Better Markets, Better Products, Better Prices

Improving Real Time Price Signals in the New England Power Market

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New Challenges Require Enhancements to New England’s Real Time Price Signals

• New England faces significant reliability, investment, and resource performance challenges over the coming decade
  – Volatile natural gas prices
  – Increased penetration of renewable resources
  – Need for new capacity with elimination of historical excess

• ISO-NE is addressing these challenges through changes to its capacity market and real time (RT) energy market
  – Capacity market compensation will be tightly linked to real time performance during shortage; same incentives as high shortage pricing
    • Changes largely accepted by FERC in May 2014
  – Real time energy market enhancements will improve pricing
    • Ongoing discussions with stakeholders

• Expected benefits: Cost-effective solutions to region’s investment requirements; improved system reliability; more flexible resources; and a simpler, resource-neutral capacity market design
A Number of Pricing Challenges

• Think of ISO addressing two (mostly) separate problems:

• Pricing during periods of shortage (energy and/or reserves)
  – Approved capacity market Pay for Performance and RCPF (reserve scarcity pricing) changes

• Pricing during non-shortage conditions
  – How to reflect fixed (start up and no-load) costs?
  – How to reflect costs of inflexible units (high minimum output levels, minimum run times, ramp rates)?
  – On-going energy price enhancement efforts
FCM PAY-FOR-PERFORMANCE DESIGN

Cost-Effective Solutions for Resource Performance and Investment
A Simple, Conceptual Approach

- **Theory**: In tight conditions, price rises to the value consumers place on reliable service. *Could be very high*

- **Reality**: LMPs reflect short-run marginal costs and administrative reserve prices. *Much lower*

- **Concept**: The “missing money” that a capacity market provides *should depend on performance during scarcity conditions*
Sound Principles for Capacity Market Reforms

1. Reward outputs (power delivered), not specify inputs
   – Let suppliers identify least-cost solutions, bearing risks and rewards

2. Re-define performance measures for capacity resources
   – Delivery of energy and reserves during (reserve) scarcity conditions
   – Not peak period ‘availability,’ or EFOR-based measures

3. Better align resources’ financial incentives with the value of reliable service during tight system conditions
   – Mimic the performance incentives of an efficient energy market, with the reduced volatility that a forward market provides
Pay-for-Performance: Four Major Elements

- **Capacity Obligations: A Standard Incentive Contract**
  - Base payment set in forward auction, and a performance payment

- **Performance Payment:**
  - Delivery of energy & reserves during (reserve) shortage conditions
  - May be positive or negative (on top of base payment)
  - Not based on “availability,” or EFOR-type measures

- **Resource Neutral, No Exemptions**
  - **All** resources have same base and performance payment rate

- **Who pays what?**
  - **Loads** pay the base payment set by the forward clearing price
  - **Performance payments** are transfers among suppliers
Design Insights: The Product Definition

• Current FCM capacity ‘product definition’ is... *hard to define*
  – Common view: Payment (subsidy) for “steel in the ground”

• PFP establishes a new, simple, economic product definition, and changes sellers’ *financial* obligations from current FCM

• With PFP, the FCM employs a standard forward contract structure. It is based on two key concepts:
  – Two-settlement principle in forward markets (i.e., like the DA market)
  – Using a scarcity pricing premium as RT incentive in scarcity conditions
ISO New England’s Reforms: Make Capacity a Proper Forward-Sold Good

**Forward-Sold Goods**
- Initial revenue on fwd sale
- Specifies a forward financial commitment (‘position’)
- 2\textsuperscript{nd} Settlement based on deviations at delivery ...
- ... at a contract rate, or at replacement (floating) price

**ISO’s Capacity Reforms**
- Auction-based fwd sale (FCA)
- *Pro-rata share* of system demand (load + reserves) during RT reserve shortages
- 2\textsuperscript{nd} Settle, for delivery (energy + reserves) delta from share
- At (high) tariff-specified rate (analogous to scarcity pricing)
Expected Benefits of Improved Capacity Design

• **Efficient resource evolution.** Strong incentives for investment in new capacity that is either:
  
  (1) Low-cost and highly reliable (nearly always operating); or
  (2) Highly flexible and highly reliable (gets online quickly and reliably)

• **Greater operational-related investments** at existing resources to improve resource performance
  
  – Esp.: Fuel arrangements and/or secondary fuel supplies

• **A more reliable power system, using market incentives**
  
  – PFP rewards suppliers who make cost-effective investments that enable them to perform during tight system conditions
Expected Operational-Related Investments

• **PFP provides strong incentives** for suppliers to improve their resources’ performance and availability:
  – Dual-fuel capability to protect against fuel shortages
  – LNG, transport arrangements yielding ‘less’ interruptible fuel supply
  – Faster unit startup capability to supply energy during deficiency hours
  – More rapid price-responsive demand, with more times available
  – Staffing improvements at many facilities
  – And so on.

• **Expectations:** Suppliers will resolve availability and ongoing performance issues in the most cost-effective ways possible
Alternative: Texas-Style Energy Pricing

• **Select suppliers:** Argue for higher RT scarcity prices alone, leaving FCM unchanged (aka, “Texas-sized RCPF” alternative)

• **Stakeholder and ISO Concerns:**
  - **Greater volatility in suppliers’ revenue** year to year
    • Would tend to *increase* financing costs for new entry
  - **Greater volatility in loads’ expenditures** over time
    • Face higher DA/RT spot prices during scarcity conditions
    • More risks for competitive retailers signing 1+ yr forward with consumers
  - **Does not fix the inherent capacity product definition problem**
  - **Market clearing problems** may require increasing offer caps above current $1,000 / MWh
    • A ‘liquidity’ game problem if DA LMP can’t converge to expected RT LMP
REAL TIME PRICING ENHANCEMENTS
Many Market Changes Expected to Improve Real Time Pricing

• Replacement Reserve constraints (currently in place)

• Hourly Offers (implementing 12/3/14)

• Increasing RCPFs (pricing during reserve shortages, 12/3/14)
  – $1,000/MWh for 30-min operating reserve (currently $500/MWh)
  – $1,500/MWh for 10-min non-spinning reserve (currently $850/MWh)

• Demand Resource Energy Market Integration (scheduled 2017)

• Real-Time Pricing Review and Enhancements (schedule TBD)
  – In the midst of series of in-depth technical sessions with stakeholders to explain how pricing works, which characteristics lead to perceived pricing problems, and explore alternatives
    • All identified changes involve trade offs
  – Initial solution focus on fast-start/peaker pricing
Principles for Evaluating Pricing Changes

- **Efficiency.** *In the context of the RT energy market, this means two things:*
  - a) RT dispatch on **offered prices will minimize actual production cost**
  - b) Assets want to produce to the cleared (dispatched) MW amount, not something else.

- **Price Transparency**
  - Defined as when "much is known by many“ about transaction price(s)
  - In this context, it is everyone knowing the price(s) others receive
  - Side payments (uplift and lost opportunity costs) are not transparent

- **Simplicity**
  - a) As few prices as possible (for each location and time)
    - Example: Pay-as-bid systems can have many different prices for the same location and time (to different sellers); uniform pricing has one price
  - b) Price formation process should have a simple logic that buyers/sellers understand (ideally)
    - No difficulties answering questions like: “How do we interpret the price?”
Electricity Market Pricing is Inherently Problematic

• Root Causes of Pricing Concerns:
  – Minimum production constraints: Economic minimum (EcoMin) values, minimum run times, minimum down times
  – Commitment-related costs: start-up costs

• Unfortunately, there is NO “perfect” pricing approach that satisfies all three principles when “lumpy” units are needed

• As a consequence, there are NO “perfect” LMPs. All pricing methods make compromises to achieve their goal

• Reviewing three pricing methods: two-tier pricing, convex hull pricing, ELMP (MISO)
ISO New England Fast-Start Pricing: Summary

- **Fast Start fixed costs**
  - Incorporates fast start, no-load, and start-up costs during start-up
  - Does not incorporate fast start, no-load, and start-up costs when online

- **Lumpiness treatment in pricing**
  - Relax EcoMin to 0, amortize fast start, start-up and no-load costs during start-up
  - Respect offered EcoMin value when online

- **Side payments and transparency**
  - Relatively easy to understand and implement
  - Fast-start units may still require make-whole payments to recover bid-in cost
Possible Enhancements to Fast-Start Pricing

• Incorporate start-up and no-load during dispatch?
• Relax economic minimum for pricing purposes while online?
• Other?
Summary

• Accurate electricity pricing is critical to ensuring both long-term investment and incenting an appropriate resource mix

• ISO-NE is seeking to improve price signals
  – Recent capacity market changes directly link compensation to energy market performance
  – Evaluating improvements to energy-market pricing
    • A number of changes are likely to be needed

• All options involve trade-offs between efficiency, transparency, and simplicity