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**From the Selected Works of Peter Cramton**

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October, 1999

## Affidavit of Peter Cramton

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UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION

New England Power Pool

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Docket Nos: ER99-4536-000

**Affidavit of Peter Cramton**

October 15, 1999

I have been asked by ISO New England, Inc. (“ISO-NE”) to summarize my review of the reserve markets, as presented in “Review of the Reserves and Operable Capability Markets: New England’s Experience in the First Four Months”<sup>1</sup> (hereafter, Market Review) prepared by Peter Cramton.<sup>2</sup>

The Market Review includes an examination of the three reserve markets—ten-minute spinning reserve (TMSR), ten-minute non-spinning reserve (TMNSR), and thirty-minute operating reserve (TMOR)—during the first four months of operation from May 1 to August 31, 1999. The Market Review is based on my knowledge of the market rules and their implementation by the ISO, and the market data during this period, including bidding, operating, and settlement information. Although this review covered only the reserve and Operable Capability markets, I have reviewed the data from the energy and AGC markets as well. Since all of the NEPOOL markets are interrelated, one cannot hope to understand one market without having an understanding of the others.

The review:

1. Identified the potential market flaws with these markets.
2. Looked at the performance of the markets to see if the potential problems have materialized.
3. Evaluated the ISO’s short-term remedies for these market flaws.
4. Proposed alternative medium-term solutions to the identified problems.

Although due to time constraints my analysis of the data was limited, I believe the analysis was sufficient to draw first-order conclusions.

**1 Potential market flaws**

The reserve markets are structured in a similar way, and hence all of these markets suffer from the same basic problems. TMSR has some special features, due to its treatment in the unit commitment and the payment of lost opportunity costs. Below I summarize the flaws common to all of these markets.

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<sup>1</sup> A preliminary draft of this review is posted on ISO New England’s web site ([www.iso-ne.com](http://www.iso-ne.com)), under NEPOOL committees, working group of the RMOC on reserve markets.

<sup>2</sup> Peter Cramton is Professor of Economics at the University of Maryland and President of Market Design Inc. Over the last 15 years, he has conducted research on auction theory and practice. This research appears in the leading peer-reviewed economics journals. During the last 6 years, Cramton has applied this research in the design and implementation of auction markets in the U.S. and abroad. He has led the design and implementation of several high-stake auction markets in the telecommunications and electricity industries.

### **1.1 Losing bidders face the same obligations as winning bidders**

The reserve markets appear to be structured in the same way as the energy market: (1) bidders submit supply schedules, (2) a market clearing price is determined from the intersection of the aggregate supply schedule and the realized demand, (3) bids at or below the clearing price are accepted, and (4) the winning bidders receive the clearing price for product delivered. However, there is a critical difference between the energy market and the other markets. In the reserve markets, *there is no difference in the costs or risks incurred by those participants who receive payment in the market and those who do not.* Every participant is providing the same service, but only those designated are paid. As a result the only rational bids in the market are a bid of zero (to insure selection in the hope there is any positive price) or a bid that is an attempt to set the clearing price. The winning bidders are receiving payment for product delivered, but the losing bidders are delivering the product as well without receiving any payment.

This problem was discussed in the March 5, 1999, Multi-settlement Proposal, which was approved by NEPOOL and filed with FERC in March 1999.

The markets do not give the participants a meaningful way to express the costs they incur in providing dispatch flexibility. In a real market, the winning bidders would be paid for the product delivered (dispatch flexibility), but losing bidders would not be forced to deliver the product as well.

### **1.2 In times of scarcity, prices in these markets are arbitrarily high**

The reserve markets, TMSR, TMNSR, and TMOR, are particularly vulnerable during periods in which all or nearly all available resources must be selected to meet the reserve requirements. In situations where the reserve requirement cannot be met (Operating Procedure 4 conditions), prices may be arbitrarily high with no basis in cost and no economic constraint on bid behavior. In these situations, there are insufficient bids to satisfy the requirement. The ISO must accept all bids.

The auction becomes equivalent to the game of “ask and it shall be given.” In this game, the auctioneer asks each participant to write a number on a piece of paper (a “bid”) and agrees to pay each person selected the number of dollars bid by the person with the highest bid selected. If there are ten bidders and the auctioneer announces that seven of the ten will be selected in each round, there is a pressure to drive the prices to zero, even if there are real costs associated with participation. However, if the auctioneer announces in advance that all ten will be selected, the only limit on the bids is the auctioneer’s bankruptcy. The forecast by the ISO of OP4 Conditions is equivalent in the reserve markets to announcing that all bids will be selected.

In a competitive market, when there is a shortage of supply, prices are determined from the aggregate demand curve. That is, in times of shortage, buyers respond to the higher prices by demanding less, which limits any price increases. Unfortunately, in the current reserve markets such a market response is not effective—demand for reserves is completely inelastic. Hence, in times of shortage, there is no market constraint on what suppliers can bid. The point is that the bids are not reflective of any costs. The price is set at the whim of the bidder willing to submit the highest number. This is a clear case of market failure.

The basic problem is the absence of a demand curve for reserves, which reflects the marginal value of additional reserves.

## **2 Conclusion**

I have reviewed the Operating Reserve Markets during the first four months of operation from May 1 to August 31, 1999. These markets suffer from serious implementation and market design flaws. The ISO has responded to these flaws with necessary and appropriate short-term remedies. These remedies are also

reflected in the filing revisions to NEPOOL Market Rules 6, 8, and 9, as filed by the NPC on September 27, 1999.

The remedies involve the use of price limitations. The ISO, recognizing the dangers of rigid price limitations, wisely decided on market-based price limitations, allowing the limitation on reserves to vary with the energy price. Although rigid price limitations are inconsistent with competitive markets, their careful application in response to market design flaws is necessary. These remedies should be continued until a better solution can be implemented.

The ISO and NEPOOL should continue to work aggressively on a long-term fix to the market design flaws in the reserve markets. The recent work of NEPOOL's Congestion Management and Multi-settlement Committee is an important step in the right direction. However, realistically it is unlikely that the long-term solution will be implemented until some time in 2000 at best, given the complexity of the issues involved. Hence, it is important that the ISO implement a medium-term fix within a matter of months.

### **AFFIDAVIT**

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth are true to the best of my knowledge, information, and belief.



Peter Cramton

October 15, 1999