

D. Sparks

The California Electricity Market

The San Francisco Chapter held three meetings in early 1999, each with a guest speaker from the California electricity market, to provide its members with insight into the workings of this new electric industry. The following is a summary of each of the presentations, which we would like to share with the PES membership.

Reliability Through Market: The California Model

On 5 January 1999, Terry Winter, chief operating officer of the California Independent System Operator (CAISO), presented *Reliability Through Market: The California Model*. (Winter was promoted to chief executive officer of CAISO subsequent to the meeting.) Winter's presentation touched on the highlights of the first 9 months of operation of CAISO as well as the events during its startup phase.

CAISO was established with the passage of California Assembly Bill 1890 in September 1996. The CAISO was an integral component of the deregulation of the California electricity markets. The mission of the CAISO is to ensure the power grid is safe and reliable and that there is a competitive market for electricity in California.

In December 1996, a restructuring trust was established. \$181 million was earmarked for CAISO start-up and development cost. By May 1997, CAISO executives and staff were being hired. In October 1997, CAISO operational dry runs were being conducted with the goal of a 1 January 1998 start date.

CAISO did not go into operation until 31 March 1998. According to Winter, the main reason for the 3-month delay in commencing operations was that the CAISO billing system was not ready on 1 January 1999.

Although in operation for only 9 months, CAISO has dealt with many issues during its brief operational life. The CAISO started during spring months when heavy precipitation resulted in excess hydro generation. The excess led to severe over-generation problems during the off-peak/low usage hours. Compounding to this problem was the quick increase in load during the mornings or the "ramp-ups."

During the early summer, the CAISO had to contend with continued excess hydro generation as well as experimentation by generation owners in the ancillary services and energy markets. Strategies intended to drive up prices or play the spot markets vs. the day-ahead market were introduced. The late summer months saw record peak loads in California. Prices for ancillary services soared, and price cap was put in place. Cooler autumn months brought new problems such as transmission congestion and increased requests for generator maintenance.

Winter concluded his presentation with some observations and direction for the future. Winter stressed that efficient markets are crucial for grid reliability. This isn't limited to energy markets but also includes ancillary services markets, real-time balancing markets, transmission congestion markets, and energy futures markets. He also remarked on the lessons learned by the CAISO during its first months of operations. Controversy regarding the market structure is to be expected. Economic incentives must be properly aligned with reliability needs. Sufficient time must be allowed for markets to mature. Transparency of information is key to fostering market maturity.

The major issues the CAISO will address in the future are a redesign of the ancillary services market, developing long range planning responsibility for the transmission grid, resolving transmission access fees, and starting a local area reliability service market.

California Electric Market Structure and Performance

On 16 February 1999, Curtis L. Kebler, director of Business Operations for the California Power Exchange (CalPX), presented *California Electric Market Structure & Performance*. Kebler's presentation began with a reiteration of the value CalPX brings to the deregulated California electricity marketplace. The CalPX provides:

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- Efficient trading by bringing buyers and sellers together at a single time and place in the form of a day-ahead hourly energy auction

- Diminished counter-party financial risk to market participants, since CalPX participants are relieved of the risk that the counter-party will not deliver their energy or pay their bill since CalPX backs the transactions

- Neutrality, since CalPX favors neither the buyer nor the seller of a transaction.

Kebler then listed the lessons the CalPX learned in 1998. These lessons include:

- Competitive markets function better and more efficiently than regulated markets.

- Fully competitive markets are more quickly reached with a Big Bang than a Phase In. In other words, a full changeover to retail and wholesale direct access achieves competitive markets more quickly than a phased-in approach where retail markets are gradually allowed to go direct access.

- Temporary intervention in the marketplace is appropriate during the transition to a fully competitive market.

- Deep and liquid spot markets are essential to development a fully competitive market.

- Accurate and timely settlements are complex but are very important to induce more market participants. Finally, Kebler stated the CalPX goals for 1999:

- Establishing firm transmission rights

- Redesigning the ancillary services markets

- Reforming the reliability must run contracts

- Reconsidering price caps and levels

- Introducing elasticity into demand-side bids

- Starting a forward contracts market similar to NYMEX's forward markets for COB and PV energy

Rolling out a new product called "Bookouts," which essentially allows for netting of export schedules by California generators. Currently California generators must pay a fee for each export schedule and cannot net their schedule against an import schedule on the same path.

Automated Power Exchange Markets and Reliability Only Independent System Operators

On 2 March 1999, Jack Ellis, executive vice president of the Automated Power Exchange (APX), presented *Automated Power Exchange Markets and Reliability Only Independent System Operators*.

Ellis' presentation was divided into two parts. First, he spoke about the APX approach to deregulated electricity markets. Later, Ellis contrasted two different approaches to establishing an ISO in a deregulated environment.

Ellis began the presentation by stressing the APX view that the electricity was a commodity and hence could be traded as such. APX runs a full-service electric commodity exchange like NYMEX or the Chicago Board of Trade. APX accepts bids and offers for energy and then matches buyers and seller anonymously based on volume and prices. APX also requires credit checks for buyers and sellers.

APX allows for price discovery, meaning that buyers and sellers know the price at which the transaction occurs. This differs from the CalPX auction in which energy prices aren't known until the marginally priced seller's bid is matched to the buyer's load. Since the utility distribution companies (UDC) are required to buy out of the CalPX regardless of price, neither the seller nor the buyer knows what the market clearing price will be until after the fact.

Ellis then discussed the challenges APX faces in California. The main challenge is that APX is competing against a mandated monopoly in the CalPX. Since UDCs are required to purchase out of the CalPX until competitive transition charges (CTC) are paid off, APX is left with a small market share to compete for. The CalPX market share dwarfs the total volume of the APX. Ellis hopes that with San Diego Gas & Electric Company's expected payoff of CTCs in 1999, the APX volume will grow. In addition to competing in California, CalPX is trying to expand outside the State.

Other challenges facing APX are FERC fees levied on all bilateral energy transactions. These fees were instituted during a time when energy transactions were largely conducted between utilities and a retail competition was non-existent. Now with open access, APX questions whether FERC fees are still applicable to transactions conducted in the APX marketplace. Also, complex California ISO designs on ancillary services and congestion markets make it difficult for APX to treat electricity as a commodity.

APX has observed trends in California's deregulated experience. Opportunities are limited to compete since CalPX has a mandate to serve UDC loads and generation. Additionally, the CalPX is the most commonly referenced price for direct access customers. Direct access has been slow to develop in California where most customers remain on UDC service. With traditional electricity markets monopolized by the CalPX, APX has carved out a niche market for green power or green energy (energy generated from renewable resources). After a year of competition, new players are entering the California

market that will speed up direct access penetration.

APX is entering markets outside of California. Currently APX is developing markets at Mid-Columbia in Washington, New York state, and for First Energy in Ohio.

The second half of Ellis' presentation focused on alternative ISO structures. APX has observed that the fundamental design of the California ISO has limited opportunities in the marketplace. Ellis contrasted the California ISO design (referred to as Traditional ISO) with the APX recommended ISO structure (ISO-Lite). The most obvious difference is that an ISO-Lite does not conduct an ancillary service, congestion management, and real-time energy market. ISO-Lite only coordinates area operations and scheduling. ISO-Lite only intervenes in the energy under emergency conditions.

Table 1 summarizes the differences between a traditional ISO and ISO-Lite.

Table 1 Alternative ISO structures and features	
Traditional ISO	ISO-Lite
Operates as a single control area	Can operate as a single control area or over multiple control areas
Complex products for hour-ahead and day-ahead energy, ancillary services, adjustment bids, and firm transmission rights	Simple products because it treats energy and transmission as tradable commodities
Runs markets for products such ancillary services	Does not run a market; allows for bilateral transaction and energy exchanges
Some prices are partially computed or come out of a "black box"	All prices are market based
Acts as expanded centralized monopolies	Acts in a decentralized and competitive environment
Heavy regulation	Less regulation
ISO governed by politically motivated boards	ISO influenced more by business goals
Innovation is the result of the efforts of a select few	Innovation results from the diverse efforts of many
High administrative fees to run markets	Lower administrative fees because no markets to run

Ellis gave a hypothetical situation to illustrate his view of the future electricity market structure. Traditional ISOs monitor system frequency and regulate it through the use of automatic generator controls (AGC). This requires that the ISO have direct control of a generator to regulate system frequency. In the past, utilities monitored their own frequency and took AGC signals from control area operators. In a newly deregulated environment, generators are not so willing to have someone else control their equipment. Often times, generators are no longer owned by utilities. Ellis hypothesized that a new control system could replace AGC. Instead sending generators signals to increase or decrease output to regulate frequency, frequency could be converted into price signal and the price signal could be sent to generator controls. Essentially, rather than responses based on Hertz, the generator would respond to \$/MW signals. Furthermore, frequency regulation does not necessarily have to be limited to generators. Curtailable loads could be controlled by price signals to increase or decrease indirectly based on system frequency.