Capacity Market Reforms: What are the Problems We Are Trying to Address?

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Topics

- Capacity Resource Performance
- Capacity Markets and Energy Market Incentives
- Energy Market Problems and Capacity Market Solutions
- Underbidding in the Day-ahead Market

Capacity Resource Performance

Maintaining reliability under peak summer or winter conditions with a capacity market design requires that all of the capacity market resources able to operate be available for commitment in the day-ahead market on these peak days and that resources scheduled in the day ahead market perform in real-time.

- These needs were initially addressed by must offer requirements for capacity resources and EFORd based performance incentives.
- UCAP/EFORd based performance incentives will work reasonably well if generation outages are independently distributed random events that are uncorrelated with load and uncorrelated with the outage of other capacity resources.

Capacity Resource Performance

Hence, EFORd based performance incentives can work reasonably well for generating resources that burn a big pile of coal but they do not work well when the resource mix evolves to include a material amount of other kinds of resources.

- The outage or non-availability of wind generation resources is correlated with load and typically correlated across wind resources.
- The reduced or zero output of solar generating resources is also correlated across solar resources.
- The outage or non-availability of gas fired generation can also be correlated with high winter load and across gas fired generating resources.
- The outage rate of many types of generating capacity tends to be correlated with high winter load, i.e. with really cold weather.

Capacity Resource Performance

When these kinds of correlations exist for a material proportion of the capacity in the market, EFORd type measures will not reflect the amount of capacity that the system operator can expect to be available during peak load conditions.

- It then becomes important both to take account of these correlations in capacity market determinations of the amount of capacity needed to reliably meet peak load, and to provide capacity market resources with incentives to incur costs that would improve their availability during peak load conditions.
- PJM and ISO New England have been working over the past 8-10 years to modify their capacity market designs to provide stronger incentives for capacity market resource to be available during peak conditions.
- The initial designs have proved to not work very well in this respect so we are involved in another round of design changes to address these issues.

Capacity and Energy Market Incentives

Beyond this peak day capacity market performance issue there are other issues relating to the relative roles of capacity and energy markets:

- Should we rely on capacity markets or energy markets to incent the availability, scheduling and performance of flexible resources needed to balance variations in net load, particularly variations in intermittent resource output?
- Should we rely on capacity market incentives to compensate for energy market design features that raise the costs for some types of resources being available to meet load during peak load conditions?
- Should we rely on capacity markets or energy markets to provide reserves in excess of reliability targets that can be used to enable the system to recover more quickly from shocks?

Capacity and Energy Market Incentives

The California ISO is the furthest down the road towards meeting load with high levels of intermittent resources and evaluating the need for flexible capacity.

- One part of the California ISO approach to procurement of flexible capacity has been to work with the California Public Utilities Commission on establishing a “flexible capacity” category as a resource adequacy target.[1]
- However, one view of the lessons coming out of that discussion is that relying on capacity market incentives to incent the supply and performance of flexible capacity would be extremely complex and likely doomed to fail.
- The California ISO has concluded that it is critical to fix problems in the energy market so that the energy market provides efficient incentives for the supply and operation of flexible resources.[2]

- **1. see http://www.caiso.com/informed/Pages/StakeholderProcesses/FlexibleResourceAdequacyCriteria-MustOfferObligations.aspx and http://www.caiso.com/informed/Pages/StakeholderProcesses/FlexibleCapacityRequirements.aspx**
- **2. seehttp://www.caiso.com/Documents/FinalOpinion-FlexibleResourceAdequacyCriteriaMustOfferObligation.pdf and http://www.caiso.com/informed/Pages/StakeholderProcesses/CapacityProcurementMechanismReplacement.aspx**

Capacity and Energy Market Incentives

Some of the complications in using capacity markets to incent the supply of flexible resources are:

- The ISO doesn't need all capacity resources to have a given set of flexibility attributes, it just needs enough of them to have appropriate flexibility attributes;
- There are many different combinations of different types of resources with somewhat different flexibility attributes that could be used to balance load and generation;
- Different types of capacity will have favorable attributes in providing flexibility in different time frames and operating situations;
- The value of a particular flexible resource will depend on many attributes of the source and its performance in many different times frames and operating conditions.

Energy Market Problems

Some of the core energy market design features that have contributed to reliability problems on peak days include:

- Inability to vary incremental energy offer prices by hour or to change them over the operating day;
- Inability to vary market based minimum load and start up offers from day-to-day and cost based offers that are based on out of date gas prices;
- Offer price mitigation for Mondays or Tuesdays based on the weekend gas package index price;
- Allocation of uplift deviation charges to virtual demand bids and underbidding in the day-ahead market.

Energy Market Problems

More energy market design features that contribute to reliability problems on peak days:

- No offer price or compensation for spinning reserves in the day-ahead market.
- Offer price mitigation of energy or fuel limited resources with significant opportunity costs.

Energy Market Problems

One can attempt to address the reliability impacts of these energy market design features through stronger capacity market performance incentives.

- The capacity market approach can attempt to address the reliability impacts, but the excess energy market costs due to these inefficient design features would then be recovered in capacity market prices.
- Not only would consumers bear the costs imposed on these resources by the inefficient energy market rules, but this approach would inflate the capacity market returns to other resources.

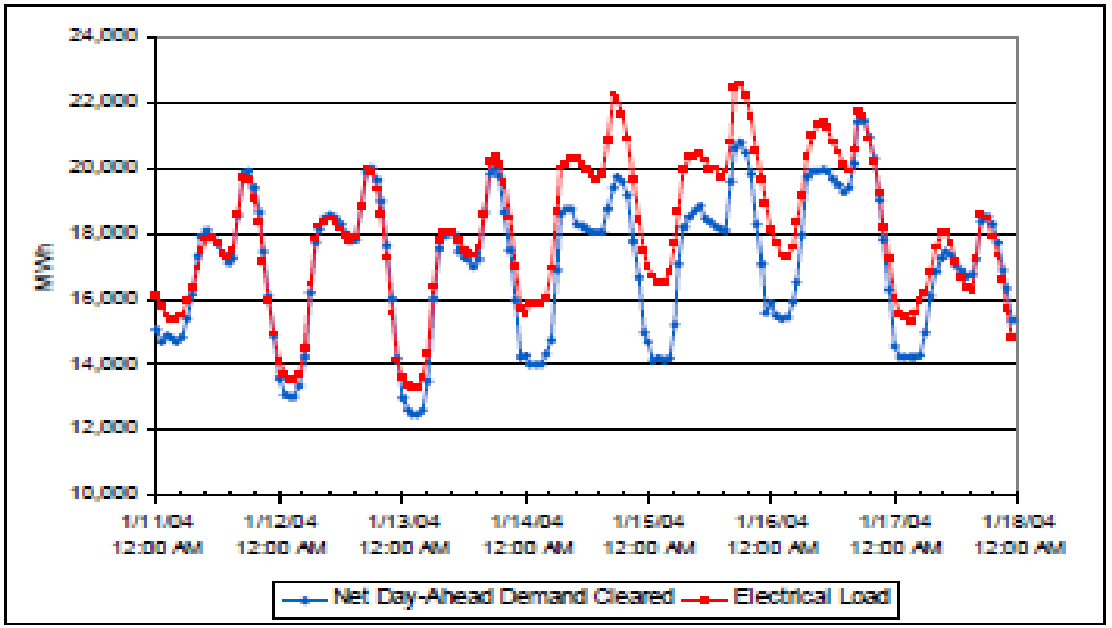
Energy Market Problems

Market rules that presume winter load will be met by generators burning a big pile of coal are not going to maintain reliability at least cost in the future.

- As PJM, New York and New England shift to low C02 emission resources with gas fired generation used for balancing, the reliability problems and cost impacts of these market rules will get worse, not better.
- As we head down the low carbon road, ISOs and their stakeholders need to carefully consider the relative merits of energy and capacity markets in incenting the development of the appropriate resource mix and performance needed to meet the low carbon goals while maintaining reliability.

Underbidding in DAM

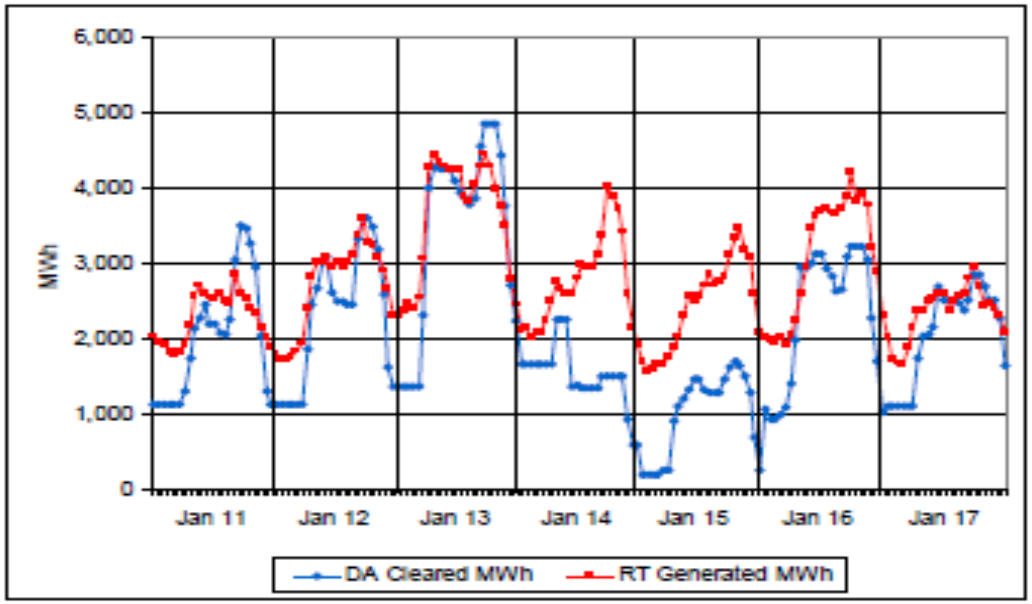
A good example of one of these energy market problems is underbidding by load serving entities on cold winter days that causes too little generation to clear in the day-ahead market.



Source: ISO New England Inc, Market Monitoring Department, "Final Report on Electricity Supply Conditions in New England During the January 14-16, 2004 'Cold Snap', October 12, 2004 Figure 21, p115.

Underbidding in DAM

Underbidding in the day-ahead market on cold winter days means too little gas fired generation gets day-ahead schedules, hence too little gas is bought and scheduled on pipelines relative to the amount needed in real-time.

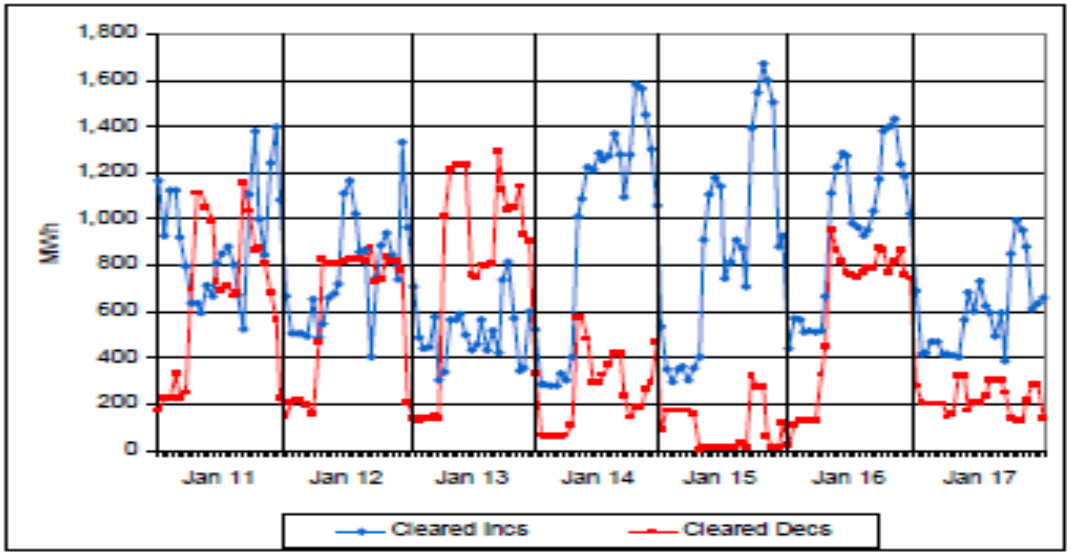


Day-Ahead Gas-Only MWh Cleared in the Day-Ahead market and Actual Gas-Only MWh Generated in the Real-Time Market, January 11-17, 2004

Source ISO New England Inc, Market Monitoring Department, "Final Report on Electricity Supply Conditions in New England During the January 14-16, 2004 'Cold Snap', October 12, 2004 Figure 24, p121.

Underbidding in DAM

Absent virtual demand bidding, the supply situation would have been even worse in 2004. Assigning uplift charges to virtual demand bids may seem like a clever way to shift costs but it magnifies the impact of underbidding in the day-ahead market and undermines reliability.



Cleared Increment Offers and Decrement Bids, January 11-17, 2004

Source ISO New England Inc, Market Monitoring Department, "Final Report on Electricity Supply Conditions in New England During the January 14-16, 2004 'Cold Snap', October 12, 2004 Figure 25, p122.

Underbidding in DAM

The problem of underbidding in the ISO New England day-ahead market on cold winter days did not end in 2014.'

COO report February 2011:

January 15 "Day ahead market clearted 88.9% of the forecast peak for the following day"

January 23 "Day ahead market cleared 89% of the forecast peak for the following day"

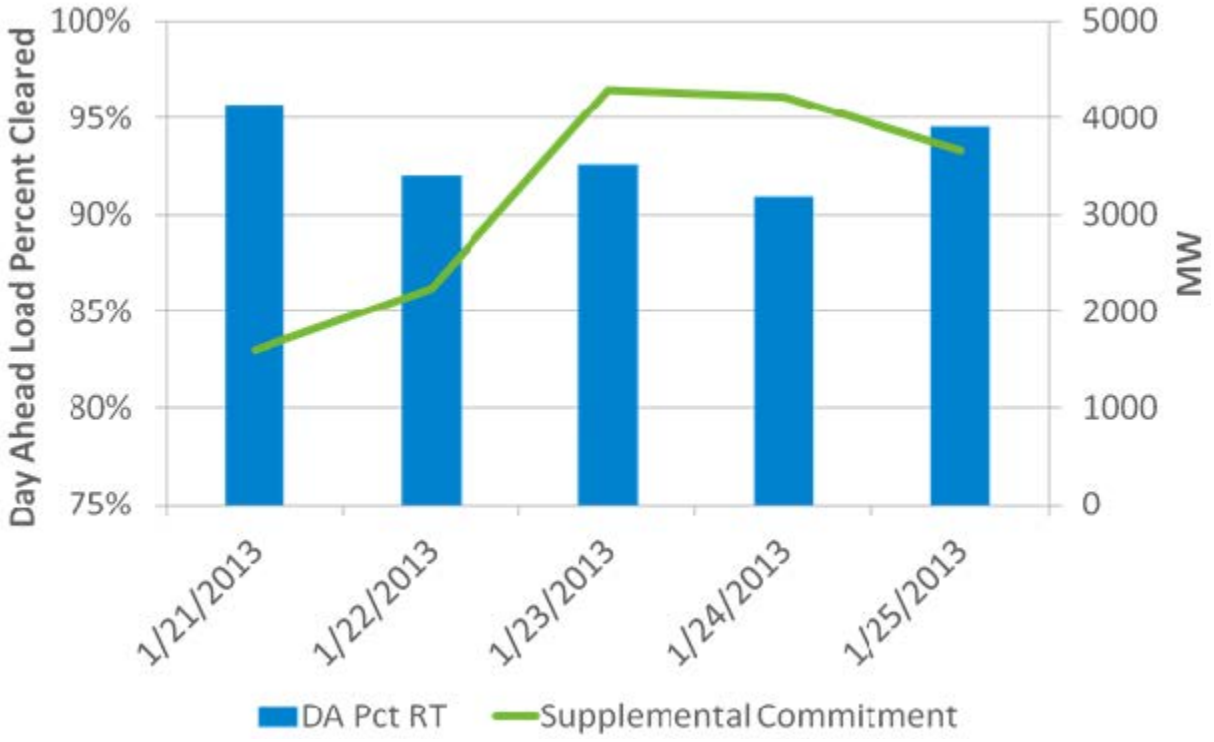
January 24 "Day ahead market cleared 88.1% of the forecast peak for the following day"

January 25 "Day ahead market cleared 83.9% of the forecast peak for the following day"

NEPOOL Participants Committee Report, February 2011 pp. 6-8.

Underbidding in DAM

Under bidding in ISO New England day-ahead markets on cold winter days continued into the winter of 2012-2013.



Source: ISO New England, NEPOOL Participants Committee Report, February 2013 p. 14

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