Preventing a Budget Blowout: Natural Gas Market Dynamics and Risk Management Strategies for Natural Gas Procurement

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Topics:

- Basic Terminology
- Supply & Demand Factors
- Risk Management
- Strategy
To set the stage...a few terminology basics:

Units of Measure

• 1 Mcf = 1,000 cu. ft. Or approximately 1 Dth.
• 1 Bcf = 1 Billion cu. ft.
• 3,000 Mcf per day is about 1 Bcf per year.
  Example: If your plant burns about 9,000 per day, then you use about 3 Bcf per year.
• The U.S. Annual Demand is about 83 Bcf/day or 30+ Tcf/yr with a daily range of about 60 to 150 Bcf/day.


Basis: Regional price. Your cost of gas.
Demand
Sources of Demand:

- Residential/Commercial
- Industrial
- Power Production
- Exports to Mexico
- Liquefied Natural Gas (LNG) Exports
- Storage

Drivers of Demand:

- WEATHER (Winter AND Summer)
- Economic Growth / Contraction
- Competing Fuels
- Regulation
- Global markets (exports)
Takeaways:

- Blue slice...Demand from power sector is playing a greater role in power production and overall gas demand.
  - Fuel used for power production back in 2000: Coal = 50%, Gas = 15%
  - Today: Gas is >30% and coal is <30% for power production.
- There are several days during the summer when power production using gas is over 40 Bcf/day. (about half of daily gas production)

Source: EIA
Takeaway: Natural gas has surpassed coal. Non-hydro renewables (wind/solar) are now up to 10% of electricity produced.

Source: EIA
Source: EIA  Data thru Jan19
Natural Gas Storage Facts:

Approx. 415 storage facilities in the U.S.

3 types:
1. Depleted natural gas or oil fields (approx. 77%*)
2. Aquifers (approx. 15%*)
3. Salt caverns (approx. 8%*)

- Total storage capacity in excess of 4 Tcf.

* - By volume
Recent Major Demand Shifts:

• Exports (LNG worldwide & pipelines to Mexico)

• Power Production
  ▪ EPA Regs & Coal Plant Retirements
  ▪ Coal to gas conversions

• Fertilizer & Chemical Sector
  ▪ Feedstock gas - new plants and also former plants back online
  ▸ Ammonia (NH₃ plants for fertilizer)
  ▸ Methanol
  ▸ Ethylene

Source: EIA
Pipelines to Mexico - Now 5 Bcf/day. Will continue to grow. Main barrier right now are pipeline projects on Mexico side of the border. 60% of Mexico’s power is fueled by natural gas.

Liquified Natural Gas (LNG) - Now about 6 Bcf/day. Started Feb16.
- 5 export facilities now operating.
- More planned - projections of around 10+ Bcf/day by 2020/21
As of late 2018
LNG Ships
Weather

IN THE END…. WEATHER IS THE MAJOR DEMAND DRIVER

• Heating demand in the winter.

• Cooling demand (power generation) in the summer.

• Residential/Commercial varies widely with the weather (10 Bcf/day in the summer to as much as 75 Bcf/day in the depth of winter).

• Affect on Market: Sometimes short term and sometimes longer term.
Example: January 30, 2019 - set record U.S. demand of 150 Bcf!
Production
> 70% of total production is shale

Source: EIA (excludes Alaska)
Note: Approx. 10% production increase YOY from 2017 to 2018 to approx. 31 Tcf
Shale! High prices in 2005-2008 spurred innovation

Marcellus leads the way at 20+ Bcf

Source: EIA
Current Market Recap:

• **Supply**: Outpacing demand (production was up 10% YOY in 2018). Increase flattening though.

• **Production**: Up due to the shale revolution and increased drilling efficiency. Shale gas has gone from 2 Bcf/day to 60+ Bcf/day over the past 15 years.

• **Exports**:
  - U.S. is now a net exporter of natural gas. Canadian imports are less than combined LNG and Mexican exports.
  - LNG (liquefied natural gas):
    - Exporting started in early 2016. Now about 6 Bcf/day.
    - Exports are projected to go to 10+ Bcf/day in the next 3-4 years.
  - Mexico: Up to 5 Bcf/day (more than double 5 yrs ago).

• **Storage**: Storage was unusually low heading into last winter. Lowest since 2005.

• **Weather**: Last winter came in hard early.
  - Cold Oct, November, and first part of December.
  - Back half December and front half of January warm.
  - Colder than norm since mid January.
  - All in all, just slightly colder than normal for the winter.
  - Summer has been hot, but not brutal and widespread.

• **Volatility**: NYMEX went from $3 and peaked at $4.84 in mid-Nov and now down to low $2’s.
Market direction?
Price

Time

$4.00

$3.00

$2.00

$7.00

$6.00

$5.00

$4.00

$3.00

$2.00

50% of market players think the price will go up

50% of market players think the price will go down
Risk Management & Strategy
Total Gas Invoice

- Gas Cost
- Pipeline Transport
- LDC Transport
- Miscellaneous Services

80-90%
• What risk do we have?

• What can we do about it?
Natural Gas – Price / Demand Characteristics

- Elastic Demand
- Inelastic Demand

US Natural Gas Demand
Afraid to take a position in the market?

You already have...you are short to the market!
Risk Positions:
Short or Long—A Foolproof Litmus Test!

Short: Any position whereby you benefit from a falling market and are impaired by a rising market.

Long: Any position whereby you benefit from a rising market and are impaired by a falling market.
Short Position

Price

$2.50

Risk

Reward

Current Market

Time

$2.50

∞
Long Position

Price

$2.50

Reward

Risk

Fixed Price

Time
Fixed Price

- Assumed Top: $8.00
- Fixed Price: $2.50
- Assumed Bottom: $2.00

- $5.50 potential reward
- $0.50 potential detriment (risk)
Fixed Price

$8.00

Assumed Top

$7.00

Fixed Price

$5.00 potential detriment (risk)

$2.00

Assumed Bottom

$1.00 potential reward

Price

Time
Toolbox:

- Index
- Fixed
What do we do when we’re in the Middle?

Time

Price

Index - Good
Fixed – Bad

Fixed - Good
Index – Bad

?
Options - Calls and Puts

Call Option: Gives the buyer of the option the right, but not the obligation, to buy gas at a predetermined price

Put Option: Gives the buyer of the option the right, but not the obligation, to sell gas at a predetermined price
Call Option

Price

$10.00

$5.00

$3.00

Time

Forward Market
or “at the money”

Strike Price

Market Price

Your Price
Option Terminology

Price

$10.00

$5.00

$3.00

“Out of the Money”

“At the Money”

“In the Money”

Strike Price

Time
**Benefits:**
- Gives you the best of both worlds (fixed and index)
- Protects against a rising market while still allowing you to participate in a falling market

**Key Variables:**
- Strike Price
- Time to Expiration
- Volatility
Toolbox:

• Index
• Fixed
• Purchase Call Options
Put Options

Put Option: Gives the buyer the right, but not the obligation, to sell gas at a predetermined price
Sell Put = Win/Win Situation

- Sell put option at $2.50
- Market Price
- Your Price

Price

$10.00

$2.50

Time
Toolbox:

- Index
- Fixed
- Purchase Call Options
- Sell Put Options
Collar

• Buy a call and sell a put at the same time

• A collar can be costless or arranged simply to lessen the cost of a call option
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Collar

- Call Strike
- Put Strike

Market Price
Toolbox:

• Index
• Fixed
• Purchase Call Options
• Sell Put Options
• Collar
Review

**Fixed Price:** Long position; eliminates end user’s exposure to upward price movement. It precludes the end user from participating or taking advantage of a falling market. In general, fixed-price is particularly attractive when the market is depressed and becomes less appealing at higher levels.

**Index:** Short position; allows end-user to take advantage of a falling market. Exposes end-user to unlimited upward price movement. Index is attractive at high price levels and becomes less attractive when the market is low.
**Review**

**Call Options:** Neutral position; they provide protection from rising prices while preserving the opportunity to gain from a falling market. Call options are probably the best overall tool to mitigate risk in any volatile market. The end-user must pay a premium for call options.

**Put Options:** Neutral to short position; allows end user to profit by giving up the right to buy gas below a chosen level. Selling put options are a win-win tool and are particularly useful in conjunction with alternate fuels.
Review

**Collars**: Neutral; establishes an upper price cap which user won’t pay more than, but also establishes a minimum floor price; can be done costless or in a manner that reduces the cost of establishing an upper price limit or cap. In summary, a collar provides a range in which the end-user’s price is guaranteed to stay.
Strategy

Moderate to maximum level of index
Moderate level of call options
Minimize level of fixed

Maximize level of call options
Moderate levels of fixed and index

Maximize level of fixed
Minimize level of call options
Minimize level of index

Price

$4.00

Think Shorter Term High

$2.50

Think Longer Term Low

Time
1/3 Index, 1/3 Fixed & 1/3 Capped
Market Increases

2/3 Protected

- Call Options
- Fixed
- Index
Market Decreases

2/3 Drops with Market
**Strategy**

- **Price**
  - $4.00
    - Moderate to maximum level of index
    - Moderate level of call options
    - Minimize level of fixed
  - High
    - Think Shorter Term
  - $2.50
    - Maximize level of call options
    - Moderate levels of fixed and index
    - Intermediate
    - Think Longer Term
    - Low

- **Time**
  - Moderate levels of fixed and index
  - Minimize level of index
Forward 36 Month Contract Trading Range
(since Nov14 or later if before contract started trading)
5-Year Forward NYMEX Curve

$ / Mmbtu

- Sep 19
- Dec 19
- Mar 20
- Jun 20
- Sep 20
- Dec 20
- Mar 21
- Jun 21
- Sep 21
- Dec 21
- Mar 22
- Jun 22
- Sep 22
- Dec 22
- Mar 23
- Jun 23
- Sep 23
- Dec 23
- Mar 24
- Jun 24

Rem. Cal 19 = $ 2.28  Cal 20 = $ 2.40  Cal 21 = $ 2.49  Cal 22 = $ 2.56  Cal 23 = $ 2.65
Floor & Ceiling

- Price signal - production ramps up
- Gas switch to coal
- Demand decreases

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- Price signal - production shuts in
- Coal switch to gas
- Demand increase
Risk Analysis - NYMEX

REWARD

$2.33 $2.50 $4.00 $?.??
Risk Analysis - with NNG Vent Basis
Recommendation

- Call Option: 25%
- Fixed: 75%
Thanks - Questions?

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