

Market Design 2002 Comments

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Outline of Talk

- Local Market Power Problem
 - What is it? Why does it exist?
 - Goal of local market power mitigation
- Physical versus Financial Markets
 - Fundamentally financial nature of energy markets
 - Costs and benefits of financial transactions
- Capacity Adequacy and Curtailment
 - Curtailment priority and generation outages

Origins of Local Market Power

- US transmission network was built for former vertically integrated monopoly regime
 - Built to take advantage of fact that both transmission (distant generation) and constructing local generation can each be used to meet sustained local energy need
 - Economies of scope between transmission and generation
 - Integrated resource planning by vertically integrated monopolist considers both local generation and transmission to find least-cost solution to serve sustained load growth
 - Transmission capacity across control areas of vertically integrated monopolists build for engineering reliability
 - Sufficient transmission capacity so imports could be used to manage large temporary outages within control area
 - Very few instances where transmission network was built to facilitate significant across-control area electricity trading

Origins of Local Market Power

- Wholesale market has independent system operator (ISO) to allocate transmission network capacity
 - Owner of local generation financially independent of ISO
 - In both short-term and long-term, ISO cannot take advantage of economies to scope between transmission and generation that current transmission network was designed to utilize
 - Economies to scope exist if joint operation of transmission network and local generation yields lower annual cost of supplying local energy
 - Local generators have strong incentive to cause transmission constraints into their local area under ISO regime
 - Raise local prices for energy (either by withholding capacity or bidding high prices) to cause congestion under ISO regime
 - State public utilities commissions (PUCs) sold off generation assets of former vertically integrated monopolists in bundles of units located in small geographic areas
 - This exacerbated extent of local market power problems

Transmission Network to Support Competitive Market

- Economically reliable transmission network requires greater capacity than a network that is reliable from perspective of vertically integrated monopolist
 - Economic reliability--All locations in transmission network face significant competition from distant generation a large fraction of the time
- Requires a dramatically different paradigm for assessing transmission upgrades
 - Suppose “over-invest” (relative to purely engineering reliability concerns of former vertically integrated regime) in transmission capacity, which increases transmission charge by \$1/MWh
 - If increased capacity of transmission network results in more competitive wholesale market because more distant generation unit owners can compete to supply at each location in network so that average prices fall by \$2/MWh, consumers benefit from upgrade
 - On the whole, consumers are ahead by $\$1/\text{MWh} = \$2/\text{MWh} - \$1/\text{MWh}$

Local Market Power Problem

- Congestion management or locational-pricing scheme does not solve locational market power problem
 - Given a geographic distribution of demand, configuration of transmission network, and production decisions of other units in this network, a firm is local monopolist for certain quantity of energy regardless of congestion management/locational pricing scheme
 - No limit to what firm can charge for amount of energy over which it is a local monopolist regardless of locational pricing scheme
- ISO must have the ability to mitigate bids of firms with local market power
- FERC gave Eastern ISO’s ability to mitigate bids of any market participant the ISO perceives as having local market power

July 17 FERC-Proposed Local Market Power Mitigation Solution in California

- July 17 FERC Order proposes to use AMP protocols to mitigate local market power
- AMP procedure is extremely generous local market power mitigation scheme
 - Large change in bids possible before mitigation takes place
 - 200% change in bids or \$50/MWh above reference price of unit
 - No mitigation of bids below \$91.87 price level
- By definition, local monopolist needed regardless of price bid
 - Out of merit generator will be paid as-bid, regardless of bid
- No clear rationale for allowing firm to earn vastly in excess of cost-of-service for provision of the regulated product?
 - Large potential transfers from consumers to producers with no accompanying market efficiency benefits

July 17 FERC-Proposed Local Market Power Mitigation Solution in California

- Because generation unit owner possesses local market power, firm will exercise it to the greatest extent possible
 - AMP protocols cannot prevent this exercise of market power
- Impossible to determine ex ante all possible system conditions when a given generator will possess local market power
 - Whether a portfolio generator has local market power can depend on how it schedules or bids all of the units it owns and how its competitors schedule or bid their units
- To eliminate incentives for portfolio generators to bid or schedule to create local market power, must make it unprofitable to schedule or bid to create these system conditions
 - Proposed AMP procedure still provides firms significant profit opportunities from exercising local market power

Proposed Local Market Power Mitigation Solution for California

- If ISO determines firm possesses local market power, i.e., energy or capacity from a firm's units are required regardless of their bid price
 - Mitigate the bid of these units to
 - Reference price
 - If mitigated bid is below market clearing price, then can pay unit the market-clearing price, otherwise pay mitigated bid
 - Don't implement AMP conduct test or impact test
 - Because units have local market power unit can bid up to these levels and know they will be accepted
- Can devise transparent procedure for determining extent to which each firm is a local monopolist given bids or schedules of all other market participants, demand conditions, and physical configuration of transmission network
 - Pivotal supplier concept in transmission network is one such procedure

Physical and Financial Energy Markets

- Wholesale electricity markets are fundamentally financial
 - Electrons cannot be delivered from point A to point B in meshed transmission network
 - System balance must be maintained at every location in the transmission network
- In all markets, even perfectly competitive markets, firms continually arbitrage price differences across time, location and like products
 - Arbitrage is like gravity--You cannot outlaw it, but you can make it work for you
- Allow arbitrage in a manner that does not degrade system reliability
 - Eastern ISOs have implemented virtual bidding (explicitly financial bids)
 - Generator notifies ISO that it would like to buy virtual good in one area and sell virtual good it in another area

Physical and Financial Energy Markets

- Under virtual bidding generation unit owners and load would identify virtual and physical schedules and bids to ISO
 - A virtual commitment in the day-ahead market implies a corresponding commitment in the real-time market (or other subsequent market) against which initial virtual commitment is cleared
- Example of across-market arbitrage using virtual transactions
 - Suppose market participant believes real-time price will be greater than day-ahead price for energy
 - Participant should buy day-ahead energy and sell it back in real-time
 - Suppose participant buys a virtual 50 MWh in day-ahead market, this implies that firm must sell this 50 MWh in real-time market
 - Note that if firm buys too many MWh in day-ahead market this will drive price up in day-ahead market and drive down price in real-time market, thereby causes prices in two markets to be equal
 - In this way, virtual trading causes prices in both market to equal one another so that generation owners and loads have no incentive to shift physical resource commitments across day-ahead and real-time markets

Physical versus Financial Markets

- Attempting to prohibit financial transactions may raise energy prices unnecessarily
 - Close off opportunities for generators and load-serving entities to undertake mutually beneficial trades to manage spot price risk
 - Generators must self-manage risk as opposed to trade among all market participants, which can raise cost to generators of managing this risk
- Eliminates incentives for firms to misrepresent physical positions and therefore harm system reliability
 - Impossible to verify if firm truly “misrepresented physical capability”
 - Generator “sick-day” problem and load “intended curtailment” problem
- Unrealistically large financial transactions can impact system reliability and market efficiency--i.e., Silverpeak incident
 - ISO must have ability to penalize persistent behavior that degrades system reliability or market efficiency--MSC Opinion on Oversight and Investigation, July 2002

Capacity Adequacy and Outage Risk

- Mechanism for allocating curtailments to load with inadequate capacity commitments may have unintended consequences unless certain changes are made
 - Accounting of capacity that qualifies for forward (month-ahead or year-ahead) capacity obligation must account for recent forced outage and market participation rates
 - Otherwise load-serving entities (LSE) may have an incentive to line-up inefficient and unreliable resources to meeting forward capacity obligations
- If capacity adequacy mechanism does not account for recent forced outage and market participation rates of units
 - Curtailments should be assigned to load-serving entity based on actual outages and market participation of capacity allocated to them
 - LSE that uses unreliable capacity bears full cost of this decision
 - Avoids need for ISO or other independent entity undertaking contentious process of verifying quality of capacity providing month-ahead or year-ahead capacity obligations for each LSE

Capacity Adequacy and Outage Risk

- Unit-level approach to capacity adequacy may raise wholesale energy prices
 - Prevents generators from managing outage risk on portfolio basis
 - Load serving entity arranges for a certain amount of capacity scheduled or bid into ISOs market at given location, but not a specific unit
 - Portfolio approach to capacity adequacy should be allowed to the extent that all units in portfolio can meet similar locational energy
 - ISO must be involved in process of determining whether a unit can meet a locational energy or capacity need