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To: John Charlton, NYISO

From: Glenn D. Haake

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Re: IPPNY Comments on DPS Staff's Energy and Ancillary Service Revenue Analysis

IPPNY, on behalf of its members, has reviewed the New York State Department of Public Service staff's ("DPS Staff") comments ("DPS Comments") submitted to the NYISO concerning on the final "Independent Study to Establish Parameters of the ICAP Demand Curves for the New York Independent System Operator" ("Final Report") prepared and distributed by Levitan & Associates, Inc. ("LAI"). Based on this review, IPPNY is concerned that the DPS Comments fail to accurately reflect the operating characteristics applicable to the Frame 7FA unit that is the subject of the demand curve re-set process for the rest of state ("ROS") region in a manner that leads to excessively high and erroneous estimates of energy and ancillary services revenues that would be received by the ROS Frame 7FA unit. Accordingly, as NYISO staff prepares its draft demand curve for the ROS region, IPPNY hereby provides some additional factors for its consideration concerning the appropriate level of net energy and ancillary services revenues that can be attributed to a Frame 7FA located in the ROS region.[1]

1. Frame 7FA Heat Rate

Based upon the information set forth in the New York State Energy Master Plan GE MAPS database (which shows the characteristics of existing NYS generation units and has been used by the DPS Staff throughout its Renewable Portfolio Proceeding and in the generation facility siting cases it has evaluated under Article X of the New York Public Service Law), the Frame 7FA generation unit that is the basis for the ROS ICAP demand curve has a heat rate (as shown in the Final Report) that will make it less efficient than any existing generation units in upstate NY, with the exception of a small number of very small simple-cycle gas turbines ("GTs"). However, we understand that many of these existing GTs are still in operation primarily because they are occasionally needed to address local reliability conditions. Unless the Frame 7FA that is the subject of the demand curve re-set process were located in the same areas as these existing GTs, it could not be used to displace their operation. If the Frame 7FA were able to displace the existing GTs, then it would most likely be paid only its bid cost for providing the reliability service and therefore would not make a significant profit by running to address the reliability concerns.

In addition, a comparison of the Frame 7FA heat rate identified in the Final Report with the NYS generation unit heat rates identified in the MAPS database commonly utilized by DPS Staff shows

[1] IPPNY will not address in these comments its concerns with the ROS capital cost estimate most recently provided by DPS Staff, nor with the recently updated ROS cost estimate issued by LAI.

that the Frame 7FA is notably less efficient than all the steam units in New York State, except for Oswego 6. With respect to Oswego 6, the Frame 7FA and Oswego 6 have roughly the same average heat rate. However, Oswego 6 has the ability to provide both spinning reserves and regulation -- capability that the Frame 7FA, by its design, does not have. Therefore, the Frame 7FA unit also would be unlikely to displace operation by Oswego 6.

Lastly, the Frame 7FA would be among the least efficient units in the larger Northeast US region as well. Thus, whenever the available transfer capability enabled external units to serve ROS load, these external units would be dispatched to deliver energy to the ROS region before the Frame 7FA unit would be dispatched. The move toward tighter regional markets will not change the Frame 7FA's relationship to the market as a whole. It will continue to be among the least efficient units in the Northeast electric system.

2. Frame 7FA Start-Up Costs and Minimum Run Time

The Frame 7FA has substantial start-up costs. The Final Report shows that the Frame 7FA has a fuel use of 557.4 MMBtu per start. At $5/MMBtu, this translates to $2,787 per start for start-up fuel alone (It is also useful to note that the Frame 7FA uses roughly 5 times the fuel per MW to start as compared to an LM6000 unit).

ISO-NE's recent filing in its LICAP proceeding before the FERC shows that there is a charge of $8000/start-up in addition to the fuel use (See, ISO-6 exhibit, included as Attachment 1). While a full itemization of these costs is not set forth in ISO-NE's analysis, it is well known that there are a significant number of service hours assigned to each start-up. Therefore, a significant portion of these costs on a per-start basis are attributable to overhauls of the turbine.

Combining the start-up fuel expense with the start-up charge for the Frame 7FA results in a total start-up cost of $10,787, or $63.4/MWh. If this amount is spread over a single operating hour it is the equivalent of a 12,700 Btu/KWh adder to the Frame 7FA's heat rate, resulting in an effective heat rate of about 24,000 Btu/kWh. The ISO-NE exhibit filed in ISO-NE's LICAP proceeding (see Attachment 1) shows that the minimum run time for the Frame 7FA unit is four hours. If the start-up cost is spread over four consecutive operating hours it results in an average effective heat rate of about 15,000 Btu/kWh. Clearly, with this kind of operating cost it is unlikely that the Frame 7FA unit will run any significant amount other than during scarcity type conditions.

While there are units in the NYISO that have much higher DAM bids than would be consistent with those units' incremental fuel and maintenance costs, those increased bid levels are largely the result of incorporating risk into their bids. In particular, the part of those units' operation for which the bid is submitted is already sufficiently expensive that an outage would cause the real-time market to clear at a much higher price and would obligate those units to buy out of their DAM commitment at a substantial loss if they did not include this risk component in this part of their DAM bid. However, these risk concerns also apply to the Frame 7FA, because it will be near the top of the bid stack as well and will be subject to similar concerns about the risk of an outage. Therefore, in addition to very high operating costs, the Frame 7FA also will be required to include a significant adder in its bids to cover its risk exposure.

3. Minimum Run Time and Ancillary Services Revenue

As noted above, the attached ISO-NE exhibit shows that the Frame 7FA's minimum run time is four hours. Based upon the information contained in the Final Report, it appears that LAI assumed a two hour minimum run time. It is not clear whether the minimum run time assumptions are based upon a need to amortize the start-up costs or whether there is also an operating hour hit if the unit is shut-down before the end of the minimum run time. Regardless of the cause, both the LAI and ISO-NE assumptions of minimum run time make the Frame 7FA ineligible for participation in the NYISO's 30 minute non-synchronized reserves market ("30MNSR market").

Specifically, while the Frame 7FA's 30 minute start time might at first appear to make it eligible to participate in the 30MNSR market, the NYISO's real-time market bidding rules require that a unit bidding into the real-time market have no more than a one-hour minimum run time. Theoretically, the Frame 7FA could attempt to participate in the 30MNSR market by attempting to bid to keep its unit running for the remainder of its minimum run time anytime it has been started for a reserve pickup. However, the bidding timeline that applies in New York's real-time market requires the unit to enter that bid 45 minutes before the hour. This gives the unit owner approximately a one in four chance of knowing that its unit will need to continue operating into the next hour – odds that are far too risky to participate in a market that will have very little, and quite possibly no, revenue, given changes in market rules associated with SMD2.

4. Impact of Start-Up Costs and Minimum Run Time

The start-up costs and minimum run time make it very difficult to estimate the likely revenues for the Frame 7FA using Dr. Patton's traditional "State of the Market" method. Dr. Patton's 2003 State of the Market Report acknowledged that his analysis did not account for start-up costs (p. vii).

If all of the Frame 7FA's start-up costs are allocated to a single hour, the unit would have essentially no expected energy and ancillary service revenues at any time other than during scarcity hours. The same conclusion holds if the start-up costs are spread across two or four hours and the analysis is revised to honor the unit's minimum run time. Put simply, the unit will just be too expensive to operate profitably, except during scarcity conditions. This result is confirmed by the Final Report, which shows production cost modeling results that indicate 29 hours of scarcity pricing in 2017 and a net revenue of approximately $15/kW-year (see pages 37 and 41 of the Final Report).

Attachment 1

Frame and Aero-Derivative Characteristics

Issue	**FRAME**	**AERO-DERIVATIVE**
Size	85 – 200 Megawatts	40 – 56 Megawatts
Genset Foundation Load	1,000,000 – 1,600,000 lb	500,000 lb
Heat Rate (Btu/kWh – Lower Heating Value)	9,000 – 10,400 Btu/kWh	8,100 – 9,200 Btu/kWh
Exhaust Temperature	990 – 1,120 degrees F	830 – 850 degrees F
Compression Ratio	~16:1	~30:1
Requires high-pressure external fuel compressor?	No[2]	Yes[3]
Stack Height	Taller	Shorter
Footprint Size	Larger	Smaller
Min Run Time	4 hours	Minimal
Start Time	30 minutes	10 minutes
Start Cost	Fuel + $8,000 per start	Fuel + $300 per start
Maintenance Schedule Hot Path Inspection Major Inspection	 After 24,000 hours or 900 starts After 48,000 hours or 2,400 starts[4]	 After 25,000 hours After 50,000 hours[5]
Fuel Type	Dual	Dual
Total Installed Cost ($/kW)	$550-$650 /kW	$950-$1050 /kW

[2] poweronsite.org
[3] poweronsite.org
[4] Maintenance schedule shown above is for the General Electric 7FA.
Source: Hoeft, R., Janawitz, J., Keck, R., "Heavy-Duty Gas Turbine Operating and Maintenance Considerations", GE Power Systems, GER-3620J. Figure 42, p32.
[5] MSA Report: Economics of New Entry, April 28, 2004