EVERYTHING YOU WANT TO KNOW ABOUT NATURAL GAS PRICES, AND MORE

The National Regulatory Research Institute

October 27, 2004, 2:30-4:00 (EDT)
Purpose of Teleconference

• Primarily, review recent developments in the natural gas sector to assess where natural gas prices are heading for the next several months

• Secondarily, look at longer-term developments through the end of this decade

• The audience will be state PUC personnel
Organization of Dialogue

• NRRI will provide (1) a summary of recent developments in the natural gas sector, and (2) natural gas price forecasts taken from different studies
• Commissioner Robert Keating of Massachusetts will moderate the discussion
• Follow-up discussion by Commissioner Don Mason of the Ohio Public Utilities Commission, and David Maul of the California Energy Commission
• Questions and comments from call-in participants
• 1.5 hours in length
Participants

Moderator: Commissioner Robert Keating
Mr. Keating is a Commissioner of the Massachusetts Department of Telecommunications and Energy. He is currently Chairman of the Board of Directors for the National Regulatory Research Institute (NRRI). He is also a member of the National Petroleum Council, appointed by the Secretary of Energy.
Participants -- continued

Presenter: Mr. Ken Costello, NRRI

Mr. Costello is a Senior Institute Economist at NRRI. He has conducted extensive research and written widely on topics related to the energy industries and public utility regulation. His research has appeared in books, technical reports and monographs, and scholarly and trade publications.
Participants -- continued

Discussant: Commissioner Don Mason

Mr. Mason is Commissioner of the Public Utilities Commission of Ohio. He was appointed by U.S. Secretary of Energy Spencer Abraham to serve on the National Petroleum Council. He serves on the State of Ohio Security Task Force and was the coordinator of Ohio utility Y2K reliability efforts. Mr. Mason is chairman of the National Association of Regulatory Utility Commissioners (NARUC) Gas Committee and serves on the NARUC Ad Hoc Committee on Electric Restructuring and the Ad Hoc Committee on Critical Infrastructure.
Participants -- continued

Discussant: Mr. David Maul
David Maul is currently Manager of the Natural Gas and Special Projects Office at the California Energy Commission. In his current position, he directs the State of California’s staff and their work to develop independent natural gas forecasts and energy policies dealing with natural gas demand, supply, infrastructure, and markets.
Outline of Costello’s Presentation

• Highlights of recent market developments in natural gas
• Implications for State Commissions
• Background statistics and other information used in support of discussion
Summary of Major Market Developments (Costello)

• Natural gas prices are the highest they have ever been at this time of year
• Natural gas prices are projected to be considerably higher this upcoming winter than last winter
• Natural gas prices can easily soar above the $10-11 range this winter with the combination of cold weather and high oil prices
• At the other extreme, a warm winter, plus falling oil prices, could drive natural gas prices this winter considerably below currently projected levels – perhaps, as low as $5-6
Summary of Major Market Developments -- continued

• Over the past few years, natural gas prices have fluctuated widely and have exhibited an upward movement because of tight market conditions.

• The consensus among experts is that natural gas prices will remain high and vulnerable to volatility, at least over the next few years, because of tight and fragile market conditions.
Summary of Major 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 the levels of the past few years.
- Liquefied natural gas (LNG) and gas supplies from other sources won’t have a noticeable moderating effect on natural gas prices until at least the middle or later part of this decade.
Summary of Major Market Developments -- *continued*

- Prices won’t loosen until new gas sources are forthcoming, which may not occur until as late as 2008
- The past few years have seen intensive drilling activity, and upward movement in well completions
- But the productivity of gas wells continues to fall off and declines are expected in the future
Summary of Major Market Developments -- continued

• Natural gas prices in the short term are extremely sensitive to various factors, making price projections highly vulnerable to error
  – Storage levels
  – Weather
  – Gas production
  – Oil prices
  – General economic conditions
  – Regional pipeline capacity
  – Fuel switching
Summary of Major Market Developments -- continued

• In the short term, the outlook for the gas market is anything but settling and, certainly, not optimistic

• Current conditions in the gas market are in some ways analogous to those that emerged in the oil market during the 1970s
Implications of Price Forecasts for State Commission Actions

• Commissions should continue to be proactive in addressing the “high gas price” problem in their states
• It is important for commissions and gas utilities to promote energy efficiency in reducing customers’ gas bills
• Other options available to commissions and gas utilities identified in last year’s NARUC NGTF’s *Natural Gas Information “Toolkit”* (available on the NARUC website) will continue to be relevant for commissions to consider
Implications of Price Forecasts for State Commission Actions -- continued

• Commissions should stress the importance of hedging and gas utilities procuring a diversified gas portfolio
• Customers should be kept informed of developments in gas markets, especially as they relate to price
• Increased assistance to low-income households is critical as higher gas prices this winter will jeopardize these households’ ability to purchase other goods and services
Background Statistics and Other Information
Sources of Data and Analysis

• EIA’s *Short-Term Energy Outlook, Winter Fuels Outlook, Weekly Natural Gas Storage Report, AEO2004* (www.eia.doe.gov)
• *Gas Intelligence* (www.intelligencepress.com)
• NYMEX futures (www.nymex.com)
• Natural Gas Supply Association (NGSA, www.ngsa.org)
• AGA reports (www.aga.org)
Sources of Data and Analysis
   -- continued

• Independent analysts
• National Petroleum Council (NPC, www.npc.org)
• National Energy Board of Canada (www.neb.gc.ca)

(Note: These sources differ as to their level of objectivity, public availability, and scope of content.)
Important Statistics

- Gas storage levels
- Behavior of Henry Hub natural gas prices over the past few years
- NYMEX futures prices over the next several months or years
- Price projections from other sources
- Consumption levels
- Projected gas bills for the upcoming winter
Important Statistics -- continued

• Domestic gas production
• LNG imports
• Canadian imports
• Rig counts
• Well completions
• Oil prices
Short-Term Perspective
U.S. Natural Gas Demand and Prices Since 1992

U.S. Natural Gas Consumption (EIA)

U.S. Natural Gas Prices (Henry Hub)
Henry Hub/Wellhead Average Annual Prices, 1992-2004

![Chart showing the trend of Henry Hub (HH) and Wellhead (WH) average annual prices from 1992 to 2004. The graph displays the price in dollars per Mcf (thousand cubic feet) over the years, with a noticeable increase in prices from 2002 onwards.]

- **Dollars per Mcf** range from 0 to 7
- **Legend**:
  - HH Price
  - WH Price
Henry Hub Natural Gas Prices, January 2002- October 22, 2004

HENRY HUB CASH PRICES

DATE

PRICE IN $/MMBtu

NRRI -- October 27, 2004
Henry Hub Average Annual Price, 1991-2004
Changes in NYMEX Futures Prices, during the Period August 13-October 22, 2004
U.S. Natural Gas-Directed Drilling Activity

Short-Term Energy Outlook, October 2004
Large Increase in Supply Rigs Shows Little Effect on Production Since 2000
(source: EIA and Baker Hughes)
Proved Reserves/Production Ratio, 1980-2003

![Graph showing the Proved Reserves/Production Ratio from 1980 to 2003. The ratio decreases over time, with bars representing the ratio for each year.]
U.S. Working Gas in Storage
(Percent Difference from Previous 5-Year Average)
EIA’s Short-Term Projections (as of March 2004)

• **Wellhead price:** $4.75 per Mcf in 2004, $4.82 in 2005

• **Consumer prices:** expect relief starting in 3Q 2004

• **Consumption:** some recovery in 2004 from decrease in 2003

• **Supply:** *Cautious Optimism* because of
  – Production increases expected in 2004 and 2005
  – Net imports (including LNG) increase in 2004
  – Storage levels adequate
EIA’s Short-Term Outlook for Natural Gas
(as of August 30, 2004)

• Continued tight gas market
  – No short-term relief anticipated
• Consumption: flat growth in 2004 and 2005
• Domestic production: marginal growth through 2005
• New well completions offset by the production declines for existing wells
• Net imports
  – Slight increase in 2004 and then decrease in 2005
  – Increased LNG imports are offset by decreased pipeline imports from Canada
EIA’s Short-Term Outlook for Natural Gas
(as of October 6, 2004)

- **Wellhead price:** $5.52 per Mcf in 2004, $5.63 in 2005
- **Oil price:** over $40 (WTI) for next year
- **Domestic production:** 1.5% increase in 2005 because of intensive drilling
- **Consumption:** 2% increase in 2005
- **Moderate improvement in supply for 2005**
  - Increase in LNG imports (22%)
  - Restrained export growth
  - Storage carryover
EIA’s 2004-2005 Winter Natural Gas Outlook (as of October 6, 2004)

- **WELLHEAD PRICE**: $6.04 per Mcf (compared to $4.92 per Mcf last winter, or an increase of almost 23%)
- **RESIDENTIAL CONSUMER PRICES (Midwest)**: $10.86 per Mcf (compared to $9.77 per Mcf last winter, or an increase of 11%)
- **CONSUMPTION**: an increase of 1.5% over last winter’s consumption
- **SUPPLY**:  
  - Domestic natural gas production slightly higher than last winter’s production  
  - Net imports slightly higher than last winter’s net imports  
  - Storage levels adequate
- **WEATHER SCENARIOS**: a cold winter could significantly drive up gas expenditures (for example, a severe winter could drive winter gas bills up almost 17% from the base case)
Ratio of Wellhead Price to Delivered Residential Price

![Bar chart showing the ratio of wellhead price to delivered residential price from 2000 to 2003. The chart indicates that the ratio was higher in 2003 compared to 2000.](chart.png)
## EIA Base Forecast


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<tbody>
<tr>
<td><strong>Natural Gas (Midwest)</strong></td>
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<tr>
<td>Consumption (mcf*)</td>
<td>88.8</td>
<td>81.3</td>
<td>94.9</td>
<td>89.1</td>
<td>92.3</td>
<td>3.7</td>
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<tr>
<td>Avg. Price ($/mcf)</td>
<td>7.61</td>
<td>7.41</td>
<td>8.40</td>
<td>9.77</td>
<td>10.86</td>
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<td>Expenditures ($)</td>
<td>676</td>
<td>602</td>
<td>797</td>
<td>870</td>
<td>1003</td>
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<td><strong>Heating Oil (Northeast)</strong></td>
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<tr>
<td>Consumption (gallons)</td>
<td>673</td>
<td>577</td>
<td>743</td>
<td>700</td>
<td>698</td>
<td>-0.3</td>
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<tr>
<td>Avg. Price ($/gallon)</td>
<td>1.12</td>
<td>1.10</td>
<td>1.34</td>
<td>1.36</td>
<td>1.75</td>
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<td>Expenditures ($)</td>
<td>754</td>
<td>637</td>
<td>995</td>
<td>953</td>
<td>1223</td>
<td>28.4</td>
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<td><strong>Propane (Midwest)</strong></td>
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<tr>
<td>Consumption (gallons)</td>
<td>877</td>
<td>803</td>
<td>940</td>
<td>882</td>
<td>914</td>
<td>3.7</td>
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<tr>
<td>Avg. Price ($/gallon)</td>
<td>1.10</td>
<td>1.11</td>
<td>1.20</td>
<td>1.30</td>
<td>1.53</td>
<td>17.3</td>
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<tr>
<td>Expenditures ($)</td>
<td>965</td>
<td>888</td>
<td>1124</td>
<td>1147</td>
<td>1396</td>
<td>21.6</td>
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Consumption based on typical per household use for regions noted. Prices are retail national averages.

*thousand cubic feet.
Figure 6. U.S. Natural Gas Spot Prices (Base Case and 95% Confidence Interval*)

*The confidence intervals show +/- 2 standard errors based on the properties of the model. The ranges do not include the effects of major supply disruptions.

Sources: History: Natural Gas Week; Projections: Short-Term Energy Outlook, October 2004.
## EIA’s 2004 and 2005 Projections

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<tr>
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<th>2003</th>
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<th>2005</th>
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<tr>
<td>LNG Imports (Bcf)</td>
<td>510</td>
<td>680</td>
<td>830</td>
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<td>Average Wellhead Price ($/Mcf)</td>
<td>$4.98</td>
<td>$5.52</td>
<td>$5.63</td>
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<tr>
<td>Average Henry Hub Price ($/Mcf)</td>
<td>$5.64</td>
<td>$6.10</td>
<td>$6.18</td>
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<tr>
<td>Residential Gas Price ($/Mcf)</td>
<td>$9.50</td>
<td>$10.60</td>
<td>$11.12</td>
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## Comparison of 2005 Henry Hub Price Forecasts (source: NGSA study)

<table>
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<tr>
<th>Company</th>
<th>Forecast</th>
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<tbody>
<tr>
<td>EIA</td>
<td>$6.16 ($6.18, update)</td>
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<tr>
<td>Lehman Brothers</td>
<td>$5.50</td>
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<tr>
<td>Raymond James and Associates</td>
<td>$6.65</td>
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<tr>
<td>SEER</td>
<td>$6.55 ($6.19, update)</td>
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<tr>
<td>EEA</td>
<td>$6.45</td>
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<tr>
<td>Stephen Smith Energy Associates</td>
<td>$5.50</td>
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<tr>
<td><strong>Average</strong></td>
<td><strong>$6.14</strong></td>
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“Demand Destruction” in the Industrial Sector

- Aluminum smelter closings
- Ammonia production reductions
- Industrial plant closings
- Fuel-switching
- Industrial process adjustments
Natural Gas Expenditures for Space Heating Customers by Income Category, 2001

Natural Gas Expenditures by Income Category, 2001

- <$10K: $555
- $10K-30K: $634
- $30K-50K: $677
- >$50K: $805
- <Poverty Level: $571
- Federal Assist.: $636
- Total: $702

Income Category
Longer-Term Perspective
Average NYMEX Winter Futures Prices, 2004-2010

Winter Months

Dollars per MMBtu

As of Oct. 13
As of Oct. 22
Lower 48 Natural Gas Wellhead Prices, 1970-2025 (2002 dollars per thousand cubic feet)

Reference case (nominal dollars)

1995: 1.55
2025: 8.44

History

Projections

Energy Information Administration
Lower 48 Natural Gas Wellhead Prices, 1970-2025 (2002 dollars per thousand cubic feet)
Natural Gas Supply, 1990-2025 (Tcf) (source: EIA)
U.S. Natural Gas Net Imports, 1990-2025

(Tcf) (source: EIA)
Shift in Long-Term Supply Perspectives since 1999

<table>
<thead>
<tr>
<th>Projections of Lower 48 Natural Gas Production (Tcf)</th>
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<tr>
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<tr>
<td>AEO 1999</td>
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<td>AEO 2003</td>
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<td>AEO 2004</td>
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<td>AEO 2005</td>
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<td>NPC 1999</td>
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<td>NPC 2003</td>
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Upward Revision of EIA’s Forecast Since 1996

EIA Forecasts of U.S. Natural Gas Prices, 2015

Source: EIA Annual Energy Outlooks for 1996 through 2004, reference case wellhead prices and reported comparison forecasts. Reference forecasts were converted to 2002 dollars using GDP implicit price deflators from EIA’s Short Term Energy Outlook, May 2004, Table A2.
High Correlation Between Oil and Natural Gas Prices

Natural Gas and Crude Oil Prices and Futures

Henry Hub monthly natural gas
West Texas intermediate light sweet crude oil

Historical prices
NYMEX futures

(for natural gas futures, the 12-month rolling average is shown)

Source: EIA, NYMEX (trade date: April 30, 2004)
NPC’s Projected Prices: Potential Benefits from Policy Initiatives

Reactive Path Scenario

Price Averages, 2006-2025:
- Reactive Path: $6.04
- Balanced Future: $4.56
National Energy Board Study:* Parallels in the U.S. and Canadian Gas Situation

• Continued tight gas market
• Concern about period between now and end of decade, as adjustments of demand and supply to high gas prices may be limited
• Question of where gas will come from to satisfy demand until end of the decade
• In a tight gas market, electric generators and core markets likely to bid gas away from the industrial sector

National Energy Board Study -- continued

• **Major recent market developments**
  - Continental gas production is flattening out
  - Gas prices have risen and have been very volatile
  - High prices have had strong impacts on gas demand for gas-intensive industrial firms
  - Electric generation has emerged as major source of gas demand
  - Reduction in liquidity in market (demise of energy traders and marketers)
  - Natural gas is becoming a premium fuel
National Energy Board Study -- continued

- North American gas prices are increasingly influenced by the
  - Cost of alternative fuels
  - Rising costs of finding and bringing new gas supply to market
- With tighter environmental restriction limiting the range of fuel options and increasing the demand for gas, gas prices will be higher and closer to range set by lighter distillate fuel oils
National Energy Board Study -- continued

• “The general consensus among [study] participants was that out of the 40 current proposals for new LNG terminals in North America, only two or three new LNG projects would likely be in service by 2010.”