

Preliminary Discussion for June 6, 2001 - LB CRAC Workshop
Market Price Analysis for Augmentation

Issue:

- ◆ In order to assess the market value or price of its remaining augmentation deficit of almost 1000 aMW, BPA performed a market price analysis for Q4 2001 and Q1 2002.

Problem:

- ◆ **The Market Was Illiquid and Not Deep**
 - At the time, BPA's expected augmentation deficit was approximately 800-1000 aMW, depending on the month, for the Q4 2001 and Q1 2002 period.
 - BPA approached the market through contacts with marketers, brokers, utilities and resource developers.
 - BPA found that most parties were only willing to quote forward prices for quantities between 25-50 aMW for either flat or on-peak energy blocks. Further, very few parties were willing to take on a short position for that period; therefore, we found the market to be both illiquid and not deep.
 - Experience (and perhaps basic economics) has demonstrated that when a party is in the market for a large quantity (over several hundred aMW) the market price will reflect:
 - ❖ the increased demand,
 - ❖ the time element in which the buyers need to fulfill their demand, and
 - ❖ the price and potential supply risk the counterparties are taking by selling forward.
 - Therefore, using price quotes for quantities between 25-50 aMW was not appropriate to value the full augmentation deficit.
- ◆ **Same Price Now as Later?**
 - An additional complication is that there is a potential for BPA to acquire additional lower cost (relative to the forward block market) augmentation through purchases from Northwest BPA customers or load reductions between now and when BPA sets the final LB CRAC.
 - Therefore, using a price for a quantity of almost 1000 aMW may not be appropriate if the actual augmentation deficit turns out to be less than the current level of augmentation.

Summary of BPA's Approach:

- ◆ BPA constructed a price curve for quantities from 25 aMW through 1000 aMW:
 - For quantities up to 75 aMW, BPA used actual market quotes and data.
 - For quantities from 100 aMW to 1000 aMW, BPA used a methodological approach to construct a price curve.

Part A: Price Quotes for Market Purchases up to 75 aMW

- ◆ BPA requested and received HLH and LLH market quotes for Q4 2001 and Q1 2002 from various sources – marketers, brokers, utilities and resource developers.
 - BPA assumed the first 25 aMW could be purchased at a mid-market price (average of the bid and ask prices).
 - Based on discussions with traders, marketers, and brokers regarding these quotes and the liquidity of the market, it was assumed that the next 50 aMW could be purchased at approximately the ask price.

Quotes:

	Q4 2001				Q1 2002			
	HLH		LLH		HLH		LLH	
	Bid	Ask	Bid	Ask	Bid	Ask	Bid	Ask
5/30/01	165	185	110	130	110	130	75	95
5/30/01	165	185	100	120	100	130	65	85
5/31/01	135	165	105	125	96	118	55	65
5/31/01	135	162	105	125	95	130	55	75
Avg.	150.00	174.25	105.00	125.00	100.25	127.00	62.50	80.00

	HLH		LLH	
	Bid	Ask	Bid	Ask
6 Mo. Price	125.29	150.78	84.12	102.89

Price Curve:

Amount	HLH	LLH
	Price	Price
25 MW	138.03	93.50
50 MW	144.41	98.19
75 MW	150.78	102.89

Part B: Affect of Purchase Quantities Greater than 75 aMW on the Market

◆ **Theory**

- The objective was to estimate the incremental responsiveness of forward block market prices to large amounts of BPA purchases for the forward period.
- Because BPA has not historically experienced a situation comparable to purchasing inside of a 5-day window for forward transactions at least 4 months in the future, BPA analyzed transactions purchased for the same delivery month, with transaction dates within two to three months of the delivery period.
- In an effort to measure the incremental responsiveness of the market to BPA’s purchasing presence, these results were then normalized for recent market trends.

◆ **Methodology**

- **Step 1:** The following criteria were applied to recent BPA transactions:
 - ❖ large number of transactions;
 - ❖ large quantity of MWh purchased;
 - ❖ transaction date within two to three months of the delivery period; and
 - ❖ the same delivery month.
 - Two delivery months met or exceeded this criteria - August 2000 (with transaction dates 6/1/00 to 7/30/00) and January 2001 (with transaction dates 9/1/00 to 12/31/00). *See Table Below.*
- **Step 2:** From the purchase data in Step 1, changes were seen in prices as a function of when BPA was purchasing. This gave us a curve of percentage change in price (from the initial price base) as a function of the quantity that was purchased.
- **Step 3:** For months previous to BPA purchasing, a market trend was calculated for the delivery months in question. This is accomplished by taking the initial market price for the month in question (two months before the purchasing began for August 2000 and three months before the January 2001 purchasing began) and trending to the eventual price that was trading before BPA began its purchase strategy. *See Table Below.*

Month	Initial Market Trend	Historical Purchase Data
August 00	4/1/00 to 5/31/00	6/1/00 to 7/30/00
January 01	7/1/00 to 9/30/00	10/1/00 to 12/31/00

- **Step 4:** The result of the curve in Step 2 was then “normalized” for market trends by reducing or increasing by the percentage trend from the historical patterns from Step 3. After this normalization, the results of the two equations were weighted by their associated purchase quantities (66% for August 2000 and 33% for January 2001).

◆ **Results**

Amount	HLH Price	LLH Price
25 MW	138.03	93.50
50 MW	144.41	98.19
75 MW	150.78	102.89
100 MW	152.19	103.85
200 MW	152.09	103.79
300 MW	162.92	111.18
400 MW	180.51	123.18
500 MW	204.88	139.81
600 MW	236.05	161.07
700 MW	274.02	186.99
800 MW	318.83	217.56
900 MW	370.49	252.81
1000 MW	418.33	285.46

◆ **Key Assumptions**

- The HLH-LLH basis differential is perfectly correlated to the HLH price increases.
 - ❖ For example, when HLH price increase by 30%, so does the LLH price.
- A simplifying assumption was made regarding the time dynamic of purchases.
 - ❖ BPA historical purchase data set, used in this analysis, assumes that the purchased power is done in equal quantity blocks (linear) over the specific month's purchasing time frame.
 - ❖ An exception was made for January 2001: Purchases transacted within a three-day window were deleted from the data set, due to their extremely large variations when compared with the remaining data set.
- The analysis assumes no market impacts from the recent price caps (or fear of price caps) in California.
- The established market trend (as measured in previous month before the buying strategy) continues throughout the purchase strategy.
- The vast majority of the transactions used in this analysis were delivered at Mid-C.
 - ❖ Note: In August 2000, there were several COB transactions – these were converted to a Mid-C price using the August 2000 COB/Mid-C basis differential from the day of the transaction.
- The analysis assumes the price curve will be applied to an equal set quantity for each of the 6 months.

◆ **Limitations**

- Comparison Differences

	Rate Issues	Analysis
Transaction Date in comparison w/Delivery Period	120 to 270 days prior to delivery	60 to 90 days prior to delivery
Transaction Date – Timeline	Over 5 days	Over 60 to 90 days
Purchase Product	Purchasing Flat Energy	Based on Historical HLH
Delivery Month	6 Month Delivery	Single Month Delivery