

Natural Gas and CHP

May 17, 2006



Bruce Hedman
Energy and Environmental Analysis, Inc.

www.eea-inc.com

Agenda

- What determines gas prices?
- What market indicators are important?
- Natural gas market events.
 - What has driven this roller coaster?
- Future gas supplies.
 - How do we get out of the box?
- Market outlook and pricing forecast.
- Gas prices and CHP.



What Determines Gas Prices?

- Fundamentals - Gas prices are determined by the balance of supply and demand in a regional marketplace.
- Technical factors - Trading momentum, speculator activities, etc.
- Market imperfections and manipulation?
 - Has had some impact in the past, but regulators have concluded that recent behavior is driven by fundamentals.



New
Supply

New
Pipe

Robust
Storage

Price of natural gas

Increased
Demand

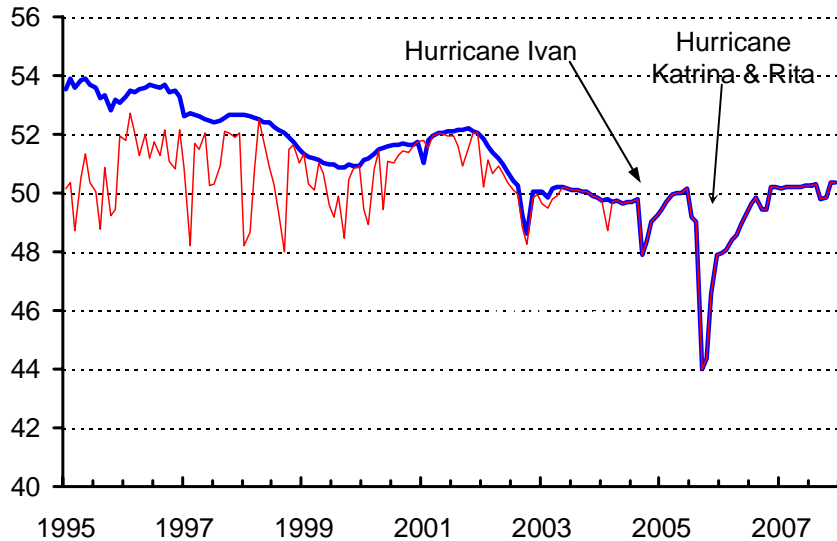
Weather

Energy
Prices

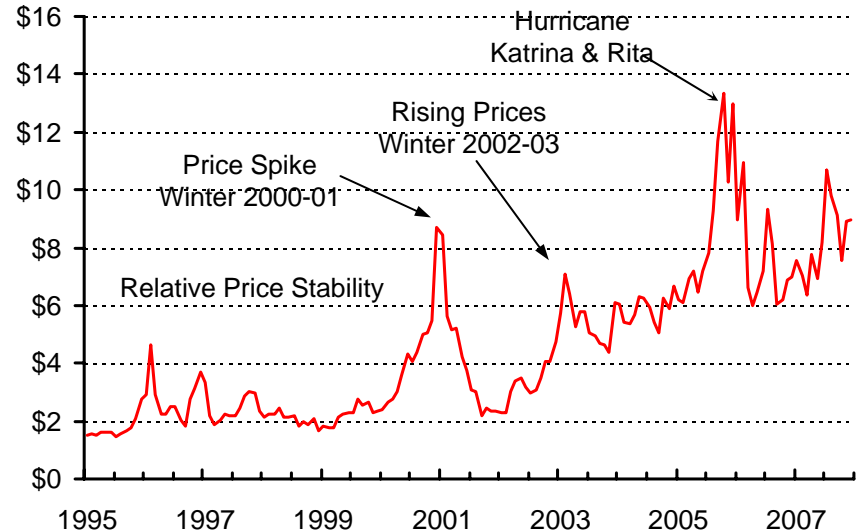
Political
Uncertainty

The Changing Gas Balance

Lower-48 Dry Gas Production Vs. Dry Gas Capacity (BCFD)



Historical Gas Price at Henry Hub (\$ per MMBtu)



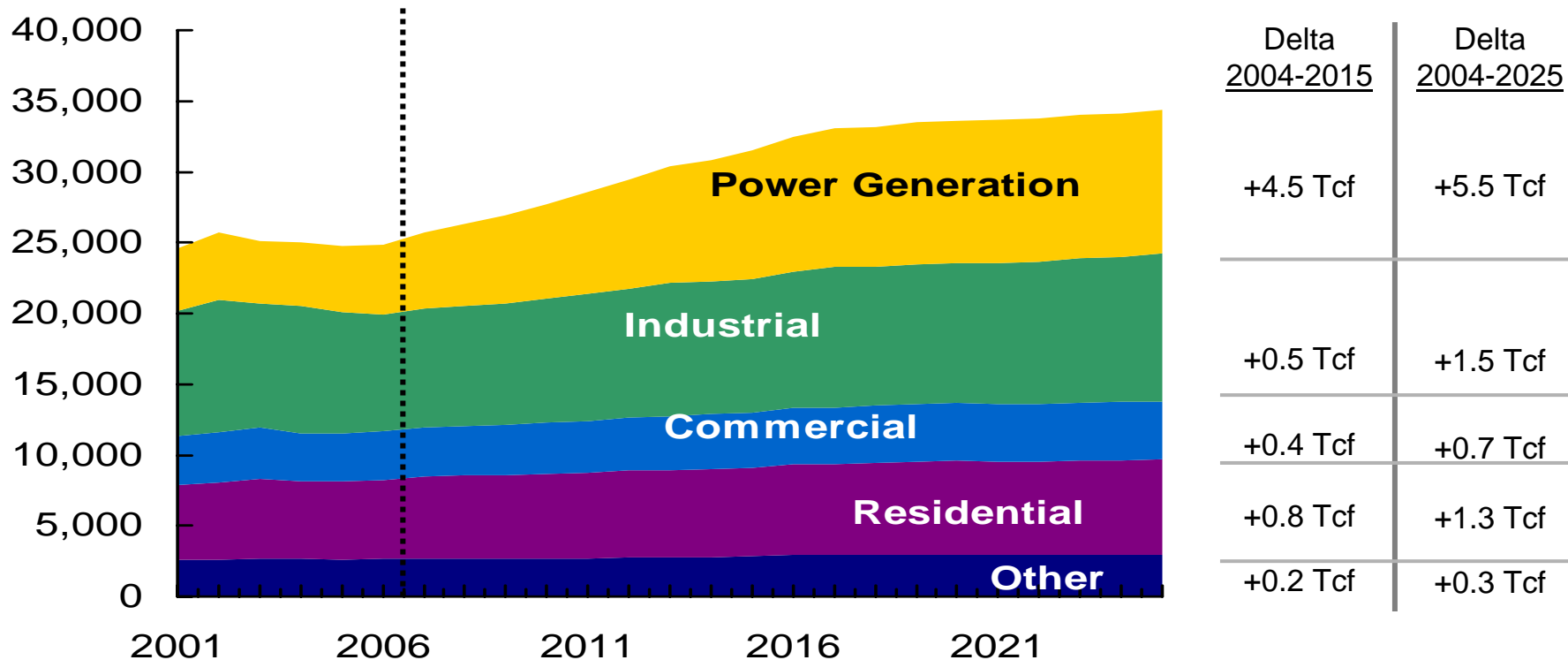
Divergent trends in gas supply and demand have led to a tight balance between supply and demand, higher gas prices, and increased price volatility.

TIGHT BALANCE EXPECTED TO CONTINUE



North America Gas Consumption Outlook

(Trillion Cubic Feet, Tcf)

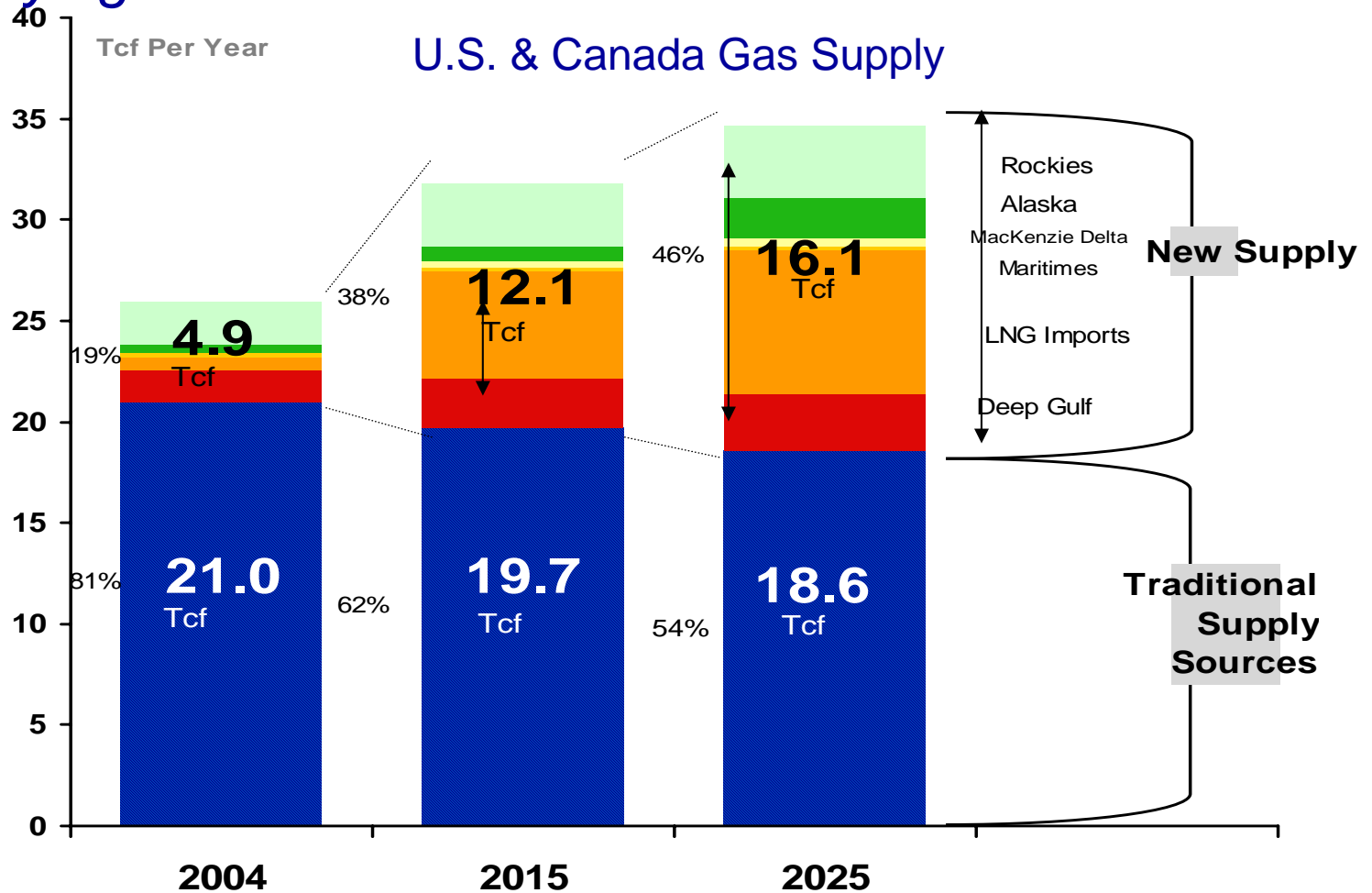


The North American gas market may be best characterized as a “demand leads supply market” for the foreseeable future.

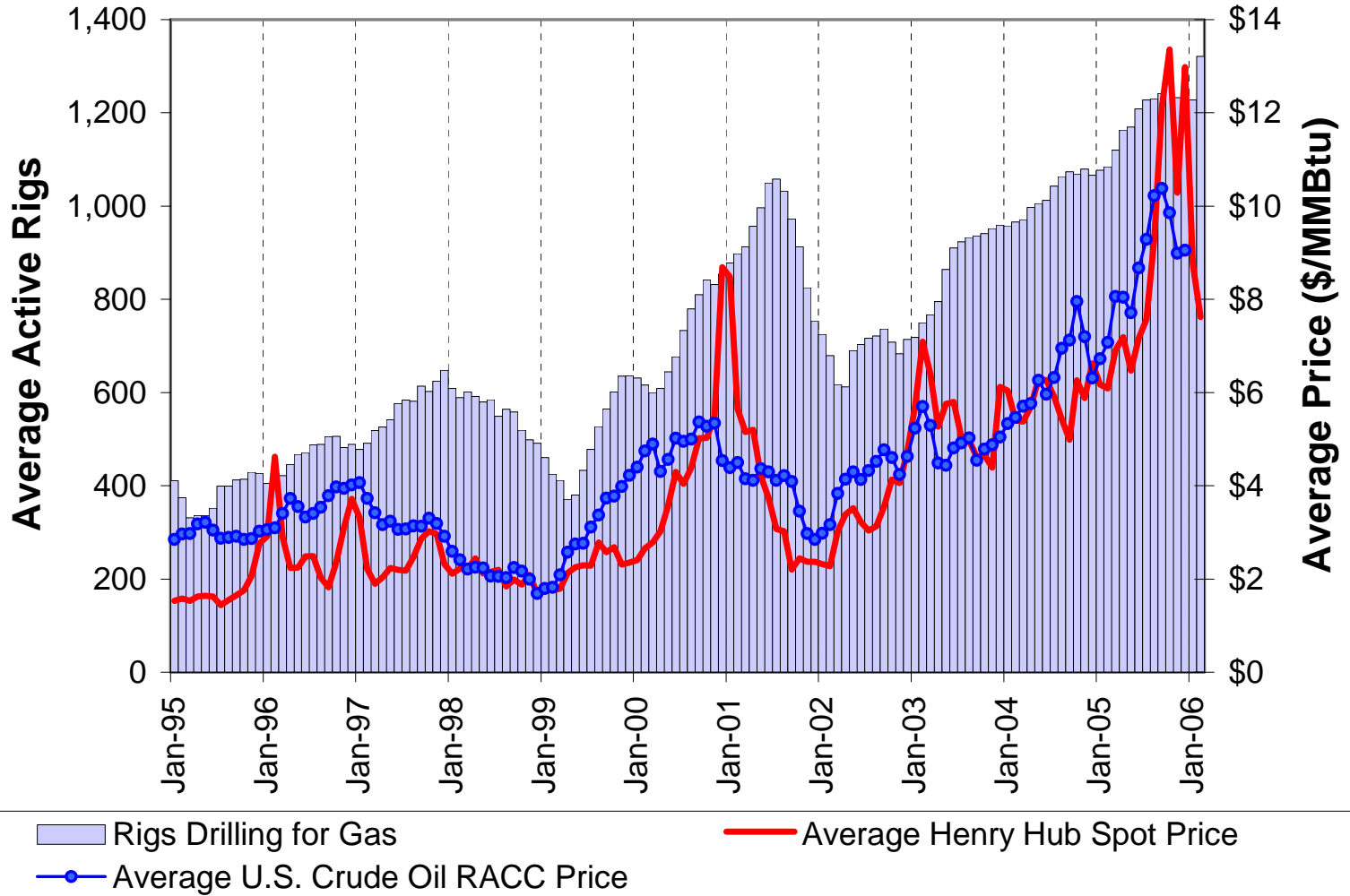


Natural Gas Supply

Relying On New Frontiers



U.S. Gas Directed Drilling Activity and Crude Oil and Gas Prices



LNG Issues

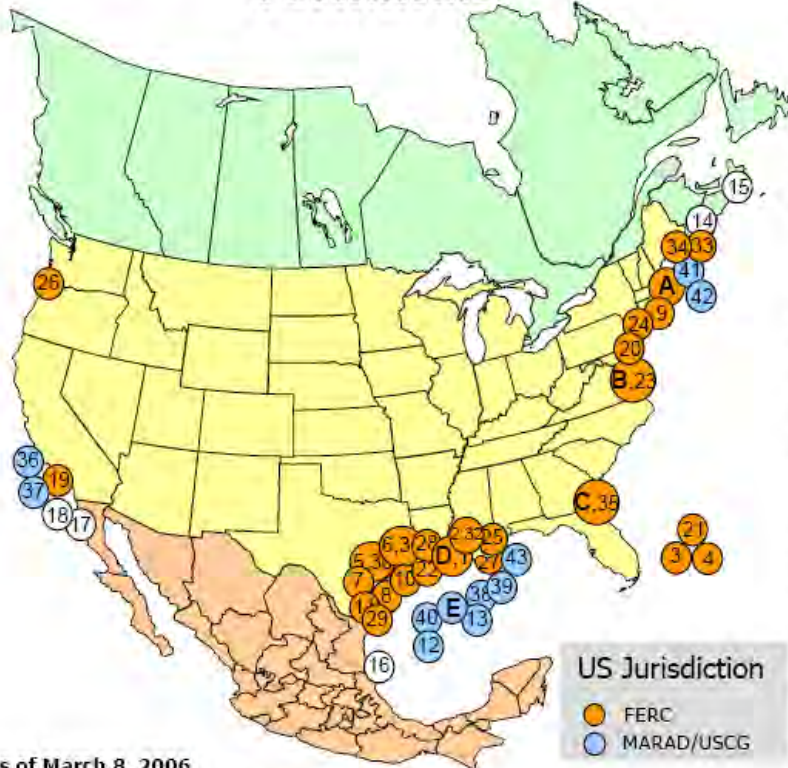
- LNG is a critical component of future supply.
- Many terminals are proposed, few will be built.
- Liquefaction and tankers may be a bigger factor in LNG price and supply.
- International competition for supply is intense.



Existing and Proposed LNG Terminals

FERC

Existing and Proposed North American LNG Terminals



As of March 8, 2006

* US pipeline approved; LNG terminal pending in Bahamas

CONSTRUCTED

- A. Everett, MA : 1.035 Bcf/d (SUEZ/Tractebel - DOMAC)
- B. Cove Point, MD : 1.0 Bcf/d (Dominion - Cove Point LNG)
- C. Elba Island, GA : 1.2 Bcf/d (El Paso - Southern LNG)
- D. Lake Charles, LA : 1.5 Bcf/d (Southern Union - Trunkline LNG)
- E. Gulf of Mexico: 0.5 Bcf/d (Gulf Gateway Energy Bridge - Exceleerate Energy)

APPROVED BY FERC

- 1. Lake Charles, LA: 0.6 Bcf/d (Southern Union - Trunkline LNG)
- 2. Hackberry, LA : 1.5 Bcf/d (Cameron LNG - Sempra Energy)
- 3. Bahamas : 0.84 Bcf/d (AES Ocean Express)*
- 4. Bahamas : 0.83 Bcf/d (Calypso Tractebel)*
- 5. Freeport, TX : 1.5 Bcf/d (Cheniere/Freeport LNG Dev.)
- 6. Sabine, LA : 2.6 Bcf/d (Cheniere LNG)
- 7. Corpus Christi, TX: 2.6 Bcf/d (Cheniere LNG)
- 8. Corpus Christi, TX : 1.0 Bcf/d (Vista Del Sol - ExxonMobil)
- 9. Fall River, MA : 0.8 Bcf/d (Weaver's Cove Energy/Hess LNG)
- 10. Sabine, TX : 1.0 Bcf/d (Golden Pass - ExxonMobil)
- 11. Corpus Christi, TX: 1.0 Bcf/d (Ingleside Energy - Occidental Energy Ventures)

APPROVED BY MARAD/COAST GUARD

- 12. Port Pelican: 1.6 Bcf/d (Chevron Texaco)
- 13. Louisiana Offshore : 1.0 Bcf/d (Gulf Landing - Shell)

CANADIAN APPROVED TERMINALS

- 14. St. John, NB : 1.0 Bcf/d (Canaport - Irving Oil)
- 15. Point Tupper, NS : 1.0 Bcf/d (Bear Head LNG - Anadarko)

MEXICAN APPROVED TERMINALS

- 16. Altamira, Tamulipas : 0.7 Bcf/d, (Shell/Total/Mitsui)
- 17. Baja California, MX : 1.0 Bcf/d, (Energy Costa Azul - Sempra)
- 18. Baja California - Offshore : 1.4 Bcf/d, (Chevron Texaco)

PROPOSED TO FERC

- 19. Long Beach, CA : 0.7 Bcf/d, (Mitsubishi/ConocoPhillips - Sound Energy Solutions)
- 20. Logan Township, NJ : 1.2 Bcf/d (Crown Landing LNG - BP)
- 21. Bahamas : 0.5 Bcf/d, (Seafarer - El Paso/FPL)
- 22. Port Arthur, TX: 1.5 Bcf/d (Sempra)
- 23. Cove Point, MD : 0.8 Bcf/d (Dominion)
- 24. LI Sound, NY: 1.0 Bcf/d (Broadwater Energy - TransCanada/Shell)
- 25. Pascagoula, MS: 1.0 Bcf/d (Gulf LNG Energy LLC)
- 26. Bradwood, OR: 1.0 Bcf/d (Northern Star LNG - Northern Star Natural Gas LLC)
- 27. Pascagoula, MS: 1.3 Bcf/d (Casotte Landing - ChevronTexaco)
- 28. Cameron, LA: 3.3 Bcf/d (Creole Trail LNG - Cheniere LNG)
- 29. Port Lavaca, TX: 1.0 Bcf/d (Calhoun LNG - Gulf Coast LNG Partners)
- 30. Freeport, TX: 2.5 Bcf/d (Cheniere/Freeport LNG Dev. - Expansion)
- 31. Sabine, LA: 1.4 Bcf/d (Cheniere LNG - Expansion)
- 32. Hackberry, LA : 1.15 Bcf/d (Cameron LNG - Sempra Energy - Expansion)
- 33. Pleasant Point, ME : 0.5 Bcf/d (Quoddy Bay, LLC)
- 34. Robbinston, ME: 0.5 Bcf/d (Downeast LNG - Kestrel Energy)
- 35. Elba Island, GA: 0.9 Bcf/d (El Paso - Southern LNG)

PROPOSED TO MARAD/COAST GUARD

- 36. California Offshore: 1.5 Bcf/d (Cabrillo Port - BHP Billiton)
- 37. So. California Offshore : 0.5 Bcf/d, (Crystal Energy)
- 38. Louisiana Offshore : 1.0 Bcf/d (Main Pass McMoRan Exp.)
- 39. Gulf of Mexico: 1.0 Bcf/d (Compass Port - ConocoPhillips)
- 40. Gulf of Mexico: 1.5 Bcf/d (Beacon Port Clean Energy Terminal - ConocoPhillips)
- 41. Offshore Boston, MA: 0.4 Bcf/d (Neptune LNG - Tractebel)
- 42. Offshore Boston, MA: 0.8 Bcf/d (Northeast Gateway - Exceleerate Energy)
- 43. Gulf of Mexico: 1.4 Bcf/d (Bienville Offshore Energy Terminal - TORP Technology)

Office of Energy Projects



60 New Liquefaction Projects Planned in Next Five Years

Planned LNG Liquefaction Projects

	Number	Trillion Btu per Year
Russia/Norway	7	2,063
Africa	13	4,209
South America	5	1,210
Middle East	17	6,081
Pacific Rim/Southeast Asia	6	1,536
Australia	7	2,119
Trinidad & Tobago	3	807
World Total	58	18,025

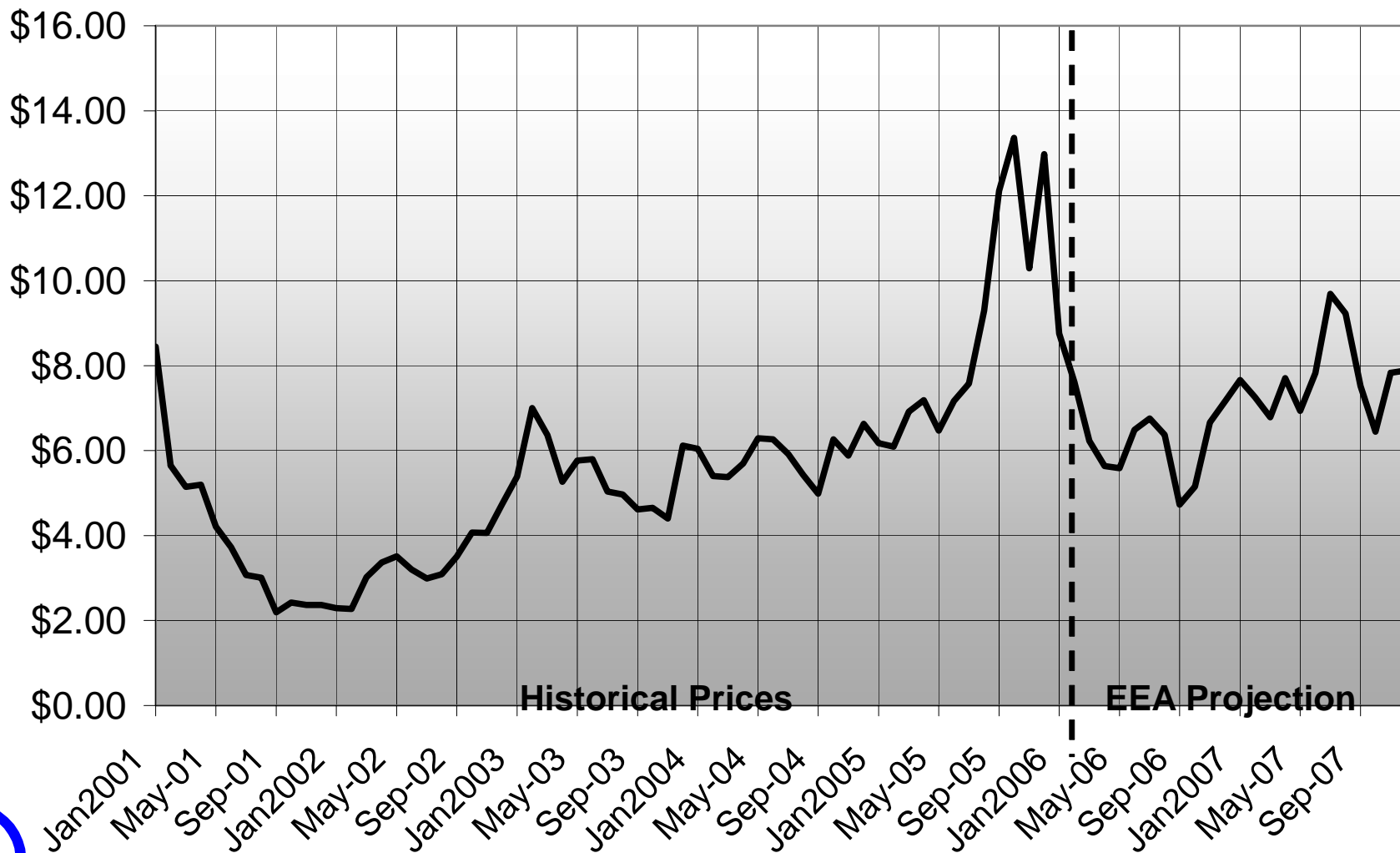


Heat, Hurricanes and Oil Prices

- Last summer was more than 15 percent hotter than normal in the U.S.
 - Gas use for power generation up by almost 35%.
- The hurricane season removed more than 700 Bcf of gas production from the market.
- Oil prices above \$60/barrel pulled all hydrocarbon prices up.
- Warm winter weather relieved pressure on market.
 - Gas prices have come down even though crude oil prices have not.



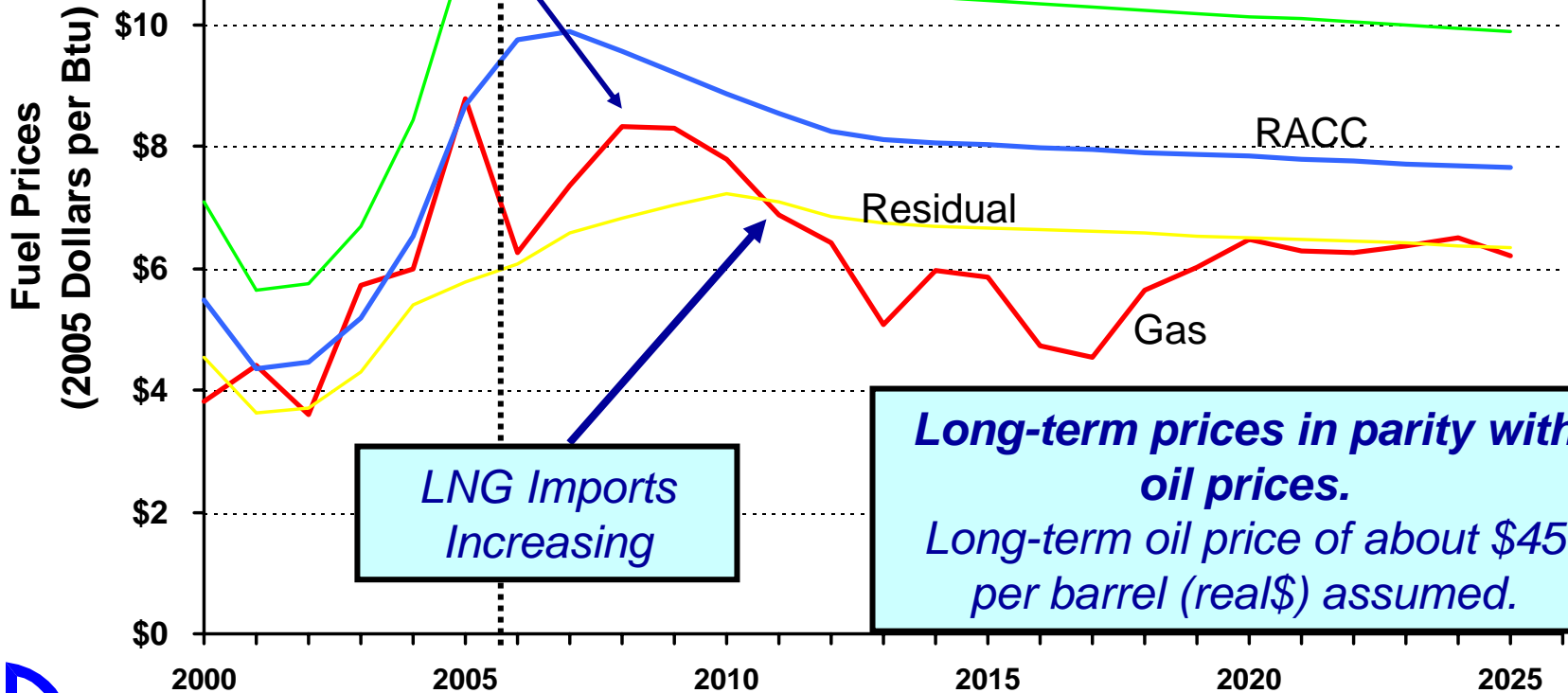
Gas Price at Henry Hub (\$/MMBtu)



Projected Annual Average Henry Hub Gas Price

Continued price pressure likely to persist for next few years.

Henry Hub gas prices will average between \$5 and \$8 per MMBtu - 1990 levels will not return.



LNG Imports Increasing

*Long-term prices in parity with oil prices.
Long-term oil price of about \$45 per barrel (real\$) assumed.*



Sources: Historical data from Platts Gas Daily, Projection by Energy and Environmental Analysis, Inc.

Gas Pricing Conclusions

- Natural gas prices reflect the fundamentals of supply and demand.
 - Extremely warm 2005/06 winter weather reduced pressure on gas prices.
 - Continued recovery of deliverability losses and high storage inventories will continue to place downward pressure on prices.
- However, the fundamental need to address supply has not changed.



CHP and Energy Prices

- Typical CHP application reduces electricity purchases, increases gas purchases.
- CHP trades increased capital cost and gas purchases for lower electric purchases.
- Electricity savings must offset gas and capital costs.



The Concern

- Higher gas prices will swamp electricity savings.
- A reasonable concern where gas and electricity prices are decoupled.
- *But* - electricity markets are changing and increasingly linking to gas markets...



The Price of Electricity

- Average cost/regulated prices
versus
- Marginal cost/competitive prices



Historic Electricity Prices

- Regulated electric rates, based on average cost of utility generation.
- Majority of electricity generated by low-cost nuclear, coal, hydro assets.
 - Energy cost \$25-\$35/MWh (2.5 - 3.5 cents/kWh).
- Large electric user rates relatively low - <\$0.05/kWh (\$50/MWh).
 - Retail rates higher than wholesale energy cost.



Restructured Electric Prices

- Wholesale price based on the marginal unit at each hour.
- Marginal units in many areas are gas-fired units for much of the year, even where coal is the primary energy source.
- In this case, gas and electricity prices are linked.



Where Are Electricity and Gas Linked?

- Restructured electric markets
 - Marginal cost pricing
- Where gas-fired units are on the margin most of the time.
 - California/Northwest
 - Texas
 - Northeast
 - Mid-Atlantic
 - Parts of Midwest (ComEd)



Changing Electric Rates

- Price caps are coming off in restructured markets.
- Utilities moving to market-based rates for large customers.
- Electricity prices will track gas prices.
- Electricity prices are more than the energy component.

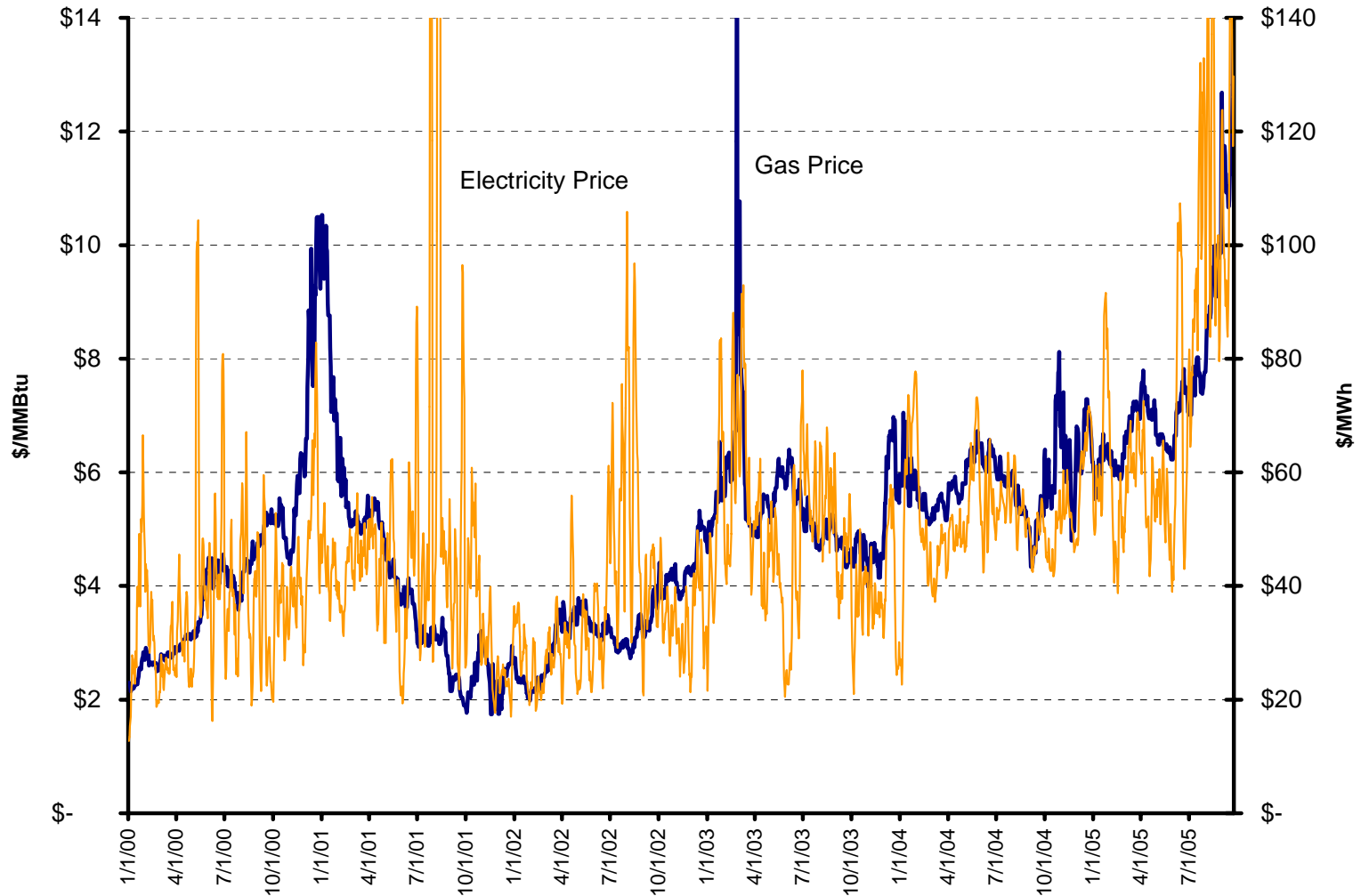


Henry Hub Gas Price

1/1/00 - 9/30/05



HH Gas Price vs PJM Electricity Price 1/1/00 - 9/30/05



Implications for CHP

- Gas prices are high and will stay high.
 - waste and biofuels may have better economics
- Electricity prices will track gas prices in restructured markets with gas on the margin.
- Consumers will experience marginal electricity cost and volatility.
- Need to consider forward-looking, full cost of electricity in project evaluation.
- Effect is much smaller in regulated markets.



Questions?



Contact Information

Bruce Hedman

Energy and Environmental Analysis, Inc.

Arlington, Virginia

(703) 528-1900

bhedman@eea-inc.com

