

Forward Trading in Electricity Markets: Benefits, Costs and Challenges



A Regulator's Perspective....

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Forward Trading is Critical to the ERCOT Markets

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- **ERCOT wholesale and retail market participants and financial counterparties must be able to:**
 - Warehouse positions,
 - Enter into wholesale power transactions, and
 - Hedge risks such as weather, time, deliverability and other market forces such as fuel prices.
- **Efficient, deep and liquid forward and secondary markets where risks can be hedged are very important to making the ERCOT markets work, both wholesale and retail.**
 - Enables the use of bilateral contracts: forward price signals inform the bilateral contracting process and forwardly hedged fuel purchases, transportation, and the acquisition of financial instruments to hedge congestion and other risks are all critical if retail electric providers (REPs) and/or load serving entities (LSEs) are to be able to offer retail customers stable prices, including fixed price contracts.
 - Enables generators to mitigate their price risk, including; deliverability risk (congestion and power supply risk) and fuel costs.
 - Enables financing of new power plants through various hedging and financing strategies.
- **Within ERCOT, REPs hedge more than 90% of their residential and small commercial (<50 MW) load with bilateral contracts:**
 - Usually on a portfolio basis.
 - Some Day Ahead and Real Time participation to cover swings and shaping.

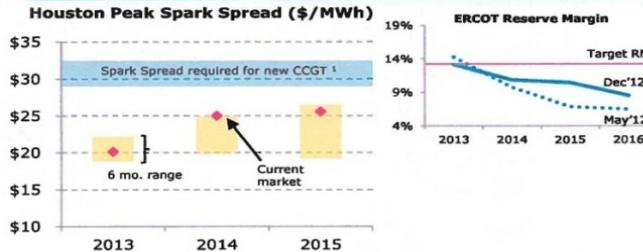
Case Study:

Excerpt from NRG's Fourth Quarter 2012 Earnings Presentation

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Market Update

ERCOT: Fundamentals Remain Strong with Spark Spreads Firming Up



¹CCGT CONE range is calculated based on overnight capital cost in the range of \$800/kW to \$900/kW. Spark Spreads = Peak Power - 7 heat rate x Henry Hub Gas

Recent developments:

- New CDR report lowered load growth. ERCOT remains below target reserve margin
- Ongoing discussion of mandated reserve margin requirements
- NERC requested Resource Adequacy plan by April 30th

Under discussion:

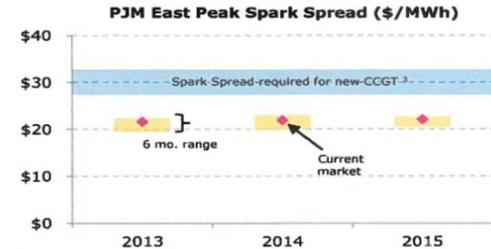
- Administrative pricing during reserve shortages
- Expansion of operating reserves
- Real time price mitigation changes



PJM: Tightening Fundamentals Not Reflected in Forward Market



²Sources: IHS CERA and NRG estimates.



³CCGT CONE range is calculated based on overnight capital cost in the range of \$1100/kW to \$1200/kW assuming \$5/kW-mo capacity price. Spark Spreads = Peak Power - 7 heat rate x TETCO M3 Gas

NRG portfolio well-positioned in Texas and PJM

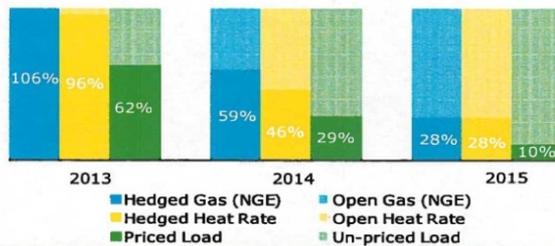
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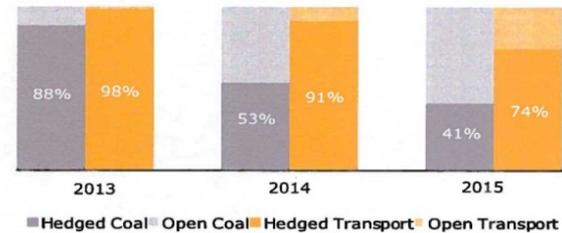
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Managing Commodity Price Risk

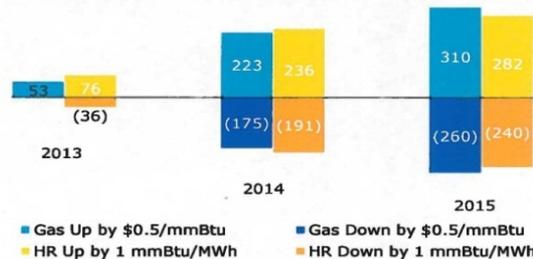
Coal and Nuclear Generation and Retail Hedge Position (1) (2)



Coal and Transport Hedge Position (1) (4)



Coal and Nuclear Generation Sensitivity to Gas Price and Heat Rate (1) (3)



Commercial Highlights

- ✦ Commercial integration of the GenOn fleet upon merger close
- ✦ Executed coal transportation agreement for Maryland units
- ✦ Fully hedged natural gas exposure for coal and nuclear assets in 2013



(1) Portfolio as of 02/15/2013; (2) Retail load includes Reliant, Green Mountain, and Energy Plus for Texas, PJM, ISONE, and NYISO regions. Retail Priced Loads are 100% hedged; (3) Price sensitivity reflects gross margin change from \$0.5/MMBtu gas price, 1 mmBtu/MWh heat rate move; (4) Coal position excludes existing coal inventory

Regulatory Certainty is Essential to All Markets, Including Forward Markets

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- **Two types of regulatory certainty:**
 1. Clear rules of conduct: statutory and administrative, and
 2. Consistent and principled application of those rules by regulators in practice.
- **Regulatory uncertainty may adversely affect forward markets by restricting depth and liquidity.**

Regulatory Challenges Affecting Forward Markets: Statutory and Administrative Rules

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- Broad and vague laws and rules regarding proscribed conduct.
- Unclear jurisdictional authority.
- Dodd-Frank and its implementation.
- **Examples:**
 - Volcker Rule: Will implementation restrict banks and their affiliates from providing necessary counter-party liquidity?
 - Volcker Rule: How will regulators provide sufficient clarity between permissible market-making and other client services and impermissible proprietary trading? Is it even possible?

Clarity of Proscribed Actions is Critical – Case Study

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Texas' Public Utility Regulatory Act (PURA)

- “. . . a power generation company may not own and control more than 20 percent of the installed generation capacity. . .” (PURA § 39.154(a))
- “. . . market power abuses are practices by persons possessing market power that are unreasonably discriminatory or tend to unreasonably restrict, impair, or reduce the level of competition, . . . “market power abuses” include predatory pricing, withholding of production, precluding entry and collusion. A violation of the code of conduct . . . that materially impairs the ability of a person to compete in a competitive market shall be deemed to be an abuse of market power.” (PURA § 39.157(a))
- “. . . the commission shall adopt rules and enforcement procedures to govern transactions or activities between a transmission and distribution utility and its competitive affiliates to avoid potential market power abuses and cross-subsidizations between regulated and competitive activities . . .” (PURA § 39.157(d))

Federal Power Act (FPA)

- “It shall be unlawful for any entity . . . directly or indirectly, to use or employ, in connection with the purchase or sale of electric energy or the purchase or sale of transmission services. . . , any manipulative or deceptive device or contrivance (as those terms are used in [Section 10(b) of Securities Exchange Act of 1934] . . . , in contravention of such rules and regulations as the Commission may prescribe as necessary or appropriate in the public interest or for the protection of electric ratepayers.” FPA § 222(a).

Regulatory Challenges Affecting Forward Markets – Regulator Behavior

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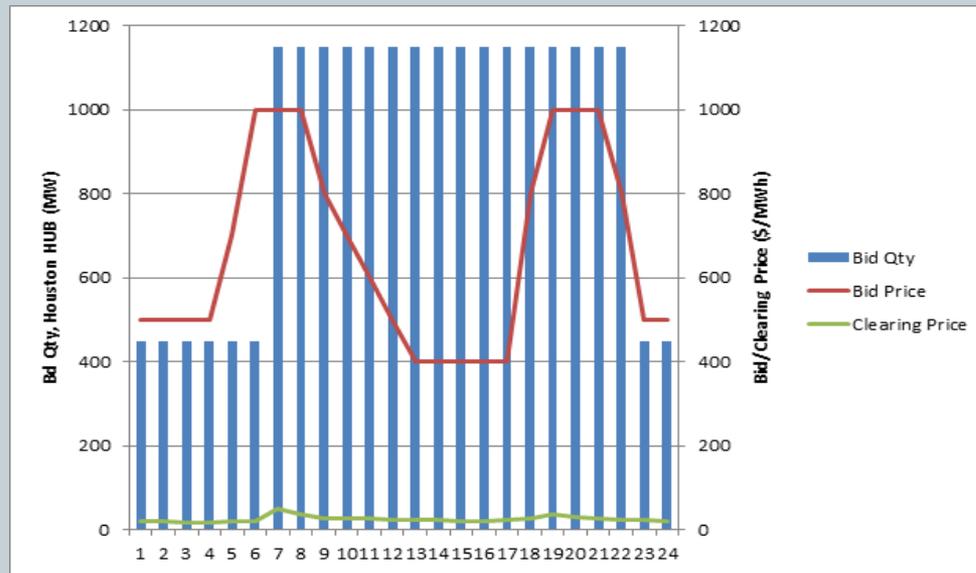
- Regulators adopt rules that fail the clarity test.
 - PUCT Example - PUC Subst. R. 25.504(d): “withholding of production. Prices offered by a generation entity with market power may be a factor in determining whether the entity has withheld production. A generation entity with market power that prices its services substantially above its marginal cost may be found to be withholding production; offering prices that are not substantially above marginal cost does not constitute withholding of production.”
 - Clear as . . . **mud!**
- Regulators applying rules that are vague in ways that may not be foreseeable by market participants.
- Regulatory arms race resulting from overlapping jurisdiction.
- Regulators permitting inordinate time to pass between market participant action and regulatory enforcement action.
- Regulators over-reacting to regulatory lapses (which may or may not be their own) or market design flaws by adopting unnecessary or overly-restrictive rules instead of modifying their oversight functions.

Regulatory Challenges Affecting Forward Markets – Use of Discretion

- **Example of a PUCT decision that provided market certainty:**
 - In Docket No. 39433, PUCT overturned ERCOT’s decision to resettle Congestion Revenue Rights (CRRs) for operating days Dec. 1, 2010 through Feb. 1, 2011.
 - ✦ In this case:
 - There were no energized settlement points in the same stations as to certain de-energized electric buses which resulted in ERCOT’s model substituting the Locational Marginal Price from the next connected station.
 - This gave value to some CRRs where no congestion was possible.
 - ✦ ERCOT:
 - Identified and corrected the error in its model, then
 - Decided to resettle CRRs for the affected time period.
 - ✦ ERCOT’s decision to resettle was appealed to the Commission.
 - ✦ Under its protocols, ERCOT can resettle if there is “data error.”
 - ✦ Commission concluded:
 - There was a model design flaw rather than a data error, and
 - Consequently, ERCOT lacked authority to resettle.
- **At the open meeting when this ruling was handed down, I asked Commission Enforcement Staff to investigate whether there was a violation of P.U.C. Subst. R. 25.503, which provides standards for wholesale market participants.**
 - Market participants are expected not to engage in activities and transactions that create artificial congestion or artificial supply shortages, artificially inflate revenues or volumes, or manipulate the market or market prices in any way, and
 - If a market participant identifies a provision in ERCOT procedures that produces an outcome inconsistent with the efficient and reliable operation of the ERCOT-administered markets, the market participant is required to call that provision to the attention of the appropriate ERCOT subcommittee.

Case Study: Bidding That Appears Irrational, May Be or May Not

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- The chart shows day-ahead bid quantities (to buy) at an ERCOT HUB. The red line shows the bid price for each hour associated with the bid quantity. The green line shows the actual clearing price in the DAM at the HUB.
- **Just looking at these data in isolation, it may seem irrational that a market participant would bid so high when the clearing prices are so much lower.**
- However, the blue bid quantities are associated with a bilateral contract for which the market participant has an obligation in real-time.
- This market participant owns generation assets, and wants to offer those generation assets into the DAM to optimize against the market.
- Because the market participant is offering its generation into the DAM, it also wants to cover its real-time obligation in the DAM, therefore it bids to buy this obligation in the DAM at bid levels that are essentially price-taking.
- If the market participant sold into the DAM but did not also buy in the DAM, then it would be exposed to the risk of selling in the DAM and buying in real-time.
- Therefore, even though the market participant's bids in the DAM are typically way out-of-market, they represent a rational approach to optimize and manage the risk of the entire transaction. If the DAM clears higher than its supply offer, it will have sold into the DAM and bought from the DAM, such that it is flat in real-time and its net revenue will be the bilateral price from its counter-party less its generation costs. If the DAM clears lower than its supply offer, it will not sell in the DAM but will still buy in the DAM, such that it is flat in real-time and its net revenue will be the bilateral price from its counter-party less the DAM purchase price (which is less than its generation costs).
- There are also benefits of this approach associated with hedging real-time congestion risk.

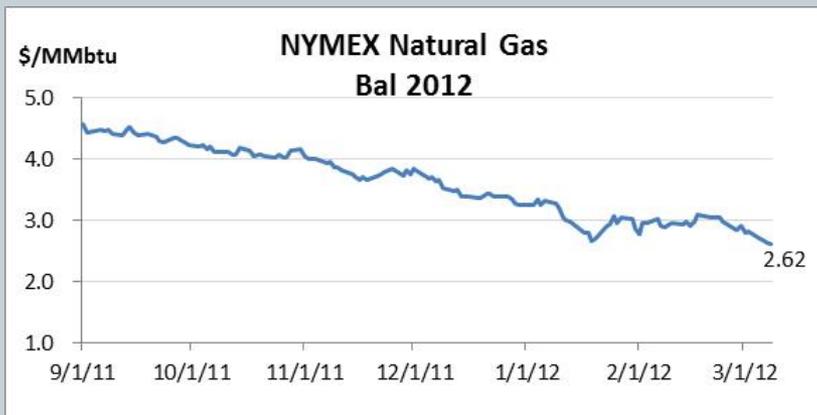
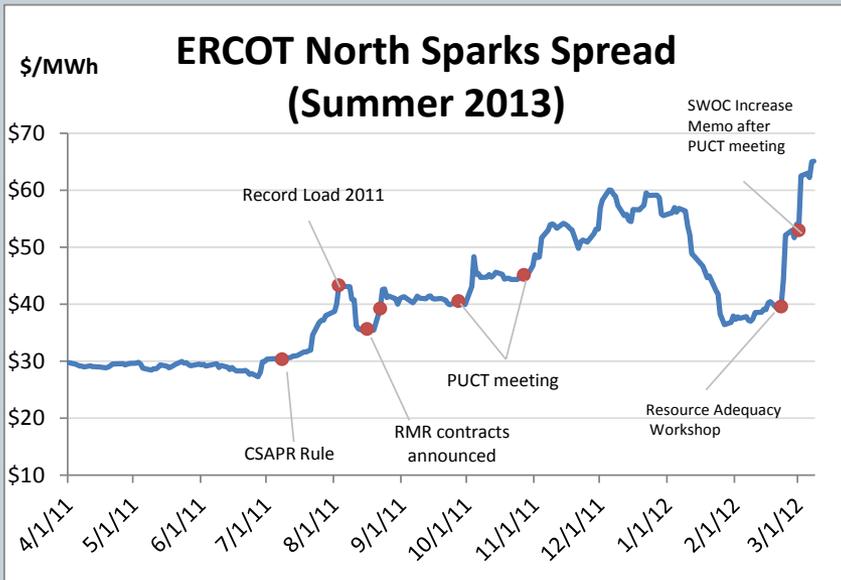
Regulator Behavior

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*Regulators need to remember:
markets, including forward markets, respond to their actions,
positively and negatively.*

Case Study: Correlation Between Regulatory Actions / Discussions (in 2011) and ERCOT Forward Prices (On-Peak Summer 2013)

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07/08/11 : CSAPR Rule Finalized

08/03/11 : All-time Record ERCOT Load

08/16/11 : RMR contracts announced

08/22/11 : PUCT Open Meeting

09/27/11 : PUCT Meeting indicating leaning toward NSRS price solution

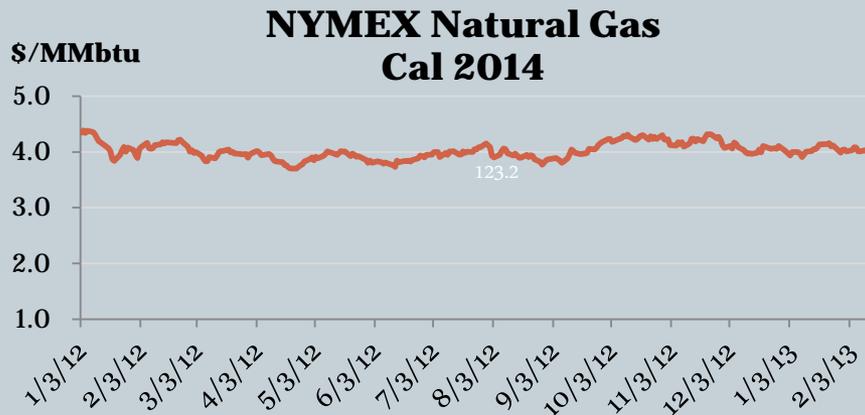
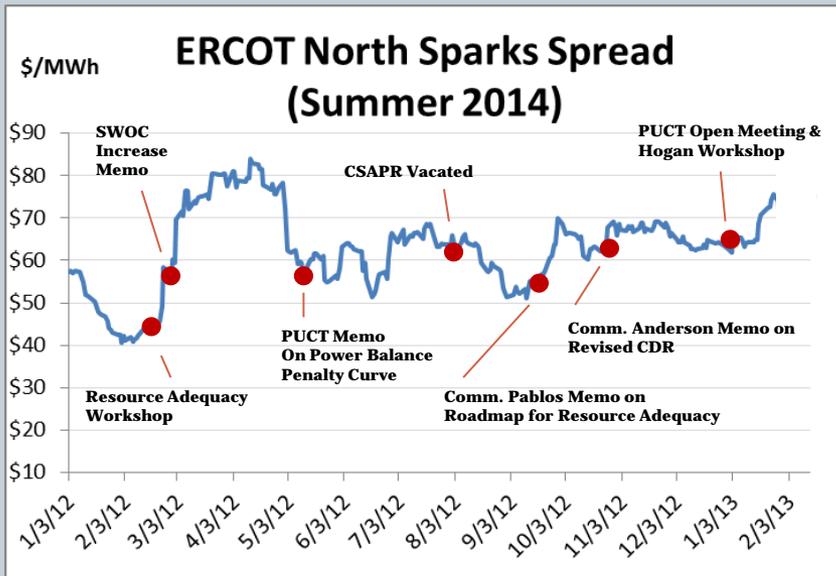
10/27/11 : PUCT Open Meeting – Guidance resulting in guidance to fix NSRS price reversals

02/23/12 – PUCT Workshop on Resource Adequacy

07/07/12 - PUCT Open meeting – Memo supporting increase in SWOC

Case Study: Correlation Between Regulatory Actions / Discussions (in 2012) and ERCOT Forward Prices (On-Peak Summer 2014)

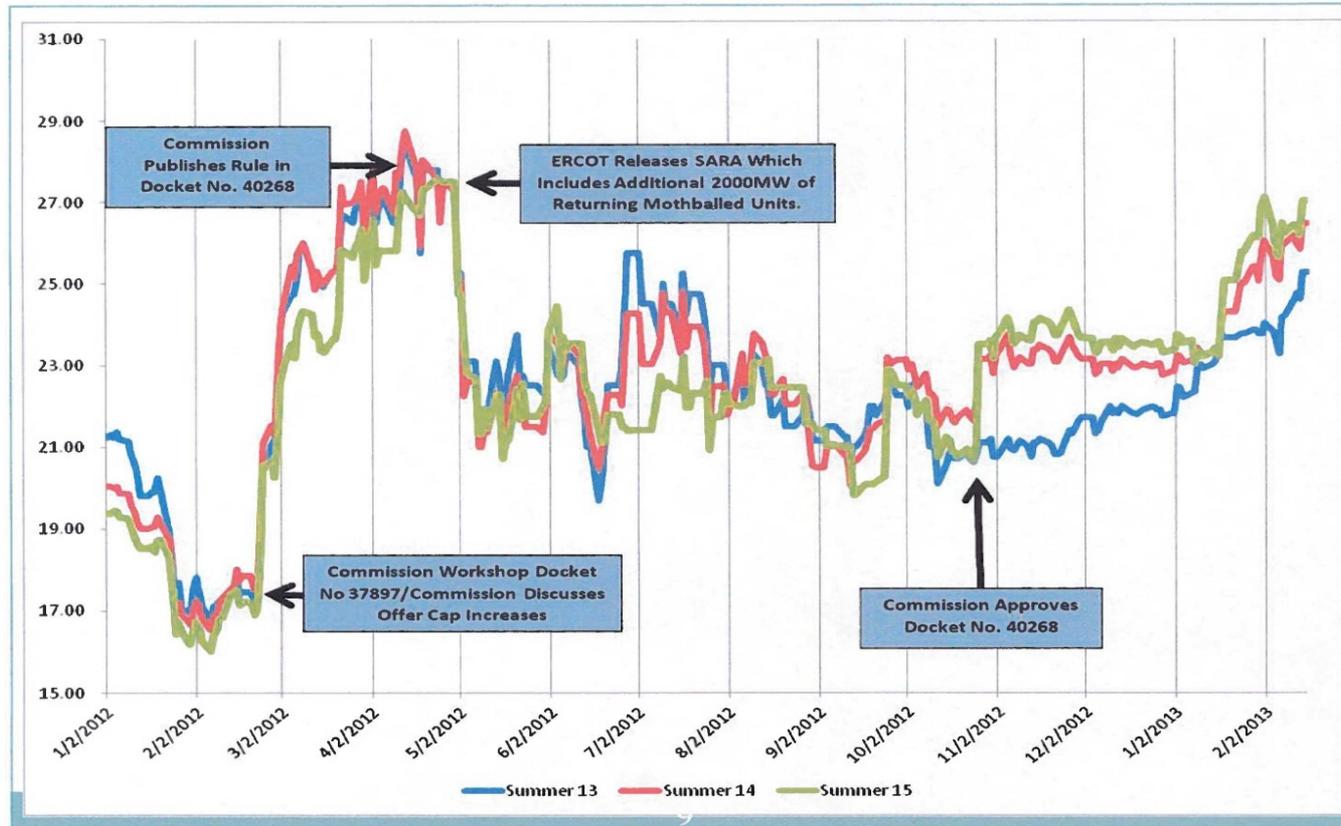
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- 02/23/12 – PUCT Workshop on Resource Adequacy
- 07/07/12 - PUCT Open meeting – Memo supporting increase in SWOC
- 05/16/12 – Commissioner Anderson memo on modifications to the Power Balance Penalty curve to synch with SWOC
- 08/21/13 – CSAPR vacated by 2-1
- 09/12/12 – Commissioner Pablos memo on Roadmap for Resource Adequacy
- 11/13/12 – Commissioner Anderson memo on Analysis of ERCOT CDR
- 01/24/13 – Workshop with Professor Hogan

Case Study: Correlation of Forward Prices to Regulator's Actions

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