RATIONAL BUYER IMPLEMENTATION

Description of the Rational Buyer Pre-Processor Algorithm

The Rational Buyer preprocessor finds the set of Ancillary Service purchases that, when processed through the ASM sequential bid evaluation software, produces the lowest total cost of procuring Ancillary Services while satisfying the ISO's reliability requirements. This problem is mathematically difficult and cannot be solved with standard linear programming or non-linear programming methods.

Instead, the ISO's algorithm searches the set of feasible bid prices (i.e., where the resulting requirements for each service would meet the ISO's reliability requirements), which is a subset of the bid prices offered in the four A/S auctions. For each feasible set of prices, the associated cost of purchasing Ancillary Services, and the service requirements associated with that cost, is found. The minimum-cost set of requirements is thus found through an exhaustive search of possible outcomes.

The algorithm guarantees that the global minimum of procurement costs is found. There may, however, be several sets of purchase quantities that produce that minimum.

To choose between multiple optima, the ISO will rank the sets based on the total absolute changes in MW purchases, compared to the original reliability requirements, and will use the purchases that have the least changes. That is, the ISO will minimize, among the set of minimum-cost service requirements, the use of Regulation as Reserves, Spinning Reserves as Non-Spin and Replacement, and Non-Spin as Replacement.

Rational Buyer Settlement Issues

The first settlement issue arises if capacity of a higher-quality service that is used to satisfy a lower-quality requirement is charged as if it met the higher-quality requirement. A scheduling coordinator that has no requirement for the lower-quality service will, if there is no adjustment of charging in settlements, see an increase in costs in the amount of its share of responsibility for the higher-quality service. For example, a scheduling coordinator that self-provides operating reserves, but purchases Regulation from the ISO's auction, will, with no adjustment of capacity charging, see an increase in costs whenever the ISO purchases additional Regulation to substitute for operating reserves (Spin or Non-Spin).

The second settlement issue arises from the increase in price of the higher-quality service that may occur when it is used to reduce the requirements for (and often price of) the lower quality service. As with the shifting of megawatts from one service to another, this issue affects SC's which have little or no responsibility for the lower-quality service, and relatively high responsibility for the higher-quality service.

Summary of Proposal

ISO Management recommends the following method to address the settlements issues described above.

Management proposes to make adjustments for potential cost shifting effects, so that no market participants are made worse off by the Rational Buyer evaluation of bids. This would be done in the following manner:

1. Initial quantities for each service are based on reliability needs and are determined before the "Rational Buyer" sequence is initiated.

2. An Out Board Processor takes all bids for A/S from SI and establishes initial prices without a "Rational Buyer" adjustment.

3. The "Rational Buyer" Processor does a search for the least cost combination of services that still satisfy the reliability need and determines adjusted quantities of each A/S to be purchased.

4. The A/S auction is run with these adjusted quantities and adjusted prices are calculated.

5. The initial prices and quantities along with the adjusted prices and quantities and are passed to Settlements.

Settlements Example

Consider an hour in which the ISO's total reliability requirement is for 1,500 MW of Regulation, and 1,100 MW each of Spinning, Non-Spinning, and Replacement Reserves. One participant with 10 percent of the load self-provides its entire Reserves requirement, but cannot self-provide Regulation. The impact in Settlements of Management's recommended allocation method, for the market as a whole and for this participant, are illustrated.

Self-provision is subtracted from total reliability requirements to find the ISO's net reliability requirement. Under the existing procedure, this set of requirements is used by ASM to determine market-clearing prices. These Existing Practices amounts are shown in columns (1) and (2) of Table 1. Following execution of the Rational Buyer pre-processor, the Rational Buyer requirements are found, which are used by ASM to determine the Rational Buyer MCPs, which are paid to capacity selected in the four auctions, and are shown in columns (3) and (4) of Table 1. Total A/S procurement costs are shown in the last row of the table.

Table 1. Reliability and Rational Buyer Requirements and MCPs

	Existing Practice		**Rational Buyer**	
Service	**Requirement (MW) (1)**	**MCP ($) (2)**	**Requirement (MW) (3)**	**MCP ($) (4)**
Regulation	1,500	10	3,000	20
Spin	1,000	20	500	20
Non-Spin	1,000	40	500	20
Replacement	1,000	80	500	20
Total Procurement Cost ($)	**155,000**		**90,000**	

Table 2 shows the allocation of costs to the entire market, and to the self-provider who buys Regulation, under Management's proposal. Regulation is settled at the price that would have resulted from the existing procedure, and the other services are assessed (90000-15000)/(155000-15000) times their charges under the original rational buyer.

In this way, no classes of users are made worse off, and the cost savings are spread amongst buyers of ancillary services in proportion to their responsibility for Reserves that would have been purchased under the sequential non-substituting arrangement. In practice, the ISO expects to produce, on the settlement statement, a charge equivalent to the "initial price" which users can check against published market-clearing prices, with a Rational Buyer adjustment credit to bring the total charges to the "adjusted prices."

Table 2. Cost allocations of Rational Buyer

Service	Existing practice	Management Recommendation
Self Provider	1,500	1,500
Regulation	15,000	15,000
Spin	20,000	10,714
Non-Spin	40,000	21,429
Replacement	80,000	42,857
Total Procurement Costs	156,500	91,500