NRRI Training for the Oklahoma Corporation Commission
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Topic 9

Natural Gas Pricing and Hedging

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Marketers

300,000 + Gas Wells

Producers
- Majors
- Independents

Gathering

29 Major Interstate Pipelines

Storage

Commercial

Residential

Industrial & Utilities

1200 Distributors

Not Regulated

Regulated by states

Regulated by FERC and DOT

Regulated by States

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Storage Facilities in the U.S.

- Depleted Fields
- Salt Caverns
- Aquifers

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U.S. Interstate and Intrastate Natural Gas Pipelines

Legend

Interstate Pipelines
Intrastate Pipelines

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Costing/Pricing at the Distribution Level

- **Base rates** (rates based on a utility’s revenue requirements for the test year)
- **Purchased gas adjustment mechanisms**
- **Other trackers and surcharges** (e.g., bad debt, costs for environmental controls, R&D, new pipes)
Base Rates

- Rates that recover the costs of investment and operations of the distribution network
  - Generally set in a rate case using the cost of service principles and applications discussed earlier
  - Some costs may be taken out and addressed on a single-issue basis (e.g., pensions, bad debt, lost revenues, etc.)
  - Utility earns a margin (i.e., profit) from base rates
Cost of Service Study for Gas Utility

(1) Cost Functionalization
- Production & Gathering
- Storage
- Other Gas Supply
- Transmission
- Distribution

(2) Cost Classification
- Fixed
  - Customer
  - Demand (Capacity)
- Variable
  - Commodity
  - Commodity

(3) Cost Allocation

Source: R. Feingold
"Traditional and Unbundled LDC Rate Design" AGA Rates School, June 2009, Center for Business and Regulation, Chicago, IL
Purchased Gas Adjustment Mechanisms

- Rates that recover the cost of purchasing gas for customers that buy from the utility
  - Generally set on a annual or semi-annual basis based on the cost of procuring the commodity (and transport to deliver commodity)
  - Revenues from these prices are reconciled to actual costs generally on an annual basis
  - Utilities typically recover costs on a dollar-for-dollar basis
  - The most universal and (probably) oldest cost tracker for gas utilities
Purchased Gas Adjustment Mechanisms – continued

- Designed to allow a utility to recover its actual purchased gas costs in a timely manner so as to prevent high deferred costs to accumulate over time

- Over time, commissions had evaluated their PGA mechanisms in part to determine whether these mechanisms have led to high deferred costs (i.e., the lag-induced discrepancy at any point in time between gas costs incurred by the utility and the costs recovered under a PGA mechanism)

- One particular area of commission investigation, tied to addressing this problem, is the frequency of purchased gas-cost adjustments

- A few commissions have moved away from annual adjustments to monthly adjustments, partially to avoid dramatic one-time rate increases that could occur under annual adjustments
# Cost Trackers

<table>
<thead>
<tr>
<th>Positive Aspects</th>
<th>Negative Aspects</th>
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<tr>
<td>Shorten the time lag between the incurrence of a cost and its recovery in rates</td>
<td>Undercut the positive effects of regulatory lag in deterring utility waste and cost inefficiency</td>
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<td>Increase cost-recovery certainty</td>
<td>Could lessen regulatory scrutiny in evaluating the prudence of costs</td>
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<tr>
<td>Lessen the regulatory scrutiny of its costs</td>
<td>Have the potential to create perverse incentives (e.g., uneven utility incentives for managing different costs)</td>
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<tr>
<td>Taking everything into account, lower a utility’s financial risk by stabilizing its earnings and cash flow</td>
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The Spot Market

- **Definition**: the market for a cash commodity where the actual physical product is traded
- **Examples**: day-ahead, monthly gas transactions
- Low transaction-cost market
- Prices determined by supply and demand
- The spot price is determined by several factors: (1) production cost, (2) storage levels, (3) economic conditions, (4) weather, (5) pipeline capacity, and (6) random shocks
- Inherently volatile and unpredictable prices
- Consequently, demand by market participants for alternative commercial arrangements and hedging mechanisms (e.g., bilateral contracting, storage, vertical integration, financial derivatives)
- Requirement of open access to the delivery network
- The spot price is frequently used as a reference price in bilateral gas supply contracts
Hedging
Definition of Hedging

• “Hedging” is an economic activity in which a party tries to protect against potential adverse price fluctuations in a market.

• Analysts often refer to hedging as insurance.

• An example is a utility buying a futures contract today at a specified price and that expires at a specified future date; the utility locks-in a price that it is comfortable with, e.g., $4 per Mcf.

• For a gas utility, hedging mitigates its exposure to high natural gas prices.
Hedging instruments come in both physical and financial forms

- Among the former are bilateral physical contracts with fixed prices and storage
- The latter category includes futures contracts, options, collars, and swaps
- Each hedging instrument has different features, effects, and costs
- The preferred instruments are utility-specific
Unlike a speculator, a hedger does not attempt to profit from price movements.

Hedging has the risk of a utility and its customers paying above-market prices; hedging can also have counterparty risk and collateral obligations.

Hedging resulting in higher prices after-the-fact to consumers should not infer utility-management imprudence.

Regulators and utilities cannot expect hedging to lower the long-term price paid for natural gas; in fact, the opposite is more likely.
Basic Things to Know about Hedging

- High natural-gas price volatility supports consideration of hedging by utilities and other large gas consumers, including with financial instruments.
- Relative to physical hedges, financial instruments can have:
  - Lower costs
  - More liquidity
- Since the beginning of this century, state commissions have conveyed to gas utilities that buying gas at the market or spot price may be unacceptable (i.e., “imprudent”).
Hedging may not always be desirable

State commissions vary in how much upfront guidance they give gas utilities on hedging

Almost always, more stable and predictable prices by way of hedging involve a long-run cost to consumers or other gas purchasers (no “free lunch”)

The pertinent question then becomes: How much should a utility pay (e.g., in the form of an options premium) to have more stable and predictable prices?
Basic Things To Know about Hedging – continued

- The fundamental answer to the previous question depends upon *how much customers are willing to pay to have more stable and predictable prices or to avoid price spikes*.
- Customers can suffer non-trivial economic welfare losses when natural gas prices rise to unusually high levels (e.g., inability to pay for other essentials).
- In the finance literature, firms primarily hedge to stabilize cash flow; but with PGAs and FACs, the biggest beneficiaries of hedging would be customers.
Hedging resulting in higher prices (ex post) to consumers can still be regarded as successful and prudent.

Hedging has the risk of a utility and its customers paying above-market prices.

A common position of state commissions is to tell the gas utility that: “go ahead and hedge, we won’t stop you, but we will evaluate your hedging strategy and the associated activities and costs after-the-fact with a prudence review”
Basic Things To Know about Hedging – continued

- How much to hedge and how to hedge are more complicated and subjective than traditional gas-procurement decision-making
- Hedging is therefore highly susceptible to second-guessing
- Regulators can view hedging as a value-added service distinct from traditional gas procurement practices (namely, the value to customers from not having to pay “high” prices)
Historical Overview of Hedging

• Gas utilities have actively hedged with financial instruments since the beginning of this century
• Pressures from state regulators explain much of utilities’ willingness to hedge
• For example, several regulators have articulated that moderate price risk should be an objective of gas procurement and gas supply planning
• A major motivator for utilities to hedge is protection against volatile gas prices for which regulators might hold them accountable (i.e., to minimize regulatory risk)
Factors Affecting Long-Term Natural Gas Prices

- LNG exports
- Exports to Mexico
- Canadian imports
- Long-term economic growth
- Shale gas resources
- Growth rate of total natural gas consumption
- Offshore access to natural gas resources
- Correlation of oil and natural gas prices
- Gas-fired generation from new and existing power plants
- Climate change policy
- Industrial consumption of gas
The high losses of some utilities from hedging with financial derivatives – in the range of hundreds of millions of dollars – is a reason for regulators to revisit hedging

- Regulators should expect utility losses from hedging in some if not most years
- The tough questions are:
  - When do large losses or prolonged losses reflect events outside the control of a utility?
  - When do they reflect unreasonable or flawed utility practices that make some of these losses avoidable?
  - Are regulators partly to blame?
Contentious Issues

- Rationale for hedging
- Hedging benefits and their relationship to hedging costs and risks
- Utility actions that might be preferable to hedging
- Effects of shale gas development on future hedging
- Regulatory oversight functions
- Capabilities and incentives of utilities to hedge effectively
- Mechanical vs. discretionary approach
- Interpretation of hedging outcomes for cost recovery and the evaluation of utility management
One Hedging Objective

- Place a cap on the price of natural gas paid during the winter heating season
  - For example, utility customers might prefer “catastrophic insurance,” which is protection from the chances of extreme price spikes
  - Such protection could reveal a preference for a price-cap approach that minimizes the downside risk (via, e.g., options)
  - Hedging then protects against upward price spikes while limiting lost opportunities in a falling-price environment
  - Even with risk-averse customers, regulators should not simply conclude that those customers would want to pay to eliminate all price volatility
  - After all, the economic well-being of the average household is not greatly influenced by its monthly gas bill
Appendix
Gas Procurement Options

- Multi-month contracts
- Month-ahead contracts
- Daily spot purchases
- Stored gas
Different Hedging Options: Physical and Financial Hedges

- Physical fixed-price contracts
- Staggered contracts
- Financial instruments (e.g., futures contracts, options, swaps, collars)
- Storage
- Gas supply diversity (e.g., connected to at least 3 supply basins)
- Fuel and power plant diversity (for electric utilities)
Examples of Financial Instruments

- Futures contracts
- Swaps
- Caps
- Collars
Futures Contracts

• **Definition:** An agreement to purchase or sell gas for delivery in the future: (1) at a price that is determined at the beginning of the contract, (2) which obligates each party to the contract to fulfill the contract at the specified price, and (3) which may be satisfied by delivery or an offset

• **Illustration:** On August 1, 2016, a January 2017 gas futures contract sold for $4 per MMBtu; the January 2017 contract calls for 10,000 MMBtus of gas to be delivered over the month; by purchasing the futures contract at $4, the utility in effect locks in that price for its customers, notwithstanding the fact that it will actually buy the physical gas during January 2017 under a separate contract at the market price
Swaps

- **Definition:** Transaction where parties exchange payments based on changes in the price of gas or a market index, while fixing the price they effectively pay for the physical commodity.

- **Illustration:** Tar Heel Gas Company purchases a swap from ENROCK trading company to lock in a fixed price of $5 per MMBtu; the utility continues to pay its supplier at index; at prices over $5, ENROCK pays the utility the difference; at prices below $5, the utility pays ENROCK the difference; the net price remains at $5 for the duration of the agreement.
**Caps**

- **Definition:** A contract between two parties, whereby the buyer is assured that she will not pay more than a given maximum price

- **Illustration:** Tar Heel Gas Company purchases a cap from ENROCK with a $6 strike price; the utility pays an upfront premium to ENROCK to protect the desired volume; should the market price rise above $6, ENROCK pays the difference between the strike price and the market price; if market prices fall below $6, the utility can discard the cap and buy gas in the spot market
Collars

- **Definition:** A contract between two parties, whereby the buyer is assured that he will not have to pay more than some maximum price, and whereby the seller is assured of receiving some minimum price.

- **Illustration:** Tar Heel Gas Company wishes to ensure it pays prices between $5-6; the utility subsequently purchases a $6 cap and sells a $5 floor, effectively "collaring" the amount to be paid; if the premiums paid/received are equal, the transaction is deemed a costless collar.
Policy and Economic Issues

- Why should a utility hedge? Who are the major beneficiaries?
- How much should it hedge? How much should it spend on hedging?
- How should a utility hedge? How much should it hedge with storage and physical contracts, and with financial instruments?
- What role should the commission play in the development of a hedging strategy?
What incentive does a utility have to hedge versus not to hedge? Does the utility have to be pushed to hedge?

Should a utility change its tactics in response to changed market conditions?

- If so, does it have the incentive given that it would require active management, continuous monitoring and the constant accumulation of market intelligence?
- Would the utility be more susceptible to a prudence review, or second guessing, since it would have to make more and complex decisions?
• Should a commission give a utility guidance on the development of a hedging strategy?
• How should a commission retroactively evaluate a utility’s strategy and execution?
• How should a utility’s hedging costs be recovered from its customers?
• What should be the essential components of a hedging strategy?
• Any strategy should try to balance the upside and downside risks of hedging to achieve a customer-preferred price range
• The optimal hedging plan depends on utility customers’ tolerance for upside and downside risks
• A utility giving up the ability to take advantage of falling and unexpected price declines constitutes a risk of hedging to utility customers
• For example, a utility selling put options or purchasing futures contracts loses the opportunity to benefit when market prices fall below that level
• Many hedging strategies seem to give deficient attention to the downside risk, which may explain why a number of utilities have experienced large hedging losses during the 2008-2010 period
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<tr>
<th>Policy Phase</th>
<th>Plan Design Phase</th>
<th>Plan Execution Phase</th>
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<tbody>
<tr>
<td>Determine objective of hedging</td>
<td>Take account of seasonal nature of hedges</td>
<td>Oversee market conditions and hedging positions</td>
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<td>Determine first principles and guidelines for hedging</td>
<td>Determine whether to set hard or soft targets for hedging volumes</td>
<td>Accommodate to changed market conditions and updated information</td>
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<td>Determine customer price-risk tolerance (upside and downside)</td>
<td>Determine budgeted amount for hedging</td>
<td>Consider and continuously review compliance with plan; inform regulator if plan should be amended</td>
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<tr>
<td>Determine goal in protecting against price risk</td>
<td>Choose specific hedging instruments</td>
<td>Report to regulator all hedging activities, costs, and results</td>
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<td>Determine whether hedging is appropriate, given market information</td>
<td>Determine price triggers for hedging volumes and timing</td>
<td>Document hedging activities for utility and regulatory review</td>
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<tr>
<td>Determine criteria for changing hedging strategy</td>
<td>Determine use of price forecasts and their distributions</td>
<td>Interpret hedging results</td>
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<tr>
<td>Determine degree of utility discretion in hedging tactics</td>
<td>Determine (and periodically revisit) predefined formulas or models driving utility actions</td>
<td>Conduct general oversight of hedging</td>
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<td>Determine internal reporting requirements</td>
<td>Determine time horizons of hedges</td>
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<td>Determine timing, amount and strategy of hedges</td>
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<td></td>
<td>Assess downward price flexibility</td>
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<td>Document all actions</td>
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Regulatory Options

- **Taking a pro-active posture**
  - Laying out guidelines or “rules of the road”
  - Evaluating the reasonable of a utility’s hedging strategy before it is executed
  - Evaluating the prudence of a plan’s execution for determining cost recovery

- **Rationale for a pro-active commission**
  - How much to hedge and how to hedge mainly affect customer (rather than utility shareholder) welfare, thus justifying commission and non-utility involvement
  - Hedging is highly susceptible to second-guessing or opportunism by regulators
  - It should help to narrow the scope and incidence of after-the-fact prudence reviews
  - It avoids placing a utility in a dilemma – no hedging versus hedging with no commission guidance
  - It reduces the chances of a bad decision
An Example of Regulatory Guidelines

- Establish the need
- Keep a hedging strategy as simple as possible
- Articulate the objectives of a hedging strategy
- Identify all hedging costs
- Establish reporting requirements
- Know the utility’s hedging expertise
- Articulate the prudence criteria (i.e., the conditions under which the commission would allow recovery of hedging costs)
In establishing a prudence standard for hedging, a commission might want to:

- Define an acceptable level of price volatility (or consumer risk tolerance toward price volatility)
- Define an acceptable average cost for gas, accounting for the costs associated with hedging

Second-guessing and micromanaging should be avoided:

- Commissions should not (and really should not want to) tell utilities how to hedge
- Second-guessing is contrary to the traditional prudence standard and, in addition, creates distorted incentives for utility hedging
- But, according to the prudence standard, a commission should maintain authority to evaluate the reasonableness of (1) a hedging strategy \textit{ex ante}, and (2) the execution of the strategy
Another regulatory response is to do nothing until the utility requests recovery of hedging costs (Is this a good policy? If not, what is wrong with it?)

Degree of regulatory commitment – what would be preferred?

- **Full commitment** (e.g., pre-approval of a hedging plan and all of its costs)
- **Partial commitment** (e.g., pre-approval of a hedging plan but not its costs; upfront guidelines)
- **No commitment** (e.g., no guidance but after-the-fact prudence review)
Standards for Evaluating Utility Hedging

- Hedging resulting in higher prices (ex post) to consumers can still be regarded as successful and prudent.
- An indicator of success is whether outcomes meet the objectives established in the hedging strategy at a reasonable cost.
- As one analyst has commented: “risk is prospective and ‘regret’ is retrospective.”
- A utility frequently sustaining large hedging losses raises a “red flag” that a regulator should investigate.
• Large losses could result from:
  ✓ Inflexible hedging strategies (e.g., non-adaptive to changing conditions)
  ✓ Wrong hedging objective
  ✓ Little utility accountability
  ✓ Poor execution or
  ✓ Failure to account for extreme or unexpected events (e.g., lower than recent historical wholesale gas prices)

• A basic question for regulators is: *Do the benefits from hedging offset the costs?* In some instances, customers have paid dearly for utility hedging in return for non-quantifiable benefits or benefits that ostensibly fell far short of the costs.
Questions for Staff Review

- For *gas procurement*, the relevant questions are
  - Did the LDC purchase gas at reasonable prices?
  - Did the LDC purchase adequate gas supplies to satisfy the demands of its customers?

- For *hedging*, the relevant questions are
  - Did the LDC adequately consider the preferences of its customers for stable gas prices (if, in fact, they do exist)?
  - Did the LDC engage in least-cost hedging?
# Eight Regulatory Functions Related to Hedging

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<tr>
<th>Regulatory Action</th>
<th>Rationale</th>
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<tr>
<td>Establish regulatory principles for hedging</td>
<td>▪ Articulates commission goals and general criteria for hedging</td>
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<td>Set hedging guidelines or standards</td>
<td>▪ Identifies general utility actions consistent with principles</td>
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<tr>
<td>Review filed hedging plans</td>
<td>▪ Allows a commission to understand and evaluate proposed utility actions</td>
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<tr>
<td>Approve, reject or modify proposed utility hedging plans</td>
<td>▪ Ensures that the approved plan is consistent with principles and guidelines</td>
</tr>
<tr>
<td>Review hedging results</td>
<td>▪ Allows a commission to understand and evaluate actual utility actions</td>
</tr>
<tr>
<td>Ask questions about hedging results</td>
<td>▪ Identify factors affecting actual hedging results</td>
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<tr>
<td>Evaluate prudence of utility management</td>
<td>▪ Determines utility recovery of hedging costs</td>
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<td>Make other decisions based on review of utility hedging activities</td>
<td>▪ Helps improve regulatory actions on the future status and nature of the utility’s hedging activities</td>
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