

North American Natural Gas: A Crisis Ahead Or Is Chicken Little Running Around Again?

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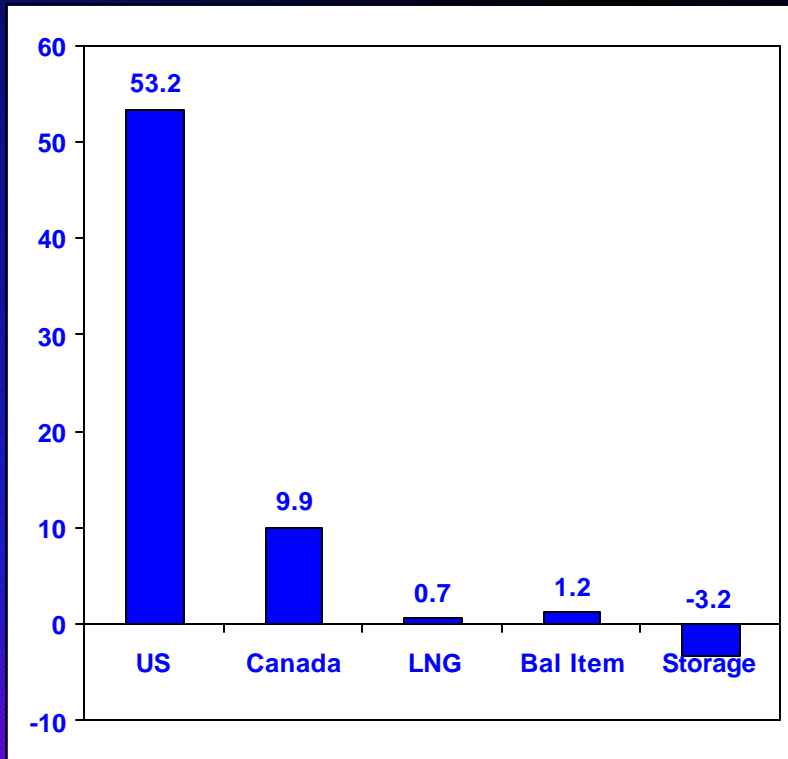
Outline

- **Is there a natural gas supply “crisis” or will there be a repeat of the 2001 experience?**
 - Why do many analysts believe that natural gas production will remain flat or decline for several years?
 - What surprises could change the outlook for high natural gas prices?

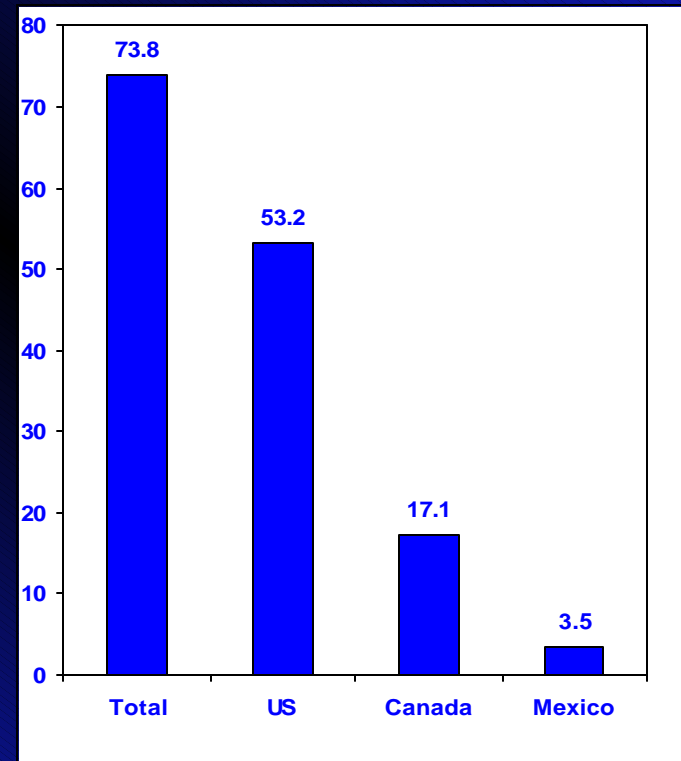
- **What forces will determine long-term natural gas supply, demand, and price?**
 - Incremental cost of supplies
 - Demand response to price
 - Price dynamics – impact on supply and demand

US Consumption is 62 Bcfd and North American Natural Gas Consumption is 74 Bcfd.

US Supply (Bcfd)

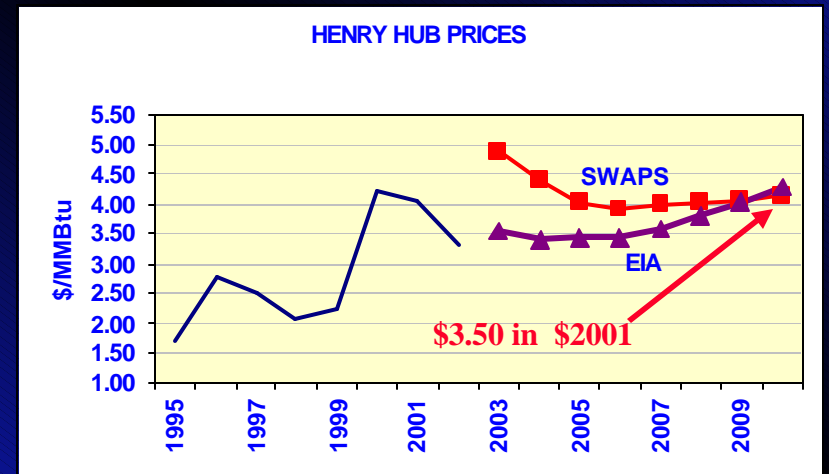
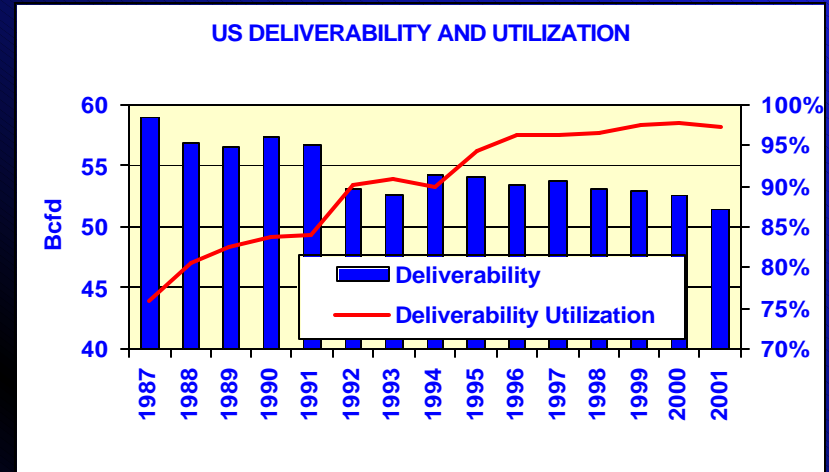


Marketed Gas Production (Bcfd)



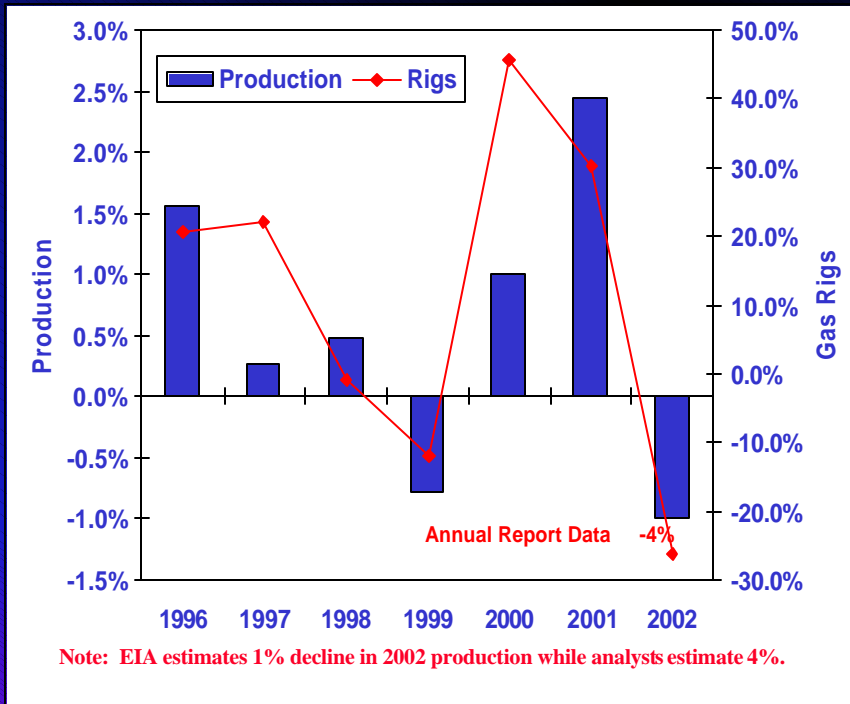
“The Future Ain’t What It Use to Be” Yogi Berra

- 1996 forecasts predicted growth in supplies from the Gulf and Canada would cause a gas bubble by 2000.
- Expectations now are for 2010 Henry Hub prices of \$4.00 - \$4.25 per MMBtu (\$3.50 in \$2001).
- There is a talk of a gas supply “crisis” based on:
 - Disappointing production increase in response to recent drilling
 - Accelerated depletion of productive capacity.
 - Belief that all the big fields have been found

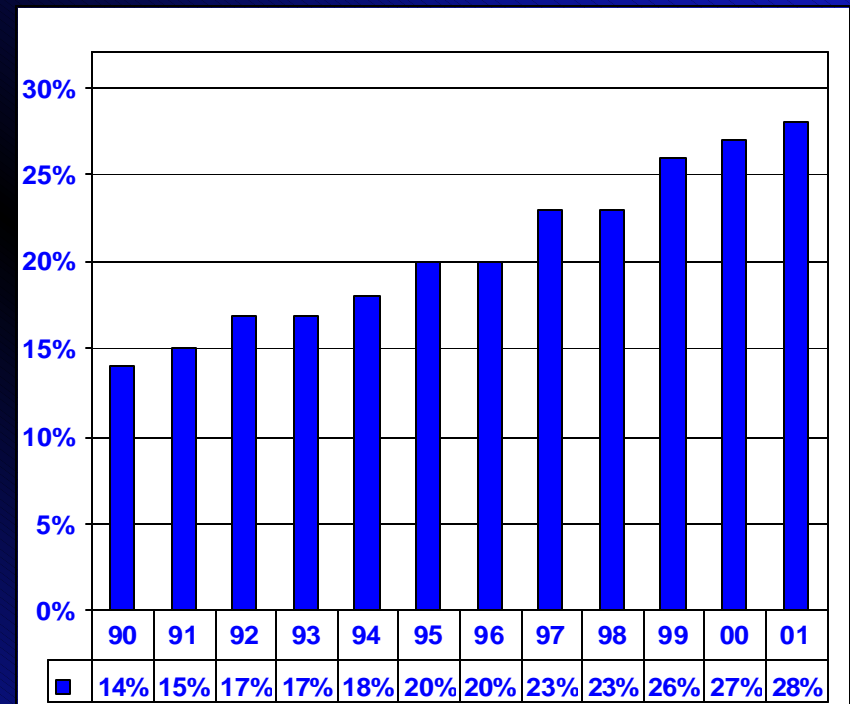


The response to gas drilling has been disappointing.
 (75% increase in rigs, 3.5% increase in production).
 Conventional fields are maturing.

Gas Rigs vs. US Production

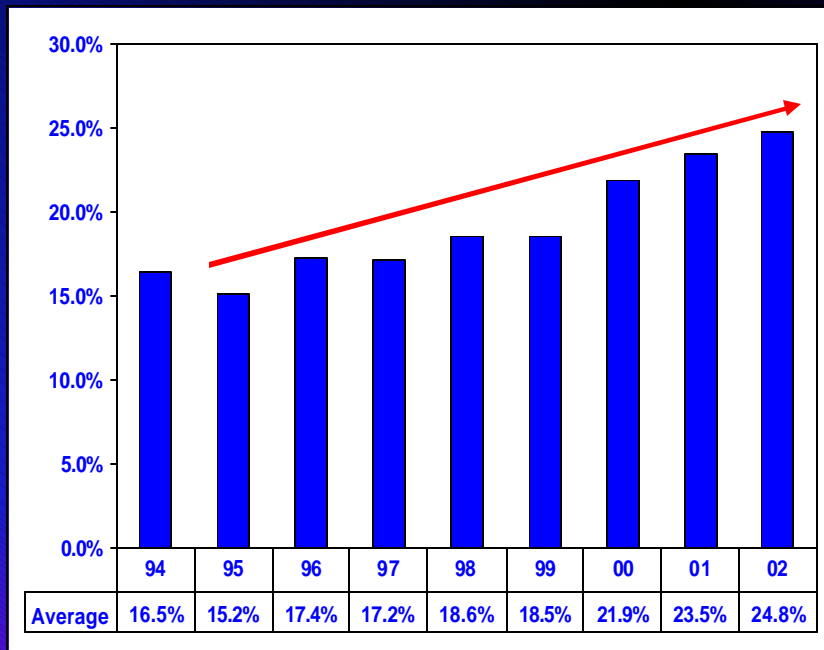


US Decline Rates

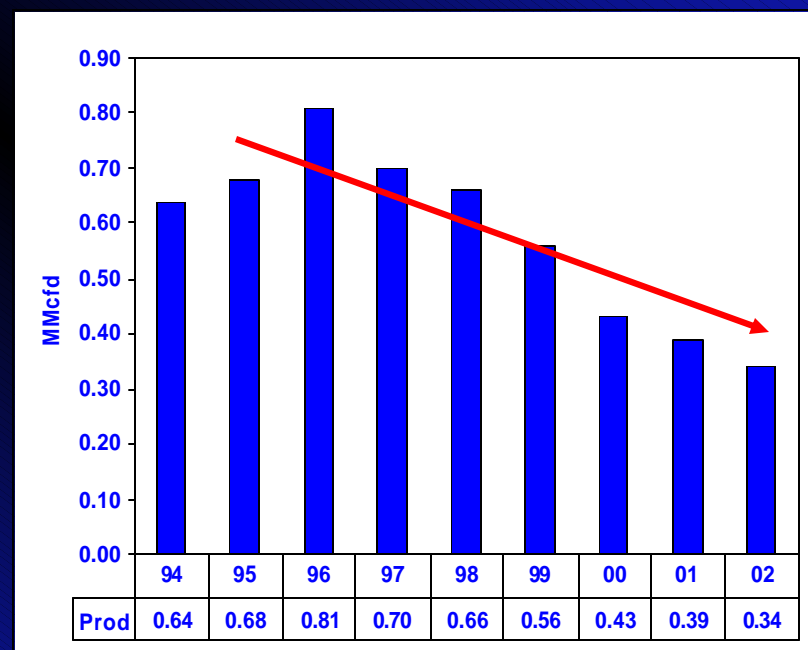


Western Canadian production decline rates continue to increase while production per well declines.

Alberta Decline Rates

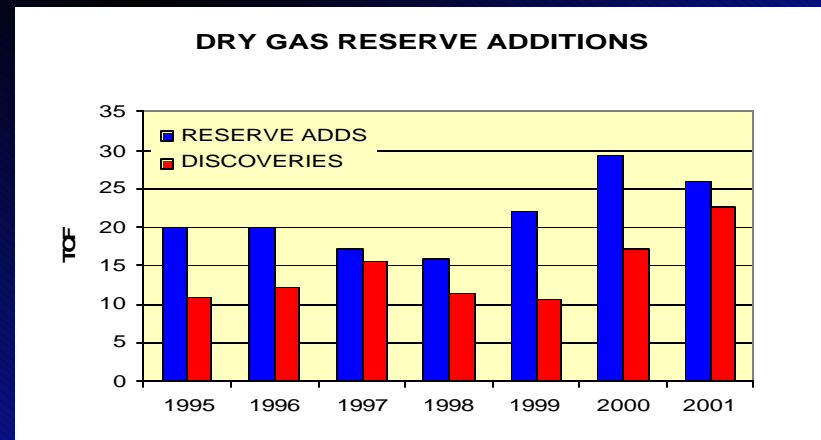
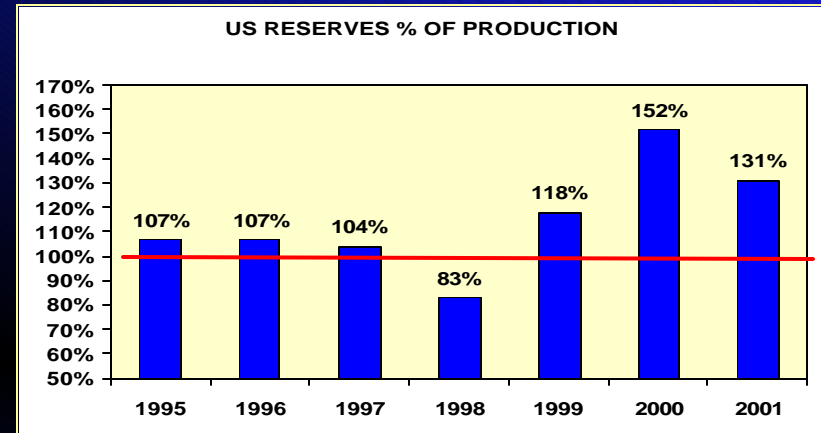


Alberta Production per Well



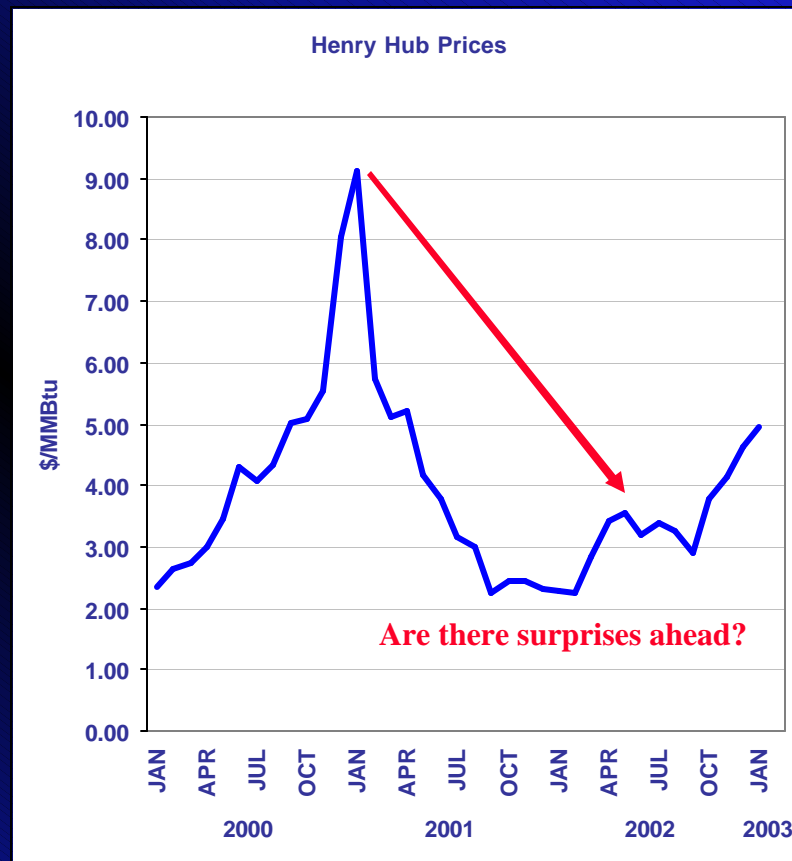
Proved reserves tell a different story than production.

- Booked additions exceeded production 6 out of 7 years.
- Gas discoveries in 2001 exceeded production -a first in over 2 decades.
- Unconventional fields (primarily coal bed methane and tight gas) and deepwater now account for the majority of recent large discoveries.



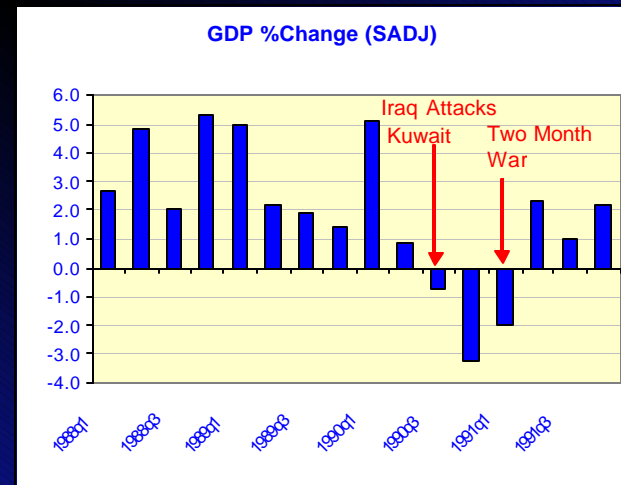
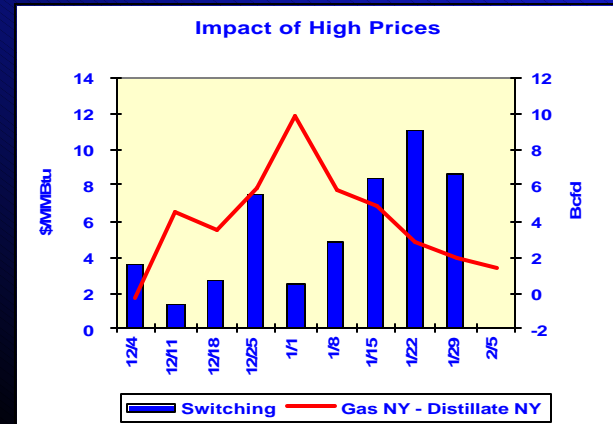
The most likely gas market outlook for next two years is for sustained high prices.

- US gas productive capacity declined about 2 Bcfd (4%) in 2002 and is likely to decline another 1 - 2 Bcfd in 2003.
- Increased drilling will probably not turn around US production until the fourth quarter of 2003.
- WCSB production declined .3 Bcfd in 2002 and is likely to decline another .2 Bcfd in 2003.
- Most likely scenario is for high oil prices – gas prices will have to be high enough to lose market to residual fuel oil.
- What are the potential surprises?



Loss of demand, new supplies, shock impact of oil crisis on economy, and terrorist activity could make prices much lower than expected.

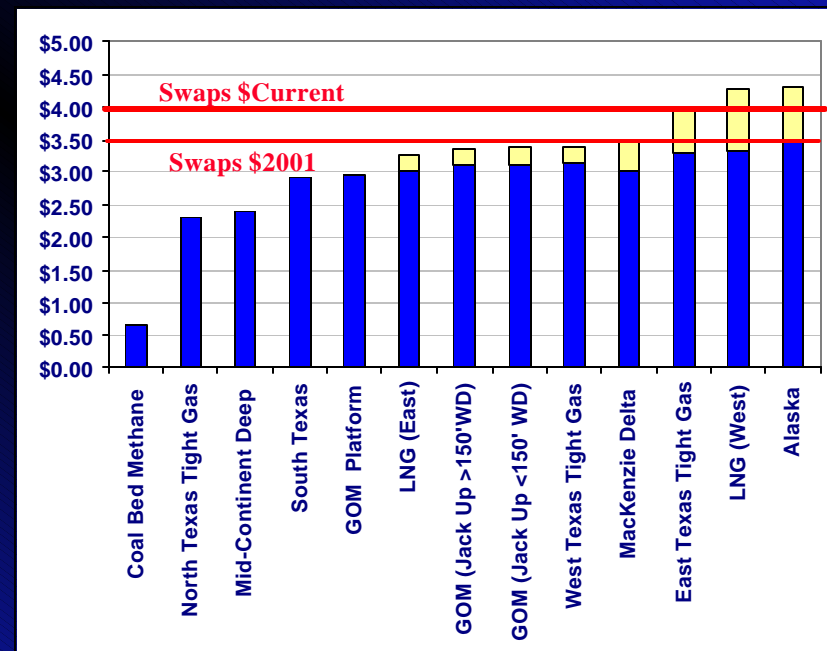
- High gas prices caused a loss of over 6 Bcfd in 2001. About 2 Bcfd was fuel switching to residual fuel oil.
- GDP declined about 2% with Iraqi war. (Prices went from \$18 to \$36/bbl)
- 2.1 Bcfd of potential supply from: LNG at Cove Point and Elba Island with respective base load capacity of 750 MMcfd and 470 MMcfd and Kern River expansion (900 MMcfd) will allow Rockies gas to flow to California in May 2003. (LNG will have to be spot).
- Does reserve growth indicate more productive drilling and unconnected wells or financial games?



Longer term swaps and price forecasts would support most LNG projects, Mackenzie Delta and possibly Alaska

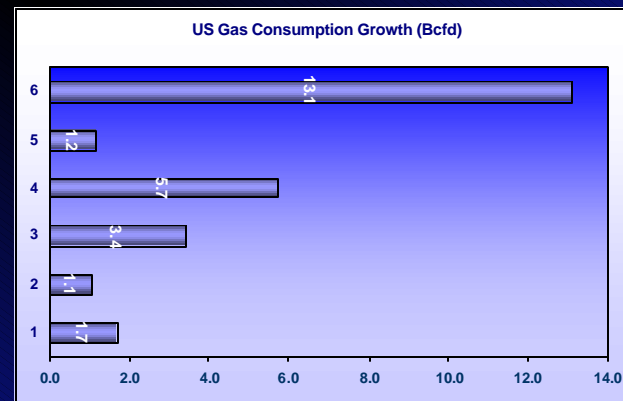
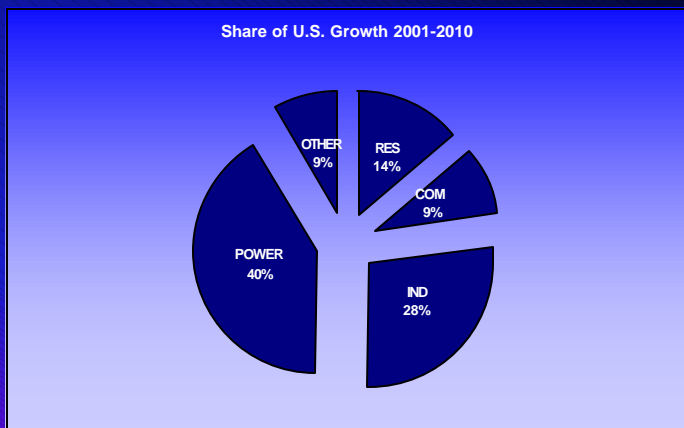
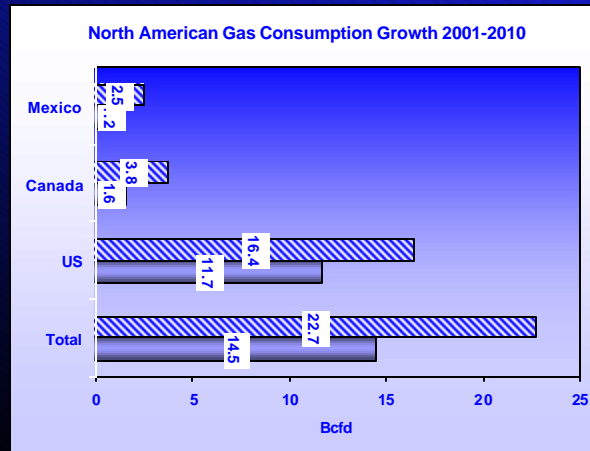
- Our estimate of LNG cost is on the low end of the range and Alaska on the high end. East coast LNG is attractive even with high cost estimates.
- MacKenzie Delta is now highly likely but Alaska is on the back burner.
- What will happen to production cost? North American production outlook is the classic issue of depletion versus technology.
- The marginal supply source will also depend upon demand growth.

Required Henry Hub Prices To Support Incremental Supplies

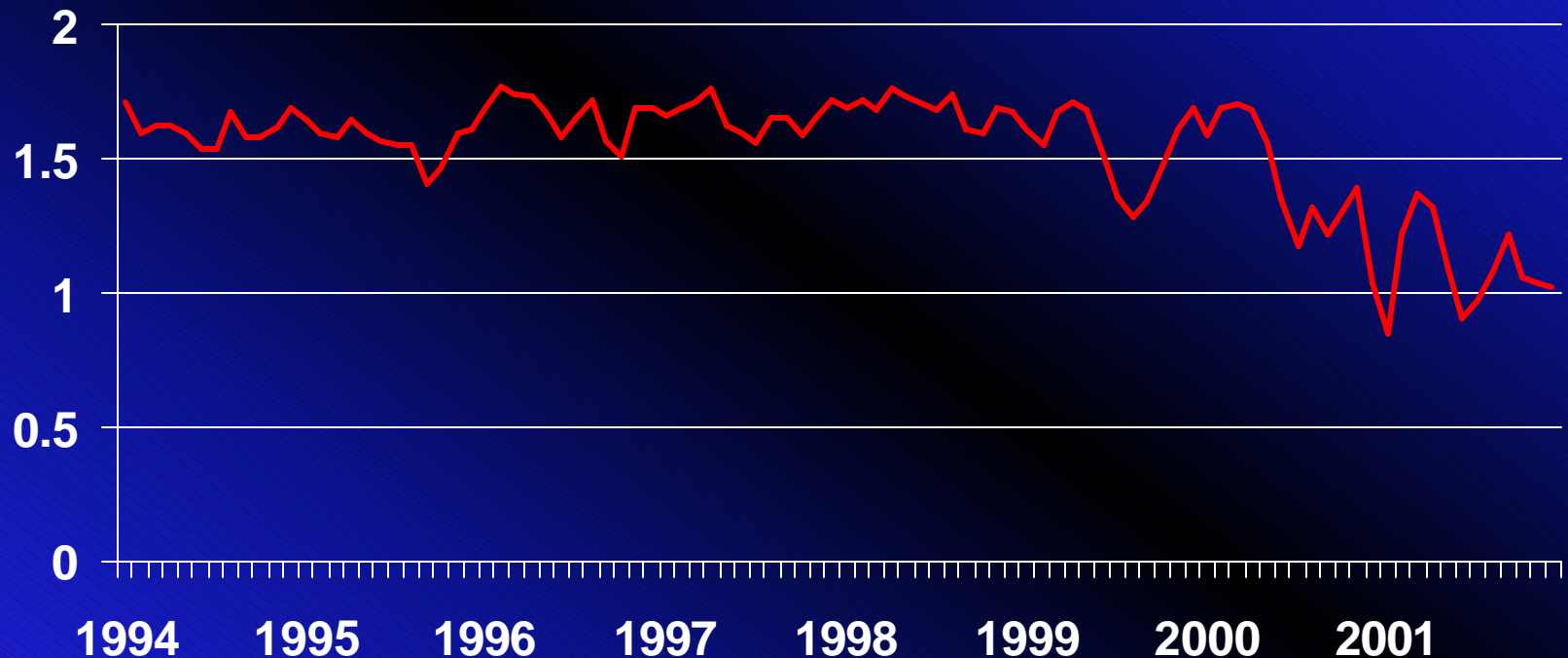


There is a wide range of gas consumption growth projections (14.1 to 22.7 Bcfd by 2010) because of uncertainty about gas prices, the gas share of power generation and generation growth.

- 12 Bcfd of the industrial sector is very price sensitive.
- Coal - gas choice for generation
- A change in the power growth rate of .2% over 10 years is equal to 1 Bcfd of gas consumption.

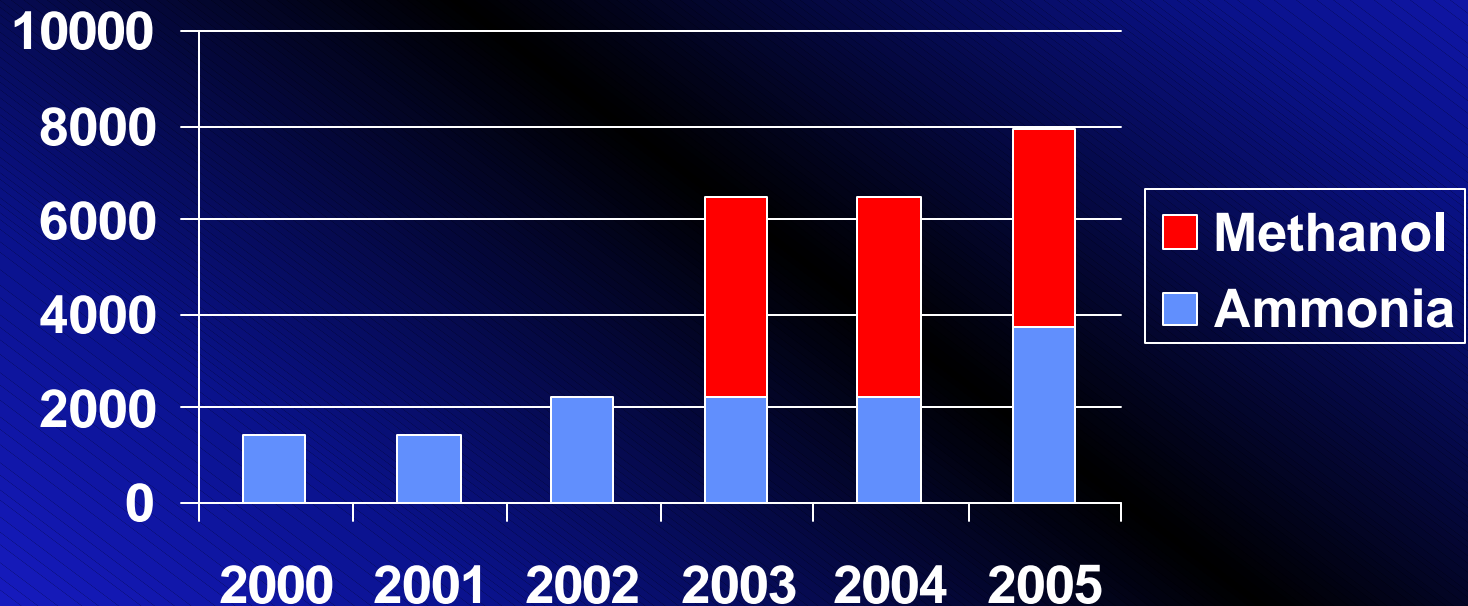


US natural gas use in ammonia production decreased with high gas prices in 2000 and 2001 (Bcf/day).



New Ammonia and Methanol Capacity in Trinidad and Venezuela is Increasing. Proposed capacity amounts to about 1.2 Bcfd of gas consumption.

Million Metric Tons, Cumulative

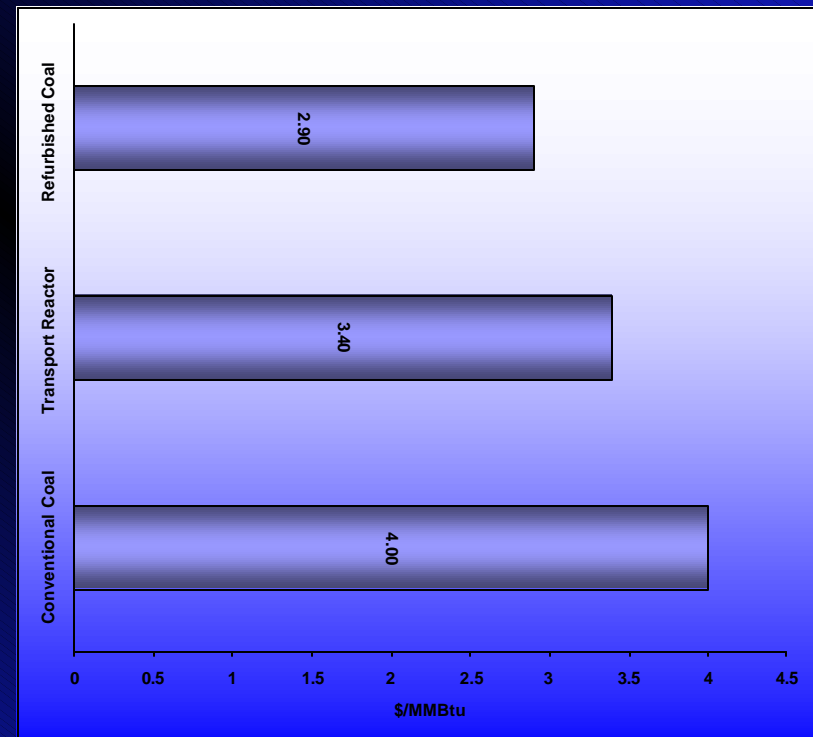


One million metric tons is 150 MMcfd

Coal would be very competitive at forecast gas prices.

- **Refurbished coal capacity is competitive at \$2.90 per MMBtu delivered (10% capacity increase).**
- **Transport reactor is being tested using oil cracking technology to gasify coal competitive at \$3.40 per MMBtu.**
- **Conventional coal is competitive with a \$4.00 per MMBtu delivered gas price.**

Delivered Gas Prices that Make Coal Competitive

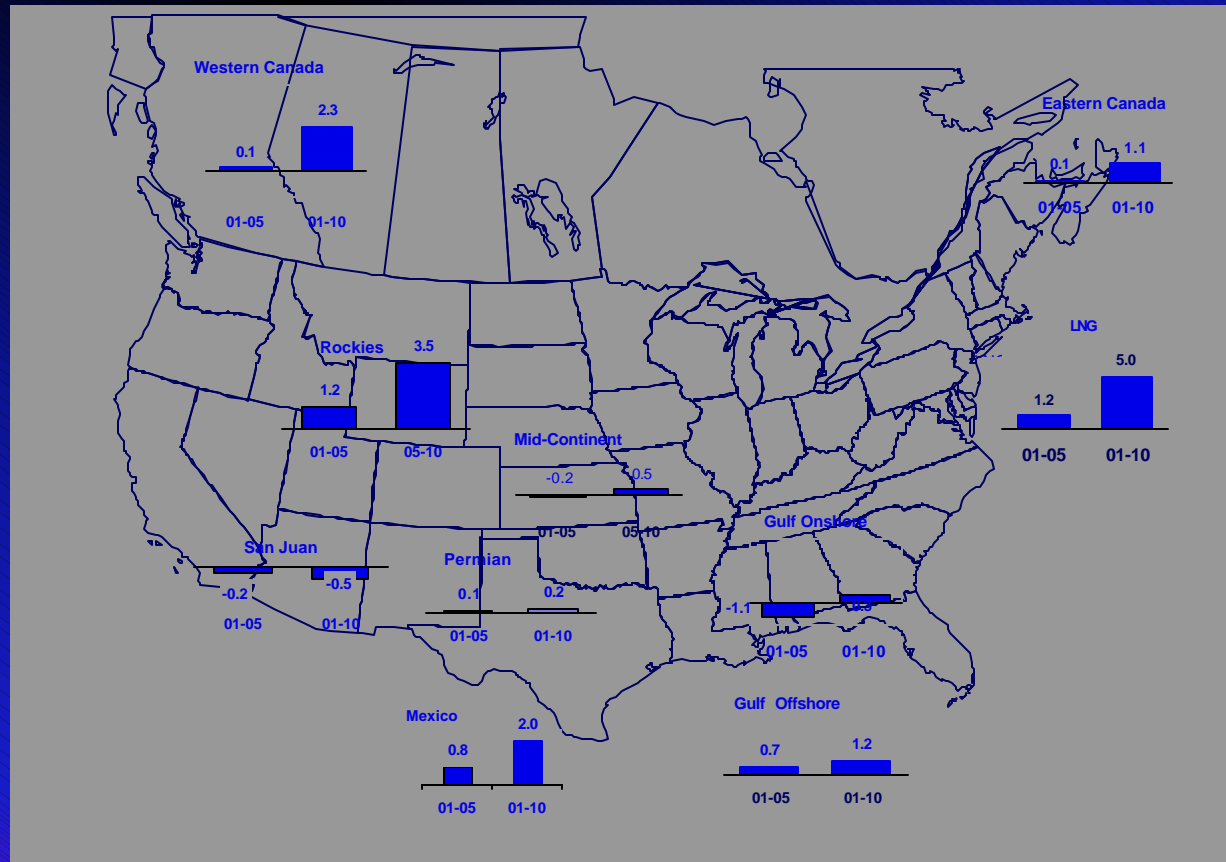


Existing and proposed sustainable annual LNG import capacity is 9 Bcfd and current imports are about .65 Bcfd.



Major sources of supply will be LNG, Rockies, Canada, and Mexico (total about 16.1 Bcfd). The Gulf is not expected to live up to its promise.

Incremental Supply 2001 – 2010 (Bcfd)



While LNG has attractive economics, there will be significant hurdles to overcome

- **Will it be possible to site new terminals in the US?**
- **Can contractual terms be developed that make it possible to finance new projects in an open access market?**
 - LNG needs a high load factor – who will take the volume and price risk?
 - Given recent difficulties of major players, how will credit risk handled?
 - What role will technology play in altering the risk profile?
 - ◆ Larger trains could lower the cost of LNG liquefaction by 20%.
 - ◆ New technologies for offloading LNG will change the economics of terminals

Summary and Conclusions

- **The most likely scenario is for Henry Hub prices to average \$5.00 in 2003, and average \$4.00 through 2010.**
- **High prices are likely to cause a substantial loss in industrial load and possibly more coal based power generation.**
- **There is a significant risk that a boom bust scenario could result in substantially lower prices in the second half of the decade as a result of the development of capital intensive projects and the loss of demand.**
- **Alternatively, if LNG and other capital intensive projects are not developed gas prices could be substantially higher.**
- **The sky is not falling but it may feel like it during the next few years.**