Valuation of Large Power Generating Assets

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Current Valuation of Power Plants

- Market value of power plants only became relevant in the last ten years
- Prior to that, most plants were regulated or under long term contracts
- The “Merchant” plant industry has had a very volatile first ten years
- Regional differences, fuel prices, and power contracts are critical
Residual Value Issues

Residual values are complicated by several factors:

• When/if regional electricity market will come back into supply/demand equilibrium
• Market rules are still being developed
• Environmental regulations could change the picture dramatically
• Tax credits, state rebates, federal programs could create winners and losers
• Fuel prices continue to be volatile
Key Issues to Consider

• Fuel and Technology
• Contracts
• Locational Issues
  – Market equilibrium
  – Market rules
  – Additions and retirements
Plant Fuel and Technology

- **Coal**
  - Pulverized coal
  - Fluidized bed
  - Stoker fired
  - IGCC *(Integrated Gasification Combined Cycle)*

- **Natural Gas (and Oil)**
  - CCGT *(Combined-Cycle Gas Turbine)*
  - Simple Cycle Combustion Turbine
  - Conventional Steam

- **Hydro, Nuclear, Solar, Wind**
Types of Contracts

- No Contracts ("Merchant")
- Ancillary Services Agreements
- Power Purchase Agreements
- Tolling Agreements
- Rate Regulated
Locational Considerations

- Market equilibrium
- Development of Market Rules
- Politics
- Environmental Regulations
- Additions and Retirements
- Transmission Access
- Fuel Access
Transactions in 2006

- From 2004-2006, over $30 billion worth of generation plant sales occurred.
- In 2006, over $13.5 billion in sales, a record.
- Volume of transactions and proceeds reflects tightening demand/supply balances, softening natural gas prices and resulting increase in spark spreads.
- In 2006, natural gas fired plants accounted for about 72% of transactions; roughly 22,000 MW.
Transaction Volume by Region
Transactions in New England

New England activity in 2006 driven by new Forward Capacity Market

New England Generation Asset Sales ($MM)

New England Generation Asset Sales ($/kW)
Selected New England Transactions

• New England Electric System
  – 1997 – Sold entire non-nuclear fleet to US Gen (subsidiary of PG&E)
  – The first market sale
  – Sold at a “premium” over book value, but …
  – Included deal for out of the money contracts
  – Prior to this sale “stranded assets” was the big issue
Selected New England Transactions

- Exelon Boston Generating
  - Mystic and Fore River (Over 3 GW of capacity - including three state-of-the art CCGTs)
  - Acquired by Exelon in 2002
  - Construction contractor took a $1 billion write-off on fixed-price EPC contract
  - Plants abandoned by Exelon in 2003
  - Exelon took a $500+ million write-off
  - Debt soon traded at more than 2X par
  - Refinanced twice
  - Debt holders about to sell at tremendous profit
Selected New England Transactions

- Lake Road (Connecticut)
  - 780 MW CCGT
  - Built by National Energy Group (PG&E)
  - NEG went into Chapter 11 in 2003
  - Mid-2004, debt was trading at about 50% of par
  - Late 2004 - offer to buy for $220 million didn’t succeed
  - Put up for sale in late 2006 – initial expectations were for over $400 million
  - British Gas North America won the bidding at $685 M (nearly $900/kW)
Valuation Approaches

- Market Approach – Enough data for sanity check, not a primary approach. Be careful of regional differences, contracts, and distressed sellers.
- Cost Approach – Generally not useful in high reserve margin regions. Very useful in low reserve margin regions and for residual value.
- Income Approach – Most applicable for transaction purposes. Going concern assumption. Includes business value
Income Approach - Revenue

- **Energy Prices**
  - Use fundamental models to determine market clearing prices based on production cost
  - Bid adders to simulate historical behavior to estimate forward prices
  - Extrinsic value determined using option model

- **Capacity Prices**
  - Apply approved or proposed market rules for capacity market
  - As appropriate, distinguish between energy-only resources and capacity resources
  - In absence of formal capacity market, estimate capacity revenue as difference between total revenue requirements and estimated energy revenues for proxy unit

- **Ancillary Services**
  - Estimate based on historical values

- **Other Revenue**
  - Estimate hedge product payment to evaluate the “fit” with extrinsic value forecast
  - Forecasts of REC prices for renewable projects
  - For dual fuel units, arbitrage models may be used to evaluate incremental value from fuel switching.
Income Model Assumptions

- Demand
- Generation Resources
- Transmission Resources
- Transmission Constraints
- Asset Specific Parameters
- Cost of New Entry
- Fuel Prices
- Market Rules
Extrinsic (Optionality) Value

• What is it?
• Should it be considered for financing purposes?
• The extrinsic value of the plant captures the potential extra revenue when taking into account the volatility inherent in electricity and natural gas prices.
• This volatility is not fully reflected in production cost-based simulation models because these models reflect normal weather, do not adequately consider natural gas price volatility, and do not capture supplier behavior and bidding strategies during peak demand conditions.
Fuel Price Projections Are Critical

- Fuel prices affect the entire market, not just the costs at the subject plant
- Important parameters:
  - Real oil prices
  - Economic growth rate
  - Gas demand, by sector
  - Timing of new North America natural gas supplies
  - Imports of LNG
  - Coal additions/retirements
Renewables

• Tax Credits and Other Programs
  – Federal Production Tax Credits
  – Renewables Portfolio Standards (RPS)
  – State Rebates
• Create Temporary Winners and Losers
• How long will they last?
• Effect on residual values.
Wind Project Development

- High natural gas prices and Renewable Portfolio Standards are driving renewable development opportunities.
- With the Production Tax Credit wind is the big winner.
- RPS standards are state-driven and vary by the size of the requirement, the allowable resources, dates, use of technology tiers/multipliers and other factors.
Transmission Is Getting Interesting

» Projects that are developed in competitive situations, take development cost risk, or have substantial amounts of merchant (uncontracted) capacity should be allowed to charge market-based rates.

» Projects that are developed in non-competitive situations and provide some relief from development cost risk will usually sell transmission services under regulated rates. Some incentive-based rates.
## Transmission – Regulated vs. Merchant

<table>
<thead>
<tr>
<th>Regulated Projects</th>
<th>Merchant Projects</th>
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<tbody>
<tr>
<td>Projects are typically associated with a regulated utility’s system and standard</td>
<td>Projects are owned by a separate entity rather than being part of the utility's</td>
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<tr>
<td>ratemaking principles apply.</td>
<td>regulated system. Financing is typically non-traditional financing and more</td>
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<tr>
<td>May qualify for FERC incentives if asset helps to ensure reliability and lowers</td>
<td>investment-capital oriented.</td>
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<td>the cost of delivered power.</td>
<td>Rates are ultimately reviewed by FERC and established in the OATT.</td>
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<td>Hypothetical capital structure may not apply.</td>
<td>May be able to receive somewhat higher returns. Allowing the owner to obtain</td>
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<tr>
<td>If project is interstate, 230 kV or above, or does not serve native load, must file</td>
<td>financing, which if the capital structure has more debt, provides opportunity for</td>
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<td>with FERC for cost-based rate.</td>
<td>higher returns.</td>
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<td>Revenue received under filed tariff with any market sales of unused capacity used</td>
<td>Owner contracts for capacity sales at a negotiated price. FERC reviews for</td>
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<td>to reduce the cost of service to regulated customers.</td>
<td>reasonableness.</td>
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<td>May require conducting “open season” for transmission capacity.</td>
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<td>Merchant owner bears greatest risk of investment and cost recovery.</td>
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<td>Profits do not go to regulated utility since it does not provide financing nor do</td>
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<td>its customers provide direct cost recovery.</td>
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<td>Sale or transfer of assets may require FERC approval.</td>
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**Note:** Both types of projects are regulated for planning and siting of transmission lines.
Current Events

• Over 20 GW is currently for sale
• Liberty Plant (Pa) could go for $450 Million
• TXU might be spending $12 billion for 11 new coal plants – or maybe not
• LS Power won the Mirant portfolio for $1.4 billion (rumored to be second highest bid)
• Calpine is in the market for $5 billion in DIP financing
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