4. Imbalance Energy Market Performance

In order to serve their loads, utilities forecast their wholesale electricity requirements as far ahead of time as possible – perhaps years ahead – and contract with wholesale suppliers to meet the portion of that load they do not expect to be able to produce themselves. As the time of delivery, known as "real time," draws closer, the utility acquires more information, such as more recent demographic information or a current weather forecast, and can make a more accurate assessment of actual needs. The utility can continue to make ahead-of-time purchases, known as "forward" purchases, up until one hour ahead of real time as it continues to receive new information. At this point, the utility and/or its suppliers provide their expected delivery information, known as scheduled electricity, to the ISO, so that the ISO can fulfill its role to manage these deliveries over the transmission lines.

However, since a utility cannot perfectly foresee, for example, exactly how many people will be turning on their lights and at what time, there will always be some discrepancy between its forward scheduled electricity and real-time consumption. To make up this difference between forward schedules and actual load the ISO conducts a market, known as the market for "real-time" or "balancing" energy. By keeping electricity on the network in "balance", the ISO provides stable, reliable electricity at the constant frequency (60 Hz) needed to ensure that end-users' appliances and other load-drawing items function properly.

This real-time balancing market, known officially as the "Balancing Energy Ex-post Price[1]" market, or "BEEP Stack," is run as an auction, potentially with a new price every ten minutes. Participants actually enter their bids once per hour with each of those bids valid for six ten-minute intervals.

During some intervals, the ISO's load requirements may exceed forward schedules. In this case, it must procure more electricity to keep the system in balance. To accomplish this, it accepts bids from generators to *increment* generation, or to increase their power output. The ISO pays those generators to produce electricity above and beyond what they had scheduled. Alternatively, load could bid a price it is willing to be paid to consume less electricity. Although this largely is prohibited by state regulation at this time, the ISO markets could accommodate it were that to change.

During other intervals, load requirements can be less than forward schedules and the ISO accepts bids from generators to *decrement* generation, or decrease their power output. In most cases, generators pay the ISO for the right to decrease their output. Alternatively, load could bid a price it is willing to pay to

[1] "Balancing" is the process of keeping delivered energy equal to actual load. An "Ex-post price" is a price that is revealed after the auction is conducted. In an ex-post price auction, participants bid prices they are willing to receive (or pay) without knowing ahead of time what the actual price will be. Conversely, an "ex-ante" price is one that is announced before any transactions are made, such as a posted price at a gasoline station.

increase its consumption in these periods; however, this too is currently prohibited by state regulation. Again, the ISO would be able to accommodate such bids in the event that state regulations change.

The BEEP auction currently works as follows: Generators place bids in the BEEP Stack by submitting pairs of prices and quantities they are willing to be paid to provide incremental energy, and/or pairs of prices and quantities they are willing to pay to decrement output. In an interval during which the ISO must increment;

- The BEEP algorithm ranks bids in order from least to most expensive.
- It "instructs" units to increase their output in the order of price rank of the bids until it has dispatched the difference between the scheduled volume and actual load. The algorithm may skip certain bids due to constraints. For example, a low-priced bid may not be dispatched if it is from a generator that is not capable of incrementing quickly.
- The highest-priced bid dispatched, known as the "marginal" bid, sets the price at which all other instructed bids are paid. All bids lower than the marginal bid receive the marginal unit's bid price, known as the "Market-Clearing Price" (MCP).
- All units with quick-dispatch ability and bids less than the MCP from are instructed to generate and receive the MCP. No bids at prices above the MCP are dispatched.

The process is similar in an interval during which the ISO has excess energy and must decrement:

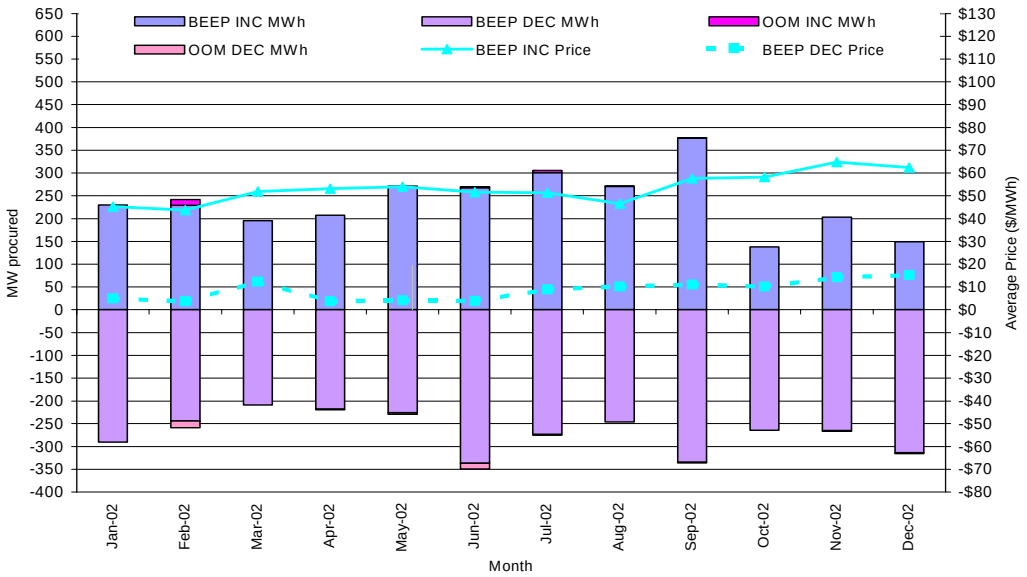
- The BEEP algorithm ranks bids in order from highest to lowest price.
- It "instructs" units to decrease their output in the order of price rank of the bids until it has dispatched the difference between the actual load and scheduled volume. Again, the algorithm may skip certain bids due to constraints.
- In this case, the *lowest*-priced bid dispatched sets the MCP at which all other instructed bids are paid. All units bidding above the MCP pay the MCP and, in return, receive the privilege of decreasing output (and thus avoiding costs of generation, such as natural gas costs).
- Any bids above the MCP from units with sufficient dispatch capability are instructed to decrement. Each unit dispatched pays the MCP for the privilege of reducing output. No bids that bid below the MCP are instructed.

4.1 Real-Time Market Performance

After June 2001, the ISO's real-time market returned to its intended state as a market for relatively small quantities of energy needed to balance forward schedules with actual load. It continued to be a small market through the end of 2002 with a volume of approximately 2,085 gigawatt-hours (GWh) of incremental (INC) energy, or 0.9 percent of the 232,011 GWh of total energy distributed in 2002. Real-time decremental (DEC) volume was slightly higher, totaling 2,379 GWh. In comparison, INC and DEC volumes in 2001 were 16,624 and 3,471 GWh, respectively. The vast majority of this energy was procured during the crisis period prior to June 2001. The INC price averaged $53.04/MWh in 2002, compared to the 2001 average of $259.82/MWh. The DEC price averaged $8.79/MWh in 2002, compared to the 2001 average of $32.38.

A key factor in the variation of 2002 prices compared to those a year earlier was the fluctuation in the price of natural gas that reached historic lows in early 2002. Real-time prices, on both the INC and DEC sides, increased toward the end of the year as gas prices also increased. Finally, out-of-market calls had small market impact in 2002, as BEEP bidding was sufficient to serve load in most hours. Figure 4.1 shows monthly averages of prices and volumes in the real-time markets in 2002.

Figure 4.1. Monthly Average Real-Time Prices and Volumes in 2002



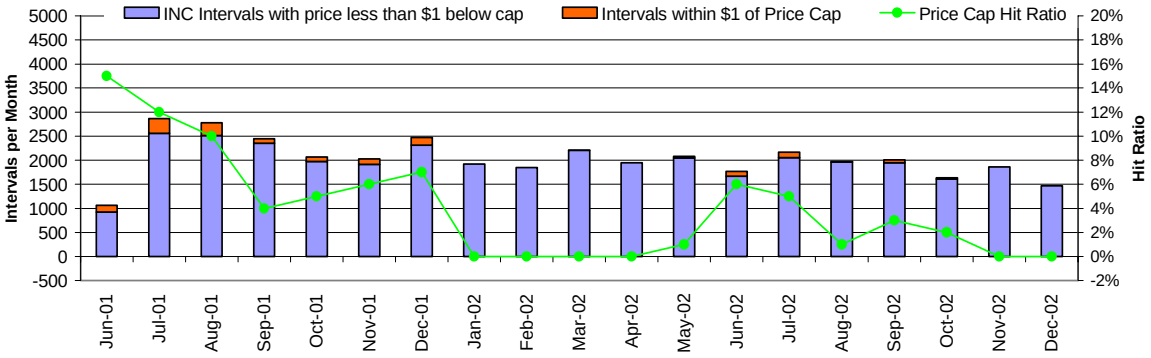
4.2 Price Caps

The BEEP market was subject to the following soft price caps in 2002:

Period	Price Cap
2001 through April 30, 2002	$108/MWh
May 1 through July 9	$91.87/MWh
July 9 through July 10	$57.14/MWh
July 10 through July 11	$55.27/MWh
July 12 through Oct 29	$91.87/MWh
October 30 through 2003	$250/MWh (plus AMP)

Throughout 2002, these price caps were binding in approximately 1.5 percent of the hours in which INC energy was procured in SP15 and in approximately 1 percent of the hours in NP15. Most of these price cap hits occurred July 9-12.[2] During these few days, the price cap was lowered twice due to a series of Stage 1 Emergencies declared for all operating hours, as directed by FERC in its Order of June 19, 2001. Six percent of all BEEP intervals in July during which INC energy was procured resulted in price cap hits. Following this series of events, in its Order of July 11, 2002, FERC fixed the price cap at $91.87/MWh until MD02 Phase 1a was to be implemented. This occurred on October 30, at which time the price cap was raised to $250/MWh. Thereafter, the price cap was not hit again in 2002, although there were several hours during which prices exceeded $91.87/MWh. Figure 4.2 shows monthly price cap hits in SP15 from June 2001 through December 2002.

Figure 4.2. Price Cap Hits by Month in SP15 through December 2002



[2] DMA classifies an interval as having a binding price cap whenever the BEEP MCP is within $1 of the price cap. This threshold was chosen because suppliers often bid just under the price cap, indicating that the cap is constraining bids, and thus is indirectly constraining the MCP.

4.3 Bid Sufficiency

Bid sufficiency in the BEEP Stack was adequate in 2002 due largely to the soft demand for imbalance energy. Most of the variation of quantities of bids to the BEEP Stack was due to sharp changes in the volume of bids submitted by importers. Near-normal hydroelectric supplies enabled suppliers from the Pacific Northwest to export electricity to California, and to sell to the BEEP Stack in particular, during the summer months.

However, on February 17, 2001, FERC ordered that importers bid all of the energy they offer into the BEEP Stack at a price of $0/MWh. Following this order, bid volume in the BEEP Stack from import suppliers fell sharply and remained below 400 MW on average through April.

In response, the ISO held stakeholder meetings and found that a chief complaint of importers was the fact that they were paid the uninstructed energy price for "predispatched" electricity (electricity that is dispatched for a full operating hour, rather than by ten-minute intervals, due to technical constraints). The ISO and market participants reached a consensus whereby importers would be paid the instructed energy price. The ISO filed this new rule as Amendment 43 on April 25, 2002, with the understanding that it would be approved shortly thereafter. FERC officially approved it on June 11. Import volume improved immediately after the filing, increasing steadily to yearly highs above 1400 MW in the summer months as suppliers had plentiful hydro resources on hand and found prices in California to be attractive.

Imports fell from approximately 1200 MW on average to approximately 150 MW within only a few weeks in October 2002 and have remained at that level through the first quarter of 2003. Figure 4.3 below shows intertie volume in the BEEP Stack through January 2003.

While the "Zero-Bid" requirement was designed to prevent "Megawatt Laundering" or "Ricochet" tactics, in which cases marketers simultaneously wheel electricity in and out of California to circumvent price caps, it had the effect of increasing marketers' exposure to the risk that they would receive prices for their electricity that would not cover their operating and/or opportunity costs. After internal discussion and consultation with suppliers, ISO Staff concluded that the reason importers have fled the BEEP Stack is that there has not been an acceptable premium in BEEP prices above regional bilateral hub prices to bear the additional risks of selling into the BEEP Stack. Although BEEP prices in 2002 have averaged approximately 20 percent higher than hub prices, importers that sell in day-ahead markets at regional hubs transact known volumes in fixed sixteen-hour blocks and avoid the uncertainties of congestion costs and learning only one hour ahead of real time whether their electricity will be needed. ISO Staff is currently reviewing these concerns to determine whether further regulatory action on this issue is warranted.

Figure 4.3. Weekly Average Volume Bid by Importers into the BEEP Stack through 2003