



Managing Risk and Volatility in Gas-Fired Generation

The Institute for Regulatory Policy Studies

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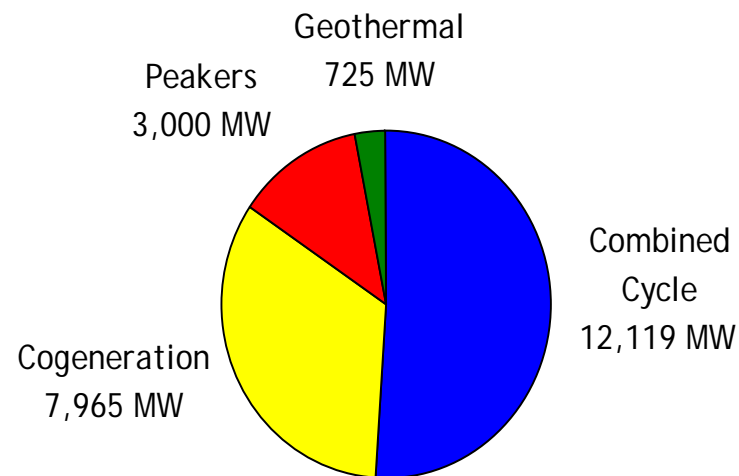
CALPINE OVERVIEW



CALPINE BACKGROUND



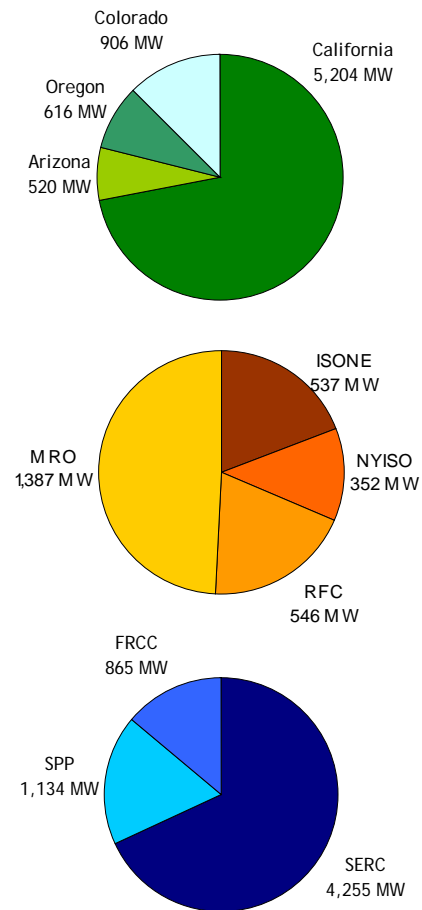
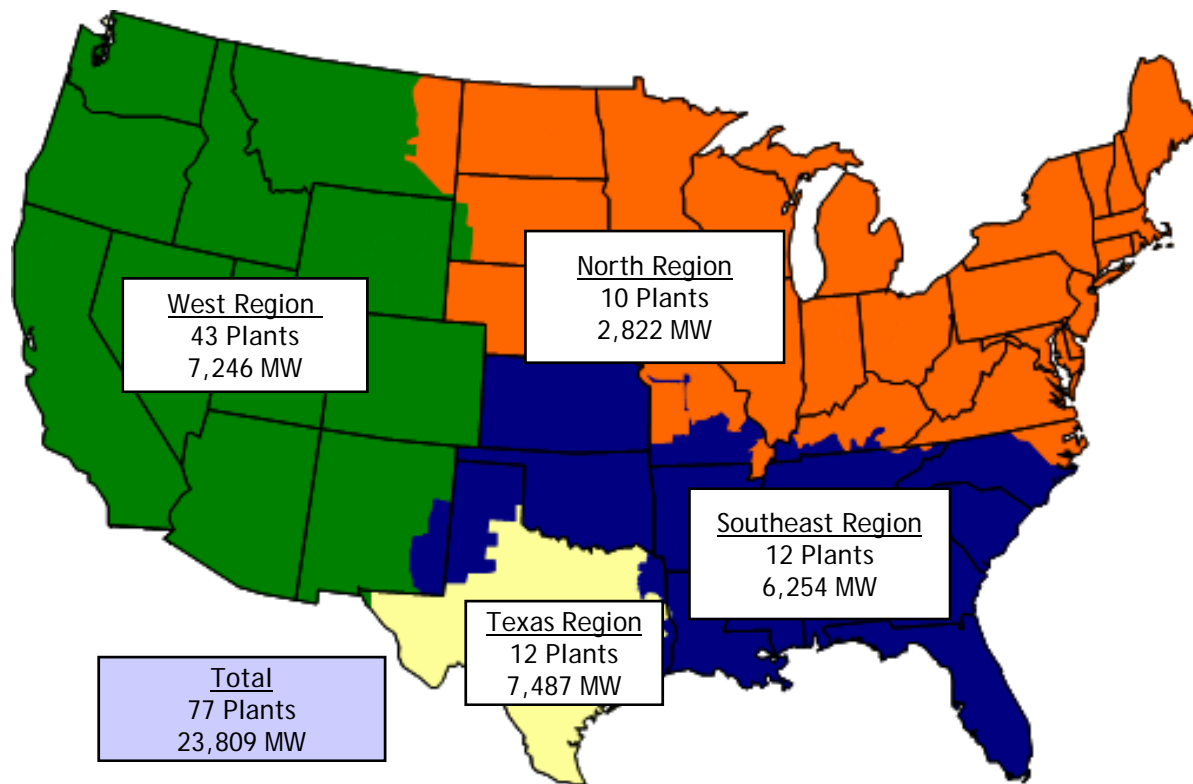
- Calpine is an Independent Power Generator
- Founded in 1984, currently operating nearly 24,000 megawatts (MW) of clean, cost-effective, reliable and fuel-efficient electric generating capacity for customers and communities across the U.S.
- Combined cycle plants represent 51% of Calpine's capacity, cogeneration technology represents another 33% of fleet.
- Calpine has the largest geothermal fleet in the nation at 725 MW of capacity.
- Calpine's fleet consumes in excess of 3 Bcf of natural gas on a peak day.
- Majority power plants were constructed by Calpine (weighted average life of assets <10 years old)



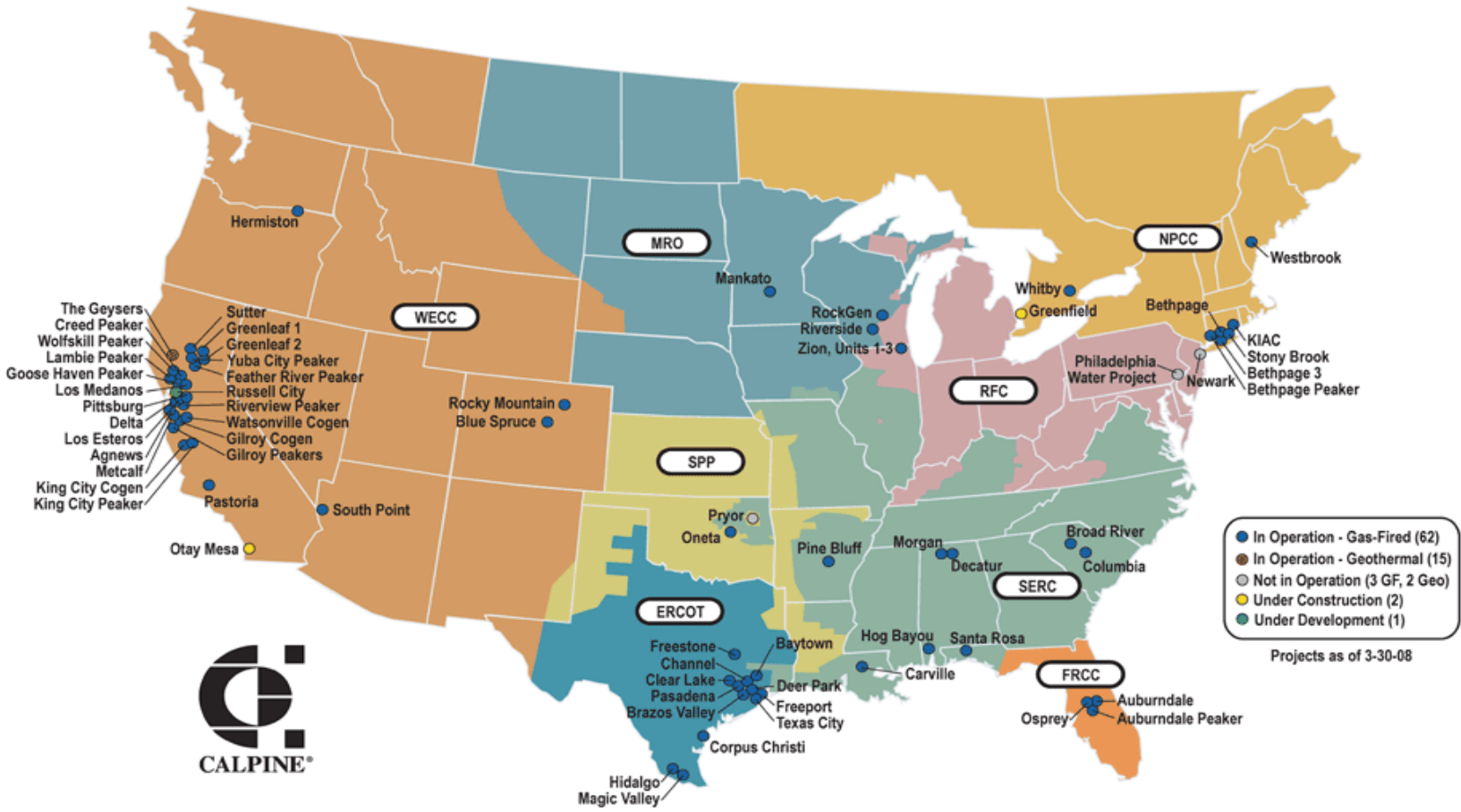
CALPINE ASSET PORTFOLIO



- Calpine owns nearly 24,000 MW of operating capacity, concentrated primarily located in California and Texas
- Fleet of 77 Plants (52 Gas-Fired and 15 Geothermal)



CALPINE: POWERING A LOW-CARBON FUTURE



RESTRUCTURING OVERVIEW



RESTRUCTURING TIMELINE



- Calpine Files for Chapter 11 Bankruptcy Protection 12/21/2005
- Submitted Plan of Reorganization 6/20/2007
- Confirmation of Calpine's Plan of Reorganization 12/19/2007
- Calpine Emerged from Bankruptcy 2/1/2008



KEY RESTRUCTURING ACCOMPLISHMENTS



- Focus on Core Markets and Assets
 - Divested or turned-over twelve plants or businesses
 - Closed 19 non-core offices
- Improved Financial Health
 - Overall debt reduced by \$7 billion and interest expense reduced by ~\$600 million/yr
 - Overall debt at emergence \$10.6 Billion with \$8.6 Billion in market capitalization.
 - Reduction of ~\$180 million/yr of overhead costs and 1,100 employees
 - Rejected 25 leases and 273 executory contracts
 - Implemented a comprehensive gas and electric hedging program
- Claims Resolution
 - Majority all of the allowed claims have been resolved.
 - Estimate that the unsecured creditors will ultimately recover 99.9% of their allowed claims.



Managing Risk and Volatility in Gas-Fired Generation



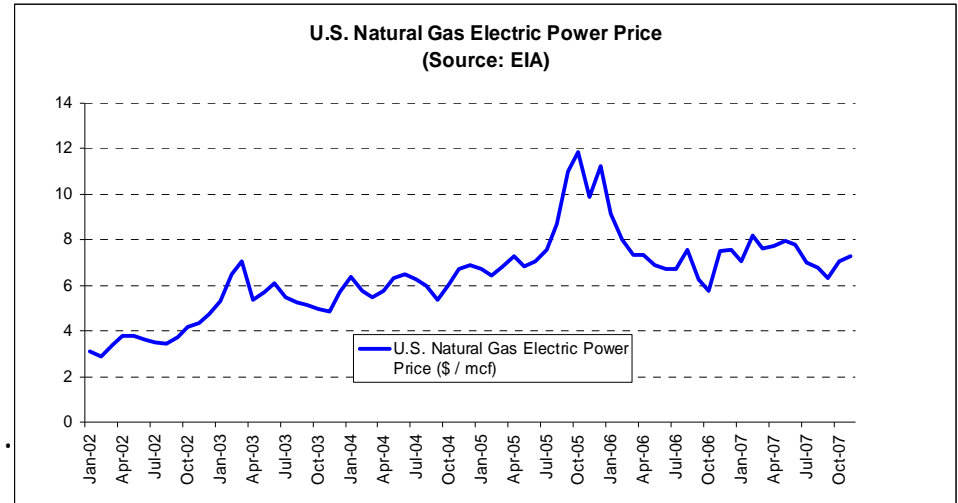
- NATURAL GAS PRICE VOLATILITY
- MANAGING TRADING RISK
Natural Gas Volumes
- REGULATORY RISKS
For Gas-Fired Generators
- LEGISLATIVE RISKS
For Gas-Fired Generators



NATURAL GAS PRICE VOLATILITY



- Why hedge natural gas?
 - Only raw material for a gas-fired power generator
 - Manage price exposure
 - Fuel costs can exceed \$200 million per year for a typical gas-fired plant.
 - Secure fuel supplies to support power sales obligations/agreements
 - Manage basis or transportation risk



MANAGING NATURAL GAS PRICE VOLATILITY



- Basic Hedging Tools
 - NYMEX Futures Contract
 - Derivatives (Swaps, options, etc.)
 - Spark Spread
 - Tolling Agreements (& other long-term contracts)
- Key Variables Facing Gas-Fired Generator's Hedging Program
 - NYMEX Gas Price Volatility
 - Heat Rate
 - Basis Risk
- Other Considerations
 - Plant's power obligations
 - Plant's primary function (cogen, peaking)
 - Availability of gas supply & transportation



MANAGING NATURAL GAS PRICE VOLATILITY

Spark Spread Hedge



- Spark Spread

- The difference between the market price of electricity and its cost of production.
- $(\text{Total Value of Electricity} - \text{Total Value of Fuel}) / \text{Electricity Units}$

Example:

Heat rate = 8 MMBtu / Mwh

NYMEX Gas = \$4.00

Power Market = \$65.00 / Mwh

Spark Spread = Price of Electricity - [(Cost of Gas) * (Heat Rate)] or $\$65 - [(8) \times (\$4.00)] = \$33 / \text{Mwh}$

- Spark Spread Hedge

- Gives a generator the ability to minimize risk by locking in margin.
- Allows a generator to hedge both sides of the transaction, locking in the in supply price of its fuel and sales price for its power

- Considerations

- There is no perfect hedge. (Ex. basis risk still remains due to price variations between hubs and actual generator location).
- Hedge Ratios: Electric and Gas Futures are not traded in equal units
- Once physical month arrives generator may elect to lift one, or both, sides of the hedge.



MANAGING NATURAL GAS PRICE VOLATILITY

Tolling Agreements



- Plant owner simply acts as the plant operator
- Eliminates all commodity risk from asset (*during contract term*)
- Performs gas to power conversions for a third party for a fee.
 - Third party arranges for delivery of fuel supplies to plant.
 - Third party then takes the generated power into the market
- **Example: Zion Energy Center**
 - Located in Zion, Illinois approximately 50 miles North of Chicago
 - 100% owned by Calpine Corporation
 - Began initial commercial operations in June of 2002
 - Three Simple Cycle Gas Turbines
 - 540 MW capacity
 - Plant is fully tolled
 - Delivers power into the ComEd control area for delivery into PJM.



MANAGING TRADING RISK

Natural Gas Volumes



- Gas Day vs. Power Day
 - Volume risk is compounded by day ahead gas scheduling vs. real-time electric dispatch orders
- Gas-fired plants often trading on the margin in electric markets
 - Often called upon to run only during the peak electric hours (8 or 16 hour blocks)
 - Therefore plant is not running in off-peak hours and burning no gas.
- Standard Gas Pipeline Transportation Services
 - Standard agreements are designed for uniform hourly flow over 24 hrs
 - Firm Gas Transportation (FT)
 - Interruptible Gas Transportation (IT)

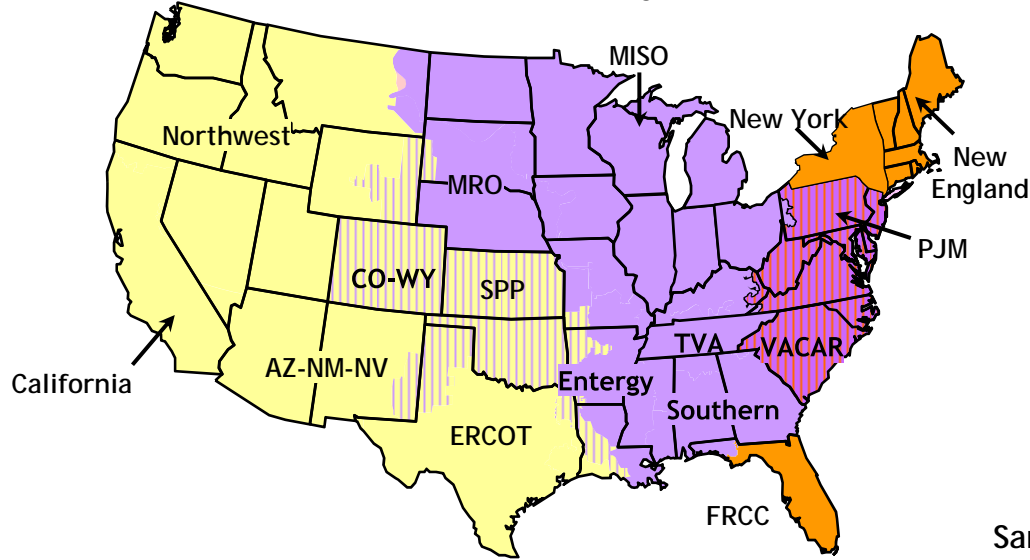


MANAGING TRADING RISK

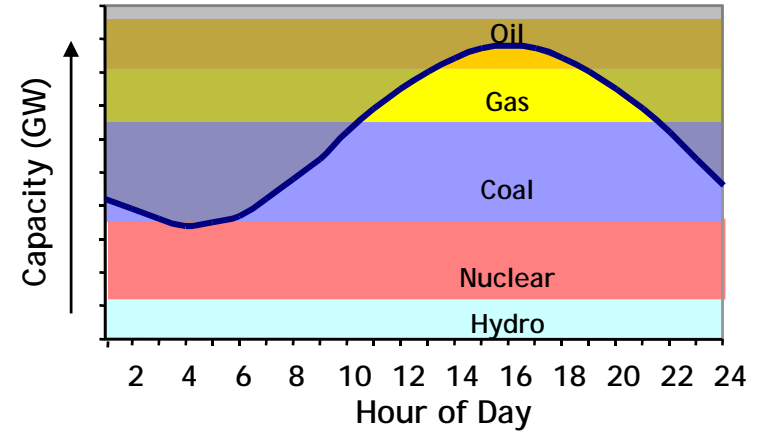
Fuel on the Margin



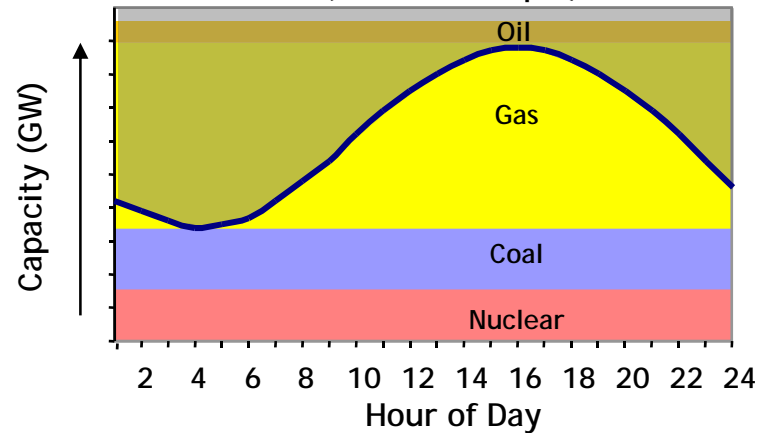
Fuel on the Margin



Sample Day of Market Dispatch (SERC example)



Sample Day of Market Dispatch (ERCOT example)



- Gas on margin >90% of time
- Gas on the margin >65% of time
- Predominately coal with gas & oil
- Predominately gas with coal & oil
- Predominately coal with gas; oil >10%

Source: PA Consulting Group



MANAGING TRADING RISK

Natural Gas Volumes



- Flexible Gas Pipeline Transportation Services
 - Storage
 - No-Notice
 - Premium or Enhanced Firm
- Gas Scheduling/Nominations by Portfolio
 - Provide multiple locations for gas consumption
- Layering of transportation services
 - Matching supply and transportation curves with anticipated demand
 - FT for baseload needs
 - IT & Storage for peaking needs



REGULATORY RISKS

For Gas-Fired Generators



- Cost of Natural Gas Transportation
 - participate in state and federal rate cases submitted by transportation providers.
 - Negotiate long-term transportation agreements
- Pipeline Gas Quality (Interchangeability)
 - Pipelines are adjusting quality standards to prepare for introduction of new foreign LNG supplies.
- Wholesale Power Markets
 - Generators need markets that send proper price signals
 - Developments in formal transmission & electric markets
 - capacity markets
 - nodal pricing
 - economic dispatch



LEGISLATIVE RISKS

For Gas-Fired Generators



- Environmental/Greenhouse Gas Initiatives
 - Modern combined cycle plants emit significantly less carbon dioxide and NO_x than coal plants and emit very little SO₂ and no mercury.
 - *“incentive should be carbon-weighted to make lower emission power sources less expensive relative to higher emissions sources”* President George W. Bush April 16, 2008.
 - Carbon-based legislation will impact modern gas-fired generators, but they may see less of a burden than traditional fossil fuel plants.

- Calpine’s View
 - Anticipate significant greenhouse gas legislation in the next 5 years
 - Young portfolio provides a competitive advantage
 - Efficient units consume less gas and emit fewer emissions
 - Peers may have to invest in costly retrofits
 - Cap and Trade Programs



MANAGING RISK AND VOLATILITY IN GAS-FIRED GENERATION

Conclusion



RISK	MITIGATION/ACTIONS
Gas Price Volatility	<ul style="list-style-type: none">• Traditional Hedging• Spark Spread Hedge• Contractual<ul style="list-style-type: none">-LT Agreements-Tolling Agreements-Industrial Partners
Trading Risk - Gas Volumes	<ul style="list-style-type: none">• Transportation Service Agreements<ul style="list-style-type: none">-Layer traditional services-Subscribe to flexible services
Regulatory Risks	<ul style="list-style-type: none">• Promote Wholesale Power Markets• Participate in Gas Policy Development
Legislative Risks	<ul style="list-style-type: none">• Focus on Generation of Clean Power



