

## **Capacity Markets - General Background Information**

### **Introduction**

This paper is intended to provide general background and educational information to assist with the discussion of capacity markets and their applicability to the California ISO. This brief paper provides background information about capacity markets, including a high level review of the design features in the PJM, New England (ISO-NE), and New York ISOs (NYISO).

### **Resource Adequacy in California**

Over the last few years, California has designed and implemented a new Resource Adequacy (RA) program. An important next step in the RA evolution is to determine whether a capacity market is a necessary complement to the phased-in RA plan. The second phase of the RA program, which began its implementation in the summer of 2006, includes the potential institution of a capacity market.

The California Public Utilities Commission (CPUC) and stakeholders have put forth considerable effort with regard to capacity market design features and their applicability to the California energy arena. Following is a summary of some of the key RA milestones on this topic:

- 2005 Assigned Commissioner's Ruling (ACR) - Beginning back In February 2005, an ACR was issued by the CPUC instructing CPUC staff to evaluate certain existing capacity markets and how the development of an organized capacity market in California might complement and aid in the effectiveness of the RA program.
- Capacity Market Whitepaper - As part of the CPUC Order Instituting Rulemaking to Promote Policy and Program Coordination and Integration in Electric Utility Resource Planning, the CPUC issued a Capacity Markets White Paper in August 2005.

Stakeholders submitted comprehensive proposals and comments. At that time, the CAISO filed comments that outlined the various market design options, including an energy only market, as well as the potential benefits of a centralized capacity market.

- 2007, RA Track 2 - In December 2006, the CPUC issued a scoping memorandum that stated that the Capacity Markets are a Track 2 item, and a decision on Track 2 items will be made in January 2008. The CPUC Track 2 RA proposals are currently due to the CPUC in late March 2007, with workshops planned for August 2007.

In parallel to the CPUC's Track 2 RA proceeding, the CAISO plans to conduct an open stakeholder process to evaluate, research, and ultimately develop a conceptual capacity market design. This effort will be carefully coordinated with the CPUC and other regulatory entities to ensure transparent and explicit definitions of the responsibilities between organizations.

## **Stakeholder Efforts**

Collaborative stakeholder working groups have formed and have begun developing capacity market design proposals. The Capacity Market Advocate Working Group (CMAG) is comprised primarily of large generation companies, and two of the large California Investor Owned Utilities (IOUs). The CMAG's principles draw on centralized capacity market models that have been implemented or are proposed by the Eastern ISOs. This group advocates that the CAISO implement and operate a centralized capacity market.

A separate stakeholder team, the Bilateral Working Group, comprised primarily of end users and financial institutions, is also cooperating to develop an alternative proposal to a centralized capacity market. Both of these groups are open, and welcome participation.

On March 6, 2007, the CAISO is holding a Market Issue Forum on the topic of Capacity Markets with representation from various segments of the industry including energy service providers (ESPs), financial institutions, the generator community, energy marketers, municipalities, and load serving entities (LSEs). The forum will also include participation by the Market Surveillance Committee, and will involve speakers familiar with capacity market designs.

The CAISO will announce its plan for conducting an open stakeholder process in 2007 to develop a conceptual design, in coordination with the CPUC RA Track 2 proceeding.

## **What is a Capacity Market, and Why?**

While California has made great strides in achieving its resource adequacy goals, there remains concern that there will not be enough capacity to meet long term resource adequacy requirements. The complex nature of the current structure does not create the regulatory certainty needed for future investment.

Although there are a variety of mechanisms for procurement of capacity in California, they fall under various regulatory jurisdictions, thus resulting in a lack of both transparency and efficiency. For example:

- On a short term basis (up to a year), the CAISO secures the generation needed to serve load through Reliability Must Run (RMR) contracts, the Reliability Capacity Services Tariff (RCST), and the Must Offer Obligation (MOO) provisions of the CAISO tariff;
- Local RA and System RA are satisfied on an annual and monthly basis, and are regulated in accordance with SB 380 and the CPUC's RA rules; and,
- Longer-term procurement also is subjected to the rules of the Utility Long Term Procurement Planning ("LTPP"), in compliance with the legislative requirements of AB 57, and is managed by the CPUC.

The combination of these short and long term procurement mechanisms have not yet provided the certainty investors are demanding, and have contributed to a lack of price and procurement transparency. The capacity market, therefore, can be a way to solve many of the problems that exist in the California energy arena today, and could provide:

- An equitable capacity obligation for load serving entities in the CAISO;
- Price signals and regulatory certainty that encourages investment;
- Sufficient tools for the CAISO to operate the grid reliably; and,
- Prevention of capacity subsidies due to customer migration.

A capacity market, bilateral or organized, allows participants to purchase or sell capacity products that meet reliability requirements. In an organized market, participants have a venue to easily purchase capacity when they are short, or sell capacity when they have an excess amount. There are primarily three distinct organized capacity market models that have been developed in the US:

- NY ISO's Demand Curve;
- ISO-NE's Forward Capacity Market (FCM), and,
- PJM's Reliability Pricing Model (RPM).

A brief review of the design features of these organized capacity markets is provided below.

## **Design Features in PJM, ISO-NE and NYISOs**

The above-mentioned capacity markets are based upon a hybrid approach that includes both bilateral markets and a voluntary centralized exchange of capacity. The volume of bilateral trading exceeds the amount exchanged in the organized capacity markets. The Eastern ISOs' markets offer capacity in various time frames – multi-month, monthly, weekly, or daily. They also have other design features that differentiate them such as: pricing and backstop mechanisms, local requirements, the ability to self supply, seasonal and peak requirements, import treatment, capacity revenue adjustments and/or penalties, performance incentives, and buyer obligations.

Although the Eastern ISOs have different rules for their capacity markets, there is still much in common. Below are some, but not all, of the attributes they share:

- RA- LSEs are required to make a showing that they have secured installed capacity to meet a reserve level in excess of their projected peak load;
- Auction - Residual capacity, not otherwise sold bilaterally, is sold through a centrally administered price auction and a market price is established for the quantity transacted in the auction;
- Net Qualifying Capacity – The ISOs maintain an approval system;
- Outside of Control Area - External suppliers are permitted to participate in the markets. They generally need to show firm transmission;
- Access to Information - Customized web-based software systems have been developed to handle the auction processes.
- Jurisdiction - The auction rules and regulations are FERC jurisdictional.

The capacity market designs in the Eastern ISOs have evolved since their early days of implementation. The following section provides general information about the Eastern ISOs capacity market designs.

## **PJM**

PJM's first capacity market design was called the Unforced Capacity (UCAP) Market, and included a requirement that LSEs provide a share of the market's capacity requirement, based on peak load plus a margin. The UCAP included a vertical demand curve, which led to a "binary" outcome. This means that when the amount of installed capacity in PJM was below the overall requirement, the price converged to the

penalty amount; and if the amount of capacity was above the requirement, the price rapidly approached zero.

In order to improve the design of the capacity market, PJM proposed an alternate arrangement, the Reliability Pricing Model (RPM). The RPM settlement was approved by FERC on December 22, 2006. The RPM introduces both a locational element, and a downward sloping demand curve. Some of the important features include:

- Locational capacity requirements: Over a four-year period, PJM can establish up to 23 separate capacity zones, although the initial set of local areas is four;
- Four-year-forward procurement auction: LSEs are required to meet capacity obligation for up to four years in advance, instead of one day in advance as it is today. PJM can procure resources through an auction for the LSEs that have not met their obligations by the four-year-ahead deadline. Transitional auctions are also scheduled. PJM is moving forward with its first RPM auction in April for capacity obligations beginning June 2007;
- Self Supply: Member utilities can supply their energy needs through a combination of generation, transmission, and demand response, including energy efficiency;
- Demand and Transmission participation: Capacity obligations can be met with existing and planned demand resources. In addition, planned transmission upgrades that provide incremental increases in import capacity into constrained areas can also be offered into the auctions as qualified capacity;
- Downward Sloping Demand Curve: The capacity obligation (and the price per MW), is determined using a downward sloping demand curve;
- Mitigation: The design includes a set of explicit market power mitigation rules that directly address market structure concerns of capacity markets; and,
- Quick-start and load-following requirements: a specified percentage of the total capacity obligation is required to have quick-start or load-following capabilities.

## **NYISO**

New York ISO's market is the second oldest functioning capacity market in the Eastern US. Below are some of the important features:

- Monthly Compliance Demonstrations: The NYISO publishes the capacity obligations one year in advance, and the LSEs make their compliance demonstrations one month in advance;
- Strip Auction: Prior to the start of a supply period, a strip auction is held. This is known as a "capability" period auction, and it is for a six month period;
- Monthly Auction - Separate monthly auctions are held in which LSEs can buy capacity in one-month blocks;

- Spot Auction: Prior to each supply month, a spot auction is conducted. LSEs that have not met their requirement are obligated to purchase capacity in the spot auction (as well as offer excess capacity). Participation in the spot auction is mandatory for any market participant that has not met their RA requirement, and is considered a backstop option; and,
- Downward Sloping Demand Curve: The market-clearing price in the spot auction is set by the downward sloping demand curve. Physical and economic withholding is discouraged due to the bid cap and the downward slope of the curve.

The NYISO is reviewing the performance of their capacity market, as well as design features that would be consistent with the neighboring longer-term capacity markets. In addition, the NYISO is assessing other design characteristics, such as the slope of the demand curve, dual fuel requirements, and performance standards.

## **ISO-NE**

The ISO-NE capacity market is in the process of transitioning to a new market design. The initial capacity market, referred to as the ICAP, is a similar construct to the earlier designs in the Eastern ISOs. In this market, New England is treated as a single zone, and all LSEs are required to secure capacity to meet obligations set out by the ISO-NE. Under this system there is a single market for capacity, and capacity located anywhere in New England can be used to meet capacity obligations either through self-supply from units owned by the LSE, or the LSE can contract for the capacity with another party.

Because there are significant transmission-constrained load pockets in the NE-ISO, the ICAP arrangement was thought to provide inefficient signals to the market about where to build new capacity. In 2002, the FERC ordered locational procurement of capacity in New England as part of the ISO-NE's Standard Market Design, and in June 2006, the FERC approved a settlement agreement between ISO-NE and regional stakeholders creating an auction-based Forward Capacity Market. The Forward Capacity Market (FCM) includes locational components and a longer lead-time. Below are some of the characteristics of the FCM:

- Locational: Import constrained areas that do not have enough local capacity to meet local needs have a local requirement;
- Forward Obligation: The FCM is forward-looking three years and is intended to allow new projects (not yet in the ground) to bid into the auction.
- Auctions: A Forward Capacity Auction (FCA) is conducted three years prior to the "commitment period", or the year during which the capacity must be supplied, with reconfiguration auctions that are held annually. After the beginning of the commitment period, there are reconfiguration auctions that are held seasonally and monthly. The auctions are "descending clock" auctions, ultimately clearing when the amount offered into the market is the same as the amount required.
- Penalties: Penalties for capacity suppliers include deductions for hours when there is a shortage, and for peak energy rent. Payments are reduced by an amount equal to the energy revenues earned during periods when prices in the energy spot market exceed a set level.
- Demand Side: FCM demand management products can qualify as capacity resources and bid into the FCM.

Because of the forward nature of the FCM, full implementation is planned for 2010-2011. A transition period is currently in place to bridge the gap between December 2006 and the 2011time periods.

## **Conclusion**

Because many of the Eastern ISOs' capacity market designs have evolved over the past few years, California can learn from these experiences to more efficiently create an enduring resource adequacy framework. The CAISO is committed to working with state entities and market participants to fashion capacity pricing mechanisms that add value and complement the state's resource adequacy rules and the CAISO's new market design.