A Transmission and Energy Exchange (TEX) for ERCOT

Presented to
Texas Nodal Team
by
Edward G. Cazalet, Ph.D
The Cazalet Group, LLC
October 22, 2003
Price Volatility & Forward Contracts

- Year Ahead
- Month Ahead
- Day Ahead
- Hour Ahead
- Hour After

Ideal Additional Volume Contracted

Price Outcomes
Benefits of a Robust Locational Forward Market

- Better locational forward price signals and incentives for investment, maintenance, storage, commitment, dispatch and demand management
- Better risk and credit management
- Better resource adequacy and reliability
- Consistency with real-time LMP avoids gaming
- If the forward market fails everyone is hurt
Forward Power Markets are Very Difficult?

- Electric markets are locational and fractured because of transmission limits.
- Volatility is high because of generator capacity limits and high cost of storage.
- Real-time price volatility may be artificially suppressed with price caps, ancillary services support and central operator intervention.
- Wholesale real-time and forward market prices may not be passed through to retail real-time and forward prices creating demand inelasticity.
- Developing liquidity is the big challenge.
TNT Design Issues

- **Day-ahead**
  - Integrated day-ahead security constrained unit commitment market
  - Auction day-ahead market

- **Congestion revenue rights (CRR)**
  - Point-to-point
  - Flowgate
  - Hybrid
  - Obligations and options

- **Clear CRRs against real-time or day-ahead locational prices**
Integrated Continuous Forward Market Transmission Energy Exchange (TEX)

- Energy, transmission, ancillary services
- Clearing at settlement points: nodes, load zones, hubs
- Point-to-point and flowgate
- Options and obligations
- One-part tenders (buy bids and sell offers)
- Continuous and auction clearing
Continuous versus Auction Clearing

- Auction market price discovery is ex-post
- Continuous market price discovery is ex-ante
- With forward prices generators will usually not commit until forward prices are cover all costs
- Storage resources optimize easily with forward prices
- With ex-post prices as in an auction, generators may prefer simultaneous auction across a day with multi-part tenders and central unit commitment
- Continuous markets in multiple products and time periods can work in parallel for efficient dispatch
- Single-part tender markets are easier to settle – uplifts not necessary to cover commitment costs
TEX: Day-ahead to Real-time

- Continuous trading of hourly and block energy & transmission products to DA scheduling deadline
- Optional auction at DA deadline
- Schedules due at DA deadline
- ERCOT may purchase through TEX for reliability on behalf of participants (RUC)
- Continuous (feasible) trading, of hourly and sub-hourly energy & transmission products to real-time with continuous reporting to ERCOT
- Transmission congestion revenue rights settled DA or real-time at participant option
TEX: Year(s)-ahead to Day-ahead

- Energy traded continuously in annual seasonal, or monthly blocks
- Initial simultaneous auction of pt-to-pt and flowgate transmission rights (CRRs)
- Additional rights released in monthly auctions or continuous market
- Simultaneous continuous trading of energy and transmission rights
Trading

- Trading Screen shows current pt-to-pt prices for transmission congestion rights
- Energy prices at any location can be translated to any other location
- Every energy tender in ERCOT can be translated to participant choice of location
- Simultaneous or nearly simultaneous energy and transmission transactions can be done
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TRADING / ENERGY
Market

Hyatt Generation Market: (more...) Mont/Ida/Ut/Wyo Hub Hourly

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**Related Links:**
- California ISO
- California PUC
- Oversight Board
- CEC
- Green-e
- NERC

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Reconfiguration Market for Rights

- Operates like reconfiguration auction with simultaneous feasibility test
- Clears continuously in response to participant tenders of rights
- Shadow prices on constraints determine which pt-to-pt and flowgate tenders are reconfigured
- Shadow prices set in initial auction and updated in response to participant tenders
CRR Forward Reconfiguration

- Point-to-Point Obligation MW
- Point-to-Point Option MW
- Flowgate MW

Transmission Network Model

Constraint MW Deficits
- Network Constraints
- Security Constraints

Constraint Shadow Price Adjustment

Shift Factors

Point-to-Point Obligation Prices
Point-to-Point Option Prices
Flowgate Prices

Bidding and Clearing
Implementation

- Trading Screens and API
- Forward market software + network model
- Exchange – automated credit management with counter party selection and/or third party credit support
- Simulate before implementation
- Most likely ERCOT run or ERCOT sponsored service
Bid Sufficiency and Mitigation

- In an auction market (integrated or otherwise) insufficient supply bids can cause price spikes. After the fact you can only artificially mitigate.

- In a continuous market insufficient bids cause price increases which then is a signal, incentive and time allowance for more supply or demand reduction bids. Mitigation is needed less and there is more time to apply mitigation.
The Question for Any Market Design: Liquidity?

- Impact of retail market design?
- Impact of ancillary services design?
- Impact of market power mitigation?
- Impact of rules to penalize non-participation
- “Voluntary” or “mandatory” participation – what does this mean?
- Market makers?
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