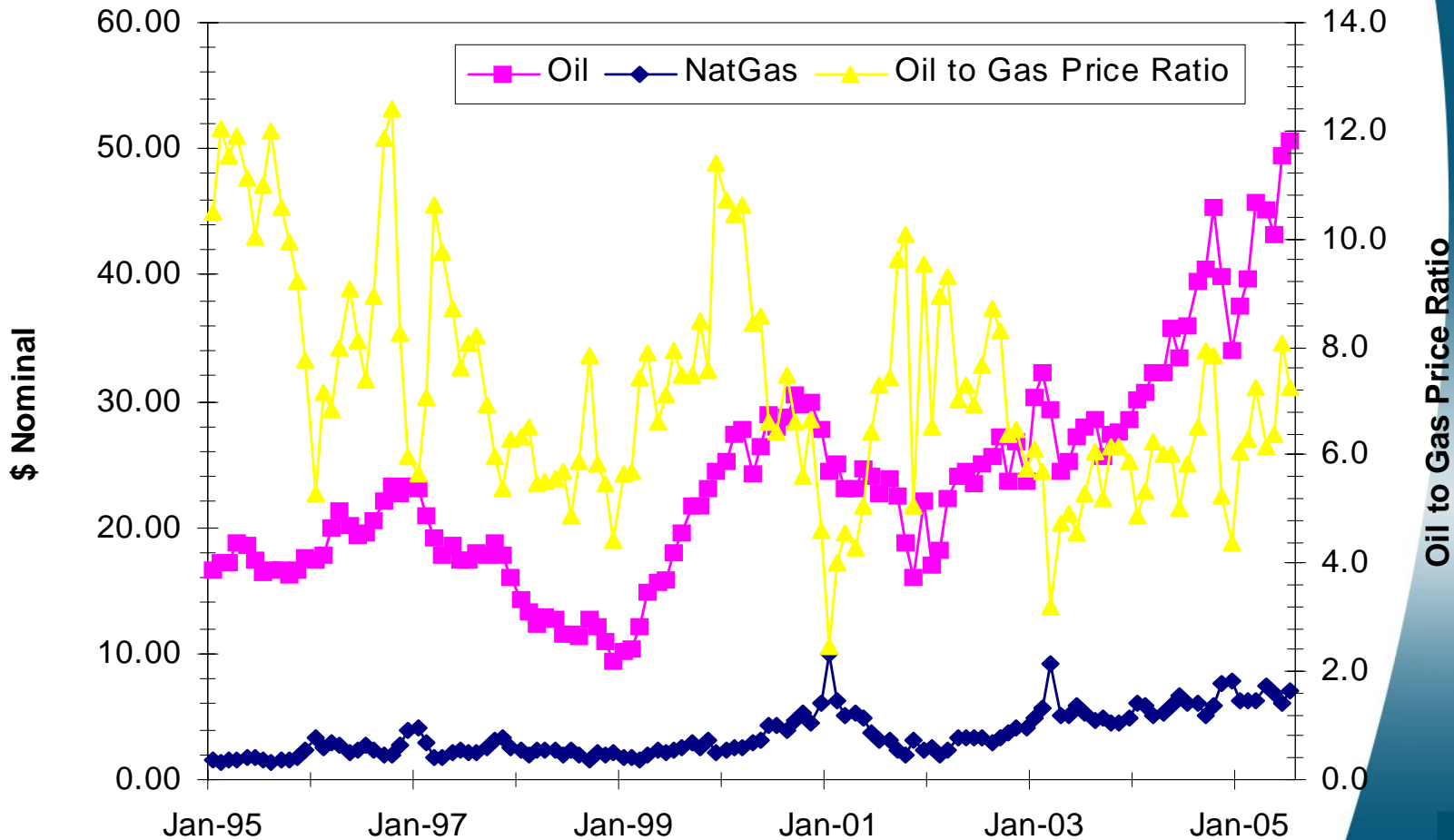
- Correlation between gas and oil in monthly prices much stronger today than from 1985 – late 2000
- Even after 2000, gas peaks during winter far more sharply than oil
- Difference between \$25/bbl oil and \$50/bbl oil can be as much as \$4 per MMBtu
- Oil prices driven by international geopolitical events:
  - Iran
  - Iraq
  - U.S. dollar being lower reduced buying power of OPEC countries
- U.S. consumers failed to substitute away from \$50/bbl oil – new price threshold most often discussed by OPEC and others is \$40/bbl



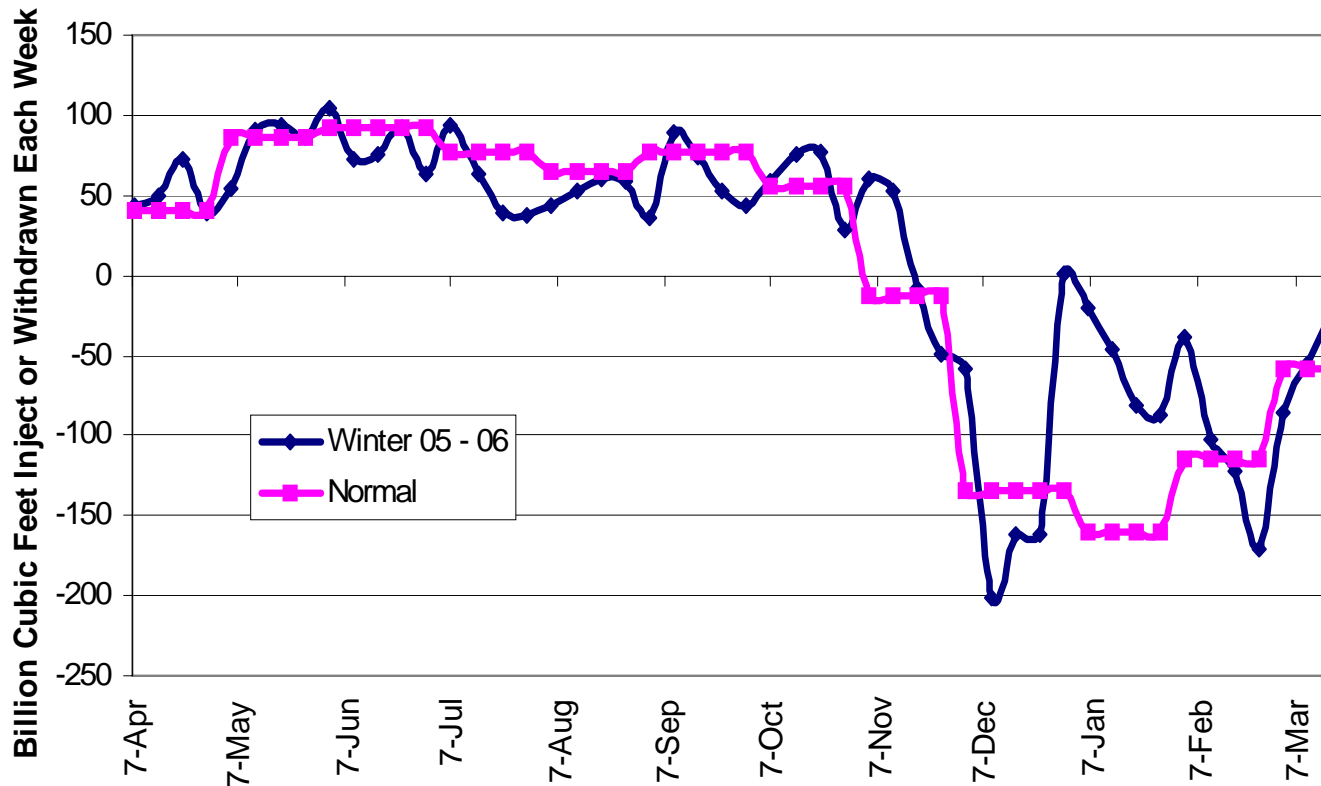
***Stable oil prices allow us to ignore oil in forecasting natural gas prices***

# Oil/Gas Price Relationship NOT a Constant

*Lower ratio implies oil becoming cheaper relative to natgas.*



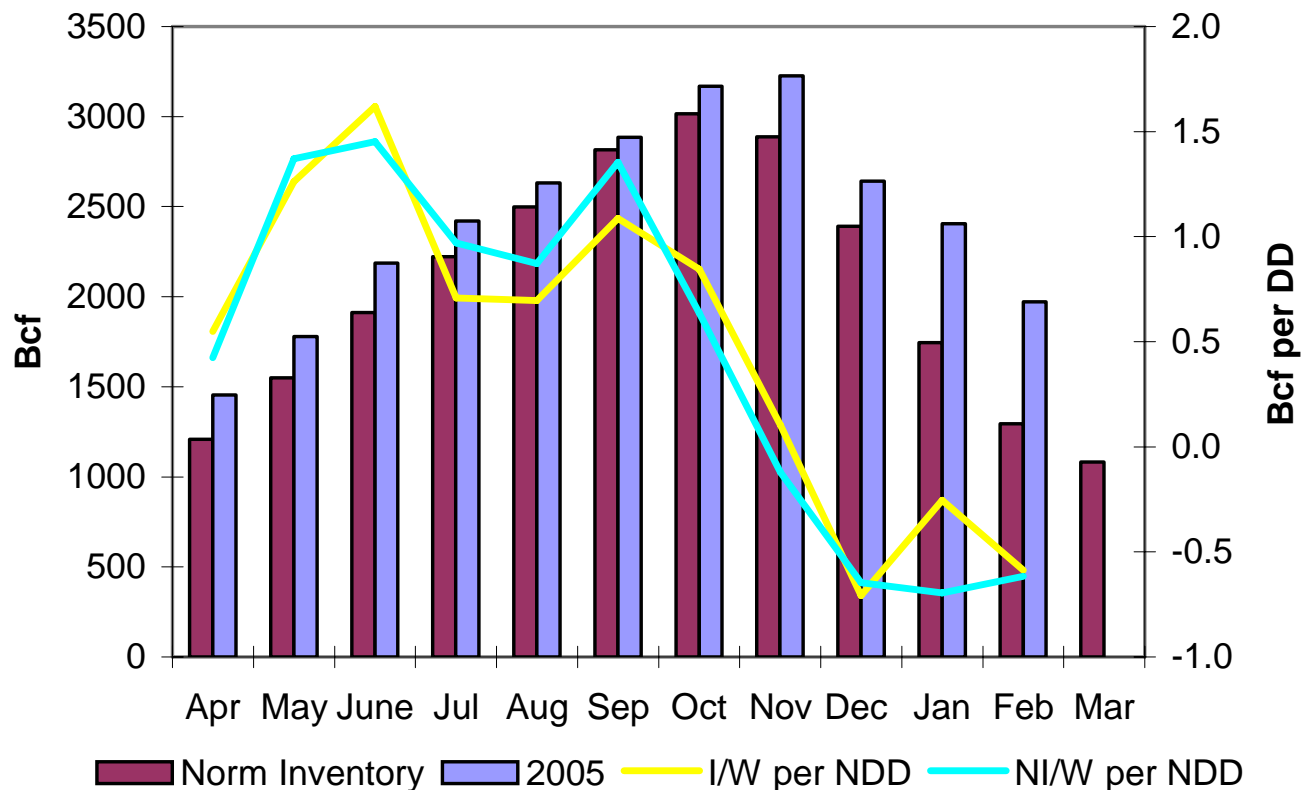
# Market Supply & Demand Balance: Storage



Storage IS an option contract, but idea that injections are driven by forward prices is a myth.

- Storage is the immediate physical daily balance from wells that produce at relative constant rate
- Gas from storage is critical to meeting winter peak load under extreme design day conditions for many LDCs

# Look at Storage Activity Normalized for Weather



Tale of Two Markets

Last summer: "We don't have enough gas to meet demand AND fill storage in hot weather."

This winter: "We only have excess gas because the winter was mild."

*On March 1, was still 2000 Bcf (2 Tcf) in storage – unprecedented 180% of Normal – but for the mild weather, market looks in balance: key reason natgas prices not dropping more now*

# Hedging Strategy Homework

- Risk Policy in Place/Understand Risk Tolerance
  - What is a bad outcome for your utility? Quantify it! By how much can gas prices increase before you are in the soup?
  - What bad outcomes can you tolerate and what can you not tolerate?
  - Understand risk relative to cost of shedding that risk & decide what is right for your business:  
Key Trade Off: *willingness to pay to shed risk versus cost to absorb – hedging is not FREE*
- Procurement policy goals change willingness to pay:
  - prudent portfolio versus cost minimization
  - basis exposure versus load factor exposure
  - Reduce impact of price spikes
  - certainty versus uncertainty
- Impact of local dynamics: basis drivers, capacity expansions, transportation rate changes

# Hedging Tools

- Diversified portfolio
  - Contracts of different tenors & different pricing mechanisms so terms and conditions reflect different market conditions and renewals capture spread
- Swap of fixed price for variable price
- Swap or lock basis
- “Costless” collar (not truly costless since prices asymmetrical)
- Weather derivatives
- Matched execution of power and gas contracts with matched unwind provisions
- Forward purchase
- Combine with options

*Right strategy and implementation vary by utility. Work with someone that will help you evaluate alternatives and customize your portfolio.*

# About R.W. Beck

*R.W. Beck, Inc. is a management consulting and engineering firm with offices nationwide that provide services to the public and private sectors in the areas of energy, water resources, solid waste and telecommunications. Founded in 1942, R.W. Beck has nineteen offices located around the U.S.*

*The one-page **Quick Summary** of R. W. Beck's current natural gas price forecast can be found at **[www.rwbeck.com/energyforecasts](http://www.rwbeck.com/energyforecasts)**.*