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TO: John Charlton and David Lawrence, NYISO

FROM: Mark Reeder, Steve Keller and Tom Paynter

Introduction

We appreciate your taking time Wednesday to meet with us to discuss our concerns with certain aspects of Levitan's preliminary report on the cost of installed capacity in New York. The following describe the issues we raised regarding capital costs of combustion turbines and their energy offsets. Our comments all reflect a basic goal of determining capacity reference prices sufficient to finance new capacity when the system actually needs new capacity, i.e. when the system's installed reserve margin approaches the minimum levels required for reliability.

Capital Costs

Based on our previous analyses of peaker capital costs, as well as certain publicly available information, we were surprised by two aspects of Levitan's estimates: first, the relatively high cost of upstate capital costs; and second, the relatively small difference between capital costs in NYC and upstate.

1. High upstate capital costs. Levitan estimated the unit cost of upstate gas turbines to be \$830 per kW (based on GE Frame 7FA) or \$987 per kW (based on LM6000). By comparison, the information we have gathered about combined cycle facilities indicates that their unit costs are significantly less than the Levitan GT numbers The per-unit construction cost for a combined cycle facility would be expected to be higher than the cost for a combustion turbine. We feel this argues persuasively that new generating capacity can be constructed in the Hudson Valley for considerably less than the per-unit cost estimated by Levitan.

2. Relatively small difference between NYC and upstate capital costs. Levitan estimated the capital cost of 2 LM6000 peakers to be \$114 M in NYC, vs. \$93.2 M upstate, implying a NYC differential of only 22%. Our previous experience with NYC capital and labor

costs implies a substantially larger differential, due to higher labor costs and more restrictive work rules in NYC, together with the difficulties of installing large pieces of equipment in very restricted spaces typical of NYC. This led us to support the NYISO's previous estimated cost differential of 87% ($159 per kW-year in NYC vs. $85 per kW-year upstate).

Energy Offsets

One important area that needs to be redone is the severe understatement of the offset for net energy revenues. For upstate New York, for the 7FA peaker, Levitan shows only about $1 per kW-year of energy and ancillary services net revenue offsets. As such, Levitan's $113 per kW-year estimate drops only to $112 after considering the energy offsets. This low $1 number occurs even for the years like 2020 in which the Levitan Report purports to model a long-run equilibrium tight market. At the meeting, a number of important energy modeling shortcomings were uncovered, all of which Levitan acknowledged. These are explained below, along with recommendations, where available, for corrections.

1. <u>Demand Side Modeled Incorrectly</u>. It is our understanding that Levitan reflected demand-side Special Case Resources (SCRs) in its model but did not reflect the ability of SCRs to count toward meeting the ICAP requirements. Currently, approximately three percent of the installed reserves that are counted by the ISO in its capacity market take the form of SCRs. They tend to have higher, often much higher, energy bids than peakers. This means that when the energy market is clearing at an SCR bid, the market price is set by the SCR bid, and is high enough to provide substantial net energy revenues to peakers. The Levitan consultants acknowledged that their energy dispatch model fails to allow any demand-side resources to be counted toward the required minimum 118 percent reserve margin. They noted that their model always adds generation, in the form of either peakers or combined cycle plants, to maintain the 118 percent reserve over the years of the study. In reality, the New York State system in equilibrium would have something like 115 percent of its capacity in the form of generators and 3 percent (or perhaps much more than 3 percent in the future) in the form of demand-side resources like SCRs. By overusing generators and underusing SCRs in its model, the Levitan analysis significantly reduces the frequency with which the market price of energy is set by the higher-priced SCRs. In essence, the model always has 3 percent more generation than it should have and thereby depresses peak prices in a way that understates, perhaps severely, the energy revenues that a peaker can be expected to receive. This shortcoming can be corrected quite easily. All the analysis needs to do is remove roughly 3 percent of its generation from the out years (the years in which it has expanded generation to achieve the 118 percent requirement) and ensure that there is a comparable amount of capacity modeled as SCRs bid at $300, $400, and $500. Levitan should make sure that demand response is not double-counted, and that when demand response is activated, it has an appropriate impact on prices. Corresponding changes, as appropriate, should be made to adjacent control areas in the model. This simple correction should be made as soon as possible.

2. <u>The Failure to Incorporate Stochastic Load Understates Energy Revenues for Peakers</u>. The Levitan consultants acknowledged that their model assumes that every summer is a normal one with a normal peak load, whereas in actuality, the world includes severe summers, normal summers, and mild summers. The consultant acknowledged that the more realistic, and more variable, pattern of summer loads would produce a larger number of severe price spikes over time that would increase the energy net revenues for peakers compared to a model that considers everything normal.

There are two types of these problems. The first occurs through the model's use of a 20-year forecast of system peak in the model. The model uses the forecast peak in each case whereas in reality, the actual peaks are sometimes higher, sometimes lower than forecast, depending on how severe the summer's worst heat wave turns out to be. The ISO "Gold Book," for example, forecasts an "Expected Peak" and an "Extreme Weather Peak," with the latter being about 1,000 MW higher. The extra 1,000 MWs produces a very tight market and can make the difference between a day of $150 prices and a day of $500 or $1,000 prices.

The second type of problem is the assumption about how many of the non-peak hours in a given summer have loads that are nearly as high as the summer peak load. This will vary from year to year, with some years having lots of high load hours and others having just a few. Here, the consultant picked the actual hourly load pattern from a single year (he could not remember if it was 2002 or 2003) and used it for all of the years of the model. The year 2002 had more than the normal number of hours with load near the peak and 2003 had fewer than normal. As you know, the New York State Reliability Council used 2002 data, as a proxy for current weather trends, in its 2004-2005 IRM determination. We believe the same data should be used by Levitan.

3. <u>Need to Reflect Unanticipated Real-Time Generator Outages</u>. Along these same lines, it is important to recognize that substantial peaker energy revenues occur due to generator outages that occur in real time. It is unclear whether the consultant's simulations properly modeled these situations. The scenario at issue is one in which the electric system starts up only as many units as it reasonably needs to meet the following day's peak but then suffers a major outage of an important generator and finds itself scrambling in the real-time market. In this situation, the real-time energy price can go quite high, providing lucrative energy revenues for peakers. We are concerned that the consultants' analysis implicitly assumes that all outages are perfectly predictable the day ahead so that it never allows the model to commit fewer units than it later realizes it needs. This would reduce the amount of unforeseen real-time shortages, lower the real-time energy price, and understate the peaker revenues. Please advise us whether or not this problem exists and, if it does, how Levitan proposes to address it.

4. <u>Eighteen Percent Reserve Margin Assumption is Too High for Later Years</u>. While not stating so, Levitan appears to have used an 18 percent reserve margin for all forecasted years. This may be too high, perhaps substantially so. The New York State Reliability Council (NYSRC) uses 10-year moving average forced outage rates for generators as inputs to its reserve margin calculations. Generator forced outage rates have dropped in recent years as the owners of existing generators now have strong financial incentives (in part because of the UCAP market) to keep availabilities high. It is generally expected that, on average, forced outage rate statistics will be substantially lower than those that are currently being used by the NYSRC in its reliability calculations. This should yield a drop in the reserve margin from 18 percent to some lower value. By staying with the 18 percent assumption out into the future, the Levitan approach is mismatching overbuilt capacity levels with a model that contains highly reliable generators that hardly ever break. It is no wonder that the model tells us via its results that it virtually never needs its upstate peakers. A lower reserve margin would better reflect the 1-day-in-10-years reliability criterion, leading to more realistic levels of peaker use and shortage pricing, and yielding larger energy offsets. This issue deserves further discussion.

5. Magnitude of Understatement is Indicated by Comparisons to Recent Actuals. For the 12 months that ended after the summer of 2002, David Patton estimated the actual energy market revenues of a peaker to be $7.50 per kW-year. In response to the observation that those actuals were understated due to the lack of any scarcity pricing rules, and noting that there were hours in which demand-side resources were dispatched and there were times when operating reserves were short, David Patton estimated that an additional $13 per kW-year of energy market revenues would have been received by peakers had the ISO's scarcity pricing rules been in effect. Combining these two values yields an "actual" 2002 net energy revenue figure of $20.50 per kW-year for a peaker. When this is compared to the $1 per kW-year value from Levitan Associates, the potential size of the error can be easily seen. Furthermore, the error is even larger when one recognizes that the Levitan study produced values in the $1 range, even for its out years that were meant to be tight, whereas the Patton 2002 number occurred during a year in which the northeast had substantial excess capacity (all numbers discussed here are upstate values). The actual peaker net energy revenues for 2003 were smaller than 2002, but Dr. Patton explained this by noting the unusually mild 2003 summer weather.

6. The Levitan Method Failed to Model a Tight Market in the Near-Term Years. The conceptual method used to develop net energy revenue offsets for last year's demand curve was one in which the estimate was based on a hypothetical "tight" market. For example, the New York State market was assumed to have approximately 118 percent reserves rather than the higher level that it actually had. This assumption of tightness is needed to properly set the demand curve; in this way, when the system does face a tight market, the demand curve's revenues plus the energy market revenues combine to produce enough revenues to induce the entry of new peakers. When the demand curve and its energy offsets are done this way, a system with excess supply will properly signal to the market that it does not need new capacity, whereas as the market tightens up, it will properly signal that the system does need new capacity. If the energy offsets used in setting the demand curve are always based on tight markets, then the estimate of energy offsets used to set the demand curve do not change from year to year as the market moves from tight to surplus and back to tight conditions. As the system moves in and out of tight and surplus conditions, the market clearing price of ICAP slides up and down the demand curve to provide the increased or decreased ICAP price signals as necessary. The demand curve itself does not shift up or down.

In contrast, the Levitan approach did not estimate net energy revenue offsets based on an assumed tight market. Instead, it looked at the actual demand/supply environment expected for each of the years 2005 and beyond. Because the near-term years are characterized by significant excess supply, the Levitan approach, when used at this time, yields a very small present value of energy offsets and therefore a very high-priced demand curve. The primary problem with this approach is that, as the system becomes tighter five years from now, and the energy market starts to produce more net revenues for peakers, the Levitan approach will, by definition, yield bigger values for energy offsets to the demand curve, with the result being that the demand curve will be dropped down. In other words, the Levitan approach leads to a situation where, as the market tightens, the demand curve shifts to a lower level and provides fewer ICAP revenues to potential new entrants. This is the exact opposite price signal of what is needed. Not only is the demand curve moving in the wrong direction, we do not want it moving around at all, given the goal of setting a demand curve that, if we implement it well, stays in one place and signals revenue stability.

This feature of the Levitan demand curve is the exact flaw that David Patton mistakenly thought that the DPS Staff proposal contained last year and led him to initially oppose the energy offsets. As he stated at the time, it makes little sense to have a demand curve have energy offsets if, as the market tightens one re-estimates those energy offsets to be a bigger number and, by subtracting this bigger number from the capital cost, lowers the demand curve at exactly the wrong time. When Staff explained to David that its approach did not at all work that way, but froze the energy offsets at the "tight market" level, he immediately agreed that our energy offsets method was appropriate and that he would support it, which he did. He should be advised of this important methodological issue, and that it has reappeared in the Levitan study.

This problem can be fixed easily in the Levitan study by scaling up the load or eliminating generating capacity in each of the early years of the study to force the reserve margin in the model down to 118 percent. Corresponding changes need to be made to adjacent control areas in the model.

cc: David Patton