Proposed Strawman for Day-Ahead Price Responsive Load

Definitions

CBL (Customer Baseline Load) – The normal energy usage of a price-responsive load, calculated on an hourly basis using recent historical data. The exact method for calculating the CBL has not yet been determined, but will parallel the definition used in the Emergency Demand Response Program.

DAM LBMP – Day-Ahead Locational-Based Marginal Price.

FLB (Fixed Load Bid) – Load bid as a firm purchase in the day-ahead market.

LR (Load Reduction) – Calculated amount of actual load reduction provided by a price-responsive load. LR = CBL – NML.

NML (Net Metered Load) – The actual load consumed by the price-responsive load in real time as determined by approved metering.

PRL – (Price-Responsive Load) – The amount of interruptible load bid into the day-ahead market by a price-responsive load.

RT LBMP – Real-Time Locational-Based Marginal Price.

Background

The Price-Responsive Load Working Group (PRLWG) has considered several variations on a day-ahead price-responsive load bidding program as developed by Neenan & Associates, with modifications from market participants.

On Dec. 20, 2000, the New York Public Service Commission issued its "Order Requiring Filings and Reports on Utility Demand Response Programs", Case 00-E-2054. It is anticipated that there will be a number of these programs in place by the summer of 2001, incorporating both PSC modifications and refinements resulting from the NYISO's programs.

In developing programs for its market participants, the NYISO recognizes the need to work with LSE-sponsored programs in a way that captures the unit commitment benefits of price-responsive load. Since many of the LSEs have expressed a desire to run their own programs, we also want to provide a nonintrusive program that avoids duplication of effort.

The NYISO also has several Direct Customers that can provide significant price-responsive load in the day-ahead market. We have formulated a Direct Customer program that basically parallels some of the concepts included in the LSE programs.

We recognize that one or more of the LSE-sponsored programs may not be on-line by the time the NYISO program is available by June 1, 2001. For end-use customers that wish to participate in a NYISO direct-sponsored program, the NYISO proposes two alternatives:

- A Direct Customer program, with registration limitations, or
- A modified version of the Direct Customer program that does not involve LBMP-related payments but does provide for ICAP payments.

The three programs are defined in the following sections:

- Program A - LSE Program
- Program B - Direct Customer / Demand Response Participant Program
- Program C – Modified Direct Customer Program w/ICAP Payments

The NYISO recommends that either Programs A+B or A+C be implemented.

Program A - LSE Program

There are two programs that provide a link between the LSE's programs and our day-ahead unit commitment program, one existing and one proposed:

- Zonal Price-Capped Load Bidding (ZPCLB), which exists in a somewhat different form today, and
- A variation on the Neenan & Assoc. Priceline/Sell program that credits the LSE for MWs associated with interruptible bids accepted in the DAM.

Under ZPCLB, the LSE submits "buy-block" bids covering whatever amount of their end-use interruptible customer load they wish. Ideally, the LSE would collect the end-user bids prior to submitting the aggregate LSE bids in the DAM. No monitoring of loads in real-time beyond that already in place to determine the LSE aggregate load is necessary. Beyond implementing ZPCLB, which is scheduled for May 2001, there would be no additional modifications needed. The only restriction with ZPCLB is that there is no capability to explicitly model strip (multiple-hour) bids.

The Priceline/Sell program has the same effect as price-capped load bid, but models interruptible loads as generators, with minimum run (shutdown) times, startup costs, etc. The process would work as follows:

1. After collecting interruptible load bids from end users, LSEs would formulate one or more aggregate pseudo-generator bids to represent the price responsive load. These bids would follow the same form as those for generators.
2. SCUC would consider price-responsive load resources and generators identically, and would select that set of load bids consistent with LBMP for each hour.
3. The LSE's firm load bid FLB will be satisfied in part by the amount of price-responsive load (PRL) pseudo-generators selected by SCUC, i.e., new DAM load requirement = FLB – PRL.
4. The NYISO net settlement procedure is unaffected. That is, the LSE pays for FBL but receives a refund for PRL. LSEs can use the savings from reduced DAM load to fund payments to responding end-use customers.

This program provides better detailed modeling of load response, including strip bid capability. Most importantly, the bids are actively evaluated by SCUC and accepted only if they improve the overall system economics.

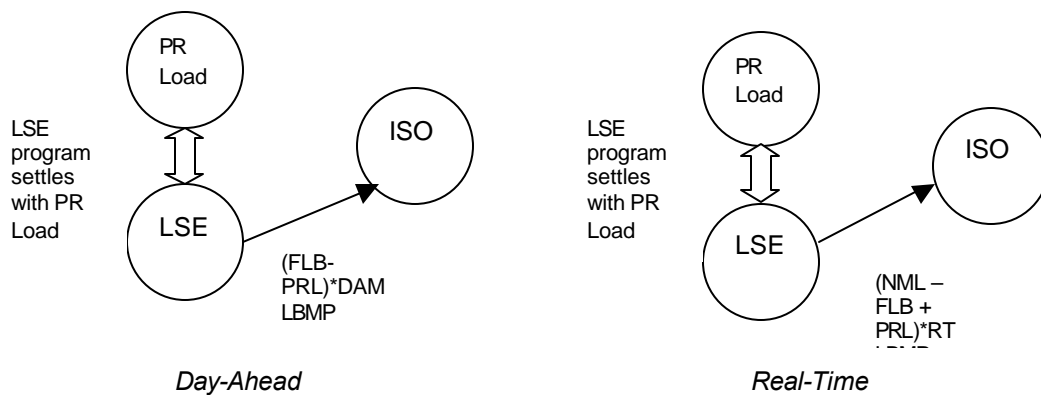The day-ahead and real-time flow of funds are shown graphically in Figure 1.

Day-Ahead   *Real-Time*

Figure 1 – Priceline Program for LSEs

Program B - Direct Customer / Demand Response Participant Program

Direct Customers of the NYISO need a program parallel to those offered by the LSEs. Moreover, there is potential for a significant amount of participation in the day-ahead program from these customers. In addition, we have defined a third class of customers that can take advantage of a NYISO-sponsored day-ahead program. A Demand Response Participant (DRP) is a retail load that wishes to sign up directly with the ISO just for purposes of participating in the day-ahead price-responsive load program. A DRP could also be an aggregator of day-ahead price-responsive load services.

For these Direct Customers and DRPs, a variation of the Priceline/Sell program is proposed wherein the Direct Customer/DRP is paid for scheduled interruption in the DAM by the NYISO using funds collected from the Direct Customer's Transmission Provider (TP) or the retail load's LSE. Interruptible load will be modeled as generation, as described in the LSE program above. The program would work as follows:

1. Direct Customers / DRPs, along with the NYISO, would prepare a Customer Baseline Load (CBL) hourly profile based on recent historical usage during normal periods, representing consumption the customer would normally have used.
2. LSE would bid load in the DAM, the Direct Customer / DRP would bid a pseudo-generator. The net effect of the two bids represents the combination of firm and interruptible load.
3. For interruptible bids that are scheduled by SCUC, the Direct Customer / DRP would receive the higher of his bid price or LBMP.
4. Funds for payment of the PRL load portion would come through:
   - in the case of a Direct Customer, the Transmission Provider would pay for the PRL portion, and whatever firm load is bid would be purchased through the NYISO directly;
   - for a DRP, all load (firm plus PRL) would be purchased through the retail load's LSE (or in the case of an aggregator, through multiple LSEs).
5. NYISO would verify in-day performance by comparing actual purchase (LR) with PRL. The residual would be purchased at the real-time price according to LR = CBL – NML (CBL fixed by agreement). In addition, the Direct Customer/DRP would be required to settle the difference between the net metered load and the fixed load bid.

The interruption payment can be split, with a portion coming back to the LSE (for DRPs) or the Transmission Provider (for Direct Customers) to account for the LSE or TP's lost wires revenue. The remainder would flow to the Direct Customer. The split fraction could be specified by the Direct Customer as a fixed price ($/MWhr) or as a percentage of the total payment, or as DA LBMP.

Figure 2 illustrates the flow of funds for a Direct Customer; Figure 3 shows the corresponding flow for a Demand Response Participant. In both examples, the effect of the split payment for lost wires revenue has been omitted for simplicity.
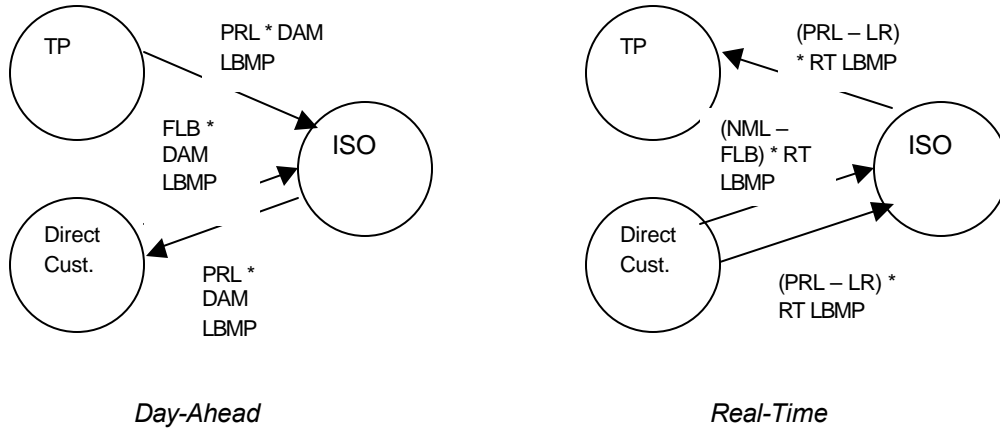
Day-Ahead   Real-Time

Figure 2 – Flow of Funds for a Direct Customer

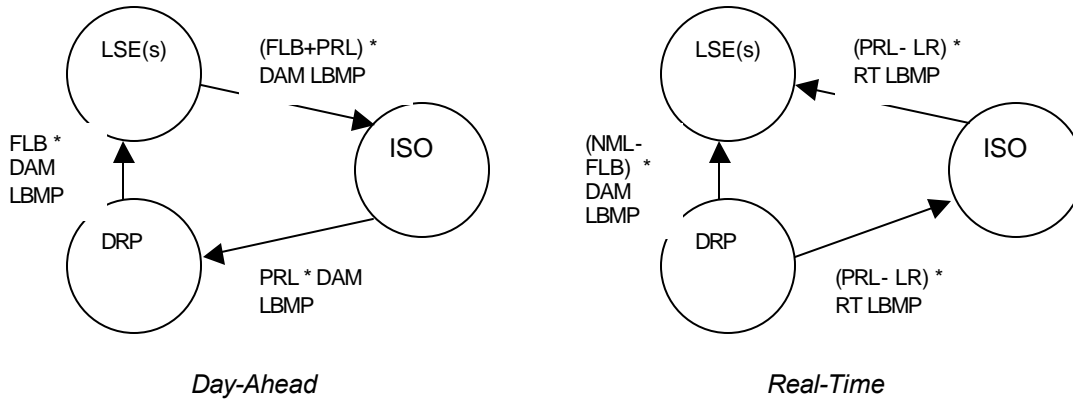Day-Ahead   Real-Time

Figure 3 – Flow of Funds for a Demand Response Participant

For real-time settlement, the effect of a buy-through will have a double penalty effect, since deviations (PRL-NML) and (NML-FLB) are both determined and payments assessed at the real-time LBMP. Table 1 shows the payments made by the price-responsive load under various day-ahead and real-time scenarios; both day-ahead and real-time LBMPs are assumed to be $500/MWhr.

Table 1 – Payment Scenarios

Case	FLB	PRL	CBL	NML	LR	DAM Payment (K$)	RT Payment (K$)	Total Payment (K$)
1	20	10	26	18	8	5	0	5
2	20	10	30	18	12	5	(1)	4
3	20	10	30	22	8	5	2	7
4	20	10	34	22	12	5	1	6
5	20	10	30	30	0	5	10	15
6	30	0	30	30	0	15	0	15

As can be seen by comparing cases 5 and 6, the payment/penalty structure will insure that, aside from the spread between day-ahead and real-time prices, no gaming can take place.

Program C – Modified Direct Customer Program with ICAP Payments

This program would be aimed at Direct Customers or Demand Response Participants and would be essentially the same as that shown in Figures 2 and 3 with the following exceptions:

- Direct Customers/DRPs would not receive payment for interruptible load accepted in the day-ahead market (the arrows labeled PRL * DAM LBMP would go away), and the balancing payments from the TP/LSE would disappear.
- As an incentive to interrupt load beyond avoided costs, DC/DRPs would be eligible to receive ICAP payments.

Requirements for Participation

LSE

- No changes to current requirements

Direct Customer

- Register as a Day-Ahead Demand Response resource (information only)
- Require Direct Customers to purchase and install metering & telemetry to collect CBL load data, verify performance.
- Minimum 1 MW demand.

Demand Response Participant

- Same as Direct Customer, plus:
- Full financial assurance procedures required
- Restricted to bidding only interruptible load portion (firm load must be purchased through LSE)
- A minimum participation period requirement of 12 months to prevent excessive switching to and from LSE-sponsored programs.
- Minimum 1 MW demand.

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