Powerhouse: The Power of Price Protection

Powerhouse works with clients to help protect profit margins and grow their businesses by designing and implementing hedging strategies.

Powerhouse provides a suite of additional services including practical hedging training, support for marketing, and software coordinating physical products and financial hedges.

Markets Served: Crude Oil, Petroleum Products, Propane, Natural Gas, Electricity, Biofuels
Agenda

• Understanding Risk and the Vocabulary of Risk Management
• Futures Markets: The Intersection of the Physical and Financial
• Option Markets
• Advanced Topic In Risk Management
  – Over-the-Counter (OTC) Instruments
  – Technical Analysis
Producer and Refiner Risks

- Producer margin risk
  - Prices falling before crude oil or natural gas is produced
- Refiners margin risk
  - Petroleum refiner’s profit margin risk
    - The price difference between the raw material (crude oil) and the products produced (heating oil, diesel, gasoline, jet fuel, etc.)
  - Biofuel producer’s profit margin risk
    - The price difference between the raw material (corn, bean oil) and the products produced (ethanol, biodiesel)
  - Electricity generator profit margin risk
    - The price difference between the raw material (natural gas, coal) and the electricity generated

Energy Supplier Risk

Profit margin risk
- Prices going higher before buying
- Price going lower while storing natural gas or propane
- Price going lower while transporting fuel by pipeline, railcar or barge

Competition within the industry
- Fixed price deals
- Capped prices
Petroleum End User Risk

- Competition within the industry
  - Will want to keep price of goods or services competitive

- Budget risk
  - Keeping fuel costs within a specified budget
Rising Fuel Prices are Back in the News

Farewell to cheap airfare

April 2018
By Keve Driscoll, Cox Newspapers

If fuel prices continue to rise, airlines will be forced to take a hit financially or raise ticket prices -- risking the loss of customers to cheaper fare.

"You don't want to be the first airline to raise prices because of fuel," Ratliff said. "If other carriers don't follow your lead, there's a chance you're going to lose some of those bookings to your rivals. We haven't seen much in fare increases over the last year yet. They'd love to do it but they can't."

Source: Cox Newspapers

Hedging

• Risk management strategy used to limit the probability of loss from unknowable fluctuations in the price of a commodity
• The purpose of a hedge is to avoid the risk of adverse price movements impacting the bottom line
• The goal of hedging is to defend your profit margin against energy price volatility, and allow you to concentrate on growing your business
Speculating

- Taking risk in exchange for the opportunity of profit
- Speculators are willing to risk capital trying to predict an unknown future
- Transactions are unrelated to an underlying physical position in the business

Hedging vs. Speculating with Futures

- Speculators:
  - Willingly take risk in exchange for the opportunity to profit
  - Transactions are unrelated to an underlying physical position
  - Profit or loss treated as investment income
- Hedgers:
  - Are trying to stabilize their revenues or cost
  - Have an offsetting physical position in their business; speculators do not
  - Hedging gains or losses are part of cost of goods sold

Consult your tax and/or legal advisors before making any tax- or legal-related investment decisions.
The #1 Reason Companies Give For Not Hedging.....

"We are conservative and do not speculate"

In reality, truly conservative companies hedge. They hedge because it is conservative to control costs, and not subject profit margins to the uncertainty of the energy markets.

"Southwest saved several billion dollars this decade by successfully hedging against rising fuel prices."

- Southwest Airlines by the numbers, The Associated Press, 06.25.09, 02:49 PM EDT
Why Don’t Rivals Copy Southwest’s Hedging?

“Some people worry that any company trading actively in futures or options is engaged in risky speculation. But Mr. Topping [Southwest’s treasurer] argues that for airlines the real risk lies in not hedging their fuel purchases. Airlines need to buy jet fuel constantly, he notes. In today's volatile energy markets, they cannot plan future costs with any reliability if they always are at the mercy of the spot market.

Hedging lets carriers get a better handle on fuel costs, he says. If oil prices plummet, airlines that are less heavily hedged might have a slight advantage. But many hedges are set up to provide both protection against soaring prices and some benefit from falling prices.”

Airline Consolidation Can’t Offset $100 Oil

April 4, 2011 3:23 PM ET

FORTUNE - Airlines are experiencing a bad case of déjà vu. Faced with jet fuel prices 50% above their levels just a year ago, the carriers tried to hike ticket prices last weekend for the eighth time this year. The first six went through without a problem, boosting the average fare in major markets by about 14%, according to FareCompare.com. And if you go back to mid-December, airlines were nine-for-nine in fare increases.

But this time things unraveled. Delta, and American backed off ticket increases almost immediately, and United, Continental, and US Airways eventually followed. Even in the 140 markets where these so-called legacy carriers don't compete against discounters like JetBlue and Southwest, which didn't participate in the latest round of hikes, fare increases were eventually rolled back. (Results from the latest increases over the past few days aren't yet in.)

The last time two fare hikes failed in the month of March as oil prices reached $105 a barrel? It was 2008, says FareCompare. American was losing $3.3 million a day and the legacy carriers posted red ink across the board. The question now is whether, after mega-mergers between Delta/Northwest and United/Continental cut competition to strengthen the industry, airlines can raise fares and cut unprofitable flights enough to make money when oil is $100 a barrel.

Meanwhile, Southwest, the single best airline at hedging against rising fuel costs, is pouncing on other carriers' fragile state and bucking fare increases to gain market share. Last weekend’s price hike unraveled in large part because of Southwest. CEO Gary Kelly told analysts this month that the airline would keep its plan to boost capacity by 4% to 6% in 2011.
Hedging Protects U.S. Oil & Gas Producers

Hedging will support US 2017 output: Deloitte
20 Apr 2017 7:34 pm GMT

Houston, 20 April (Argus) — US oil and gas producers expanded their hedging at the end of last year and early this year which will allow them to sustain output even if prices weaken, consultancy Deloitte said.

Most of the hedges taken by producers have been above $50/bbl, ensuring steady cash flow to push ahead with investment plans for this year and possibly next year. But pushing through higher output even in a low oil price environment risks prolonging the oil market downturn as supply and demand remain imbalanced, said John England, vice chairman of the US energy practice at Deloitte, at the Mergermarket Energy Forum conference today.

“Hedging incentivizes you to just keep going in and producing, it takes out the boom and bust cycles a little bit,” he said.

England did not give a figure for how much of the total expected 2017 US shale oil output has been hedged, but some producers appear to be greasing their positions. Pioneer Natural Resources is maintaining derivatives positions that cover about 80pc of its forecast 2017 oil output, which is the same as last year. Pioneer is looking to take on more hedges for 2018.

The Bakken producer Whiting Petroleum, which sharply increased its 2017 hedges last year, plans to add more hedges later this year and early next year, targeting 50-60pc coverage for 2017. Chesapeake Energy has 7tpc of its projected 2017 output covered at $3.97/mcfd and 68pc of its oil output at $50/bbl.

While hedging will ensure steady cash flow, a key unknown is the increase in costs that may come toward the second half of the year as producers continue to ramp up drilling, England said. Producers may also face a shortage of equipment and manpower to sharply ramp up activity as tens of thousands of workers were laid off, especially by the services companies, and many rigs and other equipment were idled.

Producers saw costs decline by as much as 40pc in 2016 compared to 2015, driven by the discounts offered by oilfield service providers, but also reflective of advancements in technology and techniques. Some of those costs may start to come back up as activity picks up.

“There have been tremendous cost reductions in the industry,” England said, but they are currently “generally not at sustainable levels.”

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Hedging: Smoothing Out the Market’s Impact on Profitability: An Illustrative Example

Profitability: Hedged vs. Unhedged

- Hedged Company’s Profit Margins
- Unhedged Company’s Profit Margins

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The Power of Price Protection
When Keeping It Hedged Goes Wrong

Oil and gas producers who did the prudent thing and locked in future sales prices have seen their shares slide in just over a week amid oil’s continued trade around $130 a barrel, near record highs. And with the shift away from shares of those hedgers in the stock market, investors appear to be betting against a fall in the prices of oil and gas anytime soon.

Among the large hedgers are Chesapeake Energy, Range Resources and Petroleum Development. And though all three had production and revenue increases in the first quarter, each also reported significant charges from their hedging activity that led to either losses or a sharp earnings decline.

Still, the surge in energy prices led to strong first-quarter earnings reports for most exploration and production companies, with investors pushing the S&P Der Standard & Poor’s Oil & Gas Exploration & Production ETF up 2% since Jan. 21. Even the charges from mark-to-market losses related to hedging had done little to stop the momentum, as the largest hedgers’ stock performance had mirrored the sector-wide gains for much of the year.

But since May 20, shares of Range and Petroleum Development have fallen more than 10%, while Chesapeake has dropped 5%. Over the same period, the Oil & Gas ETF fell 4%.

“With what they made those hedges, they thought they were being very smart. Would they rather take that back now? Sure,” said Kenneth Carroll, analyst for Johnson Rice & Co.

To be sure, hedging is an essential part of the business plan for many oil and gas producers. By locking in the price of future sales, these companies can be less exposed to the whims of the market and can lock in future cash flows. While the energy majors have enough cash on their balance sheets to withstand the volatile prices of oil and gas prices, these smaller firms are largely thought to be better off in the long term if they hedge.

In the short term, however, some hedged positions could weigh on companies’ profits. For example, hedged positions have already been locked in place, with analysts noting many of the hedged trades occurred during the fourth quarter, when a forward hedging contract was most likely set around $100 a barrel — roughly 24% below current market levels.

NextEra Exploration Co. recently met its oil hedge position for 2019 and 2020 at a cost of $520 million. The company said the transaction costs will be recovered through higher realized prices in both years.

While a strict of hedging seems extreme, a more likely scenario would involve some hedges taking fewer tangential positions on the price of oil.

Source: WSJ
Definition: Long

- Long: A buy
- Long: Anything you own:
  - Long futures
  - Long physicals
  - Long the basis
  - Long puts
- Long hedgers

Definition: Short

- Short: A sale
- Short: Anything you have sold:
  - Short futures
  - Short physicals
  - Short the basis
  - Short puts
- Short hedgers
- Short covering
Risk Management Tools

- Forward Markets
- Over-the-Counter Markets (OTC)
- Futures Exchanges

Definition: Forward Markets

Forward purchase or sale:
- A purchase or sale of a physical commodity at a specified amount for future delivery
Definition: Over-the-Counter-Market (OTC)

- Financial, cash settled deals between two parties (Bilateral Deals)
  - Known as swaps
- Offered by a wide range of Energy Interests (investment banks, reinsurance companies, large energy companies)
- Can be highly tailored
  - Quantity
  - Quality
  - Location
  - Type of settlement
- Tend to be large minimum transaction size or very small transaction size
- ISDA agreement needed
- Counter parties must evaluate each other’s balance sheets – that is what backs the deal
- Originally no initial cash required up front, but it depends on the counterparties
- Square-up between counterparties may be set as time interval or dollar amount
- The Dodd-Frank Wall Street Reform brings comprehensive reform to the regulation of swaps. These products, which had not previously been regulated in the United States, were at the center of the 2008 financial crisis.

Definition: Futures Markets

- Energy futures are traded on the New York Mercantile Exchange (NYMEX) and the Intercontinental Exchange (ICE)
- The exchanges are regulated by the CFTC
- Futures are traded competitively in an anonymous auction
- Allows for price discovery (price transparency)
- Cash deposit required (margin)
- Standardized contracts
- Delivery only occurs on a very small portion of all the contracts traded
- Financial performance is guaranteed by the exchange
Futures Markets: The Intersection of the Physical and Financial

NYMEX

- **New York Mercantile Exchange** (NYMEX) is the world’s largest physical commodity futures exchange
- Started trading energy (HO) – 1978
- In 2008 acquired by the CME Group (Chicago Mercantile Exchange)
- Principal energy contracts trade electronically:
  - ULSD
  - Crude oil
  - Gasoline
  - Natural gas
What is a Futures Contract?

A standardized contract, traded on a regulated exchange, to buy or sell a specified quality and quantity of a commodity at a specified price and time in the future

1. Several months’ contracts available
2. Relatively low up-front cash requirements
3. Daily mark-to-market
4. High flexibility to adapt to changing market conditions
   a. Organized exchange assures an opposite buyer or seller
   b. Positions may be liquidated at your discretion
5. Regulated by the commodity futures trading commission
6. Performance is guaranteed by the exchange

Natural Gas Futures

• **Trading unit:** 10,000 million British thermal units
• **Trading months:** The current year plus the next twelve calendar years. A new calendar year will be added following the termination of trading in the December contract of the current year.
• **Trading Hours:** Globex Electronic Trading: Sunday through Thursday trading begins at 6:00 p.m. eastern and ends at 5:00 eastern the next day.
• **Delivery Point:** Henry Hub in Louisiana
• **Symbol:** NG

Source: CME Group
Crude Oil Futures (WTI)

- **Trading unit:** 1,000 barrels
- **Trading months:** Monthly contracts listed for the current year and the next 8 calendar years and 2 additional consecutive contract months. Monthly contracts for a new calendar year and 2 additional consecutive contract months will be added following the termination of trading in the December contract of the current year.
- **Trading hours:** Globex Electronic Trading: Sunday through Thursday trading begins at 6:00 p.m. eastern and ends at 5:00 p.m. eastern the next day.
- **Delivery point:** Cushing, Oklahoma
- **Symbol:** CL

Source: CME Group

ULSD Futures

- **Trading unit:** 42,000 gallons = 1,000 barrels
- **Trading months:** Current Year + 3 Years + 1 Month
- **Trading hours:** Globex Electronic Trading: Sunday through Thursday trading begins at 6:00 p.m. eastern and ends at 5:00 p.m. eastern the next day. There is a one hour break each day between 5:00 p.m. (current trade date) and 6:00 p.m. (next trade date)
- **Delivery point:** F.O.B. New York Harbor
- **Symbol:** HO

Source: CME Group
RBOB Futures (Gasoline)

- **Trading unit:** 42,000 gallons = 1,000 barrels
- **Trading months:** Current Year + 3 Years + 1 Month
- **Trading hours:** Globex Electronic Trading: Sunday through Thursday trading begins at 6:00 p.m. eastern and ends at 5:00 p.m. eastern the next day. There is a one hour break each day between 5:00 p.m. (current trade date) and 6:00 p.m. (next trade date).
- **Delivery point:** F.O.B. New York Harbor
- **Symbol:** RB

Source: CME Group

Trading Fact

Most futures contracts are liquidated via offset and do not result in delivery.

The purpose of the physical delivery provision is to ensure convergence between the futures price and the cash market price.
**ICE**

Launched in 2000 with an electronic trading platform

Futures contracts include:
- Brent Crude Oil
- The Softs (Coffee, Sugar and Cocoa).
- Natural Gas and Natural Gas Basis
- Electricity Contracts

**Long Hedge**

A *long hedge* is employed to protect firms from prices rising in the cash market.

A long hedger buys futures contracts

**BUYING A FUTURES CONTRACT FIXES A PURCHASE PRICE**
**Futures Can Be Used To Fix a Purchase Price and Defer Local Buying**

Yore Company needs to fix a natural gas price for December supply (Long Hedge)

- **March 15th**: Cash Price – $3.50 per mmBtu
  - Yore Co. buys NG futures paying $3.50 per mmBtu
- **Dec 15th**: Cold weather - NG prices rise to $4.00 per mmBtu
  - NYMEX prices at $4.00 per mmBtu – sell hedge position

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<td>$4.00</td>
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<td>Profit or Loss</td>
<td>-$0.50</td>
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</tbody>
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*Effective purchase price $3.50 per mmBtu (assumes zero basis)*

($4.00 local price - $0.50 futures profit)

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**Futures Can Be Used To Fix a Purchase Price and Defer Local Buying**

Yore Company needs to fix a natural gas price for December supply (Long Hedge)

- **March 15th**: Cash Price – $3.50 per mmBtu
  - Yore Co. buys NG futures paying $3.50 per mmBtu
- **Dec 15th**: Economic downturn – Natural gas prices fall to $3.00
  - NYMEX prices at $3.00 per mmBtu – sell hedge position

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<td>Profit or Loss</td>
<td>+$0.50</td>
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</table>

*Effective purchase price $3.50 per mmBtu (assumes zero basis)*

($3.00 local price + $0.50 futures loss)
The Long Futures Hedge

Used by:

1. Energy marketers who want to lock in a margin on a fixed-price physical sale of fuel to their commercial and industrial customers
2. Energy marketers who want to lock in a profit margin on a fixed priced fuel delivered to their retail customers
3. The end user of fuel who want to lock in a fuel price (fuel budget)
   - Fleets
   - Construction companies
   - Municipalities

Short Hedge

A short hedge is employed to protect firms from prices falling in the cash market.
A short hedger sells futures contracts

**SELLING A FUTURES CONTRACT FIXES A SALES PRICE**
Futures can be used to fix a sales price and offset falling prices

**Yore Company Fills Storage for January supply (Short Hedge)**

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<td>Jul 15th</td>
<td>$3.80</td>
<td>$3.80</td>
</tr>
<tr>
<td>Jan 15th</td>
<td>$3.00</td>
<td>$3.00</td>
</tr>
<tr>
<td>Profit or Loss</td>
<td>- $0.80</td>
<td>+$0.80</td>
</tr>
</tbody>
</table>

Effective sales price $3.80 per mmBtu (assumes zero basis) ($3.00 local price + $0.80 futures gain)

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**Futures Can Be Used To Fix a Sales Price and Offset Falling Prices**

**Yore Company Fills Storage for January supply (Short Hedge)**

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<td>Jul 15th</td>
<td>$3.80</td>
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<td>Jan 15th</td>
<td>$4.60</td>
<td>$4.60</td>
</tr>
<tr>
<td>Profit or Loss</td>
<td>+$0.80</td>
<td>-$0.80</td>
</tr>
</tbody>
</table>

Effective sales price $3.80 per mmBtu (assumes zero basis) ($4.60 local price - $0.80 futures loss)
The Short Futures Hedge

Used by:
1. Energy marketers who have inventory in storage
2. Fuel buyers who have purchased fuel that is being shipped on a pipeline, barge or railcar
3. Crude oil and natural gas producers

Applying the Tools of Price Management

The critical question:

WHAT IS YOUR PRICE RISK?
Are you harmed by prices moving higher or prices moving lower?

The answer will determine if you are a long hedger or short hedger
Margin

- Collateral deposited for each contract as a show of good faith
- Minimum account balance requirement set by the exchange
- Margin requirement is eliminated when the trade is liquidated
- Subject to change at any time
- Your brokerage firm (Futures Commission Merchant) may set margin requirements higher than those set by the exchange
- If you are unable to post margin, your positions may be liquidated by your brokerage firm with little, or no, prior notice

Margin: Must Be Satisfied Daily
(Mark-To-Market)

Example: Long 1 futures contract

Monday:
- Buy 1 NG contract: $3.00
- Margin requirement: $1200
- Settlement price: $3.00
- Cash in account: $1200

Tuesday:
- NG contract settlement price: $2.99
- Mark-to-market: -$100
- Account balance: $1100
- Margin requirement: $1200
- Margin call: $100

Wednesday:
- Action needed: wire or ACH $100 to meet call
Margin: A Zero Sum Game (Mark-To-Market)

Example: Short 1 futures contract

Monday:
- Sell 1 NG contract: $3.00
- Settlement price: $3.00
- Margin requirement: $1200
- Cash in account: $1200

Tuesday:
- NG contract settlement price: $2.99
- Mark-to-market: +$100
- Account balance: $1300
- Margin requirement: $1200

Wednesday:
- No action needed, account in excess

Hedge Rate Margin Requirements*
As of Sep 19, 2018

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Initial Margin</th>
<th>Futures Price</th>
<th>Margin as a % of Futures Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil*</td>
<td>$3,100</td>
<td>$71.12</td>
<td>4.4</td>
</tr>
<tr>
<td>ULSD*</td>
<td>$3,800</td>
<td>$2.2466</td>
<td>4.0</td>
</tr>
<tr>
<td>RBOB*</td>
<td>$4,000</td>
<td>$2.0207</td>
<td>4.7</td>
</tr>
<tr>
<td>Natural Gas*</td>
<td>$1,200</td>
<td>$2.908</td>
<td>4.1</td>
</tr>
</tbody>
</table>

* Hedge Rate for Spot Month Futures Contract

Source: CME Group
Futures Trading Floor

Crude Oil (WTI) is Traded on CME’s Globex Platform

Timestamp: September 20, 2018 2:25 p.m.

Source: NYMEX
**Basis**

Basis is associated with the physical transportation of a commodity from one location to another.

For natural gas, basis is the difference between delivering natural gas from the NYMEX natural gas delivery point at Henry Hub to your local market.

For petroleum products, basis is the difference between delivering from the NYMEX delivery point in NY Harbor and a spot market reported by OPIS, Argus or Platts.

In physical pricing, the word "DIFF" refers to the price difference between a physical index and a NYMEX futures price.

**How Price Information Flows**

- **NYMEX**
  - Oil Price Benchmark
  - Primary Industry Trading and Hedging Tool

- **Spot Markets**
  - Physical Oil Benchmark
  - Primary Industry Physical and OTC Tool

- **Rack**
  - Pricing Mechanism to Distributors

- **Retail**
  - Pricing to End Users
Basis Movement (Cash Prices – Futures Prices)

- Strengthen (less negative or more positive)
  - 20
  - 10
  - 0
  - -10
  - -20

- Weaken (less positive or more negative)

Cash prices increase relative to future prices
Cash prices decrease relative to future prices

Basis Over Time
Assumptions: 20,000 bbls of RBOB bought on Platts Gulf Coast Index on a 3 day wrap
RBOB transit time to Fairfax, VA 20 days
RBOB is sold from the terminal daily in 42,000 gallon increments

SOURCE: OPIS, NYMEX
Options as Insurance: 
An Analogy…

Option BUYER (policy holder) 
– Pays premium 
– Receives right (to reimbursement if risk occurs)

Option SELLER (policy writer) 
– Receives premium 
– Takes on obligation (to reimburse policy holder if risk occurs)

Puts & Calls

Calls gain value as prices rise (are “called up”)

Puts gain value as prices fall (are “put down”)
Option Terms

Strike Price:
The price above which the futures contract must settle for calls, below which for puts, for the option to have value at expiration
  • It is the price at which the buyer of American-style options may exercise the right to acquire the underlying futures contract (long or short)
  • NG options are available in 5 cent increments

Expiration Date:
The date on which trading in the option terminates
  • American Style NG Options expire one business day before the expiration of the NG futures contract

Call Strike Prices

You own the December $3.00 Call. At expiration, the price of the December future is:

$3.50: an insurable event “in-the-money”

$3.00: “at-the-money”

$2.50: no insurance needed “out-of-the-money”
Options Can Be Used to Cap a Purchase Price and Defers Local Buying

Yore Company needs to buy natural gas for December supply (Long Hedge)

March 15th:  
Cash Price – $3.50 per mmBtu  
NG futures trading at $3.50 per mmBtu  
Yore Co. buys call options: The $3.50 Call paying $0.20 per mmBtu

Dec 15th:  
Cold weather - NG prices rise to $4.00 per mmBtu  
NYMEX prices at $4.00 per mmBtu  
$3.50 Call worth $0.50 per mmBtu

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Effective purchase price $3.70 per mmBtu (assumes zero basis)  
($4.00 local price - $0.30 option proceeds)

Yore Company needs to buy natural gas for December supply (Long Hedge)

March 15th:  
Cash Price – $3.50 per mmBtu  
NG futures trading at $3.50 per mmBtu  
Yore Co. buys call options: The $3.50 Call paying $0.20 per mmBtu

Dec 15th:  
Rig Count Up - NG prices fall to $3.00 per mmBtu  
NYMEX prices at $3.00 per mmBtu  
$3.50 Call worth $0.00 per mmBtu

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Effective purchase price $3.20 per mmBtu (assumes zero basis)  
($3.00 local price plus $0.20 option premium paid)
Put Strike Prices

You own the December $3.00 Natural Gas put. At expiration, the price of the December future is:

- $4.00: no insurance needed “out-of-the-money”
- $3.00: “at-the-money”
- $2.00: an insurable event “in-the-money”

Options Can Be Used To Place a Price Floor

Yore Company Fills Storage for January supply (Short Hedge)

July 15th:
- Yore Co. buys Natural Gas for storage paying $3.80 per mmBtu
- NG futures at $3.80 per mmBtu
- Yore Co. buys put options: The $3.80 Put paying $0.25 per mmBtu

Dec 15th:
- Warm winter - NG prices fall to $3.00 per mmBtu
- NYMEX prices at $3.00 per mmBtu
- $3.80 put worth $0.80 per mmBtu

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<td>July 15th</td>
<td>$3.80</td>
<td>($0.25)</td>
</tr>
<tr>
<td>Dec 15th</td>
<td>$3.00</td>
<td>$0.80</td>
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<tr>
<td>Profit or Loss</td>
<td>-$0.80</td>
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Effective inventory value $3.55 per mmBtu (assumes zero basis)
($3.00 local price plus $0.55 option proceeds)
Options Can Be Used To Place a Price Floor

Yore Company Fills Storage for January supply (Short Hedge)

July 15th: Yore Co. buys Natural Gas for storage paying $3.80 per mmBtu
           NG futures at $3.80 per mmBtu
           Yore Co. buys put options: The $3.80 Put paying $0.25 per mmBtu

Dec 15th:  Polar vortex - NG prices rise to $4.60 per mmBtu
           NYMEX prices at $4.60 per mmBtu
           $3.80 put worth $0.00 per mmBtu

<table>
<thead>
<tr>
<th></th>
<th>Local Prices</th>
<th>Futures Position</th>
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<tr>
<td>July 15th</td>
<td>$3.80</td>
<td>($0.25)</td>
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<tr>
<td>Dec 15th</td>
<td>$4.60</td>
<td>$0.00</td>
</tr>
<tr>
<td>Profit or Loss</td>
<td>+$0.80</td>
<td>+$0.25</td>
</tr>
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</table>

Effective inventory value $4.35 per mmBtu (assumes zero basis)
($4.60 local price less $0.25 option premium paid)

Mexico makes $8bn as oil hedges pay off

FT.com

Mexico is set to earn a record $8bn from financial contracts it bought last summer as insurance against weaker energy demand and lower oil prices this year.

The oil producer’s astute risk management will make it the envy of Opec, the oil cartel whose members are struggling with a collapse in prices from last year’s peak of $147 a barrel and who are due to meet tomorrow to decide output levels.

It has also given Agustin Carstens, Mexico’s finance minister and architect of the strategy, a Wall Street-sized reputation for financial wizardry.

Traders joke that Mr Carstens is probably 2009’s “most successful, but worst paid, oil manager”. He will be hard pressed to repeat his success as Mexico is unlikely to secure the same protection for next year.

Oil traders said the world’s sixth-largest oil exporter had started to hedge a small portion of its oil revenues for next year after it successfully locked in an average price of $70 a barrel for all its oil exports this year. The deals were securing a lower price floor for 2010 of about $55-55.5, they said.

The Mexican windfall will be envied by other producers, particularly by Opec’s members. The cartel is set to earn revenues of $550bn this year, down 40 per cent from 2008 according to US estimates.

Mexican officials expect to earn $100bn-110bn pesos ($7.5bn-8.2bn) from the hedge as the prices the country has achieved for its oil exports so far this year have averaged less than $50 a barrel.
Mexico is set to get a record payout of at least $6 billion from its oil hedges this year, according to data compiled by Bloomberg.

For 2015, Mexico guaranteed sales at almost $30 a barrel higher than average prices over the past year.

The 2015 payment, due next month, is set to surpass the record from 2009, when the Mexican government said it received $5.1 billion after prices plunged with the global financial crisis. The country's crude has fallen by almost half over the hedging period so far this year. Crude sales historically cover about a third of the government budget.

The hedge, which runs from Dec. 1 to Nov. 30, covered 228 million barrels at $76.40 each for the Mexican oil basket, according to government documents and statements. With less than two weeks to the end of the program, the basket has averaged $46.61 a barrel over the period.

Source: Bloomberg, November 22, 2015
Mexico’s Floor On Production

*Final 2017 floor at $42 per barrel

2018: Mexico has completed its annual oil hedge for 2018, which will lock in an average export price of $46 per barrel of crude, Deputy Finance Minister Vanessa Rubio said in an interview. Mexico spent about 24 billion pesos ($1.25 billion) to lock in prices of oil exports for next year, or more than 21 percent what it paid to hedge crude a year ago, according to Finance Ministry data.

Types of Options Traded on NYMEX

• American (Exercisable)
• European (Financially Settled)
• Asian - also called Average Price (Financially Settled)
Determinants of an Option’s Cost (Premium)

• Difference between the futures price and the option’s strike price
• Volatility of the underlying futures price
• Time remaining before the option expires
• Value of the underlying future
• Supply of and demand for the option

20 Day Historic Volatility – Continuation CL Futures NYMEX

Source: www.eSignal.com
Selling Options

Increased revenue/reduced cost under stable pricing situations

Profit is limited to premium received

Loss is unlimited

Option sellers are short volatility or “Vega”
Long vs. Short Options

**Calls**
- **Call Buyers: Long Calls**
  - Risk: Limited to Premium
  - Profit: Unlimited
  - Expectation: Rising Prices
- **Call Sellers: Short Calls**
  - Risk: Unlimited
  - Profit: Limited to Premium
  - Expectation: Neutral or falling prices

**Puts**
- **Put Buyers: Long Puts**
  - Risk: Limited to Premium
  - Profit: Unlimited
  - Expectation: Falling Prices
- **Put Sellers: Short Puts**
  - Risk: Unlimited
  - Profit: Limited to Premium
  - Expectation: Neutral or rising prices

Fences

- **Long Fence**: Buy a Call, Sell a Put
- **Short Fence**: Buy a Put, Sell a Call

Also known as “Collar” or “Synthetic Future”

Like a futures contract “with a hole in the middle”
### Long Fence

Buy a Call, Sell a Put:

- **Buy 1 Apr NG $3.50 Call:** Pay $0.150
- **Sell 1 Apr NG $3.00 Put:** Receive $0.150

Net Cost: $0.00

At Expiration:
- Max Profit: Unlimited above $3.50
- Max Loss: Unlimited below $3.00
- Break Even: Between $3.50 and $3.00
The Development of NYMEX ClearPort®

- Enron collapses in late 2001 and all OTC Energy Trading grinds to a halt
- The CFMA (Commodity Futures Modernization Act of 2000) allows for the clearing of OTC trades by clearing organizations
- ClearPort was developed in response to the counterparty failures in energy of the late 1990's. NYMEX was first to offer cleared trades executed off exchange
- Trades are executed as futures contracts off-exchange through block transactions or agency cross trades
- **ALL contracts are cleared as regulated NYMEX Futures (or options) contracts**

Source: CME Group

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**CMEGroup ClearPort™ Energy Product Slate**

- Natural gas (outrights, basis swaps, swing swaps, index swaps)
- Crude oil (outrights, basis swaps)
- Petroleum products (outrights, basis swaps)
  - NYH, Gulf Coast, Chicago, Group 3, LA Spot Markets
  - OPIS, Platts, Argus Indexes
- NGL/plastics
  - Propane Futures Indexed to OPIS Mount Belvieu and Conway
- Ethanol
- Electricity (peak, off-peak, real time, day-ahead)
  - Coal
  - Uranium
  - Freight
  - Green products
Electricity is traded on both NYMEX and ICE

- Electricity futures contracts are financially settled
- Available for both peak and off-peak power
- North American Power Markets Traded:
  - PJM, MISO, NYISO, ISONE, ERCOT, CAISO and Ontario
    - Monthly and Daily Peak & Off-Peak futures available
    - Contracts available by Zone
    - Day-Ahead Contracts typically traded in 5 MW Blocks
    - Real-Time Contracts typically traded in 2.5 MW Blocks
    - Options are also available
  - NYISO Capacity futures
- ICE Mini Contracts are traded in 1 MW Blocks are available on ICE
Over-the-Counter (OTC)

- Customizable contract sizes
- Customizable time frames
- Credit exposure to counter-party
- Possibility of extension of trading credit

Common Questions

- What if I need to hedge less than 10,000 mmBtu’s in any month?
- What if I need to hedge a volume other than 1,000 bbls in any month
- What if I want a custom option strike?
- What if I need to hedge less than 42,000 gallons per month in ULSD, RB or propane?
- How can I hedge my weather exposure?
- Is there a way I can get credit for trading and not pay margin every day?
CustomQuotes

Powerhouse CustomQuotes allows you to compare, quote and execute a variety of energy and weather hedge products. Our platform provides transaction capabilities not available with traditional OTC or exchange-listed products.

Compare: All structures and shape profiles automatically saved in your account for custom quoting. No need for repeated data entry. You can even build and save custom heat curves.

Quote: Fully configurable trade volumes with your customized shaping profiles.

Execute: Trade multiple instruments with varying volumes and strikes easily.

Powerhouse CustomQuotes is a one-of-a-kind solution focused on your risk management needs. It is not just another trading platform. Contact Powerhouse to get started today.

The Power of Price Protection

368314 - HH Natural Gas Monthly Swap

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<tr>
<th>Date</th>
<th>Contract Month</th>
<th>Identity Identifier</th>
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</table>

The Power of Price Protection
Temperature as a Commodity

• Products for HDDs (Heating Degree Days) and CDDs (Cooling Degree Days)

• Both HDD and CDD values are calculated according to how many degrees a day's average temperature varies from a baseline of 65° Fahrenheit. (The day's average temperature is based on the maximum and minimum temperature from midnight to midnight.)

• Available products:
  • Swaps
  • Options
  • Quantos
Technical Analysis

Graphically depicting price movement in any openly traded market to..

1. Identify trending markets
   A. Moving averages
   B. Breaks of consolidation patterns
2. Look for change in trends
   A. Reversal patterns
   B. Buy and sell signals
   C. Identify oversold/overbought markets
3. Identify important chart points
   A. Support
   B. Resistance

Technical Analysis: The Study of Market Movement

Technical traders believe:

1. It is impossible to know all of the news and items that fundamentally affect price at any given point in time
2. Even if this wealth of information were known, it is too rapidly changing to allow for interpretation and corrective action
3. The news is dated and widely disseminated by the time it is received
4. Money is either made or lost in the price movement. Therefore efforts should be conducted in the study of price movement
Useful Information is A.R.T.

- **Accurate**
- **Relevant**
- **Timely**

Accurate and Relevant, but not Timely
Relevant & Timely, but maybe not so Accurate

Source: NBCUniversal

Accurate, Relevant and Timely

Source: Thomson Reuters Eikon
Dynamics of the Energy Futures Market

• An Auction Process to Match Buyer & Seller

• An Intensity Gauge

• Sustained Intensity Generates Trend

Fear Meets Greed in Public
...and in Private

A 2005 study conducted by Carnegie Mellon University, the Stanford Graduate School of Business and the University of Iowa shows that people with brain damage that impaired their ability to experience emotions such as fear outperformed other people in an investment game.

- The brain damaged participants were more willing to take risks that yielded high payoffs.
- They were less likely to react emotionally to losses.
- They finished the game with 13% more money than other players.

Source: Wall Street Journal July 21, 2005

Just How Rational Are We?

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Source: Wall Street Journal July 21, 2005
The Power of the Herd

450 Sheep Jump to Their Deaths in Turkey

First one sheep jumped to its death. Then stunned Turkish shepherds, who had left the herd to graze while they had breakfast, watched as nearly 1,500 others followed, each leaping off the same cliff, Turkish media reported.

In the end, 450 dead animals lay on top of one another in a billowy white pile, the Aksam newspaper said. Those who jumped later were saved as the pile got higher and the fall more cushioned, Aksam reported.

“There’s nothing we can do. They’re all wasted,” Nevzat Bayhan, a member of one of 26 families whose sheep were grazing together in the herd, was quoted as saying by Aksam.

The estimated loss to families in the town of Gevas, located in Van province in eastern Turkey, tops $100,000, a significant amount of money in a country where average GDP per head is around $2,700.

Source: AP

How Emotions Are Manifested in the Market

The Battle of Fear vs. Greed…

Also known as Bears vs. Bulls…

Also known as Support & Resistance
Support and Resistance

• **Support**: Area where buying is expected to increase and halt the bearish price action.
• **Resistance**: Area where selling is expected to increase and halt the bullish price action.

*Continuation Brent Crude Futures ICE*  
$80 Resistance Is Now Support

Source: www.eSignal.com
Elliott Wave Theory

Riding the Wave

1. Price Moves in Waves
   A. 5-Wave Advance (Impulse)
   B. 3-Wave Retracement (Corrective)

2. Third Wave Often the Longest, Never the Shortest

3. Fourth Wave Correction Should Not Overlap First Impulse Wave

4. Fifth Wave Length Equal to First Wave

5. Fibonacci Relationships
   A. Fibonacci Series, Each Number is the Sum of Two Preceding Numbers
   B. 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987
   C. Important Ratios
      1. Each Number is 1.618 of Preceding Number
      2. Each Number is 0.618 of Following Number
   D. Valuable in Estimating Price Objectives and Entry Points

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WTI Crude Oil Daily Continuation Chart
As of September 25, 2018

Source: www.eSignal.com
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