New York Market Advisor
Annual Report on
The New York Electric Markets

for

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Ancillary Services Section

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Capital Economics

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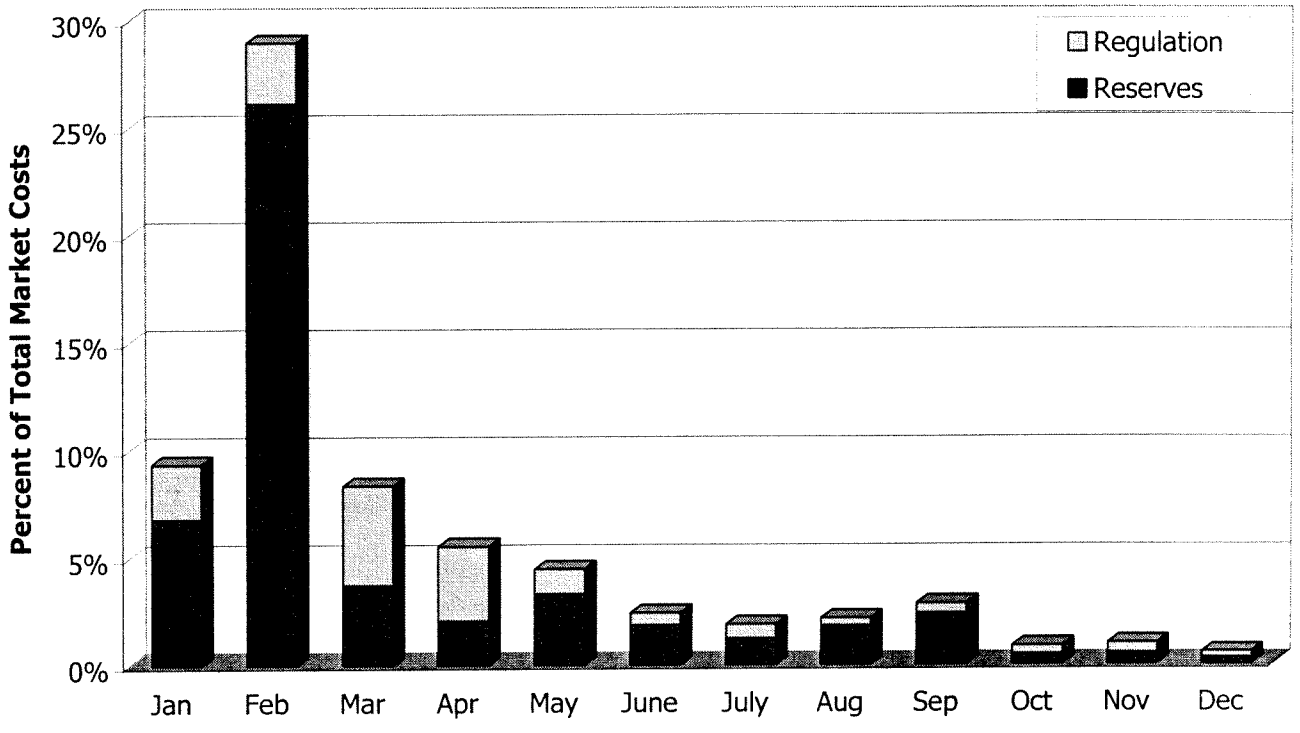
A. Introduction

The New York ISO ("NYISO") began operation in 1999 by implementing three reserves markets and a regulation market along with the energy markets. This report will review the competitive performance of these markets and the issues that have arisen during the first year. In addition, this section will summarize the modifications that have been made or are underway to address the issues and recommends future improvements to further enhance the performance of the markets.

Figure 1 shows that during the latter months of 2000, reserves and regulation expenses were reasonable as a percentage of the total market costs -- ranging from one to three percent on a monthly basis. Earlier in the year, however, these costs far exceeded this expected range due to withholding in one of the reserve markets.

Figure 1
Reserves and Regulation Costs



However, before describing these events and assessing the competitive performance of the ancillary services markets, I will briefly describe how they are structured and operate. New York procures three types of operating reserves: 10-minute spinning reserves, 10-minute total reserves (can be spinning or non-synchronous reserves ("NSR")), and 30-minute reserves. 10-minute spinning reserves are those that are on-line and can provide additional output within 10 minutes. 10-minute NSR resources are resources that are not on-line but may be turned on and providing their output within 10 minutes, which are typically gas turbines. 30-minute reserves may be on-line or off-line resources that can be producing a given output within 30 minutes. The NYISO receives availability bids from each generator that indicates the minimum price they are willing to accept to provide the reserve.

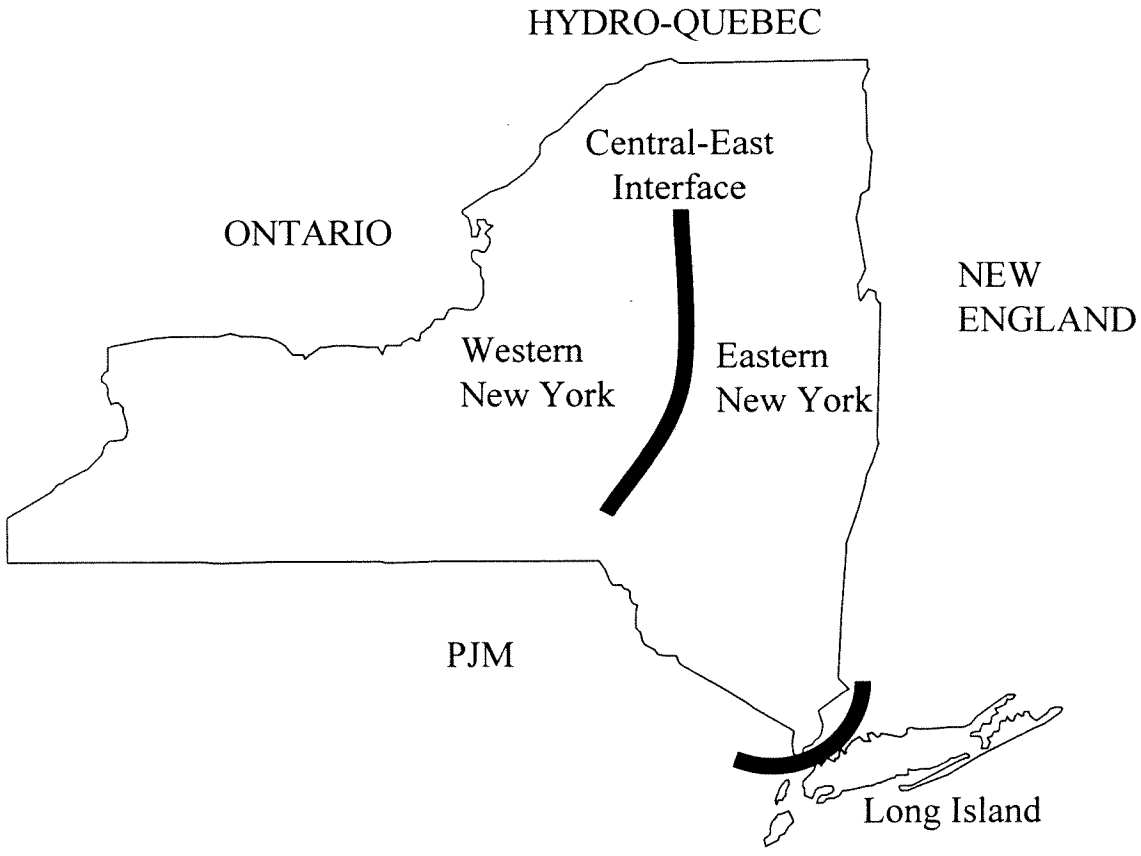
In total, 1800 MW of operating reserves must be purchased in the the New York Control Area ("NYCA"), of which 1200 MW must be 10-minute total reserves (spinning or NSR). Therefore, the NYISO may purchase up to 600 MW of 30-minute reserves. Of the 1200 MW of 10-minute total reserves, at least 600 MW must be spinning reserves and the balance may be NSR resources. Therefore, there is a limit on how much NSR resources can be used to meet the statewide 1200 MW requirement for 10-minute reserves. There is no such limit on spinning reserve purchases – i.e., all 1200 MW 10-minute total reserve purchases by the NYISO could be spinning reserves. Likewise, 30-minute reserves cannot be substituted for 10-minute reserves, but 10-minute reserves could be purchased to meet the entire 1800 MW operating reserve requirement.

Therefore, 10-minute spinning reserves are the highest value reserve while 30-minute reserves are the lowest value reserves. Each of the reserves markets are simultaneously cleared together with the energy market to minimize total bid production costs. In this process, the price for lower value reserves often clears below the price for higher value reserves. For example, the 10-minute NSR prices generally clear below the price of 10-minute spinning reserve prices because the ISO must purchase reserves from more expensive spinning reserve units to meet the 600 MW spinning reserve requirement.

However, when higher value reserves are substituted for lower value reserves because the lower value reserves are more expensive, then the price of both types of reserves will be set at the marginal cost of the higher value reserve. For example, when 10-minute NSR resources were withheld in the spring of 2000, 10-minute spinning reserves were often substituted for 10-minute NSR resources to satisfy the 10-minute total reserves requirement and the price in both markets were set at the same level – i.e., the bid of the marginal 10-minute spinning reserve.

In addition to the NYCA requirements described above, the procurement of reserves are also subject to locational requirements to ensure that they will be fully available to respond to possible system contingencies and maintain reliability. The transmission interfaces that can become constrained and contribute to the locational requirements are shown in Figure 2.

Figure 2



The most significant interface in New York, and perhaps the entire Northeast, is the Central-East Interface that limits economic transfers from Western New York, PJM, Ontario, and Hydro Quebec to Eastern New York and New England. Because of this constraint, maintaining reliability requires that a substantial portion of the reserves be procured in Eastern New York. Likewise, the interface between Long Island and the rest of New York has resulted in a requirement that specified amounts of operating reserves be purchased from generating units on Long Island. These requirements include the following.

First, 1200 MW of total 10-minute reserves (spinning and NSR) must be purchased east of the Central-East constraint. This does not mean that all of the 600 MW of 10-minute spinning reserves required within the NYCA will necessarily be purchased in Eastern New York. When 10-minute NSR resources are relatively inexpensive, more than 600 MW may be purchased in the east (e.g., 800 MW) with the balance of the eastern requirement supplied from 10-minute spinning resources (400 MW) and the rest of the 600 MW 10-minute spinning requirement purchased in Western New York (200 MW). This example shows that some 10-minute spinning reserves may be procured in Western New York despite the locational requirement for Eastern New York. Nevertheless, the eastern requirement does limit quantity of 10-minute reserves that may be purchased in Western New York where roughly half of the state's spinning reserve capability is located.

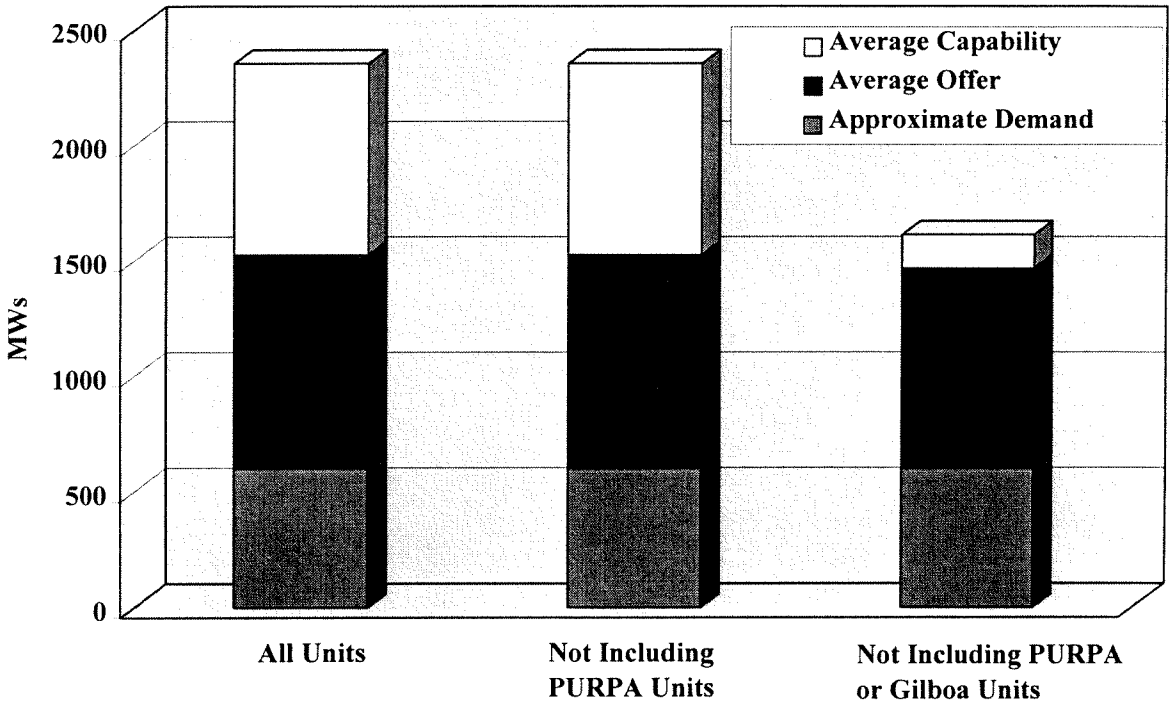
Second, prior to November 1, 2000 locational reserve requirements for Long Island required that 380 MW of 10-minute reserves (spinning and NSR) and 540 MW of total reserves (10-minute and 30-minute) be purchased on Long Island. After November 1, the 10-minute reserve requirements for Long Island were reduced to 60 MW of 10-minute spinning and 120 MW of total 10-minute reserves while the requirement for total operating reserves remained at 540 MW. Because prices in each reserve market are set by the bid of the marginal resource, if an expensive resource is needed to meet the Long Island requirements, it will establish the clearing price for the entire state. The NYISO has proposed modifying this provision to allow spatially differentiated prices to reflect the effects of the locational reserve requirements in the same way that locational energy prices reflect transmission system limits.

There are no locational requirements for the procurement of regulation service, which may be purchased throughout the NYCA. The NYISO purchases a greater amount of regulation during high ramp hours than during low ramp hours. The amount of regulating capability a generating resource may sell is equal to the amount of output it can produce within 5 minutes (ramp rate per minute times 5). In addition, to qualify as a regulating unit, the unit must be able to receive and respond to a continual dispatch signal and have the ability to ramp at a rate of 1 percent of the unit's total capability per hour. When a regulating unit is off of its dispatch point on the low side by a significant amount, it may be subject to significant penalties, while a unit producing more than its dispatch point (i.e., over-generating) is not paid for its excess energy. The following sections will describe the performance of each of the ancillary services markets and provide recommendations short-term and longer-term modifications.

B. 10-Minute Non-Synchronous Reserves

Withholding of 10-minute NSR resources was primarily responsible for the inflated reserve costs in early 2000. Therefore, the results in the 10-minute spinning reserve market will be better understood after first reviewing the offers and results in the 10-minute NSR market. I will describe the withholding later that led to the imposition of the mandatory bidding requirement and bid cap. First, the average capability available to the market is shown in Figure 3 for the period during 2000 with the bidding requirements in place.

Figure 3
10 - Minute Non - Sync. Reserves in Eastern New York
April 1, 2000 - December 31, 2000



The first two bars in Figure 3 show the capability located in Eastern New York with and without PURPA units included. PURPA units generally do not offer capacity into the reserves markets

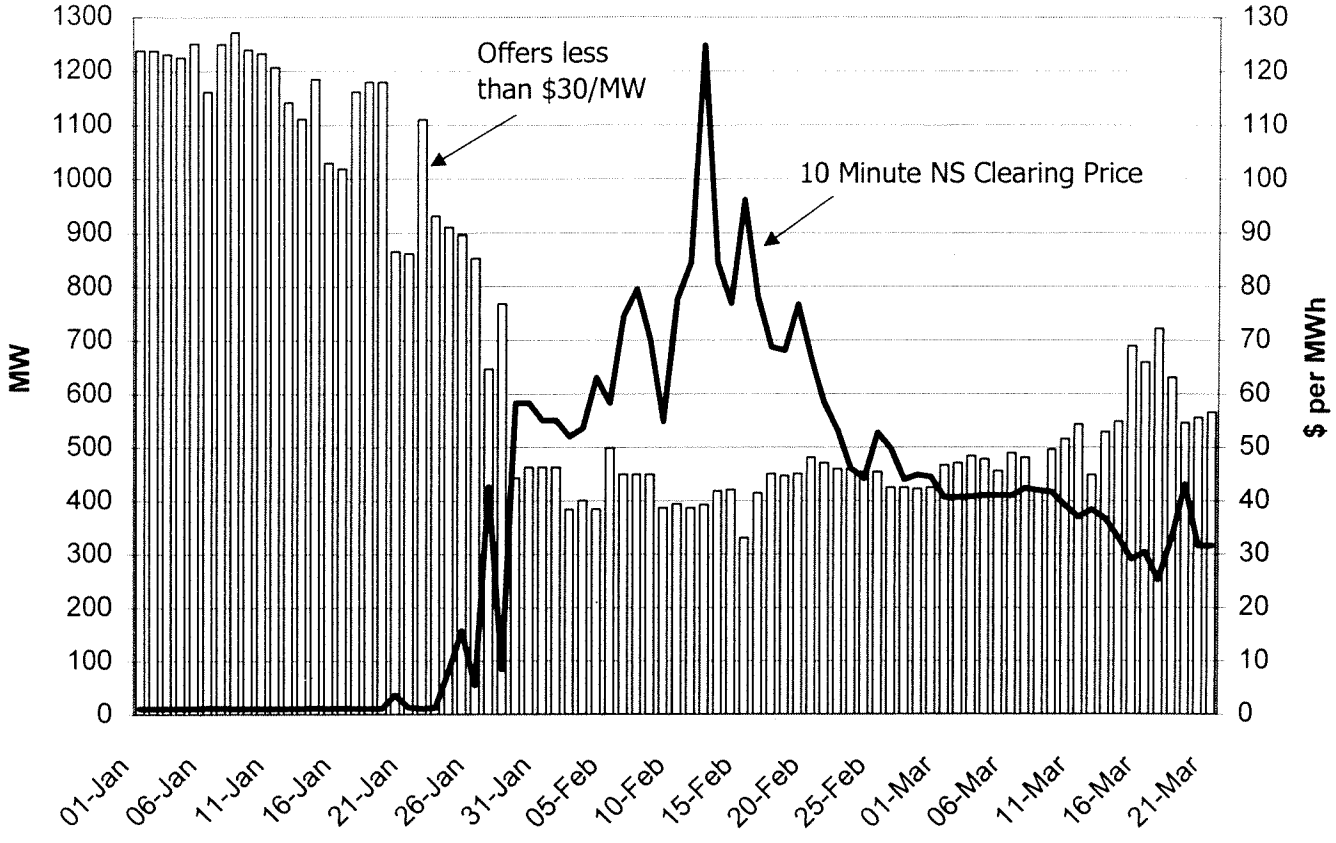
due to contractual limitations or concerns regarding qualifying facility status. The last bar removes the capability and offers of the Blenheim-Gilboa Pumped Storage Project ("Gilboa"). Although the average capability from Gilboa shown in the figure approaches 1000 MW, the initial modeling of the project under the "B-G Scheduling Agreement with NYISO Operation" limited the amount of Gilboa's capability that could provide reserves by modeling Gilboa as a single unit. In reality, Gilboa is comprised of four 250 MW units that can pump water into storage ("pumping mode"), or release the water to generate electricity ("generating mode").

Each unit can switch very quickly from pumping to generating mode or start-up from stand-still. By modeling Gilboa as a single unit in the generating or standstill mode, it could only be scheduled to generate in a given hour if none of the units are in pumping mode. This prevented the NYISO from taking full advantage of Gilboa's flexibility as a supplier of reserves. However, the necessary software changes were completed last fall to allow Gilboa to bid as 10-minute spinning and 10-minute NSR to the extent that its capabilities allow. In theory then, Gilboa could now bid all 1000 MW into the 10-minute reserve markets although the NYISO has limited its purchases of reserves from Gilboa to 560 MW for reliability reasons (i.e., so as not to hold an excessive portion of the State's reserves at one location). Even without Gilboa, however, Figure 3 shows that the NYISO receives more than double the amount of offers than the typical demand for 10-minute NSR, all of which are subject to the $2.52 per MW bid cap. This was not always the case.

During the spring of 2000 after more than two months of relatively competitive conduct on the part of 10-minute NSR suppliers, a significant amount of physical and economic withholding began. The 10-minute NSR market had been clearing below the $2.52 level because the amount of capability offered substantially exceeded the typical demand. However, this capability is held principally by only three suppliers, with the capability of one of the three entities by another one of the three entities bid under an agency agreement. The largest supplier of 10-minute NSR holds 58 percent of the capability, while the capability of the two entities bid by the same agent total more than three quarters of the total 10-minute NSR capability.

Figure 4 shows the changes in bidding patterns for the 10-minute NSR suppliers from the beginning of January 2000 through the third week in March.

Figure 4
10 Minute Non-Synch Clearing Prices and Offers less than $30 per MW
Daily Averages for January 1 to March 21



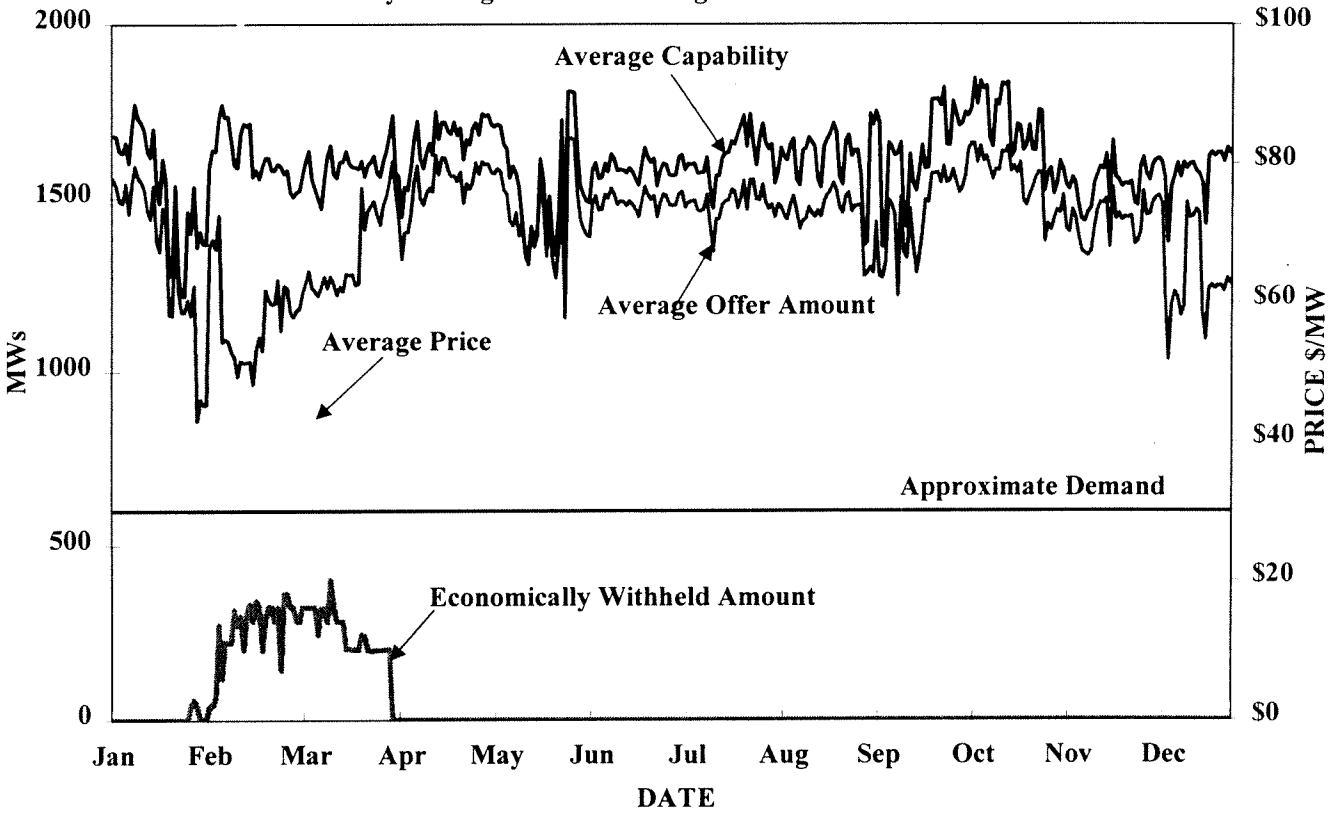
The $30 per MW level was selected for this figure because it should substantially exceed the expected lost opportunity costs facing most suppliers during this period. The figure shows the considerable reduction in economic bids for 10-minute NSR resources that occurred at the end of January 2000, falling from well over 1000 MW to close to 400 MW. Both physical and economic withholding contributed to this reduction. The decline in economic bids caused 10-minute spinning reserves to be substituted for 10-minute NSR resources, resulting in a single clearing price for all 10-minute reserves at substantially elevated levels.

I estimated the cost of this conduct at close to $70 million by calculating the likely clearing prices in the 10-minute reserve markets assuming the 10-minute NSR suppliers continued to

offer their resources as they had prior to January 29. One of the justifications the 10-minute supplier cited for the substantial increases in 10-minute NSR bid prices was that the units sometimes face the lost opportunity to profitably sell their output in the energy market. This cost should rationally be incorporated in the suppliers' availability bids.

Therefore, when the $2.52 bid cap and mandatory bidding requirement was imposed to address this conduct, a lost opportunity cost provision was also implemented to ensure that suppliers receive the full value of their resources in either the reserves or energy market. These provisions have effectively protected the reserves markets from any further consequences from withholding of 10-minute NSR capability as Figure 5 shows.

Figure 5
10 - Minute Non - Sync. - Eastern New York
Daily Averages - Not Including PURPA Units or Gilboa



The figure shows that prices after March 2000 were relatively flat due to the bid cap with the exception of the isolated price increases due to the 30-minute reserve market. In each of these cases, tight reserve conditions on Long Island caused relatively high priced 30-minute reserves to

clear the market to meet the Long Island locational reserve requirement. As discussed above, the price of lower value reserves can set the price for all higher value reserves when the marginal cost of supplying the lower value reserve is higher. Because reserve prices are not locational (i.e., the highest accepted bid needed to meet all reserve requirements for a given type of reserve sets the price statewide), the high 30-minute clearing price needed to satisfy the Long Island constraint set high prices statewide for all reserves. A proposal to set reserves prices by location is described below that would address this issue.

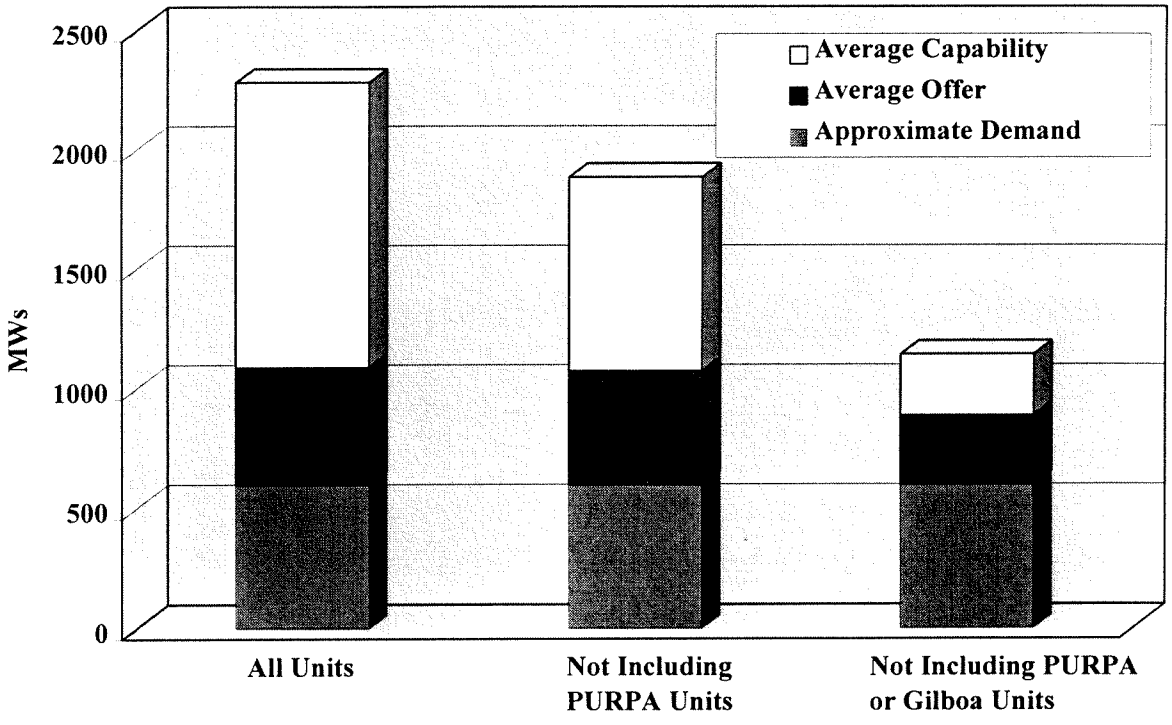
Additional supply of 10-minute NSR resources will help ensure that the market remains competitive once the bid cap is removed by decreasing the ability of suppliers to withhold and raise the price. Therefore, the enhancements to the modeling of Gilboa should clearly be beneficial. In addition, gas turbines that require longer than 10 minutes to reach full output can currently only supply 30-minute reserves. The NYISO is investigating modifications that would allow such units to supply 10-minute NSR for the portion of its output that would be available within 10 minutes, thereby increasing the 10-minute NSR supply. Several measures to increase the supply of 10-minute spinning reserves are outlined in the next section that will impose additional competitive discipline on the 10-minute NSR suppliers since spinning reserves may be freely substituted for NSR resources to meet the total 10-minute reserve requirement.

B. 10-Minute Spinning Reserves

As discussed in the prior section, prices in the 10-minute spinning reserve market were affected by the conduct in the 10-minute NSR market. Apart from that episode, the spinning reserve market has generally exhibited competitive results. The spinning reserve market is significantly less concentrated, as 10 suppliers in the east hold significant shares of the spinning reserve capability, and none with a share higher than 25 percent.

Figure 6 shows the amount of capability on average that is available and has been offered in the 10-minute spinning reserve market in Eastern New York during the year, with and without the PURPA units and Gilboa. Reserves in Eastern New York only are shown due to the locational requirement that 1200 MW of 10-minute reserves be purchased in Eastern New York. This provision limits the value of 10-minute reserves in Western New York.

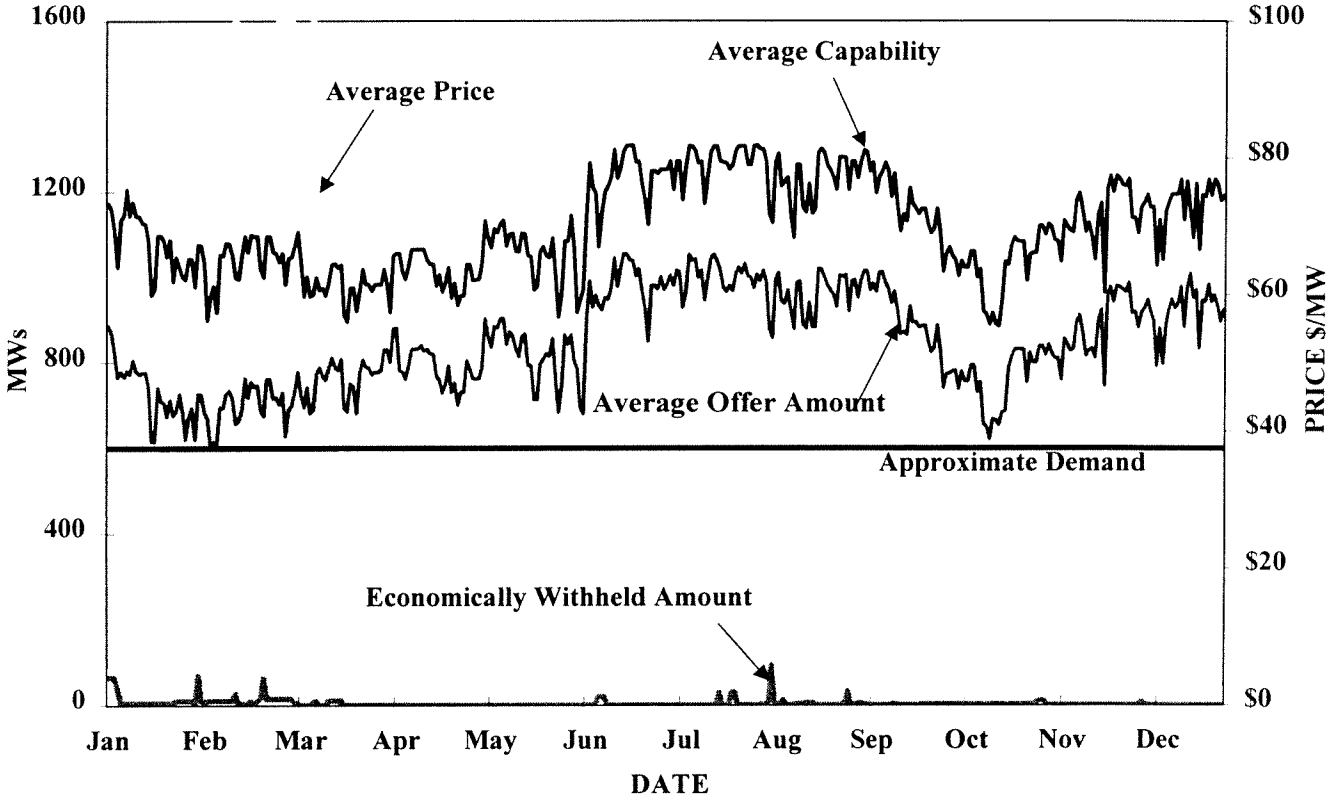
Figure 6
10 - Minute Spinning Reserves in Eastern New York
April 1, 2000 - December 31, 2000



The figure shows that suppliers typically offer 75 percent more 10-minute spinning reserve capability than the approximate demand level of 600 MW. This rough estimate of the excess bids ignores the fact that some spinning reserves in Western New York may be used to meet the 600 MW spinning reserve requirement if additional 10-minute NSR resources are substituted to meet the 10-minute reserve requirement in Eastern New York.

Figure 7 shows the average daily capability, bids, and prices for 10-minute spinning reserves in Eastern New York, showing that adequate capacity generally is offered on a daily basis, even ignoring Gilboa and PURPA units.

Figure 7
10 - Minute Spinning Reserves - Eastern New York
Daily Averages - Not Including PURPA Units or Gilboa



The figure clearly shows that there were substantial effects during the spring on prices in the 10-minute spinning reserve market due primarily to the conduct in the 10-minute NSR market. Some physical withholding did occur that reduced the amount offered to levels close to the approximate demand on some days that contributed to the higher 10-minute reserve prices by

limiting the amount of substitution that could occur between the spinning and NSR market. This conduct alone, however, would not have been sufficient to cause the price increases that were experienced during that period. After March of 2000, the amount offered in this market has generally been adequate to achieve competitive results. Nevertheless, the chart clearly shows that a substantial amount of capability is generally not offered in this market. With Gilboa more fully utilized in the reserve markets, this will not cause significant problems under most conditions. However, it is important to remember that the energy, operating reserves, and regulation markets are all simultaneously cleared. All of the spinning reserve resources can provide energy and many also have the capability to provide regulation service.

Hence, under tight market conditions when a large share of the resources bidding in the 10-minute spinning reserve market are also needed to supply energy or regulation, price spikes in all three markets are possible. On June 26, for example, day-ahead energy prices in Eastern New York exceeded $1000 for most of the afternoon. On this day, tight conditions in the reserves markets caused some lower priced energy resources to be selected to provide reserves causing higher priced energy resources to be selected to provide energy (because the higher priced energy resources had not offered to provide reserves). Therefore, increasing the amount of 10-minute spinning reserve offers will likely benefit the energy market and other ancillary services markets when market conditions become tight.

Several enhancements are underway to increase the capability offered in the 10-minute spinning reserve markets beyond the modeling improvements for the Gilboa units that I described in the prior section. First, the NYISO is discussing a reserve sharing agreement with New England that would allow reserves in New England to be available to New York and vice-versa. This would effectively increase the amount of available supply to each region and potentially reduce the overall reserve requirements.

Second, the NYISO is investigating the feasibility of allocating transmission capability on the Central-East Interface to allow western reserve suppliers to meet Eastern New York reserve requirements. This would be beneficial in cases where the difference in the marginal cost of

providing energy in Eastern New York versus Western New York is less than the difference in marginal costs of reserves in eastern and Western New York. This is sometimes the case under normal conditions when the Central-East Interface constraint is not binding. However, it was frequently true during the episode in spring 2000 and this type of provision could have mitigated the effects of the withholding seen during that period by providing an additional source of potential supply. Therefore, this modification promises some benefits to the market, the change should be investigated thoroughly prior to implementation to ensure that it does not create inefficient effects in the energy market by underutilizing the transmission system, or otherwise hinder reliability.

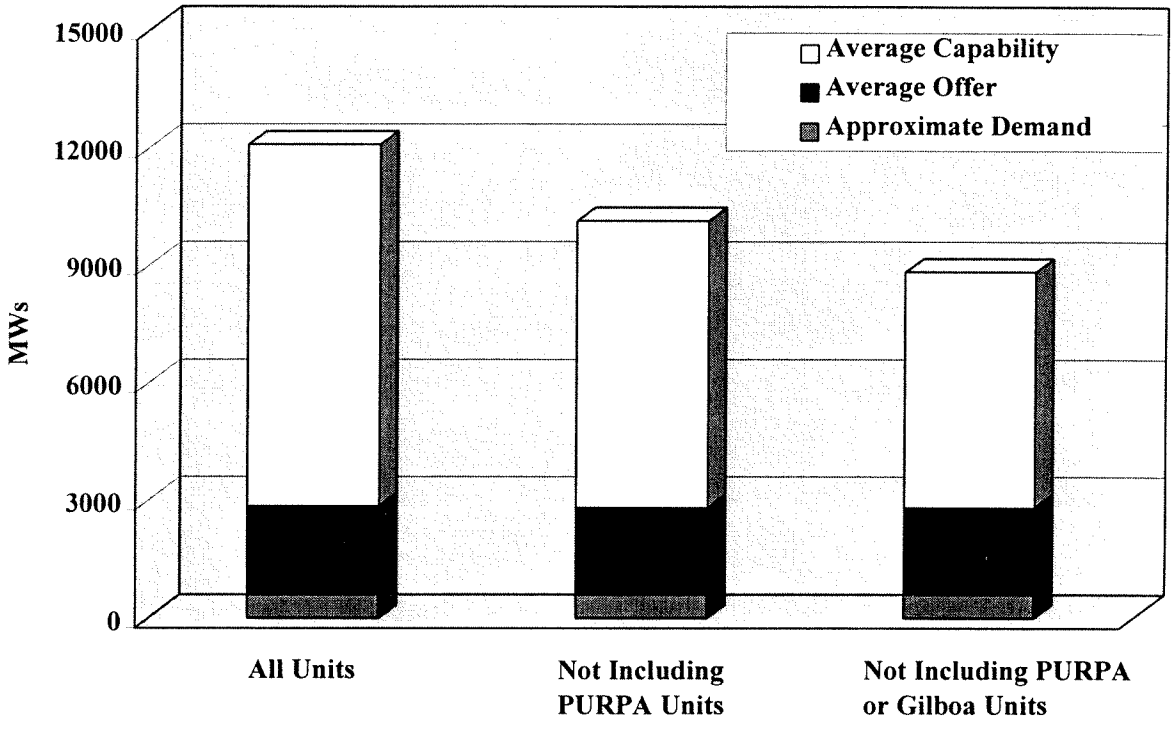
In addition to these measures to increase the total capability of 10-minute spinning reserves available to the New York markets, improvements in the pricing of 10-minute spinning reserves may provide additional incentives for potential suppliers to bid in this market. For example, the NYISO currently compensates a generator for its own lost opportunity costs of providing reserves versus selling energy in the real-time energy market. No lost opportunity costs are available associated with foregone sales in the day-ahead energy market although these costs may be substantially different than real-time lost opportunity costs. Also, because the price is set at the level of the highest accepted availability bid, it may not reflect the true market value of the service in the day-ahead market. The availability bid currently should include an expected lost opportunity cost component, but the uncertainty associated with this expectation will cause the availability bids not to accurately reflect these costs.

Therefore, pricing reforms that would pay each reserve supplier the sum of the availability plus lost opportunity of the marginal reserve supplier would provide a more accurate price signal to potential suppliers. This pricing structure would be appropriate for each of the reserves and regulation markets, which currently receives no lost opportunity cost payment. However, like the previous provision to meet eastern reserve requirements with western supplies, this provision is not critical to the reliable supply of operating reserves for the upcoming summer. For this reason and because it will require tariff modifications and software changes, it should be considered as a potential longer-term improvement.

C. 30-Minute Reserves

The 30-minute reserve market was not significantly affected by the conduct in the 10-minute NSR market since 30-minute reserves are a lower value resource that cannot be substituted for 10-minute NSR resources. Therefore, the performance of this market throughout the year has been relatively consistent as sufficient supply has existed in all hours to meet the demand for 30-minute reserves. Figure 8 shows the capability and offers of the 30-minute reserve suppliers during 2000 with and without PURPA units and Gilboa included.

Figure 8
30 - Minute Reserves All New York
April 1, 2000 - December 31, 2000

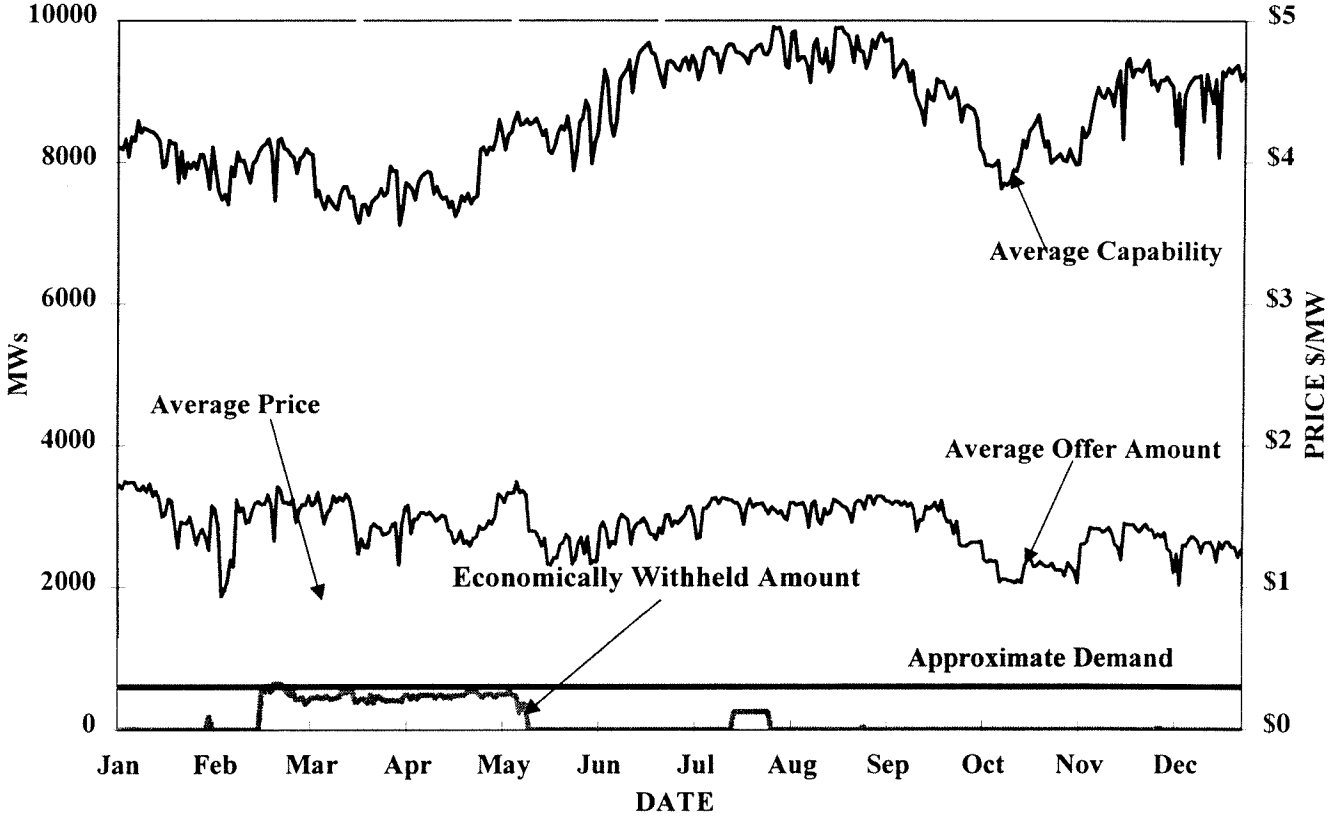


Relative to the other reserves, the 30-minute reserve market had the highest level of excess supply offered. On average, the NYISO received bids totaling almost five times the approximate demand for 30-minute reserves. This excess supply is caused by a number of factors.

First, with the exception of Long Island, there are no locational requirements for 30-minute reserves so they may be provided from anywhere within the NYCA. Second, non-synchronous reserves that cannot be producing at full output within 10 minutes may qualify to provide 30 minute reserves. Third, units that provide spinning reserves can generally provide three times the amount of 30-minute reserves that they could provide of 10-minute reserves since the amount that can be provided is equal to the ramp rate of the unit multiplied by the timeframe (10 minutes vs. 30 minutes) subject to the total capability of the unit.

The daily average capability and prices are shown below in Figure 9, showing that substantial excess supply is available on a daily basis that has led to relatively flat and reasonable prices.

Figure 9
30 - Minute Reserves - All New York
Daily Averages - Not Including PURPA Units or Gilboa



As the figure shows, the price for 30-minute reserves is generally close to $1 per MW and is the lowest price of all of the operating reserves. The figure also shows a number of price increases

that have occurred in this market in the presence of the substantial excess supply I have described above. These temporary increases are related to the Long Island locational requirement. When the market for reserves on Long Island is tight or the resources offered are more valuable in the energy market, the marginal cost of meeting the reserve requirements on Long Island can be substantially higher than the typical clearing price level. When this occurs, the marginal cost for 30-minute reserves on Long Island can set the price for all reserves in the state.

Because the Long Island Power Authority ("LIPA") resources are necessary to meet the Long Island reserve requirements, LIPA has the unilateral ability to raise statewide reserves prices to any level it chooses by withholding resources from these markets and thereby causing a shortage of reserves on Long Island. To mitigate this concern, LIPA has agreed to offer sufficient reserves to meet its locational reserve requirements at competitive levels. In addition, the market mitigation measures would apply if withholding of reserve capability were to raise concerns in the future.

In addition, the NYISO has proposed locational reserve pricing that would set reserves prices at the marginal cost of meeting the reserve requirements at that location. Therefore, if the marginal cost of meeting the Long Island reserve requirement for reserves is higher than the marginal cost of meeting the reserve requirements for the NYCA, the price paid to the reserve suppliers in each location would vary accordingly. This would eliminate the pricing effects in the rest of the state that occurred during 2000 when reserve conditions on Long Island became tight. Therefore, the relevant pricing zones for all of the operating reserves would be: Western New York, Eastern New York excluding Long Island, and Long Island. When a locational reserve requirement is not binding, the price in all three areas would be identical.

Currently, only the price paid to generators is proposed to vary by location. The allocation of the reserves costs would not vary by location, although this would be the logical extension. The reason for this is that some argue that the locational reserve requirements provide reliability benefits to loads located in other areas. In the longer-term, the NYISO should establish a cost-

allocation method that is fair, reflects these benefits, and sends appropriate signals for loads choosing to self-supply their reserve obligation.

Given the performance of this market, limited changes appear to be needed in the near-term to ensure adequate and competitive supply of 30-minute reserves. However, some of the improvements described in prior sections will enhance supplies in this market as well. For example, a reserve sharing arrangement with New England would likely include 30-minute reserves and allow for reduced purchases of 30-minute reserves as the requirements are coordinated.

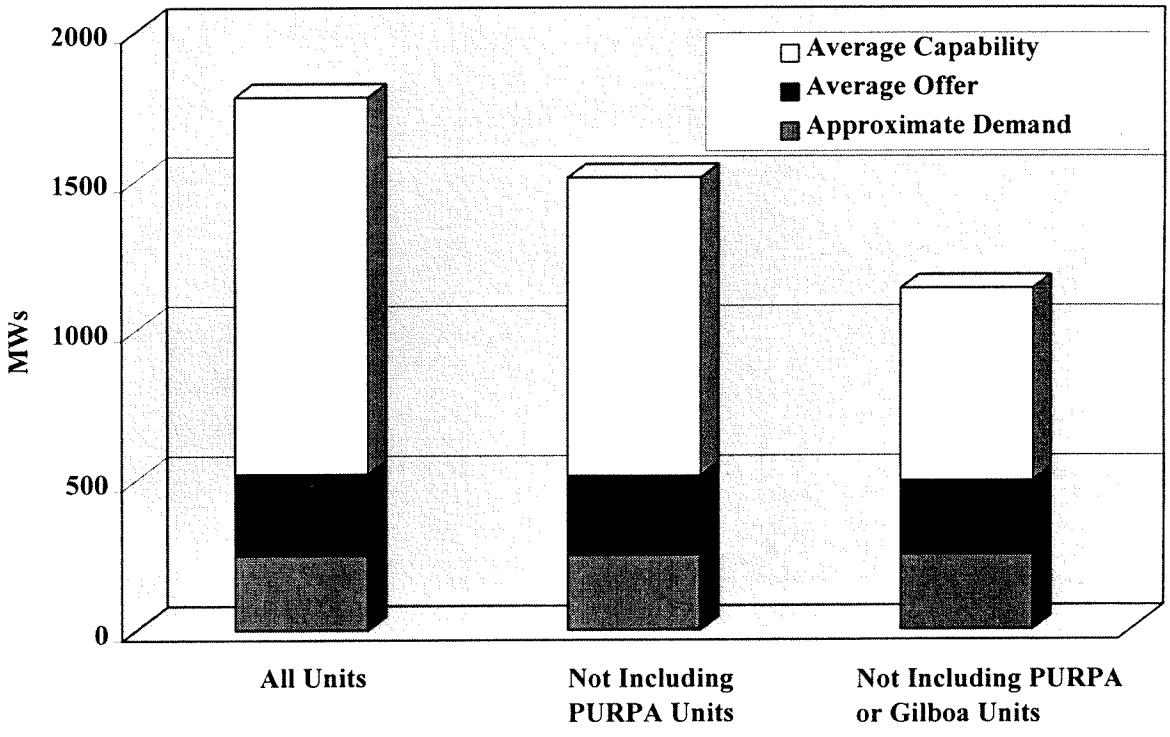
In addition, the pricing reform I described in the previous section would also improve the incentive for certain suppliers to offer their resources in this market by including in the 30-minute reserve price the opportunity cost for suppliers related to sales in the day-ahead energy market. Although this reform is not immediately necessary in this market, consistent pricing across all reserves markets and the regulation market would make the markets easier to understand and participate in, would reduce risks associated with lost opportunity costs, and ultimately make it easier to monitor.

D. Regulation Market

The last ancillary service market that I review in this report is the regulation market. Units providing regulation service receive a dispatch signal every six seconds, allowing the NYISO to ensure that supply equals demand on a real-time basis. Regulating units must have the ability to move upward or downward from their base point an amount equal to the amount of regulating service they are providing. Like an operating reserve, therefore, a regulating unit cannot be scheduled to provide energy to the upper operating limit of the unit and may incur a lost opportunity cost associated with the undispatched portion of its output.

The amount of regulating service a unit may provide is equal to its ramp rate per minute times five minutes. Therefore, a unit's regulating capability is generally half of its 10-minute spinning reserve capability. Figure 10 shows the average capability and the offers the NYISO received during 2000.

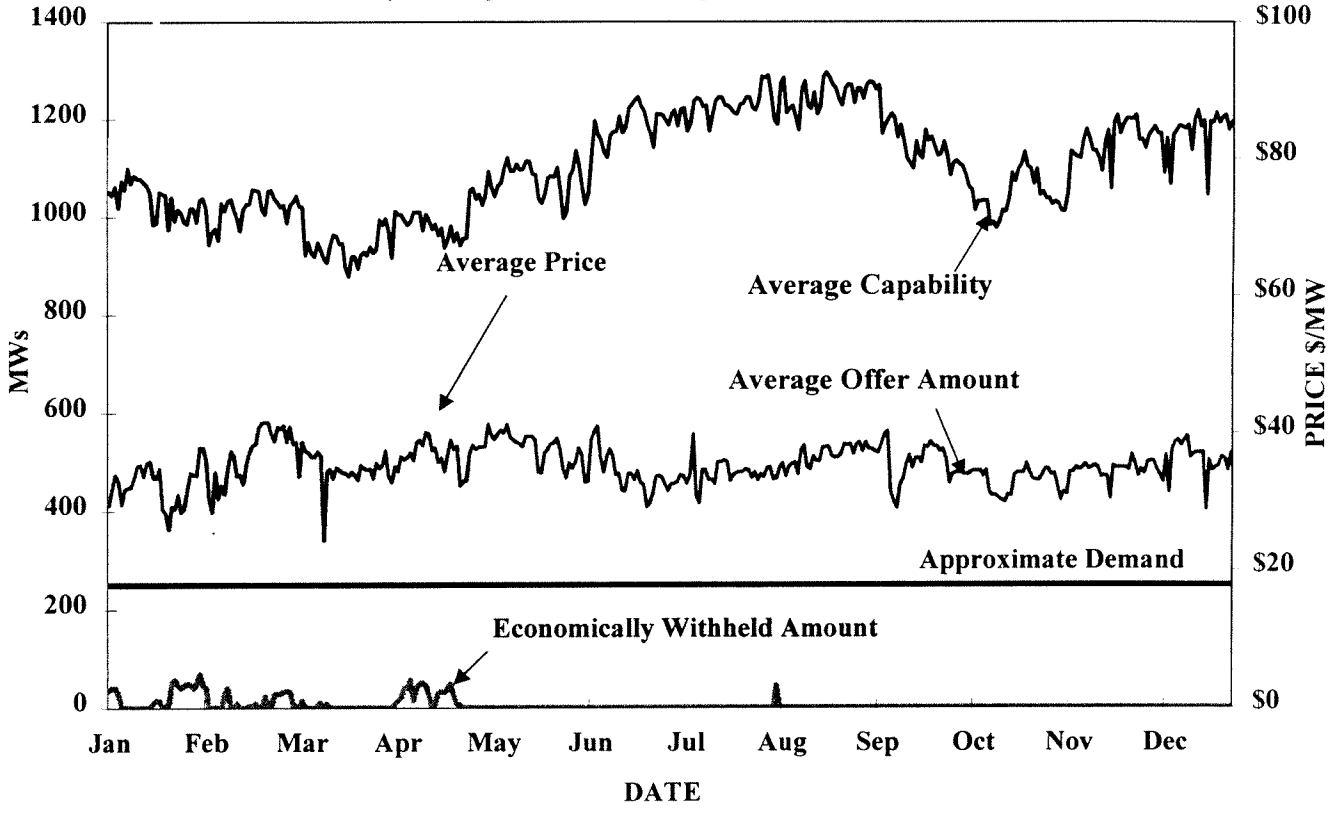
Figure 10
Regulation Market All New York
April 1, 2000 - December 31, 2000



This figure shows that the NYISO typically received approximately 75 percent more bids than the regulation requirement of 275 MW during high-ramp hours (200 MW is required in other hours). This is approximately the same amount of excess as in the 10-minute spinning reserve market. However, the regulation market is arguably tighter than the 10-minute spinning market because some substitution is possible from Western New York into Eastern New York for 10-minute spinning reserves. The 75 percent margin for regulation already includes all of the capability statewide since the regulation requirement is not locational.

When the market first began in late 1999, the NYISO frequently received fewer regulation bids than the total regulation requirement. This shortage was remedied by the beginning of 2000 with additional suppliers offering resources into the regulation market. The average daily offer amount continued to rise on average through the end of February and then remained relatively constant over the rest of the year. These daily offer patterns are shown in Figure 11 below together with the daily average regulation prices.

Figure 11
Regulation Market - All New York
Daily Averages - Not Including PURPA Units or Gilboa



The figure shows that prices for regulation fell consistently over the year, particularly from late January to April 2000. The higher prices that occurred in the spring may be attributable in part to the events in the operating reserve markets during this timeframe. As supplies of 10-minute NSR decreased, increasing amounts of 10-minute spinning reserves were substituted to meet the reserve requirements. Because the resources that provide 10-minute spinning reserves also typically supply regulation, the resources available to meet the regulation requirement were reduced, resulting in higher clearing prices.

Although Figures 10 and 11 both show that the supply has been adequate to meet the regulation requirement, they also show that less than half of the available regulation capability is typically offered in this market. The relatively low participation rate in this market limits the amount of excess supply in this market, making it much more susceptible to significant price increases. This can occur when a large portion of the supply is uncommitted or in the process of starting up. For example the highest regulation prices in recent months has occurred between midnight and 2 a.m. The regulation market will also be vulnerable to price increases when conditions are tight in other markets and a portion of the regulation-capable resources are needed to provide operating reserves or energy. In this case, a higher participation rate would result in more stable prices.

There are a number of factors that may contribute to the participation rates that the NYISO has realized in this market and are currently being investigated. Some participants cite the additional wear on the generating unit that can be caused by frequent output changes required by regulating units. However, this cost could be estimated and incorporated in a unit's bid to provide regulation. The more likely cause of the low participation rates is the market rules that currently apply to regulating and other on-dispatch generators.

Regulating units must meet a number of other requirements in addition to having the ability to receive dispatch signals every six seconds. For example, regulating units must have the ability to change their output by 1 percent of the unit's capability per minute. In addition, regulating units must operate within a relatively tight band around their instructed dispatch level or they can be subject to substantial regulation performance penalties. Units that are above their dispatch level

are not compensated for their over-generation, even if it is assisting the NYISO keep the market balanced because other generators are producing below their instructed dispatch level. Together, these rules may preclude some generators from participating in the market, and may reduce the incentive or raise the costs for other generators.

The NYISO has recently conducted a survey of suppliers regarding these issues to determine the extent to which they may be hindering participation and is considering modifying the rules to reduce or eliminate regulation penalties and increase the amount of capacity that would qualify to provide regulation (e.g., by reducing the one percent ramp rate requirement). The results of this survey have informed the NYISO's decision to modify these rules to encourage additional supply to participate in the market. The market participant committees are currently considering a proposal by the NYISO to modify these rules and if action is taken by the committees and ultimately by FERC, these changes could be in place prior to the summer.

E. Conclusions and Recommendations

The performance of the operating reserves markets and regulation market has been consistent with workable competition during 2000 with the exception of the episode during the spring. Following the imposition of the 10-minute NSR bidding requirement and cap, the bids and prices in each of the other markets remained at competitive levels. However, tight conditions in the ancillary services markets have contributed to the price spikes in the energy market in Eastern New York during the year. Under these conditions, even a modest amount of additional supply can provide substantial benefits to the market.

Therefore, I have recommended that the NYISO proceed most rapidly with those provisions that would expand the total capability or participation rates in the reserves and regulation markets. This includes:

- Allowing 30-minute NSR units to provide 10-minute NSR at the level their generator can produce within 10 minutes, although it may not have the ability to achieve full output in 10 minutes;
- Establishing a reserve sharing agreement with New England to coordinate reserve purchases and utilization, which should result in lower reserve requirements and competitive improvements in the reserves markets; and
- Modifying regulation market rules and penalties to remove disincentives or other barriers to fuller participation in the market by reserve capable generators.

These improvements should be implemented as soon as is feasible as they promise immediate relief for the reserves and regulation market when conditions become tight. Another provision that may increase the supply of reserves in Eastern New York under certain circumstances is the provision to allow reserve suppliers in Western New York to supply reserves in Eastern New York by setting allocating or reserving transmission capability on the Central-Easttransmission interface for this purpose. However, this modification requires more investigation and planning than the measures listed above. Therefore, I have recommended that this not be attempted in the

short-term, until it is thoroughly investigated and tested to ensure that it will not adversely affect the utilization of the transmission system.

In addition to the supply enhancements, a number of pricing enhancements are also being considered.

- Establishing prices that vary by location for suppliers of operating reserve when the locational reserve requirements are binding. This would lower the cost of reserves and send more accurate price signals to reserve suppliers. This provision has been proposed and awaits FERC's approval.
- Implementing a consistent pricing structure for the operating reserves and regulation that would compensate the suppliers in each market with a clearing price equal to the availability bid plus lost opportunity cost of the marginal supplier in that market. This would reduce uncertainty regarding lost opportunity costs, which results in much higher availability bids and may be a significant disincentive for some suppliers offering their resources.

I have recommended that the former be implemented as soon as feasible after FERC approves this modification. Given the process required to implement the latter provision, I have recommend that the NYISO consider this modification over the longer-term.

Finally, additional long-term modifications have been discussed, including implementing a second settlement in the hour-ahead from the ancillary services. The NYISO currently optimizes its reserves purchases in the hour-ahead, but does not settle the differences between the day-ahead schedules and the hour-ahead schedules at an hour-ahead price. A second settlement would provide more accurate price signals for potential reserve suppliers in the real-time market and could lower costs to the market to the extent that a day-ahead reserve supplier is dispatched for energy the following day. Without the second settlement, the day-ahead supplier is not obligated to buy back its reserve schedule in the hour-ahead and would be paid for both the reserve schedule and the energy schedule. However, this remains a longer-term recommendation because it is not resulting in substantial costs to the market.