STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC UTILITY CONTROL

Application of the Connecticut Light and Power Company for Approval of Recovery of Stranded Costs Under P.A. 98-28	*** * * ***	**Docket No. 99-02-05**

TESTIMONY OF

BRUCE E. BIEWALD

ON BEHALF OF

THE OFFICE OF CONSUMER COUNSEL

APRIL 21, 1999

{Note: This is the redacted version. Specific reference to allegedly confidential information provided by CL&P has been removed.}

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1. Qualifications

Q. State your name, occupation and business address.

A. My name is Bruce Edward Biewald. My address is Synapse Energy Economics, Inc., 22 Crescent Street, Cambridge, Massachusetts, 02138.

Q. Please describe your current employment.

A. I am President of Synapse Energy Economics, Inc., a consulting company specializing in economic and policy analysis of electricity restructuring, particularly issues of consumer protection, market power, stranded costs, renewables, efficiency, environmental quality, and nuclear power.

Q. What are your qualifications with regard to energy policy?

A. I graduated from the Massachusetts Institute of Technology in 1981, where I studied energy use in buildings. I was employed for 15 years at the Tellus Institute, where I was Manager of the Electricity Program, responsible for studies on a broad range of electric system regulatory and policy issues. I have testified on energy issues in more than 50 regulatory proceedings in 20 states, two Canadian provinces, and before the Federal Energy Regulatory Commission. I have co-authored approximately 100 reports, including studies for the Electric Power Research Institute, the U.S. Department of Energy, U.S. Environmental Protection Agency, the Office of Technology Assessment, the New England Governors' Conference, the New England Conference of Public Utility Commissioners, and the National Association of Regulatory Utility

Commissioners. My papers have been published in the Electricity Journal, Energy Journal, Energy Policy, Public Utilities Fortnightly and numerous conference proceedings, and I have made presentations on the economic and environmental dimensions of energy throughout the U.S. and internationally. My resume is provided here as Exhibit BEB-1.

Q. What are your qualifications specifically with regard to electricity markets and electric industry restructuring?

A. I have analyzed electricity market issues in New York, New England, and PJM. I have testified on market power in the New Hampshire restructuring docket on behalf of the Consumer Advocate; in the Vermont restructuring docket on behalf of the Department of Public Service; in Consolidated Edison's restructuring case on behalf of the City of New York; in Pennsylvania on behalf of a coalition of intervenors; and in Mississippi on behalf of the Attorney General's Office.

I have conducted a simulation analysis of market power in New England on behalf of the New England Conference of Public Utility Commissioners. My June 11, 1997 report was filed by NECPUC with its comments to FERC on market power in New England. I was retained by the Maine Department of Attorney General in July of 1997 to work on a study of market power issues raised by the prospect of retail competition in the electric industry. My testimony for the Maine AG's Office on market power in New England was filed on January 23, 1998 in FERC Docket Nos. OA97-237-000 and ER97-1079-000.

I have analyzed the market power implications of the proposed merger of Allegheny Power System with Duquesne Light Company on behalf of the Maryland Office of People's Counsel. This analysis was presented in my testimony before the Maryland Public Service Commission (Case No. 8774) and in my Affidavit filed in the corresponding FERC docket (No. EC97-46-000).

I have been invited to speak on market power issues by the National Association of Regulatory Utility Commissioners, the New England Conference of Public Utility Commissioners, the National Consumer Law Center, and the National Association of State Utility Consumer Advocates.

Q. What is your experience with electric system simulation modeling?

A. I have applied electric system dispatch models to simulate the operations of many utility systems. The models that I have used include SYSGEN, UPLAN, ELFIN, and ELMO. The systems that I have modeled include the Kentucky utilities, the Michigan Coordinated Electric System (Consumers Power and Detroit Edison), Pacific Power and Light and Utah Power and Light (now merged to form Pacificorp), Middle South Utilities (now Entergy), Northern States Power, the Pennsylvania-Jersey-Maryland (PJM) system, Maine Public Service, the New York City portion of the New York Power Pool, and the New England Power Pool.

2. Summary and Recommendations

Q. What is the purpose of your testimony in this case?

A. I have been asked to assist the Office of Consumer Counsel by reviewing and commenting upon the market price projection filed by the Company in this case.

Q. Please provide an overview of your analysis and this testimony.

A. I begin with a discussion of the connection between market power and market price. I then discuss the market price analysis done by PHB Hagler Bailly, Inc. (PHB) for the Company, focusing upon the GE-MAPS model used in that analysis.

Q. Please summarize your testimony with regard to the connection between market power and market price.

A. Market power in electricity markets will be a crucial factor in determining the level of market prices. The impact of market power upon market prices should not be dismissed as unimportant. While FERC can be expected to continue to consider market power in its decisions, it would be quite naïve to believe that FERC approvals will entirely eliminate market power and its effect upon market prices. Similarly, the ISO-NE has an important market monitoring and market power mitigation role, but should not be expected to entirely eliminate the exercise of market power in the regional electricity market. "Residual" market power effects should be accounted for in estimating market prices for standard cost determination.

Q. Please summarize your testimony with regard to PHB's analysis of market

prices.

A. I address PHB's analysis of market prices for CL&P in section 4 of this testimony. While I have not been able to fully review PHB's analysis of market prices in detail due to time and confidentiality concerns, I can point out several things that the DPUC should be aware of in considering reliance upon that analysis. Specifically, the PHB analysis:

- Employs a model (GE-MAPS) that is complex, is subject to claims of confidentiality (with some input assumptions withheld even from those parties that have signed confidentiality agreements), and has in a prior case been found to contain a fundamental error;
- While that particular error in the application of GE-MAPS in the APS-DQE merger case may not be a concern in this case, the possibility of other unidentified errors is a concern;
- Revealed in a recent case a counterintuitive pattern of regional variation that conflicts with actual market data, logical expectations, and with PHB's results using the same model in a prior case; and
- Is similar to a prior analysis by PHB using the same model and methodology that was flatly rejected for stranded cost valuation by the Pennsylvania Public Utilities Commission in Docket R-00973981.
- Contains what appear to be errors in the load data for particular companies and in the reported spot market prices for some specific hours.

Q. What do you recommend in this case with regard to market prices?

A. I recommend that the Department of Public Utility Control recognize the difficulty of reviewing the GE-MAPS model assumptions and algorithms a the history of the model producing anomalous and incorrect results in other cases. The CL&P model results should not be relied upon until and unless a thorough review by the regulatory staff and other parties have been completed.

3. Market Power and Market Prices

Q. Please comment on the connection between market power and market prices.

A. Market power in electricity markets will be a crucial factor in determining the level of market prices. As the experience last summer in the midwest market indicates, "strategic behavior" of suppliers in the wholesale market is likely to be profitable in some significant number of hours of the year. That is, suppliers of generation are unlikely to behave in the manner that is assumed in the market models that are used by the Company to estimate market prices in this case. Instead, it is quite likely that suppliers will find it profitable to withhold capacity from the market in some situations and/or to bid above marginal costs. Such, opportunities to profitably and legally exploit market power will serve to raise market prices and decrease stranded costs.

It is my understanding that the PHB model assumes that the market will operate as an ideal, fully competitive market. That is, generation suppliers are represented in the model as bidding their resources into the energy market at variable cost, without adding any premium for market power. Capacity withholding and its upward effect on market price are not included. There should be a strong, independent ISO with broad authority and resources to monitor and correct market power abuse. Nonetheless, it is also certain that some opportunities to exploit market power will arise and be realized, driving up market prices. It is my belief,

based upon analyses that I have done in other cases, that market power is likely to have a significant influence upon electricity market prices.

Q. Is it possible to use computer models of the electricity market to analyze whether and to what extent market power is likely to be present in a particular market?

A. Yes. Computer models can be very helpful in understanding the extent to which profit-maximizing companies will find it possible and attractive to exert market power. The models can also be helpful in analyzing the extent to which various monitoring and mitigation procedures might be helpful in detecting and discouraging undesired behavior by companies with market power.

Q. Have you performed any analysis of market power in the New England region?

A. Yes. I have analyzed market power in New England on behalf of the Maine Attorney General and on behalf of the New England Conference of Public Utilities Commissioners. My June 11, 1997 report, filed by NECPUC with its comments to FERC, found that market power in generation was a significant concern in the New England region. That report is available on Synapse's web site (www.synapse-energy.com). While the structure of the market has been changing in New England, mainly due to the various generation divestitures, and the specific quantitative results should be updated, the general conclusion of the June, 1997, analysis is, I believe, still valid. That is, market power in New England electricity

markets remains an important consideration from today's perspective looking forward.

Q. Have you know of any instances in which the GE-MAPS model has been applied to analysis of the profitability of exercising market power?

A. Yes. Dr. Howard Pifer III of PHB conducted an analysis of strategic bidding behavior using the GE-MAPS model in his testimony in support of the APS-Duquesne merger, in FERC Docket No. EC97-46 et al. While Dr. Pifer claimed that his results indicated that "bidding up" was not profitable, in fact, he had made a crucial mistake in his modeling. When corrected, the result was quite the opposite. That is, Dr. Pifer's GE-MAPS results showed that bidding above competitive levels would be quite profitable, and that bidding up by 15 percent is even more profitable than bidding up by 10 percent. Dr. Pifer's modeling error, and its implications for market power in the APS area are discussed on pages 5 through 11 of my February 9, 1998, testimony in Maryland Case No. 8774.

I bring this issue up in the current case in order to emphasize that the impact of market power upon market prices should not be dismissed as unimportant. The experience with GE-MAPS in the merger case also indicates to me that one must be very cautious in accepting the results of a such complex model, particularly where confidentiality claims limit the ability to conduct a comprehensive review of the inputs and algorithms (even parties that signed confidentiality agreements have been denied access to many of the input assumptions to the GE-MAPS model that

the Company relies upon).

Q. Why did PHB not consider the effects of market power upon market prices in the current case?

A. According to CL&P's answer to Data Request OCC-05 Q-OCC-265, reproduced here as Exhibit___(BEB-2), the PHB analysis does not include market power because "The market prices prepared by the Company are based on market rules that have been approved by FERC" and that "ISO-NE and NEPOOL have developed processes to identify and mitigate any market power abuses if they occur once the markets begin." I believe that this is a simplistic and unwarranted dismissal of an important determinant of market price. While FERC has reviewed and will continue to review market power rules, it would be naïve to believe that FERC approvals will entirely eliminate market power and its effect upon market prices. Similarly, the ISO-NE has an important market monitoring and market power mitigation role, but should not be expected to entirely eliminate the exercise of market power in the regional electricity market. "Residual" market power effects should be accounted for in estimating market prices for standard cost determination.

Q. What do you recommend in this case with regard to market power and market prices?

A. Market power is an issue that state regulators, the FERC, and the ISO must continue to address. Even with significant attention, electricity markets can only

be expected to function in a reasonable approximation of the competitive ideal. Even with the progress made in the region toward setting up ISO-NE and its market monitoring and mitigation plan, some residual degree of market power can be expected. For purposes of stranded cost policy in this case the DPUC should recognize the limitations of projections of market prices – particularly those that do not account for some degree of market power -- and require a true market test for the purpose of determining stranded costs.

4. PHB's Simulation of the Energy Market

Q. Were you able to fully review the GE-MAPS model application in this case?

A. No. CL&P's consultants, PHB, provided some information about its model runs in response to discovery. However, the Company's responses have left insufficient time to adequately review the materials provided given the schedule to file direct testimony in this case. Moreover, the Company indicated in response to our data request (OCC-03, Q-OCC-P-139) that the input data and documentation are proprietary by General Electric and cannot be provided. It is my understanding, based upon this response and my experience in other cases that GE-MAPS model inputs and documentation are subject to extremely severe restrictions that make independent review impossible as a practical matter.

For example, in the Maryland PSC Case No. 8797 (Potomac Edison) PHB allowed my staff to visit their offices to inspect the GE-MAPS model inputs. The claimed confidentiality, however, made it quite difficult to conduct a thorough review of PHB's application of the model in this case. For example, while my staff were allowed to look at the input data at the PHB office, they were not allowed to copy any materials or take notes on the written documents or printouts with numbers. In reviewing an application of a complex model with thousands of inputs, this is a severe limitation. In addition, while my staff were allowed to review the GE-MAPS model documentation, the text of the documentation merely

described the complex systems for processing the input files to the model – it did not address the substantive issues regarding the methodology and assumptions used by the model. In response to our data requests in that case, the Company claimed that inputs to GE-MAPS were proprietary. These inputs include the generator forced outage rates, maintenance schedules and rates, unit operating parameters, and representation of the transmission system of thousands of buses.

As I discussed in Section 3 of this Testimony, I have had experience in a prior case with the GE-MAPS model in which PHB's Dr. Pifer did, in fact, make a fundamental error in modeling market behavior. I have not found this problem PHB's analysis in this case, but I do have concerns that there may be errors in the application of GE-MAPS that we were not able to identify due to schedule and confidentiality constraints.

Q. Please comment on the geographic pattern of market prices in the region produced by the GE-MAPS model for the ECAR region.

A. Dr. Pifer's modeling in the Maryland case showed an odd pattern of market prices geographically. The average all-hours price varies greatly for APS generators from a low of $10.18/MWh for RP Smith 3 to a high of $17.83/MWh for Mitchell 1 while the average all-hours prices for generators owned by other companies tends to range from $18/MWh up to $25/MWh (these are averages for 2001 in 1997 dollars, from Exhibit HWP-18 in Maryland PSC Case No. 8797).

This pattern can also be seen in a general way in Dr. Pifer's GE-MAPS results

presented in Exhibit HWP-23, which show prices in the eastern portion of ECAR (where APS is located) that are lower than prices elsewhere in ECAR (with the exception of Southern Indiana). With average electricity prices in the PJM region, located to the east of ECAR, being higher than prices in ECAR, one would expect the market prices to rise gradually from central ECAR as one moves toward the east.

Q. Does the odd pattern of decreasing market prices in the eastern part of ECAR show up in actual market price data?

A. No. The opposite – and expected – geographic pattern emerges from the actual market price data. Actual market price data for seven markets in ECAR for 1998 show that for the on-peak periods, the eastern part of ECAR has the highest market prices of any of the ECAR markets, averaging about 7 percent above the ECAR average on-peak price. Off-peak, the prices in the eastern part of ECAR are very slightly below the ECAR average, but off-peak prices in general are quite flat in this region.

Q. Does the odd pattern of decreasing market prices in the eastern part of ECAR show up in prior analysis by PHB in other cases?

A. I have examined Dr. Pifer's analysis of market prices using the GE-MAPS model filed in Pennsylvania Public Utility Commission Docket No. R-00973981, the West Penn Power restructuring proceeding. Dr. Pifer's Rebuttal Testimony in that case included an Exhibit HWP-15 that is analogous to his Exhibit HWP-23 in

the Maryland case. I have reproduced the two Exhibits here as Exhibit___(BEB-3) to allow easy comparison. It appears that the odd geographic pattern of market prices produced by PHB's application of the GE-MAPS model was dependant upon the particular case. In the Pennsylvania case, Dr. Pifer's exhibit shows market prices that are higher in APS's area relative to AEP, PSI, and KUC. In the exhibit for the Maryland case, the APS market price in Dr. Pifer's Exhibit is lower than those three areas.

Q. What is the significance of this pattern of market prices from the GE-MAPS model?

A. While the geographic pattern of market prices in ECAR is not directly an issue in this case, I believe that the example is useful in that it suggests that the GE-MAPS model should not be relied upon as it is presented in this case by CL&P.

Q. What did the Pennsylvania Commission conclude about PHB's analysis of market prices using GE-MAPS?

A. Dr. Pifer of PHB used the GE-MAPS model to project market prices on behalf of West Penn Power before the Pennsylvania PUC in Docket R-00973981). The Pennsylvania Public Utilities Commission was unimpressed with PHB's GE-MAPS analysis of market prices. The Pennsylvania Commission found in its Order in that case that "The GEMAPS model used by West Penn witness Pifer also inappropriately assumes bid price will be the incremental cost of changing unit operation rather than the average variable cost" (page 105 of the PUC Order in

Docket R-00973981) and that “West Penn witness Pifer’s valuation must be rejected as unreasonable” (page 104).

Q. Have you identified any errors in PHB’s application of the GE-MAPs model in this case?

A. I believe so. {Confidential information removed}

Q. Is it your testimony that these apparent errors have a significant impact on the overall annual market price or stranded cost results?

A. At this time it is not possible to determine this. I point out these apparent errors to underscore my main point – that the Company's application of the GE-MAPS model in this case should be comprehensively reviewed by independent parties with full access to all of the input assumptions and documentation before the results are relied upon in any way in this case.

Q. Please summarize your testimony with regard to PHB's analysis of market prices.

A. While I have not been able to fully review the PHB's analysis of market prices in detail due to scheduling and confidentiality concerns, I can conclude that the analysis:

- Employs a model that is complex, is subject to claims of confidentiality, and has in a prior case been found to contain a fundamental error (while that particular error is not a concern in this case, the possibility of other unidentified errors is a concern);
- Has produced a counterintuitive pattern of regional variation for the midwest market conflicts with actual market data, logical expectations, and with results from the same model in a prior case; and
- Is similar to a prior analysis by PHB using the same model and methodology that was flatly rejected for stranded cost valuation by regulators in

Pennsylvania; and

- Contains what appear to be errors in the load data for particular companies and in the reported spot market prices for some specific hours.

Q. Are there other ways to conduct an analysis of market prices besides using the GE-MAPS model as the Company's consultants have in this case?

A. Yes. There are many other models available. Some of these models are certainly preferable to GE-MAPS, particularly in terms of documentation and transparency. Regulators should not based decisions about stranded cost recovery upon model applications that cannot or have not been thoroughly reviewed.

Q. What would a thorough review entail?

A. Because the GE-MAPS model is very detailed and complex and because of the lack of prior outside review, I expect that even with full cooperation by CL&P, PHB, and GE and full access to all of the input data and documentation that a review would take about two months to complete.

Q. Does this conclude your testimony?

A. Yes, that concludes my testimony for now, but I must reserve the right to present supplemental testimony after I have had an opportunity to fully review the Company's analysis.