Implementing Reserve Demand Curves

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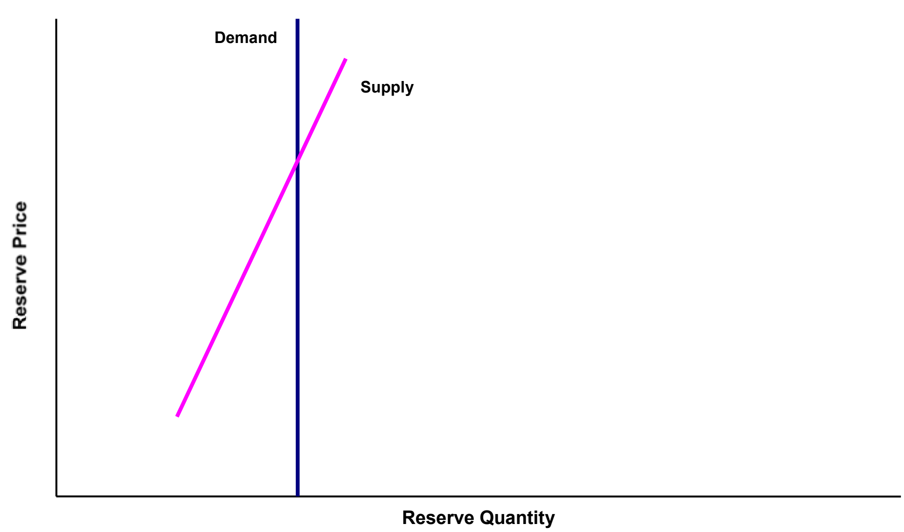
AGENDA

The agenda for today's presentation is:

- Why a demand curve for reserves?
- The impact of demand curves in shortages and on the exercise of market power.
- Counting exports as reserves in the New York market.
- Achieving consistency of Day-Ahead and Real-Time reserve schedules and prices.
- Treatment of latent reserves particularly in capacity deficient system conditions

Fixed Demand for Spinning Reserves

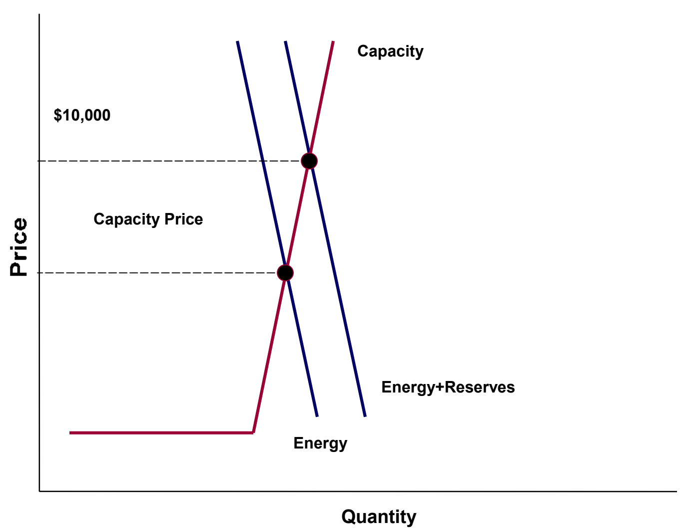


WHY A DEMAND CURVE? Fixed Demand

One approach to scheduling ancillary services is to establish targets based on the configuration and characteristics of the transmission grid and generators and to pay whatever is required to schedule that quantity of reserves and regulation.

Such an approach in effect defines a series of vertical demand curves for the various ancillary services.

This is system currently in place in NEPOOL and California.



WHY A DEMAND CURVE? Fixed Demand

Under this approach, even very small reserve shortages can drive reserve prices to very high levels.

- Even in a co-optimized market for energy and reserves, such a fixed demand curve for reserves could require the ISO to purchase energy at unlimited prices in order to maintain targeted reserve levels.
- The fixed demand curve approach is, therefore, likely to produce economically irrational outcomes under high load conditions, even in a highly competitive market.

WHY A DEMAND CURVE? Fixed Demand

The potential for these irrational reserve price levels in shortage situations led to the imposition of price or bid caps for ancillary services in most markets during the summer of 2000.

- California $250
- NEPOOL $1000
- NYISO $1000

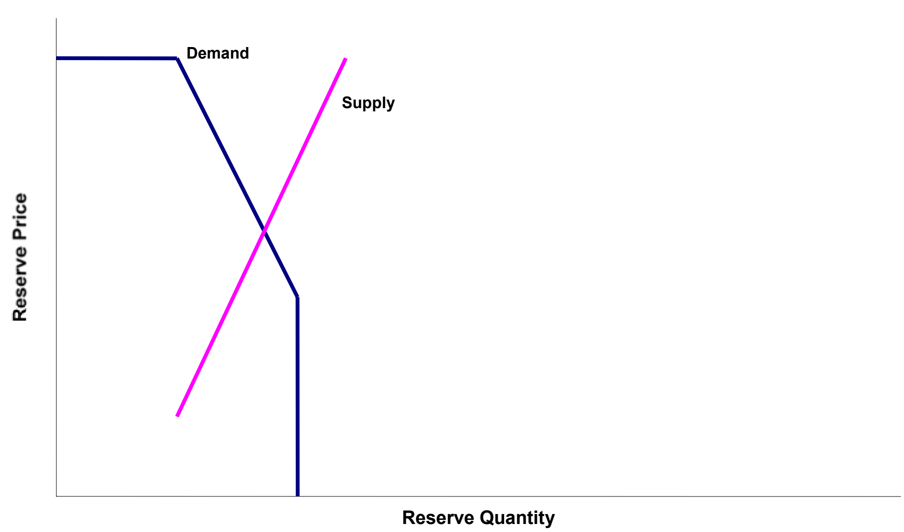
PJM does not directly cap reserve prices but caps what it will pay for the minimum load block of generation providing reserves.

WHY A DEMAND CURVE? Fixed Demand

The vertical demand curve model leads to irrational outcomes because it is inconsistent with the actual operation of the grid.

- The vertical demand curve for ancillary services implies that system operators would shed load whenever reserves fell below targets.
- In practice, system operators do not shed load to maintain desired reserve targets. This reality implies that the underlying demand curve for reserve is not vertical, and this should be recognized in the pricing system.

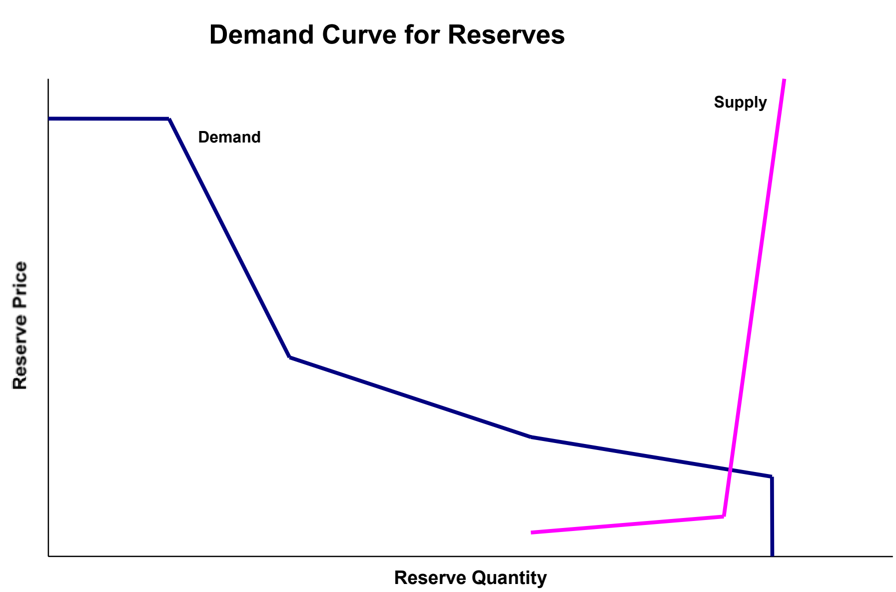
Demand Curve for Reserves



WHY A DEMAND CURVE? Fixed Demand

The demand curve approach to ancillary services pricing would replace a fixed vertical demand for reserves with a demand curve in which the quantity of reserves scheduled would depend both on transmission grid and generator characteristics and as-bid reserve costs.

The demand curve would be defined to be consistent with the ISO's actual operating policies. If the ISO would not shed load to maintain a given level of spinning reserves, then the ISO would not be willing to pay more than the value of lost load to maintain that level of reserves.

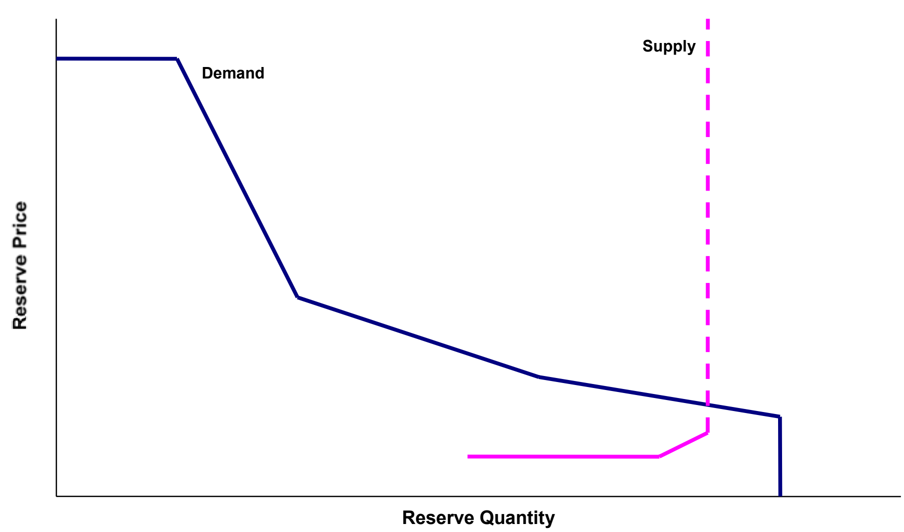


PRICING IN SHORTAGES — Rational Prices

With the ISO's reserve scheduling governed by such a demand curve, the scheduling of incremental reserves to satisfy small reserve deficits (relative to reserve targets) would not result in irrational market clearing prices.

- Reserves that cost more to provide than their value to the market would not be scheduled.
- The price of reserves in shortage situations would reflect their value.

Demand Curve for Reserves



Under this approach, the price of reserves would be defined even if not enough reserves were available at any price to meet the ISO's reserve target.

- In shortage situations, the price of reserves would be set by the demand curve.
- Because demand curves for ancillary services cause ancillary service markets to clear, they will sometimes result in higher prices than would prevail under other pricing systems.
- The demand curve limits the level of price increases caused by market power to price/quantity pairs defined by the demand curve and creates a risk to the bidder that their bid will be to the right of the demand curve and thus not be designated as reserves or paid the reserve clearing price.

"The Commission finds merit in the ISO's proposal to consider price in determining the amount of reserves to procure. In principle, the ISO's proposal could help contain ancillary service prices during capacity tight periods and ensure that ancillary service prices do not exceed their value. Currently, the ISO purchased the required amount of ancillary services regardless of the price. Thus, suppliers' may have the ability to set prices arbitrarily high -- perhaps above the value of ancillary services to loads -- during periods of capacity deficiency. To address this problem, the Commission has approved requests to apply price of bid caps.[30]

However, it is possible that the ISO may encounter problems in implementing its demand curve proposal. For example, it may be difficult for the ISO to estimate accurately the value of ancillary services to load. Also, the amount of ancillary services purchased under the ISO's proposal may fall short of the NERC requirements. Accordingly, we will defer ruling on this issue until we receive a detailed and complete proposal from the ISO. The detailed proposal should describe, for example, the exact derivation of the demand curves and how the ISO will meet the NERC requirements in real time in the event that the demand curves result in procuring fewer reserves in the day-ahead market." FERC 6/28/00

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30 See, e.g., ISO New England, Inc., 90 FERC 61,170 (2000); and New England Power Pool, 88 FERC 61,315 (1999)

HOW WILL IT WORK? — Implementation

There are, however, three principal difficulties in moving to a reserve market based on demand curves.

- How should the demand curve for reserves be established?
- Does compliance with NERC rules require control area operators to pay any price to maintain spinning, 10 minute and 30 minute reserves in real-time?
- If so, will FERC require that ISOs adhere to NERC rules, while permitting other control area operators to ignore them when they are too expensive.

EXPORTS AS RESERVES — Rationale

The rationale behind counting exports as reserves in the hour-ahead and potentially day-ahead market scheduling software stems from the ability of the system controllers to count curtailable exports as 30-minute reserves in real time.

The system operators can avoid going into emergency procedures if the internal physical shortage of 30-minute reserves can be covered by curtailable exports.

If the operators are allowed to operate the system in this fashion then perhaps the scheduling software should consider these exports as reserves when it is purchasing expensive imports or committing expensive internal units in an attempt to create reserves.

COUNTING EXPORTS AS RESERVES — Issues

If exports can be counted as reserves in real time and there is no cost to doing this, then should the scheduling software be able to count all exports as reserves at a cost of $0?

- Scheduling software would always count the exports first
- Exports would never be capacity backed and this would most likely affect scheduling relationship and practices between neighboring control areas.
- Energy traders trading out of New York would not like to see this as a regular practice.
- Operations might be allowed to count exports as reserves but are likely not comfortable relying on them 8760 hours a year. However, they do want access to exports as reserves to avoid emergency operating procedures.

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COUNTING EXPORTS AS RESERVES — Issues

It is necessary to define a cost of scheduling the reserves that ensures exports as reserves are only counted in capacity tight situations.

The exports as reserves cost curve (which is yet to be finally confirmed by market participant vote) allows:

- 200 MW of exports to be counted at $50/MW
- a further 200 MW of exports at $100/MW
- a further 200 MW of exports at $200/MW

These prices were derived by analyzing the 30-minute reserve shadow prices determined by New York hour-ahead market model.

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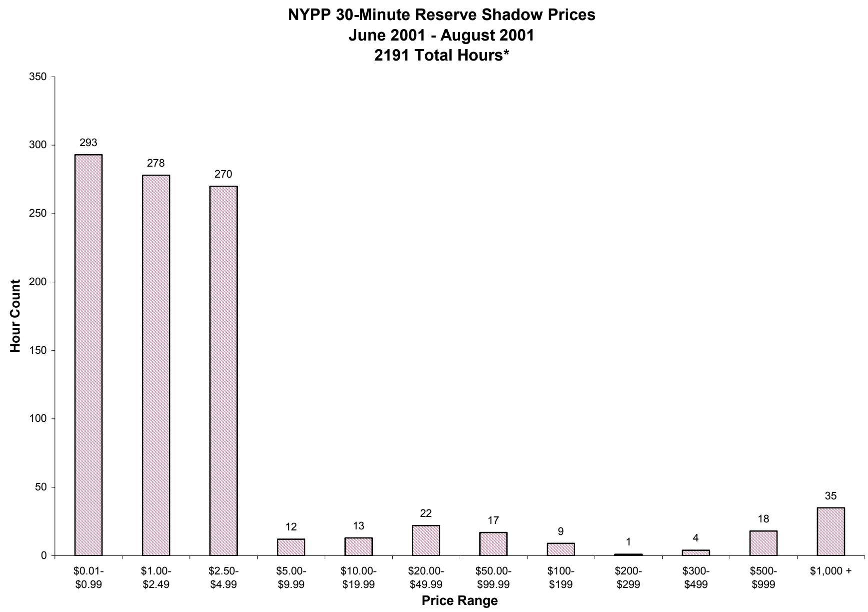

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EXPORTS AS RESERVES vs DEMAND CURVE

The key difference between a demand curve for reserves and the proposal to count exports as reserves is that under a demand curve approach the system can actually be short of reserves.

Under the exports as reserves approach if there are no exports that can be scheduled as reserves, reserves will be purchased at any price in order to meet the system reserve requirements.

Under a demand curve approach the reserve requirements will not be met whenever the cost of purchasing the reserves exceeds the perceived value of those reserves as defined by the demand curve.

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EXPORTS AS RESERVES

Price Consistency

The ability to count exports as reserves in New York's hour-ahead market will likely improve price convergence between the hour-ahead and real-time markets.

Currently, 30 minute spinning reserves are not held back in the real time energy dispatch and can be dispatched to provide energy even when there is a shortage of 30 minute reserves. In the hour-ahead scheduling process all the 30 minute reserves are held back while other internal units or imports are purchased to meet energy plus the full reserve requirement.

Allowing exports to count as reserves will allow the commitment decisions in the hour-ahead market to reflect the actual operation of the 30 minute reserves in real time. i.e. 30 minute reserves will not be held back in the hour-ahead market if the cost of those reserves exceeds the exports as reserves cost curve.

LATENT RESERVES

Price Consistency

If a demand curve or exports as reserves approach is to be taken in committing and scheduling energy and reserves it is important that the scheduling software take account of all latent reserves.

Latent reserves are the spare ramp and capacity available on already committed units that can respond to a signal to increase generation.

It does not make sense to pay a high price for reserves or replacement energy if there are reserves available, but not bid and therefore not counted on the system.

A market change to count all latent 30-minute reserves at $0 bids will be implemented in the New York market concurrent with the market change allowing exports to be counted as reserves.

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