Status of TO Questions Regarding 2008 State of the Market Report

1. Slides 42 and 43 contain net revenue analyses for combined cycle units and combustion turbines. Can you provide similar analyses for coal and nuclear units, for demand response, and for energy efficiency?

   Status: Similar analyses were not feasible for coal and nuclear units because the dispatch of those units is more complicated, and that similar analyses are not feasible for demand response or energy efficiency because it is difficult to state what the marginal cost of those resources is.

2. On slide 44, the report asserts, "Vernon/Greenwood is the only area of NYC where new CT investment might have been profitable in 2008." It goes on to say, "The estimated CONE for a new CT in NYC was $188/kW-year for the 2008/09 Capability Period," with that estimate having been taken from the ICAP demand curve reset study. However, that value of "CONE" was calculated using an amortization period that is much shorter than the forecasted 30-year life of the plant. A generator owner would consider revenues to be earned over the full 30-year lifespan of the plant, so it is not appropriate to use this version of CONE in this analysis. Instead, a CONE calculated using a full 30-year amortization period is appropriate. Would new CT investment have been profitable in 2008 in the areas of NYC that you analyzed, using CONE calculated over a 30-year amortization period? What about new CT investment in the locations outside NYC that you analyzed?

   Status: The CONE used for the purposes of setting the demand curve was also be used in this analysis. We do not have better information regarding CONE. To the extent that parties believe one or more assumptions used to calculate CONE are not correct, that should be addressed in the demand curve reset process.

3. Can you confirm that the data presented on slides 49 and 50 reflect scheduled flows, rather than actual flows, across each interface? Also, could you confirm that net imports from HQ are actually highest in the winter and lowest in the summer, as slide 50 suggests? This seems counterintuitive.

   Status: The data reflects scheduled flows and are correct, even if counterintuitive.

4. Slides 52 through 56 discuss circuitous transactions around Lake Erie. However, they do not discuss the large increase in transactions being scheduled from Ontario to PJM through MISO. As we understand from your comments, about half of this energy actually flows through New York, so this is the cause of significant adverse parallel flows in New York. Can you prepare a written presentation on this issue, its impact on New York consumers, and potential procedures for alleviating this impact?

   Status: We provided supplemental slides addressing the Ontario to PJM transactions. We have not performed an analysis of the effects of these

transactions on New York consumers. However, procedures for alleviating this impact were discussed during the July 8 MIWG meeting.

5. The graph on slide 58 shows the extent to which New York prices and prices calculated for adjoining control areas differ during unconstrained hours. Elsewhere, on slides 145-149, you describe top-of-hour pricing issues. How would omitting these intervals from the analysis on slide 58 affect your conclusions?

   Status: It would not be appropriate to omit those intervals since external transactions are scheduled for the hour as a whole.

6. Could you provide more background on the simulations of optimal hourly scheduling on the New York-New England interface that are described in slide 64? Did they assume perfect foresight by each ISO? How frequently could inter-ISO schedules be changed? Can the data in slide 65 be updated to include 2008? When will a similar study for the New York – PJM interface, as requested at the May Management Committee meeting, be completed?

   Status: We provided an illustration of these calculations in a separate memo, which was distributed to MIWG members on June 24. The updated data for 2008 is included in the full text version of the report. We do not have the data that would be needed to perform a similar study for the New York-PJM interface.

7. Slide 82 discusses convergence between day-ahead and real-time ancillary services prices. Slides 83 and 84 indicate that for eastern 10-minute non-spinning reserve and western 10-minute spinning reserve, when there are significant differences between day-ahead and real-time prices, day-ahead prices are usually lower than the real-time prices (with the exception of the 10-minute non-spinning reserves during summer afternoons). Does this pattern apply to other products in addition to the two illustrated? More generally, other than permitting virtual trading in OR and regulation markets, what can be done to produce convergence in cases when day-ahead prices exceed real-time prices?

   Status: Average day-ahead prices are usually lower than real-time prices for OR products other than those shown on slides 83 and 84. Other than permitting virtual trading, we expect that the changes to the process for committing generators for local reliability (which were implemented in February 2009 and described in Tech Bulletin 182) will likely improve convergence in these cases.

8. Slide 86 asserts, "Suppliers in markets that are not workably competitive will have the greatest incentive to withhold at peak load levels when the market impact is the largest." However, this is not necessarily true, because the foregone margins resulting from withholding will also be higher at peak load levels. To see this, consider the following example:

- In Hour 1, assume that by withholding 10 percent of its 1000 MW of generation, a generator owner can cause prices to increase from $100/MWh to $115/MWh, a $15/MWh increase.

- In Hour 2, assume that by withholding 10 percent of its 1000 MW of generation, a generator owner can cause prices to increase from $200/MWh to $220/MWh, a $20/MWh increase.

- For simplicity, assume operating costs for all generation are zero.

- Then if the generator withholds in Hour 1, it realizes 900 MWh × $115/MWh = $103,500 in revenue, while if it does not withhold, it realizes 1000 MWh × $100/MWh = $100,000 in revenue, so it is better off in Hour 1 if it withholds.

- If the generator withholds in Hour 2, it realizes 900 MWh × $220/MWh = $198,000 in revenue, while if it does not withhold, it realizes 1000 MWh × $200/MWh = $200,000 in revenue, so it is better off in Hour 2 if it does not withhold, despite the fact that its withholding had a larger impact on energy prices in Hour 2 than in Hour 1.

Given that incentives to withhold may be higher at lower load levels, even if withholding has a larger effect on prices when load levels are higher, as this example has demonstrated, have you performed any analysis to determine whether incentives to withhold are actually higher at higher load levels? If so, can you share the results of that analysis with us? If not, how much reliance can be placed on the analysis in Slides 87-92 indicating that withholding is not occurring?

The result illustrated in this example occurs because the percentage increase in prices that results from withholding is lower at the higher load level than at the lower load level, which we consider unlikely. Given the NYISO supply curves, percentage increases in price that result from withholding generally increase as load increases: 1000 MW of withholding would produce a 3-6% increase in prices at lower load levels to a 20-30% increase in prices at higher load levels. We previously provided a slide containing the representative supply curve.

9. Slide 87 asserts that "the figure [on Slide 88] shows that long-term deratings and short-term deratings decline during the highest load conditions," and Slide 90 asserts, "These figures [on Slides 91 and 92] indicate that the output gap decreases under the higher load conditions." However, that is not obvious from inspection of these figures, because there are so many data points on the figures that it is difficult to draw any conclusions from them. How strong was the correlation between load and derates, and between load and the output gap? How likely is it that this correlation was simply chance? What sort of correlations would you expect to observe in a competitive market, taking into account the example in the preceding question (which illustrates that incentives to withhold

may, in some cases, be stronger at lower load levels). Can you make the data underlying the figure available to market participants?

Status: The ISO sent a spreadsheet to market participants containing the data used in these figures. The short-term deratings may be mildly positively correlated with load because some unit that rarely run are called on during the highest load conditions and certain thermal units' capability decreases as ambient temperatures increase. However, one would not expect substantial increases in deratings during peak demand.

10. Slide 100 recommends reconsideration of the requirement that steam units in NYC offer 10-minute spinning reserve at a price of zero. What is the basis for this recommendation? Can you provide data comparing day-ahead prices to real-time prices for eastern 10-minute spinning reserve?

    Status: We found that convergence between day-ahead and real-time reserves prices has been poor under certain conditions. Under some conditions, day-ahead clearing prices appear to be systematically lower on average than real-time clearing prices. When suppliers expect day-ahead prices to be lower than real-time prices, it increases the opportunity cost of selling reserves in the day-ahead market. In response, suppliers acting competitively should raise their day-ahead reserve offer prices. However, we find that the mitigation measures likely limit the offers of suppliers below competitive levels under peak demand conditions. The recommendation addresses this issue. The requested data is publicly available, but should not show results that contradict the results in Figures 17 and 18 in the full text report since real-time spikes in the eastern spinning reserve price are accompanied by spikes in one or both of the prices shown in these figures.

11. Slide 106 states, "There have been substantial net virtual sales upstate and virtual purchases downstate during the past three years. This is consistent with the pattern of imports into downstate being higher in the day-ahead market than in the real-time market." Could you explain this further? Slide 102 states, "load has generally been over-scheduled in NYC and Long Island and under-scheduled in upstate NY." Consequently, one would expect the day-ahead price of energy to exceed the real-time price in NYC and Long Island, in which case the incentive on the margin is for virtual traders to schedule virtual supply, so that they can sell at the higher day-ahead price and cover their positions at the lower real-time price, which is inconsistent with the observation that there have been substantial net virtual purchases downstate. Similarly, one would expect the day-ahead price of energy to be less than the real-time price upstate, in which case the incentive on the margin is for virtual traders to schedule virtual load, so that they can buy at the lower day-ahead price and sell at the higher real-time price. That seems to be inconsistent with the observation that there have been substantial net virtual sales upstate.

Status: The expectation regarding the relative prices that is described in this question is not correct. The fact that load is overscheduled in NYC does not mean day-ahead prices are expected to be higher in the day-ahead market. Typically, load is overscheduled when day-ahead prices at the location would otherwise be lower than real-time prices (which makes the over-scheduling profitable). This is most frequently the case when there are differences in transmission limits or modeling that would result in price differences between the day-ahead and real-time markets (absent arbitrage).

12. Slide 110 states, "The Central-East Interface exhibited more frequent constraints in 2008, due to higher net imports from Hydro Quebec and increased clockwise loop flows around Lake Erie." However, this does not explain the growth in the frequency or value of real-time congestion on Central East from 2004 to 2007. What are the causes of this growth?

    Status: We addressed this question in a separate memo, which was distributed to MIWG members on June 24.

13. Similarly, what caused the large decreases in the frequency and value of real-time congestion on the UPNY-Con Ed interface in recent years?

    Status: We addressed this question in a separate memo, which was distributed to MIWG members on June 24.

14. Congestion into NYC is shown by the yellow bars in the figure on the right side of slide 112. What accounts for the decrease in congestion into NYC over the last several years?

    Status: We addressed this question in a separate memo, which was distributed to MIWG members on June 24.

15. The figure on slide 115 shows that the prices of TCCs in the capability period auctions for summer 2008 were considerably lower than the prices for those TCCs in either the monthly auctions or the congestion payments made to the holder of those TCCs. Have you conducted any analysis to attempt to explain this difference? If so, what conclusions have you drawn? Is this phenomenon limited to summer 2008, or has it been going on for longer than that? If so, do you know why?

    Status: In general, such differences occur when market participants expectations depart from the congestion patterns that actually occur. Figure 39 in the 2007 State of the Market Report shows that this did not occur in 2007 when the capability period TCC prices exceeded the actually day-ahead congestion. The TCC prices for the summer 2008 capability period were approximately equal to the actual day-ahead congestion incurred in the summer capability period in 2007. It is reasonable that the actual congestion in 2007 would form the basis for participants' expectations in 2008.

The average prices in the monthly Reconfiguration Auctions in 2008 were more consistent with day-ahead congestion. This is expected since the monthly Reconfiguration Auctions occur closer to the actual operating period when more accurate information about the state of the transmission system is available.

16. According to slide 117, 57 percent of day-ahead congestion rent shortfalls were not associated with specific outages and were accordingly socialized among the TOs. How does this compare to previous years? Do you have any information as to the causes of these shortfalls, and how much of the shortfall resulted from each of those causes? For example, how much was attributable to differences between parallel flow assumptions made in the DAM and parallel flow assumptions made when conducting the TCC auction (some of which may have been the result of adjusting the day-ahead assumptions to reflect the circuitous Lake Erie scheduling)? How much was attributable to transmission outages occurring outside the NYCA?

    Status: In comparison to the 57 percent of shortfalls that were not associated with specific outages in 2008, 75 percent were not associated with specific outages in 2007.

    We have not conducted the type of investigation that would be necessary to identify the causes of the shortfalls requested in this question. However, the pattern of clockwise loop flows around Lake Erie in 2008 contributed to the day-ahead congestion revenue shortfalls. Clockwise loop flows use a portion of the west-to-east transmission capability in New York, thereby reducing the capability available for scheduling in the NYISO market. The magnitude of clockwise loop flows was increased substantially in the Spring of 2008 as the quantity of circuitous transactions increased. Since the assumptions used in the TCC auctions were determined months before the assumptions used in the day-ahead market auctions, the unexpected increase in clockwise loop flows were not reflected in the TCC auctions. As a result, the quantity of TCCs sold in the auctions generally exceeded the available west-to-east transmission capability in the day-ahead market auctions, leading to significantly higher day-ahead congestion revenue shortfalls.

17. Slide 129 states, "Balancing congestion shortfalls result when external interface capability is reduced in real-time below the day-ahead scheduled level." It goes on to note that real-time offers can be as low as –$999.70/MWh, and recommends "that the current offer limit for real-time import transactions be adjusted from –$999.70/MWh to a level more consistent with the avoided costs of curtailing the import." Is there reason to believe that market power has been exercised in these cases? If so, is the ISO considering any actions other than changing the lower limit for real-time imports? Also, how would the ISO calculate the real-time offer that is "more consistent with the avoided costs of curtailing the import"?

    Status: We believe the periodic effects of these very low offers are attributed to illiquidity at an interface rather than market power. The fact that other market

participants can easily enter to submit bids and offers at these interfaces would mitigate market power concerns for most interfaces. At those interfaces where this may not be true, the NYISO has implemented competitive pricing rules to address the competitive concerns.

Regarding calculating a new floor value, the ISO will likely need to seek information from market participants regarding the costs of curtailing transactions in real-time.

18. Slide 133 states, "One factor that tends to reduce the efficiency of GT commitment is the use of simplified interface constraints in NYC load pockets rather than the more detailed model of transmission capability." Could you explain why RTC uses the simplified interface constraints? Is it possible to increase the amount of detail used in RTC's model?

    Status: We believe it is possible increase the detail of the transmission modeling used by RTC. The NYISO is in a better position to explain why RTC uses the simplified interface constraints.

19. Slide 145 describes one of the factors contributing to top-of-hour real-time price volatility as occurring "when pump storage units switch between consuming electricity and producing electricity." Isn't there usually a one-hour (or longer) gap between being in pump mode and being in generation mode? Therefore, are these actually occasions when these units switch between consuming electricity and being shut off, or between generating electricity and being shut off?

    Status: Yes, there is usually a one-hour (or longer) gap between being in pump mode and being in generation mode. The chart shows the occasions when these units switch between consuming electricity and being shut off and between generating electricity and being shut off according to the times when those respective switches occurred.

20. Have you attempted to estimate the net impact of top-of-hour real-time price volatility on the amounts paid by load? If so, what were the results?

    Status: We have not attempted to estimate this net impact.

21. Slides 157 through 161 explain how the hybrid pricing methodology caused some shortages of eastern 10-minute reserve not to be reflected in prices for the affected intervals. However, as slide 153 notes, there were also some intervals in which shortage pricing occurred, even though there was not a shortage in those intervals. What is the explanation for this discrepancy?

    Status: In general, this occurs when the supply in the pricing dispatch is less than the supply in the physical dispatch. This can occur if generators are over-producing, which would increase the supply in the physical dispatch.

22. Slides 179 and 180 highlight transmission constraints between Zones A-F and G-I and recommend consideration of a Southeast New York capacity zone. What is the basis for distinguishing the Hudson Valley from other transmission-constrained areas within the existing capacity regions, such as Staten Island and Astoria?

    Status: It is our understanding that the primary deliverability concerns that have been identified on the "highway" transmission facilities are between west and east New York, and on the paths into Southeast New York.

23. Would there be sufficient competition in a Southeast New York capacity zone?

    Status: This would need to be studied to determine whether the types of market power mitigation measures implemented in New York City would be warranted in the Southeast New York zone. In evaluating competition in this zone, it will be important to analyze the competitiveness of the overall zone, as well as the portion of the zone outside New York City and Long Island.

24. If NYISO added a Southeast New York capacity zone, what procedure should the NYISO use to determine the capacity requirements for that zone and for the New York City and Long Island Localities that are nested within that zone? Might this procedure be similar to the Tan 45 method currently used to balance the ICAP requirement for the NYCA against ICAP requirements for the Localities? If so, would adding the Southeast New York capacity zone cause the Locality ICAP requirements to differ from those calculated using the current procedures, which do not include this extra step of balancing ICAP requirements for the Localities against ICAP requirements for Southeast New York? Given the potential that the addition of this zone, this could change the ICAP requirements for the Localities, would it make sense to create a new capacity zone only when there is a demonstrated need for such a zone (because sufficient generation would not be provided in the new zone without imposing such a requirement)?

    Status: The determination of the local requirements for capacity zones is not within our scope or expertise. However, the fact that creating a new zone may change the locational requirement for an existing zone is not a compelling reason to postpone the creation of a zone when such a zone is warranted.

25. Slide 179 states, "The [deliverability] test should be revised over time to correspond to a real potential set of contingencies. This would determine whether incremental capacity can respond to maintain the reliability of the system." Is this the proper role of a deliverability test? If you are referring to the impact that incremental capacity would have on loss of load expectation, wouldn't that be better ascertained when determining the required installed reserve margins?

    Status: Yes, we believe that is the proper role for the deliverability test, especially since the deliverability testing will play a fundamental role in establishing the economic signals that guide investment in new resources and transmission. We

don't believe the determination of the installed reserve margin will produce efficient changes in the economic signals when deliverability concerns arise.

26. Slide 180 states, "If the deliverability test determines that new units or imports are not deliverable due to a congested path, the definition of a new capacity zone is likely needed to distinguish between capacity on either side of the path." What if the deliverability test simply determines that *surplus* capacity cannot be delivered? At some quantity of capacity, a deliverability test will always fail, but it does not follow that there should be sufficient transmission to deliver an infinite amount of upstream capacity.

    Status: Yes, surplus capacity that creates deliverability issues warrant the definition of the zone, which will cause prices on both sides of the constraint to more efficiently reflect supply and demand conditions in both areas. We agree with the final statement, which is why we have recommended that the deliverability test be structured to evaluate a reasonable set of contingencies rather than evaluating whether all of the upstream capacity can be delivered simultaneously.

27. Slide 180 also states, "The capacity market will not send the signals necessary to build new capacity if it is needed in the congested area." Wouldn't developers of new capacity in the congested area avoid the need to pay for transmission upgrades needed for deliverability, while developers of new capacity outside the congested area would need to pay for such upgrades? Given that, what is the basis for your statement?

    Status: Simply avoiding a requirement to pay for new transmission does not constitute providing a positive incentive to invest in the congested area. You need the price in the congested area to increase to provide such an incentive, which is particularly important if it costs more to build in the congested area.

28. Slide 180 goes on to say, "Suppliers upstate and a large share of the potential capacity imports will be foreclosed from the market. This will raise capacity costs for New York consumers and reduce competition." Can you explain this conclusion? Wouldn't creating a new capacity zone also raise capacity costs for New York consumers (because they would be required to purchase more capacity in that zone than they would have been required to purchase in the absence of that requirement) and reduce competition (because resources in that zone would only have to compete with other resources in that zone)? Also, does this statement take into account the ability for suppliers to sell ICAP into other control areas, which would mitigate the impact on upstate suppliers that elect not to pay for the upgrades that are required in order for them to be deemed deliverable?

    Status: We don't believe creating a new zone would raise costs because the price in the west would fall more than the quantity purchased would increase. Suppliers upstate (on the unconstrained side of the interfaces) would be facing more competition from imports and others. Potential competitive issues on the

constrained side of the interfaces would need to be evaluated. Regarding the last question, our recommendation is not based market inefficiency of excluding upstate supply and imports, not on how this affects them individually so their ability to sell ICAP in other control areas is not relevant.

29. In addition, slide 180 states, "Suppliers that can provide capacity and reliability benefits to a large portion of the NYCA will not receive any revenue, which results in inefficient investment incentives." Given that the deliverability test is determining that capacity in excess of the ICAP requirement is not deliverable, how significant are those benefits?

    Status: The demand curve that is established for the new upstate zones should reflect the size of those benefits. If they diminish rapidly as the surplus increases, the price would fall to zero in that zone. This would be a more efficient price signal than the current ROS price.