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Madison Milhous
Director of Regulatory Affairs
Keyspan Energy Supply
303 Merrick Road
Lynbrook, NY 11563

Dear Mr. Milhous:

Upon reviewing the independent review of ICAP Demand Curves conducted by Levitan and Associates, Inc. (LAI) for the NYISO, PA Consulting Group, Inc. (PA) has drafted the following report, which contains PA's findings.

Executive Summary

The current Installed Capacity Market construct in New York calls for a periodic independent review of the ICAP Demand Curves every three years to determine whether the parameters of the Demand Curves should be adjusted. The review is performed to determine the current levelized embedded cost of gas turbines in New York City (Zone J), Long Island (Zone K), and Rest of State (ROS), and the associated energy and ancillary services revenues. LAI was chosen by NYISO to conduct the independent review that will be used to determine the ICAP Demand Curves for the three-year period beginning with the 2005-2006 capability year.

Keyspan Energy has contracted with PA to provide support in preparation for deliberations of the NYISO ICAP Working Group regarding establishing future ICAP Demand Curves in Zone J. PA was asked to review the LAI "Independent Study to Establish Parameters of the ICAP Demand Curves for the New York Independent System Operator" Report dated August 16, 2004 (LAI Report) and to provide an independent opinion on the assumptions and methodology used to derive the proposed ICAP Demand Curves in Zone J.

The construct of the ICAP demand curve is instrumental in keeping sufficient generation online in Zone J because the LM6000 plants depend on ICAP revenues for a large percentage of their revenue. As such, the ICAP demand curve is an integral piece to assuring long-term system reliability. Overall, PA believes that LAI's proposed levelized capacity revenue requirement and corresponding demand curve for Zone J is insufficient to attract adequate levels of new generation. Furthermore, inclusion of energy offset from either the deterministic or stochastic models only exacerbate the insufficient revenue recovery for these plants.

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PA's review of the LAI Report can be broken down into three pieces:

- ***Review of the capital cost construct (LAI Case 1):*** While the construct of LAI capital costs is reasonable, sensitivity around project life and total plant capacity have a significant upward impact on the subsequent derivation of the Zone J levelized capacity revenue requirement ($176/kW-yr) and corresponding ICAP demand curve.

- ***Review of the deterministic model (LAI Case IIa):*** Changes to assumptions regarding load shape (weather normalized average vs. actual 2002) and LM6000 heat rates (10,400 Btu/kWh vs. 9,740 Btu/kWh) would significantly reduce LAI's revenue projections for the Zone J peaking plant.

- ***Review of the stochastic model (LAI Case IIb):*** LAI's stochastic analysis is based on aggressive load assumptions that may significantly overestimate the revenue projections for the Zone J LM6000 plant.

Capital Cost Review

PA reviewed the approach LAI used to develop the capital cost estimate for an LM6000 installation in Zone J. PA does not find the $114 million total LM6000 capital cost unreasonable. However, given the $114 million capital cost feeds directly into the calculation of the ICAP demand curve, PA believes the conversion from millions of dollars ($114 million) to dollars per kilowatt-year ($176/kW-yr) may be lower than what is actually needed to attract new entrants into Zone J. The use of an average annual net capacity and a 20-year recovery life are the items of concern in this calculation. While the $114 million capital cost estimate appears reasonable, the derivation of the levelized capacity revenue requirement could be altered. As it stands, the levelized capacity revenue requirement may be insufficient to attract adequate levels of new generation in Zone J for two reasons.

- First, LAI uses the average annual net capacity (96 MW) to calculate the $1,188/kW unitized capital cost for the LM6000. Since LM6000s generate most of their revenue from the summer period and the ICAP demand curve is based on summer peak loads, a generation-weighted average summer capacity for the LM6000 is a more relevant approximation of the unitized capital cost. Substituting a generation-weighted summer net capacity of 91 MW[1] for the average annual net capacity of 96 MW would effectively increase the 2005 levelized capacity revenue requirement by almost 5% (see Figure 1).

- Second, LAI uses a 20-year recovery life to calculate the Zone J $176/kW levelized capacity revenue requirement for the LM6000. The basis for this assumption is that peaking units typically last more than 20 years. While this is true, PA believes a 15-year life is a more reasonable methodology for three primary reasons.

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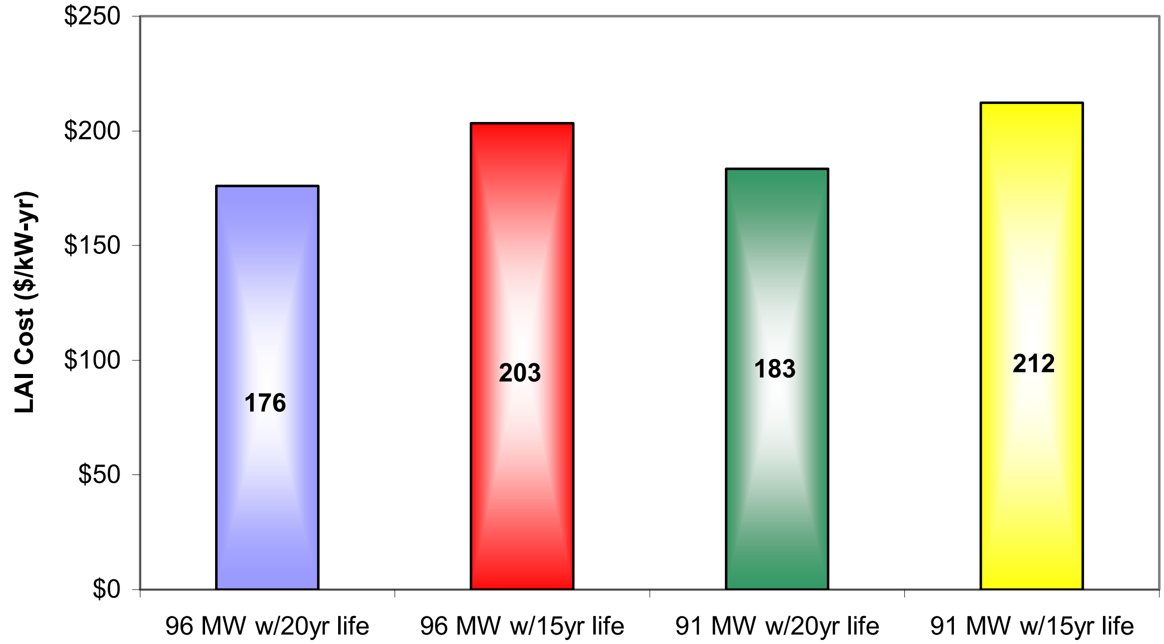
[1] PA looked at actual 2003 generation of the five recently built LM6000 plants in Zone J (see Table 1). Fifty-three percent of their 2003 operations took place in the four months of June through September. The generation weighted average temperature during that time period was 74 degrees, significantly higher than the 59-degree average annual rating temperature. Using the same calculation as LAI, the LM6000 would be rated at 91 MW at 74 degrees opposed to 96 MW at 59 degrees.

Figure 1
2005 Levelized Capacity Revenue Requirement in Zone J ($/kW-yr)



- First, the IRS uses a 15-year depreciable life for peaking plants.
- Second, the investment community has widely accepted a 15-year life for financing peaking plants.
- Third, the majority of a peaking plant's revenue comes from the ICAP market, thus there is an investment risk associated with fluctuations in market reserve margins, which applies to peaking plants more so than baseload generation. There is a disincentive to invest in new peaking plant capacity if entities cannot gain full returns on their investments in 15 years. Using an industry standard 15-year life on peaking plants increases the levelized capacity revenue requirement by approximately 15% (see Figure 1).

Deterministic Model Review

PA employed an in-depth review of LAI's deterministic assumptions, including, but not limited to load, installed capacity, fuel prices, merchant additions, and LM6000 operating characteristics. For the purposes of this report, PA focused on the assumptions that significantly affected Zone J energy prices and corresponding revenue for the LM6000 plant. The assumptions PA focused on are load shape and LM6000 heat rate.

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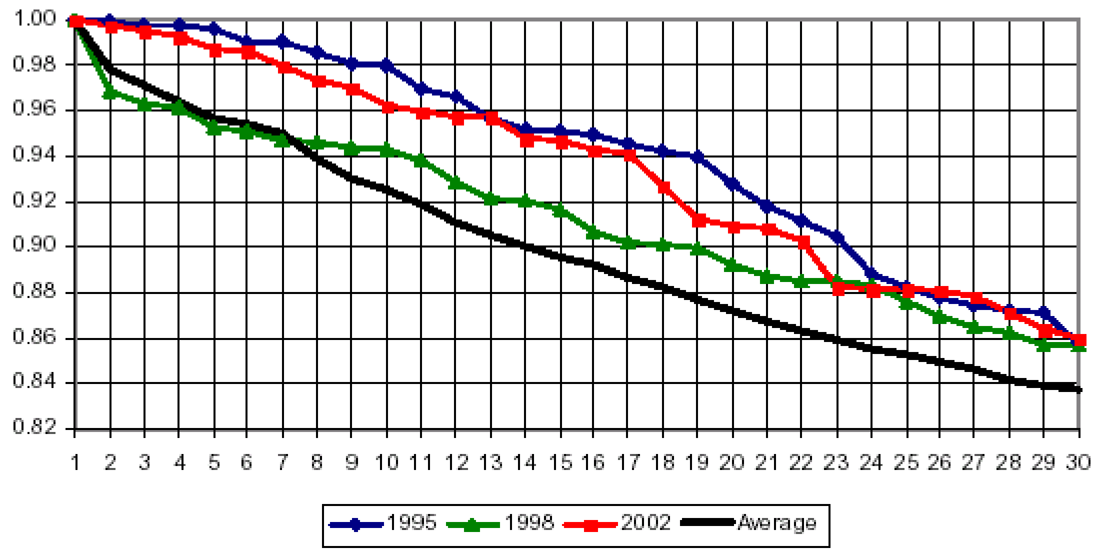
Load Shape

The use of a 2002 load shape in the LAI analysis tends to overstate energy revenues for a LM6000 in Zone J. Temperatures were considerably higher than average in the summer of 2002 as measured in cooling degree-days[2] against the 30-year period from 1971-2000.[3] Not surprisingly, the 2002 load duration curve (Figure 2) shows 2002 to have an above-average load. By using this load shape, a Zone J peaking plant dispatches more often and recovers more revenue than during a typical year.

Figure 2
1995, 1998, 2002, and Average Load Duration Curves
(top 30 peak days)



Source: New York State Reliability Council.

Although the New York State Reliability Council (NYSRC) used the 2002 load shape for short-term planning, this precedent does not mean that it should be used in a long-term forecast. The NYSRC use of this more volatile load shape is conservative in terms of capacity planning, but it is an aggressive assumption when applied to a long-term forecast of peaking plant revenues. For a

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[2] Degree-days are relative measurements of outdoor air temperatures used as an index for heating and cooling energy requirements. Cooling degree-days are the number of degrees that the average daily temperature rises above 65 degrees. If a weather station recorded an average daily temperature of 75 degrees, cooling degree-days for that station would be 10 degrees.

[3] According to the National Oceanic and Atmospheric Administration, the degree-day index for 2002 was 1,478, which is 33% higher than the 30-year average of 1,110.

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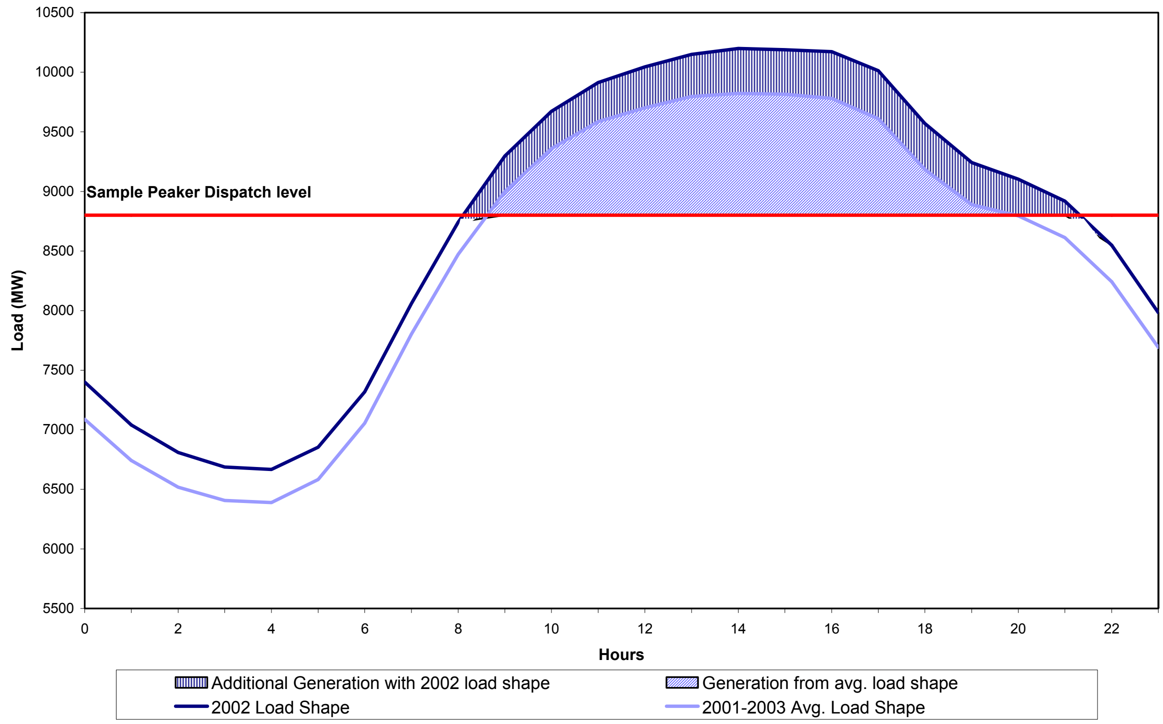
Figure 3
Average of 10 Highest Weather Days Hourly Load (July-August)



Source: NYISO web site (www.nyiso.com).

peaking plant, the volatility, or number of peaks, in the load shape is directly proportional to energy revenue (see Figure 3).

For example, using the 2002 load shape – as opposed to a weather normalized five-year average[4] – may produce similar annual energy prices; however, the more volatile load shape with additional peak hours will increase the revenue of a peaking plant. The effect of this aggressive load shape is highlighted when comparing energy revenue of a peaking plant between the PA and LAI deterministic models. While PA and LAI energy prices for Zone J are within 5%[5] over the 20-year forecast, LAI's net energy revenues exceed PA's forecast by 100% for an LM6000 unit.[6] The higher

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[4] PA's deterministic model uses a weather normalized average load shape based on data from 1993 through 1997.

[5] PA 20-year average Zone J energy price = $43/MWh, while LAI 20-year average Zone J energy price = $46/MWh (real $2004).

[6] PA 20-year average net energy revenue = $12.4/kW, while LAI 20-year average net energy revenue = $24.6/kW (real $2004).

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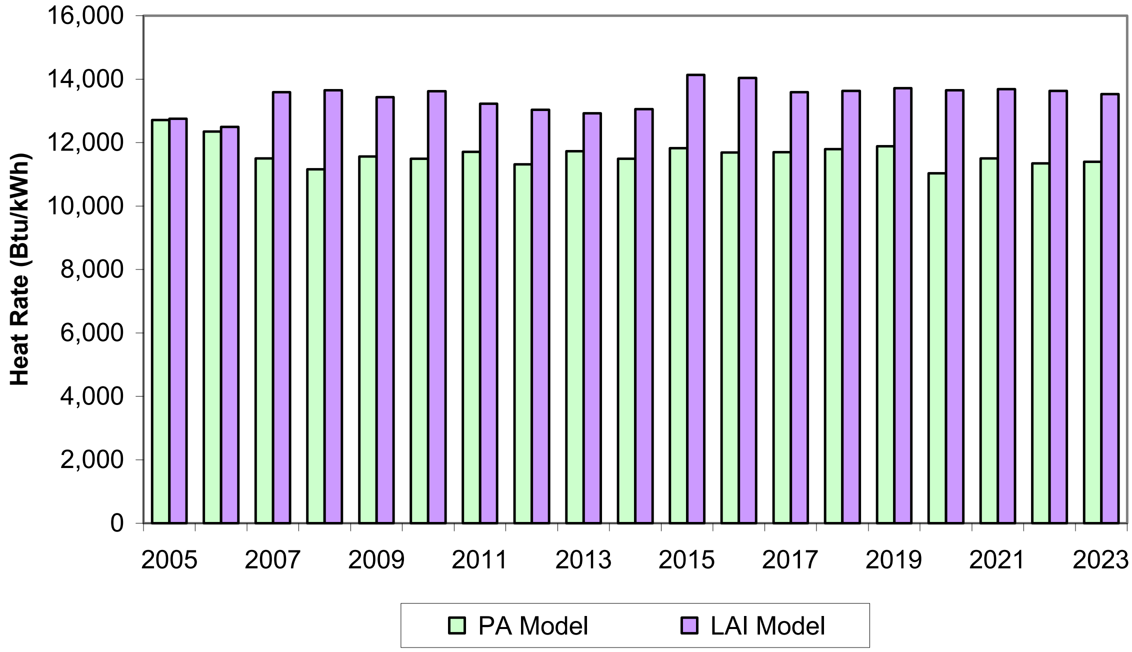
Figure 4
Zone J Average System Heat Rate (Btu/kWh)



Note: The LAI data was approximated from graphs in the LAI Report.

revenue from the LAI model means that spark spreads are significantly higher during these peak periods. A comparison of the average system heat rate for Zone J (Figure 4) indicates frequent load spikes in which higher cost units were dispatched in LAI's deterministic model. Therefore, while energy prices are very similar between the models, system heat rate in LAI's model is over 15% higher due to the use of an above-average hourly load shape.

LM6000 Heat Rate

The LAI analysis uses an average full-load heat rate for the LM6000 unit of approximately 9,740 Btu/kWh. While this figure represents vendor specifications adjusted for degradation, it does not accurately reflect the performance of Zone J LM6000 plants. According to the FERC Form 1 (see Table 1), the average effective heat rate for the LM6000 unit in Zone J is closer to 10,790 Btu/kWh.[7]

[7] FERC Form 1 material excerpted from the Platts POWERdat® copyrighted databases. Platts is a division of the McGraw-Hill Companies.

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Table 1
Effective Heat Rates for LM6000 Plants in Zone J

Plant Name	Company Name	Online Date	Nameplate Capacity (MW)	2002 Heat Rate (Btu/kWh)	2003 Heat Rate (Btu/kWh)
23rd Street	NYPA	06/22/2001	79.9		11,069
Harlem Rail	NYPA	06/21/2001	79.9	10,836	10,477
Hell Gate	NYPA	06/21/2001	79.9	10,404	10,906
Pouch Terminal	NYPA	07/1/2001	44.0		10,582
Vernon Boulevard	NYPA	07/1/2001	79.9	10,837	10,919
			Average	**10,692**	**10,790**

Accounting for embedded start fuel costs,[8] PA has substituted a 10,400 Btu/kWh heat rate for LAI's 9,740 Btu/kWh heat rate. This represents an increase in projected fuel cost of almost 7%, which could decrease LAI's projections for net energy revenues[9] by as much as 15-20% (see Figure 5).

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[8] PA assumes start fuel constitutes approximately 3% of total fuel cost based on deterministic model results. 10,790 × (0.97) = 10,422.

[9] LAI net energy revenues ($/kW) and capacity factors are approximated from Figures 25 and 26 of the Levitan ICAP Demand Curve Report.

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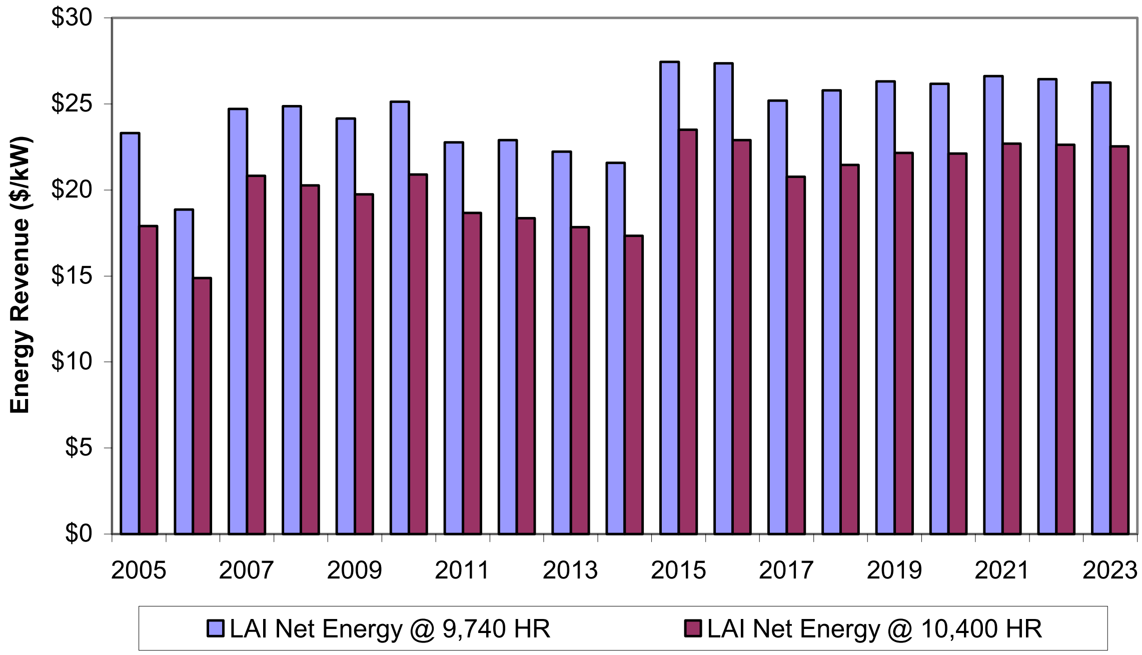
Figure 5
LAI Zone J LM6000 Energy Revenue ($/kW)



Note: The LAI data was approximated from graphs in the LAI Report. Results at both heat rates reflect a 2002 load shape.

The effects of heat rate and load shape on the deterministic results were factored separately. To determine the compound effect, consider the load shape reduces energy revenue from $24.6/kW-yr to $12.4/kW-yr, and the higher heat rate decreases energy revenue another 15% from $12.4/kW-yr to $10.5/kW-yr. Overall, the compound effect of these assumption changes reduces energy margins for the LM6000 by nearly 60%.

Stochastic Model Review

PA agrees that peaking units can earn a large proportion of their annual energy revenue (which excludes ICAP revenue) during a relatively small number of high price hours. The use of a stochastic model may be appropriate to capture this if the deterministic model does not include sufficient complexity to produce a realistic price distribution suitable for estimating the potential energy revenues of peaking units. However, PA has several concerns about the methodology used in the particular stochastic analysis conducted by LAI.

The analysis performed by LAI attempted to reproduce the complex interactions that result in volatile power prices by adding a stochastic component to load only. This approach neglects the impact of random generator and network outages, volatile fuel prices, etc. Of particular concern is that gas and power prices tend to be positively correlated in New York during the summer

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months (e.g. 27% correlation during June-August 2002).[10] When this correlation is neglected in a stochastic model, the projected energy revenue is inflated because a positive correlation indicates the average gas price of the days with high power prices is higher than average.

LAI developed a stochastic treatment of load by developing a random variable that was used as a multiplier to the "deterministic hourly loads for that day." These "deterministic hourly loads" are synthesized in an undefined way from the 2002 load shape. If LAI used the actual 2002 hourly loads, this would be a very aggressive assumption. For example, it would be possible in this simulation for the highest load day in 2002 to be multiplied by a random variable significantly greater than one, resulting in a peak load significantly higher than any historical load. This would in effect be double counting load volatility, resulting in a number of days with loads greater than historical peaks, hence higher revenues for peaking plants. Even if the "deterministic hourly loads" are normalized 2002 load shapes, the fact that 2002 had a historically high number of days near peak load (see Figure 2) would result in normalized load profiles with a higher than average number of days near peak load. This would lead to higher revenues for the Zone J peakers.

LAI used a normal distribution to characterize the random variable used as the load multiplier. The statistical analysis that is presented in Appendix E of the LAI Report relates to the suitability of this distribution to reflect all changes in load. However, for the analysis of peaking plants, the key feature of this distribution is not how well it reflects average change in load, but how well the distribution models the extreme increases in load. Figure 1 in Appendix E of the LAI Report indicates that the top 30% of this distribution is above the empirical distributions calculated from 2000, 2001, and 2002 data. This indicates that the magnitude of the greatest increases in load in the stochastic model is greater than that observed in recent history, which would lead to higher peak loads and corresponding higher revenue for Zone J peakers.

Table 2 in Appendix E of the LAI Report shows that the peak load for Zone J using the simulated distribution is significantly higher (20% higher) than historical peak load, and that in fact more than 2.3% of hours are above the historical peak load. While LAI characterizes this as a consequence of the sample space of simulated loads being much larger, it is still an aggressive assumption to include any loads higher than the peak historical load. Again, these higher loads will result in higher revenue projections for Zone J peakers.

Conclusions

In conclusion, PA believes that LAI's proposed levelized capacity revenue requirement and corresponding demand curve for Zone J is insufficient to attract adequate levels of new generation. As such, long-term system reliability could be compromised. PA suggests using a generation-weighted summer net capacity (91 MW) in calculating the unitized capital cost and a 15-year capital recovery life in calculating the levelized capacity revenue requirement for the LM6000. These two items would effectively raise the LAI Case 1 levelized capacity revenue requirement from $176/kW-yr to $212/kW-yr. For the deterministic piece, PA suggests using a load shape more typical than the aggressive 2002 load and an LM6000 heat rate more indicative of what the unit can

[10] Calculated using Transco Zone 6, NY, gas prices from Bloomberg and NY Zone J on-peak power prices excerpted from Platts POWERdat(c) copyrighted databases.

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achieve. The effect of these deterministic changes would significantly decrease the LAI Case IIa $24/kW-yr net energy and ancillary revenues. For the stochastic piece, PA has several concerns about the methodology used in the particular stochastic analysis conducted by LAI. These concerns point to a conclusion that the stochastic estimates of net revenues are overstated, relative to the deterministic results. Overall, PA believes incorporating these suggestions and considerations will result in a more realistic levelized capacity requirement that will attract sufficient levels of new generation to Zone J and thus assure future system reliability.