ATTACHMENT 1

NERA
Economic Consulting

Eugene T. Meehan
Senior Vice President

National Economic Research Associates, Inc.
1255 23rd Street NW
Washington, DC 20037

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. Docket No. ER11-2224-000

AFFIDAVIT OF
EUGENE T. MEEHAN

Mr. Eugene T. Meehan declares:

1. I have personal knowledge of the facts and opinions herein and if called to testify could and would testify competently hereto.

I. Purpose of this Affidavit

2. The purpose of my affidavit is to respond to assertions made by the Independent Power Producers of New York ("IPPNY") that NERA Economic Consulting ("NERA") inexplicably abandoned its method of basing the escalation factor for the Installed Capacity ("ICAP") Demand Curve on the Handy-Whitman Index in favor of the general inflation rate (*see* page 49 of the IPPNY Motion to Intervene and Protest) and the statement by the Astoria Generating Company, the NRG Companies, and TC Ravenswood (collectively referred to herein as the "In-City Incumbent Generators") that the New York

Independent System Operator ("NYISO") ignored NERA's recommendation to adopt an escalation rate of 2.4%.[1]

II. Qualifications

3. I am a Senior Vice President with NERA and directed NERA's work for NYISO in connection with the ICAP Demand Curve[2] reset. A full statement of my qualifications is provided in the affidavit that I prepared that was filed by NYISO as Exhibit A to Attachment 2 in this Docket on November 30, 2010.

III. Uses of the Escalation Rate

4. The escalation rate for generation equipment is used in two aspects of setting the ICAP Demand Curves. First, the escalation rate is used to adjust the ICAP Demand Curves in 2011 dollars that apply to the first year of the reset period, in this case the 2011/2012 period, to 2012 dollars that will apply in the second year to which the reset is applicable, and to 2013 dollars that will apply in the third year to which the reset is applicable. Second, the escalation rate for generation equipment is used over the life of the equipment to determine the economic carrying charge. The first use is obvious and applies to just the first three years. The second use may be less obvious and I explain it detail.

5. The economic carrying charge is often simply referred to as a real carrying charge and is described as representing the first year's value of a stream of payments that rises at the rate of inflation and provides for the required internal rate of return on the investment. The methodology used in the ICAP Demand Curve reset to amortize investment is based

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[1] *See* Protest of the NYC Suppliers ("In-City Incumbent Generators' Protest") at 53.

[2] Terms with initial capitalization herein shall have the meaning set forth in the NYISO's Market Administration and Control Area Resources Services Tariff ("Services Tariff").

on an economic carrying charge and hence implicitly assumes that the ICAP Demand Curve will continue to escalate over time as the cost of equipment escalates. This continual increase in the ICAP Demand Curve reduces the amount of revenue required in the early years of the investment's life.

6. The rationale underlying the economic carrying charge is that, over time, new entry will set price levels, investors will anticipate those price level changes and investors will be forced by competition to set first year prices recognizing that a portion of return will come from future price escalation. As a simple example, in a rising real estate market the price of renting would be less than the annual cash cost of owning based on a traditional levelized mortgage because real estate investors would anticipate returns in the form of rising rents or capital gains over time. First year rents would not need to cover all first year cash costs.

7. The description of the economic carrying charge in Paragraph 5, above, is a simplification. The economic theory underlying the economic carrying charge does not specify the use of a general inflation rate but specifies the use of a technology-specific rate of inflation less technical progress. This theory is explained in a NERA report, "How to Quantify Marginal Costs", produced as part of the Electric Utility Rate Design Study sponsored by the Electric Power Research Institute, Inc. and various investor-owned utilities and public power trade organizations.[3] This economic theory is sensible if an investor is predicating pricing decisions based on future price increases resulting from increases in the cost of entry; the rate of escalation that is relevant is the escalation of the specific technology that will be used by future entrants.

[3] *See* "How to Quantify Marginal Costs: Topic 4", dated March 10, 1977 at pp. 111 – 12.

IV. NERA Recommendations on the Escalation Rate

8. The economic carrying charge used in the NERA and Sargent & Lundy Demand Curve reset report[4] ("NERA/S&L Report") reflects a long term inflation rate of 2.4 percent and a technical progress rate of 0.25 percent, for an escalation rate net of technical progress of 2.15 percent. All values are per annum. The 2.4 percent inflation rate is built into the economic carrying charge while the technical progress rate is reflected in the model used to develop the ICAP Demand Curves.

9. The 2.4 percent reflects the long term (2010 to 2019) headline Consumer Price Index ("CPI") inflation rate forecast from the May 14, 2010 Survey of Professional Forecasters published by the Federal Reserve Bank of Philadelphia ("Federal Reserve Bank Survey"). As explained in the NERA/S&L Report, the rate of technical progress was developed viewing the U.S. Department of Energy estimate of the learning effect for combustion turbines:[5] The higher the rate of escalation net of technical progress, the lower the economic carrying charge and hence the lower the ICAP Demand Curve. A higher escalation rate means that revenues escalate more rapidly over time and future cash flows will increase by a greater magnitude, reducing the revenues needed in the early years to achieve the target rate of return. The Federal Reserve Bank Survey used by NERA indicated a 2.40 percent inflation rate over the 2010 to 2019 period, but a slightly lower inflation rate in the first several years.

10. I elected to use the 2.40 percent inflation rate to arrive at the 2.15 percent escalation rate net of technical progress for several reasons. First, the economic carrying charge

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[4] *See* November 30 Filing at Attachment 2, "Independent Study to Establish Parameters of the ICAP Demand Curve for the New York Independent System Operator," September 3, 2010 (revised September 7, 2010), prepared by NERA Economic Consulting; also available at http://www.nyiso.com/public/webdocs/committees/bic_icapwg/meeting_materials/2010-09-16/Demand_Curve_Study_Report_9-3-10_clean.pdf.

[5] NERA/S&L Report at p. 71.

methodology employs a long term forecast of escalation and I have no reason to believe that over time the price of generating equipment will escalate more or less rapidly than general inflation adjusted for the rate of technical progress for the ICAP Demand Curve peaking units. Second, the Federal Reserve Bank Survey was published in May 2010 and hence was reasonably contemporaneous with the cost of debt and equity estimates which are based on bond yields from April 2010. Because bond yields are influenced by inflationary expectations, it is desirable that the inflation forecast and the bond yields be as contemporaneous as practicable. Third, the survey represents the view of professional forecasters and there is no reason to believe it would be biased.

11. NERA's recommendations with respect to the escalation rate focused on the long term and were developed primarily for the second use of the escalation rate described above, that is, the use of the escalation rate to develop the economic carrying charge.

12. NERA did not explicitly or separately examine the generating equipment escalation rate that could be expected to apply over the short term. While over the long term I would have no reason to believe that generating equipment prices would rise by more or less than general inflation (except for the impact of technical progress), the same does not necessarily apply to the short term. Over the short term, a market can be loose or tight and the commodity prices to which it is sensitive may trend up or down. Thus, in the short term it may be reasonable to assume that factors other than general inflation and technical progress will impact prices, or it may not. Whether it is reasonable depends upon the particular facts. Absent facts that indicate a trend different than general inflation, it is my opinion that the best assumption would be to assume general inflation will apply to the price of a particular type of technology.

13. In the 2007 ICAP Demand Curve reset, the NYISO employed in developing its escalation rate the Handy-Whitman Index for combustion turbine generators. It is my understanding that the NYISO used the Handy-Whitman Index as the forecast escalation rate because at

the time of the 2007 reset both commodity and equipment prices were rising rapidly. In order to reflect this trend, the NYISO applied an escalation rate based on a linear trend in the then recent historic Handy-Whitman Index applicable on a national basis. As explained by Mr. Lawrence in his November 2007 affidavit filed in the 2007 ICAP Demand Curve reset proceeding, recent data were applied given "the fundamental changes in equipment and raw materials costs over the last few years."[6]

14. In the instant ICAP Demand Curve reset, the NYISO applied, for the purposes of adjusting the ICAP Demand Curves from 2011 dollars to 2012 and 2013 dollars, respectively, an escalation rate of 1.7 percent based on short term general inflation forecasts of independent and respected forecasting sources. Those sources are the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters, the U.S. Office of Management and Budget, and the U.S. Congressional Budget Office.

15. The NYISO's use of the forecast general inflation rates of these independent forecasting sources, as opposed to the historic Handy-Whitman Index, is consistent with the fact that there does not appear at the current time to be a short term trend of rising commodity or equipment prices. The affidavit of Mr. Ungate of S&L indicates that combustion turbine equipment prices are stable.[7]

16. In my opinion, NYISO made reasonable decisions with respect to escalation both in 2007 and in the instant reset. Witnessing instability and rising equipment prices in 2007, the NYISO used a recent index that reflected the specific trend in combustion turbine equipment prices at the time of the 2007 reset analysis. That trend was the then short term

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[6] *See New York Independent System Operator, Inc.*, Tariff Revisions to Implement ICAP Demand Curves for 2008/2009, 2009/2010, and 2010/2011, Docket No. ER08-283-000, Attachment 6 at pp. 6-9.

[7] *See* Affidavit of Christopher Ungate, Section VI, P 24-30, Attachment to the NYISO's January 5, 2011 filing in this docket ("Ungate Affidavit").

historic change in the Handy-Whitman Index for combustion turbine generation equipment. There are no publicly available forecasts of generating equipment prices from independent forecasting experts as there are for general inflation.

17. In the instant reset, not witnessing current pressure on equipment costs, the NYISO applied a forecast of general inflation. The Handy-Whitman Index has the virtue of being specific to the equipment and the vice of being a reflection of recent history and not a forecast. The general inflation forecast has the vice of not being specific to the equipment and the virtue not of being a reflection of recent history but a forecast. It is reasonable to use the former when there is evidence of current trends and instability in the equipment market, and reasonable to use the latter when the equipment market is currently stable. This is what NYISO has done. I believe that the NYISO's escalation rate is appropriate given the market conditions described in the Ungate Affidavit and, as explained below, is consistent with long term inflation assumptions used to develop the economic carrying charges.

18. It is also desirable that the assumed rate of escalation used to apply to adjust the ICAP Demand Curves over the three year rest period be consistent with the rate of escalation used to develop the economic carrying charges used in the reset. This is the case. The NYISO has used 1.7 percent over the three year reset period. This is reasonably consistent with the long term escalation rate net of technical progress that is used in the NERA report of 2.15 percent. The NYISO's formulation is more appropriate when one considers that the early year components of the inflation forecast that NERA used are slightly lower than the long term rate. While the assumptions do not exactly match, substituting the NYISO assumption of 1.7 percent for the reset period in place of the continuous long term assumption of 2.15 percent would have a minimal impact on the carrying charge and the ICAP Demand Curve.

19. While it is my view that NYISO's use of the general inflation rate to adjust the ICAP Demand Curves over the reset period for the period under review in this proceeding is appropriate and reasonably consistent with the escalation assumption used to develop economic carrying charges in the NERA/S&L Report, should the Commission disagree and direct a Handy-Whitman-based value on the magnitude of 7.8 percent (as proposed by IPPNY and the In-City Incumbent Generators) be used to adjust the ICAP Demand Curves over the reset period, I believe it would be necessary to adjust the economic carrying charges. Such an adjustment would, all else equal, lower the carrying charges and the ICAP Demand Curves. While it is typical to calculate economic carrying charges using a single long term escalation rate net of technical progress, it quite feasible to calculate economic carrying charges that reflect differential escalation rates over time and NERA could develop economic carrying charge rates that reflected the higher escalation rates for the three year reset period or a period somewhat longer than reset period but shorter than the life of the equipment.

V. Conclusion

20. In consideration of the foregoing, I conclude as follows:

- There are two applications of the escalation rate – one to adjust the ICAP Demand Curves over the reset period and one to develop the economic carrying charge;
- The escalation rate used in both applications should be consistent, but may differ as it is customary to use a single long term rate in developing economic carrying charges and such a rate may not reflect short term market trends that may be reflected to adjust ICAP Demand Curves over the reset period;
- The NYISO has used a general inflation rate of 1.7 percent to adjust the ICAP Demand Curves over the reset period;
- In light of Mr. Ungate's affidavit that prices in the equipment market are stable and there are no current instabilities or upward trends in the

market, it is my opinion that the NYISO's use of general inflation to adjust the ICAP Demand Curves over the reset period under review in this proceeding is appropriate;

- The NYISO assumption of 1.7 percent escalation is reasonably consistent with the long term assumptions that are reflected in the NERA report and any iteration to achieve complete consistency would have a minimal impact (substituting 1.7 percent over the reset period for 2.15 percent would increase the carrying charge for the areas other than NYC from 9.54 percent to 9.67 percent);

- Should the Commission not accept NYISO's escalation assumption and use a higher escalation assumption on the order of the 7.8 percent proposed by IPPNY and the In-City Incumbent Generators, it would be necessary to revise the carrying charges used in the NERA report and the adjustment would, all else equal, lead to a lower carrying charge and lower ICAP Demand Curves. The carrying charge rate, assuming escalation over the reset period of 7.8 percent and 2.15 percent thereafter, would drop from 9.54 percent for the areas other than NYC to 8.69 percent.

This concludes my affidavit.

ATTESTATION

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information and belief.

Eugene Thomas Meehan

Eugene T. Meehan

Subscribed and sworn to before me this 4th day of January, 2011.

Notary Public

Rosalind Brown
Notary Public, District of Columbia
My Commission Expires 12/14/2014

My commission expires: _____

Advised Central Maine Power Company (CMP) on the development of a competitive bidding framework. This framework was implemented in 1984 and was the first of its kind in the nation. CMP adopted the framework outlined in EMA's report and won prompt regulatory approval.

Advised a utility in the development of an incentive ratemaking plan for a new nuclear facility. This assignment involved strategic analysis of alternate proposals and quantification of the financial impact of various ratemaking alternatives. Presented strategic and financial results in order to convince senior management to initiate negotiations for the incentive plan.

Advised and testified on behalf of the New York Power Pool utilities on the methodology for measuring pool marginal capacity costs. This work included development of the methodology and implementation of the system for quantifying LOLP-based marginal capacity costs.

Provided testimony on behalf of the investor-owned electric utilities in New York State, concerning the proper methodology to use when analyzing the cost-effectiveness of conservation programs. This methodology was adopted by the Commission and used as the basis for DSM evaluation in New York from 1982 through 1988.

Developed the functional design of a retail access settlement system and business processes for a major PJM combination utility. This design is being used to construct a software system and develop business procedures that will be used for retail settlements beginning January 1999.

Reviewed the power pool operating and interchange accounting procedure of the New York Power Pool, the Pennsylvania, New Jersey, Maryland Interconnection, Allegheny Power System, Southern Company, and the New England Power Pool as part of various consulting assignments and in connection with the development of production simulation software.

Summarized and analyzed the operational NEPOOL to examine the feasibility of incorporating NEPOOL interchange impacts with Central Maine and accounting procedure of the New England Power Pool Power Company's buy-back tariffs.

Developed and presented a two-day seminar delivered to electric industry participants in the UK (prior to privatization), outlining the structure and operation of power pools and bulk power market transactions in North America.

Benchmark analysis and FERC testimony of PGE's proposed twelve-year contract between PG&E and Electric Gen LLC (contract value in excess of $15 billion).

Responsible for NERA's overall efforts in advising New Jersey's Electric Distribution Companies on the structuring and conduct of the Basic Generation Service auctions (the 2002 auction involved $3.5 billion, and the 2003 and 2004 auctions involved over $4.0 billion).

Publications, Speeches, Presentations, and Reports

Capacity Adequacy in New Zealand's Electricity Market, published in *Asian Power*, September 18, 2003

Central Resource Adequacy Markets For PJM, NY-ISO AND NE-ISO, a report written February 2004

Ex Ante or *Ex Post*? Risk, Hedging and Prudence in the Restructured Power Business, The Electricity Journal, April 2006

Distributed Resources: Incentives, a white paper prepared for Edison Electric Institute, May 2006

Restructuring Expectations and Outcomes, a presentation presented at the Saul Ewing Annual Utility Conference: The Post Rate Cap and 2007 State Regulatory Environment, Philadelphia, PA, May 21, 2007

Making a Business of Energy Efficiency: Sustainable Business Models for Utilities, prepared for Edison Electric Institute, August 2007

Restructuring at a Crossroads, presented at Empowering Consumers Through Competitive Markets: The Choice Is Yours, Sponsored by COMPETE and the Electric Power Supply Association, Washington, DC, November 5, 2007

Competitive Electricity Markets: The Benefits for Customers and the Environment, a white paper prepared for COMPETE Collation, February 2008

The Continuing Rationale for Full and Timely Recovery of Fuel Price Levels in Fuel Adjustment Clauses, The Electricity Journal, July 2008

Impact of EU Electricity Competition Directives on Nuclear Financing presented to: SMI – Financing Nuclear Power Conference, London, UK, May 20, 2009

Testimony

Forums

Arkansas Public Service Commission

Federal Energy Regulatory Commission

Florida Public Service Commission

Maine Public Utilities Commission

Minnesota Public Service Commission

Nevada Public Service Commission

New York Public Service Commission

Nuclear Regulatory Commission – Atomic Safety and Licensing Board

Oklahoma Public Service Commission

Public Service Commission of Indiana

Public Utilities Commission of Ohio

Public Utilities Commission of Nevada

Public Utilities Commission of Texas

Public Utilities Commission of New Hampshire

United States District Court

United States Senate Committee on Energy and Natural Resources

Various arbitration proceedings

Clients

Arkansas Power & Light Company

Baltimore Gas & Electric Company

Carolina Power & Light Company

Central Maine Power Company

Consolidated Edison Company of New York, Inc.

Dayton Power and Light Company

Florida Coordinating Group

Houston Lighting & Power Company

Minnesota Power and Light Company

Nevada Power Company

Niagara Mohawk Power Corporation

Northern Indiana Public Service Company

Oglethorpe Power Corporation

Pacific Gas and Electric Company

Power Authority of the State of New York

Public Service and Electric Company

Public Service Company of Oklahoma

Sierra Pacific Power Company

Southern Company Services, Inc.

Tucson Electric Power Company

Texas-New Mexico Power Company

Recent Expert Testimony and Expert Reports

Supplemental Testimony on behalf of Texas-New Mexico Power Company, Docket No. 15660, September 5, 1996.

Direct Testimony on behalf of Long Island Lighting Company before the Federal Energy Regulatory Commission, September 29, 1997.

Rebuttal Testimony on behalf of Texas-New Mexico Power Company, SOAH Docket No. 473-97-1561, PUC Docket No. 17751, March 2, 1998.

Prepared Testimony and deposition testimony on behalf of Central Maine Power Company, United Stated District Court Southern District of New York, 98-civ-8162 (JSM), March 5, 1999.

Prepared Direct Testimony Before the Public Service Commission of Maryland on behalf of Baltimore Gas & Electric Company, PSC Case Nos. 8794/8804, June 1999.

Rebuttal Testimony Before the Maryland Public Service Commission, on behalf of Baltimore Gas & Electric Company, PSC Case Nos. 8794/8804, March 22, 1999.

NORCON Power Partners LP v. Niagara Mohawk Energy Marketing, before the United States District Court, Southern District of New York, June 1999.

Prepared Supplemental Testimony Before the Maryland Public Service Commission, on behalf of Baltimore Gas & Electric Company, PSC Case Nos. 8794/8804, July 23, 1999.

Prepared Supplemental Reply Testimony Before the Maryland Public Service Commission, on behalf of Baltimore Gas & Electric Company, PSC Case Nos. 8794/8804, August 3, 1999.

Direct Testimony on behalf of Niagara Mohawk, Before the New York State Public Service Commission, PSC Case No. 99-E-0681, September 3, 1999.

Rebuttal Testimony on behalf of Niagara Mohawk, PSC Case No. 99-E-0681 Before the New York State Public Service Commission, November 10, 1999.

Arbitration deposition on behalf of Oglethorpe Power Corporation, last quarter of 1999.

Direct Testimony Before the Public Utilities Commission of Ohio on behalf of FirstEnergy Corporation, Ohio Edison Company, The Cleveland Electric Illuminating Company and The Toledo Edison Company, Case No. 99-1212-EL-ETP re: Shopping Credits.

Direct Testimony on behalf of Niagara Mohawk, Before the New York State Public Service Commission, PSC Case No. 99-E-0990, February 25, 2000.

Testimony on behalf of Consolidated Edison Company of New York, Inc., State of Connecticut, Department of Public Utility Control, Docket No.: 00-01-11, April 28, 2000 and June 30, 2000.

Testimony on behalf of Texas-New Mexico Power Company, Fuel Reconciliation Proceeding before the Texas PUC, June 30, 2000.

Testimony on behalf of Consolidated Edison Company of New York, Inc., Before the New Hampshire Public Service Commission, Docket No.: DE 00-009, June 30, 2000.

Rebuttal Testimony Before the Public Utilities Commission of the State of Colorado, Docket No. 99A-549E, November 22, 2000.

Testimony Before the Public Utilities Commission of the State of Colorado, Docket No. 99A-549E, January 19, 2001.

DETM Management, Inc. Duke Energy Services Canada Ltd., And DTMSI Management Ltd., Claimants vs. Mobil Natural Gas Inc., And Mobil Canada Products, Ltd., Respondents. American Arbitration Association Cause No. 50 T 198 00485 00, August 27, 2001.

State of New Jersey Board of Public Utilities, In the Matter of the Provision of Basic Generation Service Pursuant to the Electric Discount and Energy Competition Act of 1999, Before President Connie O. Hughes, Commissioner Carol Murphy on Behalf of the Electric Distribution Companies (Public Service Electric and Gas Company, GPU Energy, Consolidate Edison Company and Conectiv) Docket No.: EX01050303, October 4, 2001.

Direct Testimony Before the Federal Energy Regulatory Commission on behalf of Pacific Gas and Electric Company, Docket No.: ER02-456-000, November 30, 2001.

Fourth Branch Associates/Mechanicville vs. Niagara Mohawk Power Corporation, January 2002 (Expert Report).

Arbitration Deposition on behalf of Oglethorpe Power Corporation, March 2002.

Direct Testimony and Deposition Testimony Before the Federal Energy Regulatory Commission on behalf of Electric Generation LLC in Response to June 12 Commission Order, Docket No.: ER02-456-000, July 16, 2002.

Rebuttal Testimony Before the Federal Energy Regulatory Commission on behalf of Electric Generation LLC in Response to June 12 Commission Order, Docket No.: ER02-456-000, August 13, 2002.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company, in the matter of the Application of Nevada Power Company to Reduce Fuel and Purchased Power Rates, PUCN Docket No. 02-11021, November 8, 2002 and subsequent Deposition Testimony.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Deferred Energy Case, Docket No. 03-1014, January 10, 2003.

Direct Testimony Before the Public Utility Commission Of Texas on behalf of Texas-New Mexico Power Company, Application Of Texas-New Mexico Power Company For Reconciliation Of Fuel Costs, April 1, 2003.

Rebuttal Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company, PUCN Docket No. 02-11021, April 1, 2003.

Rebuttal Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company, Docket No. 03-1014, May 5, 2003.

Testimony on behalf of Consolidated Edison Company of New York, Inc., Before the Public Service Commission of New York, Case No.: 00-E-0612, September 19, 2003.

State of New Jersey Board of Public Utilities, In the Matter of the Provision of Basic Generation Service Pursuant to the Electric Discount and Energy Competition Act of 1999, Before President Connie O. Hughes, Commissioner Carol Murphy on Behalf of the Electric Distribution Companies (Public Service Electric and Gas Company, GPU Energy, Consolidate Edison Company and Conectiv), September 2003.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's Deferred Energy Case, November 12, 2003.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Deferred Energy Case, January 12, 2004.

Rebuttal Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Deferred Energy Case, May 28, 2004.

Direct Testimony on behalf of Texas-New Mexico Power Company, First Choice Power Inc. and Texas Generating Company LP to Finalize Stranded Cost under PURA § 39.262, January 22, 2004.

Rebuttal Testimony on behalf of Texas-New Mexico Power Company, First Choice Power Inc. and Texas Generating Company LP to Finalize Stranded Cost under PURA § 39.262, April, 2004.

State of New Jersey Board of Public Utilities, In the Matter of the Provision of Basic Generation Service Pursuant to the Electric Discount and Energy Competition Act of 1999, Before President Connie O. Hughes, Commissioner Carol Murphy on Behalf of the Electric Distribution Companies (Public Service Electric and Gas Company, GPU Energy, Consolidate Edison Company and Conectiv), September 2004.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's Deferred Energy Case, November 9, 2004.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Deferred Energy Case, January 7, 2005.

Expert Report on behalf of Oglethorpe Power Corporation, March 23, 2005.

Arbitration deposition on behalf of Oglethorpe Power Corporation, April 1, 2005.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's December 2005 Deferred Energy Case.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's 2006 Deferred Energy Case, January 13, 2006.

Remand Rebuttal for Public Service Company of Oklahoma before the Corporation Commission of the State of Oklahoma, Cause No. PUD 200200038, **Confidential**, March 17, 2006

Answer Testimony on behalf of the Colorado Independent energy Association, AES Corporation and LS Power Associates, LP, Docket No. 05A-543E, April 18, 2006.

Cross-Answer Testimony on behalf of the Colorado Independent energy Association, AES Corporation and LS Power Associates, LP, Docket No. 05A-543E, May 22, 2006.

Distributed Resources: Incentives, a report prepared for Edison Electric Institute, May 2006

Rebuttal Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's 2006 Deferred Energy Case, Docket No. 06-01016, June 2006.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Deferred Energy Case, December 2006.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Application for Recovery of Costs of Achieving Final Resolution of Claims Associated with Contracts Executed During the Western Energy Crisis, December 2006.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's Application for Recovery of Costs of Achieving Final Resolution of Claims Associated with Contracts Executed During the Western Energy Crisis, December 2006.

Direct Testimony Before the Public Utilities Commission of the State of Hawaii, on behalf of Hawaiian Electric Company, Inc., Docket No. 2006-0386, December 22, 2006.

Direct Testimony Before the Public Utilities Commission of the State of Hawaii, on behalf of Hawaiian Electric Company, Inc., Docket No. 05-0315, December 29, 2006.

Rebuttal Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's 2007 Deferred Energy Case, January 2007.

Declaration Before the State of New York Public Service Commission, on behalf of Consolidated Edison Company of New York, Inc.'s Long Island City Electric Network, Case 06-E-0894 – Proceeding on Motion of the Commission to Investigate the Electric Power Outage and Case 06-E-1158 – In the Matter of Staff's Investigation of Consolidated Edison Company of New York, Inc.'s Performance During and Following the July and September Electric Utility Outages. July 24, 2007

Direct Testimony Before The Public Utilities Commission of Colorado, In The Matter of the Application of Public Service Company of Colorado for Approval of its 2007 Colorado Resource Plan, April 2008

Answer Testimony Before the Public Utilities Commission of the State of Colorado on behalf of Trans-Elect Development Company, LLC, and The Wyoming Infrastructure Authority, Docket No. 07A-447E, April 28, 2008

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's 2008 Deferred Energy Case, February 2009.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's 2008 Deferred Energy Case, February 2009.

Direct Testimony Before the Public Utilities Commission of Texas, on behalf of Entergy Texas, Inc. Docket No. 33687, April 29, 2009

Direct Testimony Before The Public Utilities Commission Of Nevada On Behalf of Nevada Power Company D/B/A Nevada Energy, 2010 – 2029 Integrated Resource Plan, June 26, 2009

Before the Public Service Commission of New York, Case 09-E-0428 Consolidated Edison Company of New York, Inc. Rate Case, Rebuttal Testimony, September 2009

Direct Testimony Before the Public Utilities Commission of Nevada on Behalf of Sierra Pacific Power Company's 2009 Deferred Energy Case, February 2010.

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's 2009 Deferred Energy Case, February 2010

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Nevada Power Company's 2010 – 2029 Integrated Resource Plan, Docket No. 09-07003, July 2010

Direct Testimony Before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company's Eighth Amendment to its 2008 – 2027 Integrated Resource Plan, Docket No. 10-03____, July 2010

ATTACHMENT 2

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. Docket No. ER11-2224-000

AFFIDAVIT OF DAVID LAWRENCE

Mr. David Lawrence declares:

1. I have personal knowledge of the facts and opinions herein and if called to testify could and would testify competently hereto.

I. Purpose of this Affidavit

2. The purpose of this Affidavit is to provide an analysis of the impacts on the ICAP[1] Demand Curves for New York City ("NYC"), Long Island ("LI") and the New York Control Area ("NYCA") if the adjustments recommended by the Independent Power Producers of New York ("IPPNY") in its protest[2] were implemented.

II. Qualifications

3. My name is David Lawrence, and I am the Manager of Auxiliary Market Products for the New York Independent System Operator, Inc. ("NYISO"). In this position I am responsible for the design and implementation of, and enhancements to, the Installed Capacity ("ICAP") product in the NYISO market, including the development of the ICAP Demand Curves and Capacity market mitigation measures, and for working with stakeholders on such matters. Prior to my current position, I was employed for 24 years by Power Technologies, Inc., where, among other positions, I served as the Director of the

[1] Terms with initial capitalization not defined herein have the meaning set forth in the NYISO's Market Administration and Control Area Services Tariff, and if not defined therein, then as defined in the NYISO's Open Access Transmission Tariff.

[2] *Motion to Intervene and Protest of Independent Power Producers of New York, Inc.* Docket No. ER11-2224-000 (December 21, 2010) ("IPPNY Protest").

Instrumentation and Energy Management Department. I received a Bachelor of Science degree in Engineering and a Master of Science degree in Electric Power Engineering from Rensselaer Polytechnic Institute in Troy, New York.

III. Background

4. In the IPPNY Protest, IPPNY requests that the Commission require the NYISO to reset the ICAP Demand Curves to reflect:[3]

   - the excess capacity risk factors recommended by NERA Economic Consulting ("NERA")
   - the inclusion System Deliverability Upgrade ("SDU") costs in the Net CONE for the Proxy Unit in the NYCA or, in the alternative, to determine the NYCA Demand Curve based on the Net CONE of a Proxy Unit located in the Lower Hudson Valley;
   - the inclusion of property taxes into the calculation of the Net CONE for the Proxy Unit in NYC;
   - the escalation of the Demand Curves for the 2012/2013 and 2013/2014 Capability Years by 7.8%; and
   - IPPNY's proposed alternative estimates of interconnection costs for the Proxy Unit in NYC.

5. IPPNY submitted its recommended modifications to the NYISO's proposed Demand Curves as a package, but does not inform the Commission of the impact of its recommendations on the Demand Curves for NYCA, NYC and LI.

IV. Analysis of the Impact of IPPNY's Recommendations on the ICAP Demand Curves

6. I used the most recent NERA model, used in the formulation of the final Demand Curves, to investigate the impact of IPPNY's five recommendations (quoted in Section III above) on the annual reference price for each ICAP Demand Curve. Characterizing the recommendations by Capacity region, the IPPNY's recommendations call for the following changes to be made:

[3] IPPNY Protest at 8.

- NYCA: Modeled the level of excess capacity for energy and capacity revenue at 1.5%,[4] with a standard deviation of 0.75%; included SDU costs of $88.50/kW[5] and used a 7.8% escalation factor for Capability Years 2012/2013 and 2013/2014.[6]

- NYC: Modeled the level of excess capacity for energy and capacity revenue at 3%,[7] with a standard deviation of 1.5%; did not model property tax abatement,[8] included System Upgrade Facility ("SUF") costs of $23.6 Million,[9] and used a 7.8% escalation factor for Capability Years 2012/2013 and 2013/2014.[10]

- LI: Modeled the level of excess capacity for Energy and Capacity revenue at 6%,[11] with a standard deviation of 3%; and used a 7.8% escalation factor for Capability Years 2012/2013 and 2013/2014.[12]

7. Table 1 of Exhibit 1 to this Affidavit compares Demand Curves for the current Capability Year of 2010-2011, NYISO recommended Demand Curves for 2011-2014, and IPPNY's proposed 2011-2014 Demand Curves. Values represent the reference price at 100% of the minimum Installed Capacity Requirement for each of the NYC, LI, and NYCA Capacity zones on a monthly basis ($/kW-mo, the form used for the ICAP-to-UCAP translation in the NYISO's ICAP auctions) and on an annual basis ($/kW-yr). Values for the NYISO recommended and IPPNY proposed ICAP Demand Curves for the 2011-2012 Capability Year were taken directly from the results of the NERA model (cells M29 and M30), with escalation factored as per the tables included in Appendix A, Demand Curve Parameters and Demand Curves, of the NYISO recommended Demand Curves. [13]

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[4] *See* IPPNY Protest, Exhibit 2, Affidavit of Mark D. Younger ("Younger Affidavit") at 9, P 30.

[5] *See* Younger Affidavit at 24, P 84.

[6] *See* IPPNY Protest at 7.

[7] *See* Younger Affidavit at 9, P 30.

[8] *See* IPPNY filing letter at 7.

[9] *See* Younger Affidavit at 25, P 89.

[10] *See* IPPNY Protest at 7.

[11] *See* Younger Affidavit at 9, P 30.

[12] *See* IPPNY Protest at 7.

[13] *See New York Independent System Operator, Inc.*, Tariff Revisions to Implement ICAP Demand Curves for 2008/2009, 2009/2010, and 2010/2011, Docket No. ER08-283-000, Exhibit DJL-1 of Attachment 3.

8. Figure 1, of Exhibit 1 of this Affidavit, plots the percentage increase in the reference prices for NYCA, NYC and LI, comparing the IPPNY proposed Demand Curves with the NYISO's recommended Demand Curves. The IPPNY recommendations (enumerated in Section III above) would raise the 2011-2014: (1) NYCA Demand Curve by between 20 and 36 percent; (2) the LI Demand Curve by between 76 and 97 percent; and (3) the NYC Demand Curve by between 87 and 111 percent..

9. The NYISO recommended ICAP Demand Curves compared to IPPNY's proposed ICAP Demand Curves are plotted in Figures 2 through 4 for NYCA, NYC and LI, respectively. Given the linear slope of the ICAP Demand Curves, the percentage increases in ICAP Demand Curves and the Market-Clearing Prices for the ICAP Spot Market Auction in each of the NYC, LI, and NYCA Capacity zones would exist at any level of excess capacity, not only at the reference point (100%).

This concludes my Affidavit.

ATTESTATION

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information, and belief.

David J. Lawrence

Subscribed and sworn to before me
this 5th day of January 2011

Pamela J Mead
Notary Public

PAMELA J MEAD
Notary Public, State of NY
No. 01ME5062365
Qualified in Columbia Cty
Commission Expires 6/24, 2014

My commission expires: 6/24/2014

EXHIBIT 1

Table 1 – Comparison of Current, NYISO Recommended and IPPNY Proposed Demand Curves

	NYCA		NYC		LI	
	$/kW-mo summer	$/kW-yr	$/kW-mo summer	$/kW-yr	$/kW-mo summer	$/kW-yr
2010-2011 ICAP demand curves	$ 9.90	$ 96.46	$ 15.99	$ 143.15	$ 8.69	$ 89.47
NYISO proposed, 2011-2012	8.86	89.79	16.91	157.21	6.31	66.63
NYISO proposed, 2012-2013	9.01	91.31	17.20	159.88	6.42	67.77
NYISO proposed, 2013-2014	9.17	92.86	17.49	162.60	6.52	68.92
IPPNY recomm, 2011-2012	10.70	108.43	31.70	294.76	11.08	117.02
IPPNY recomm, 2012-2013	11.54	116.88	34.18	317.75	11.94	126.15
IPPNY recomm, 2013-2014	12.44	126.00	36.84	342.53	12.87	135.99

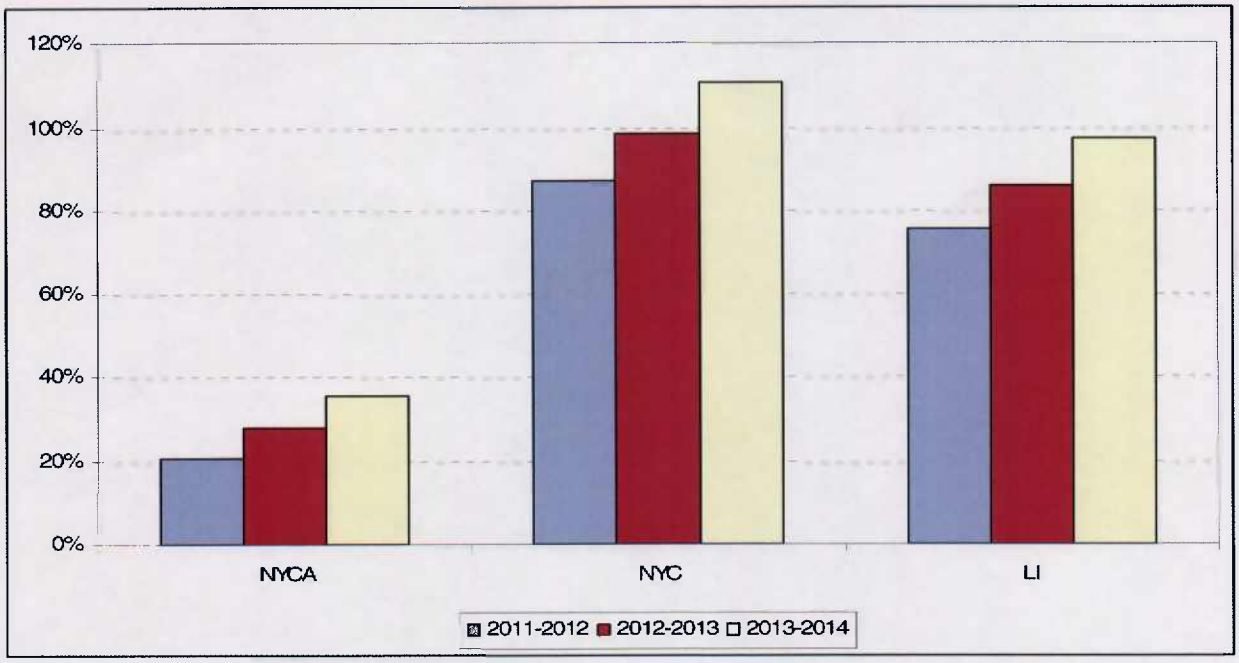

Figure 1 – Percentage Increase in Demand Curve Reference Price, IPPNY Proposed vs. NYISO Recommended Demand Curves

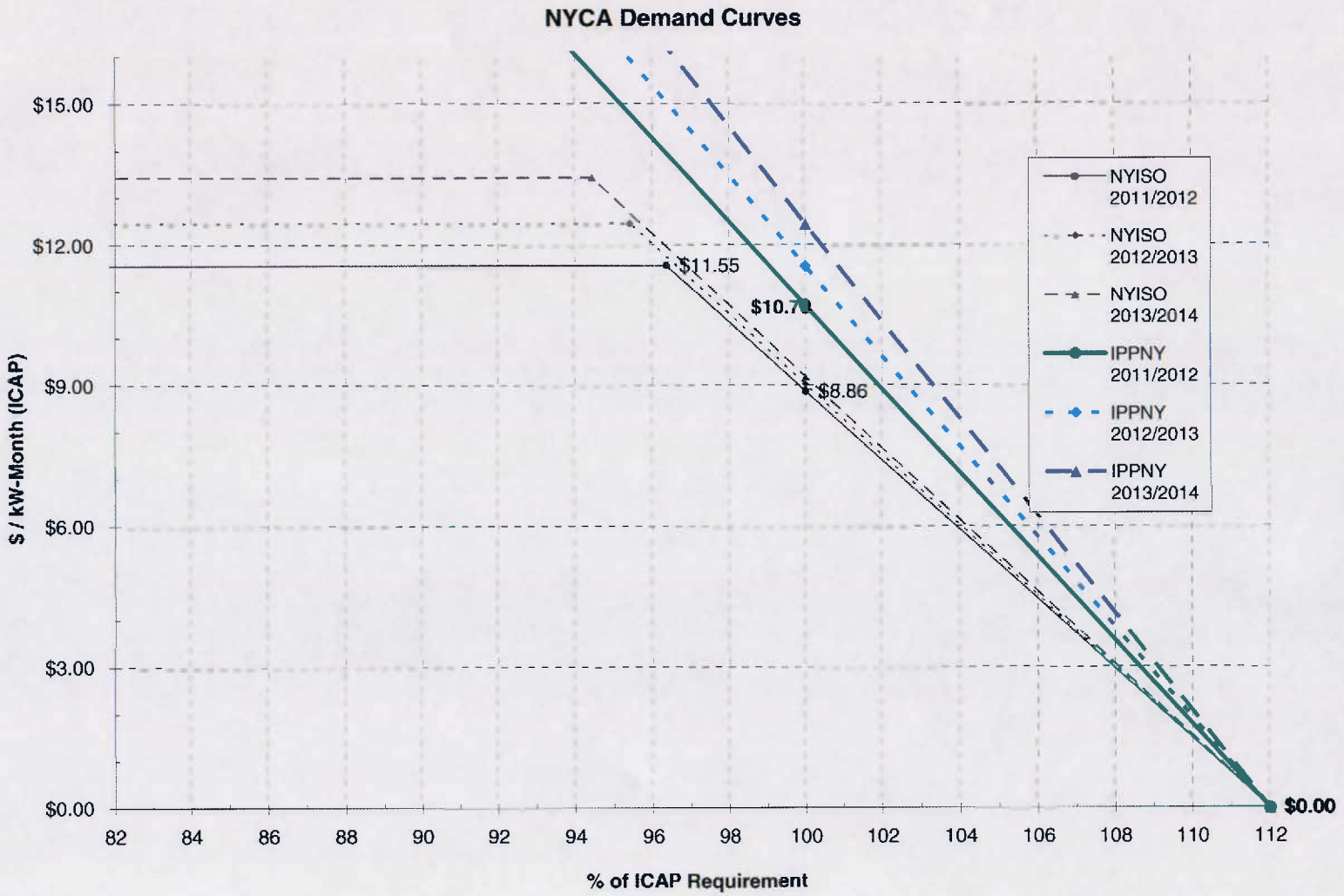

Figure 2 – NYCA Demand Curves, NYISO Recommended vs. IPPNY Proposed

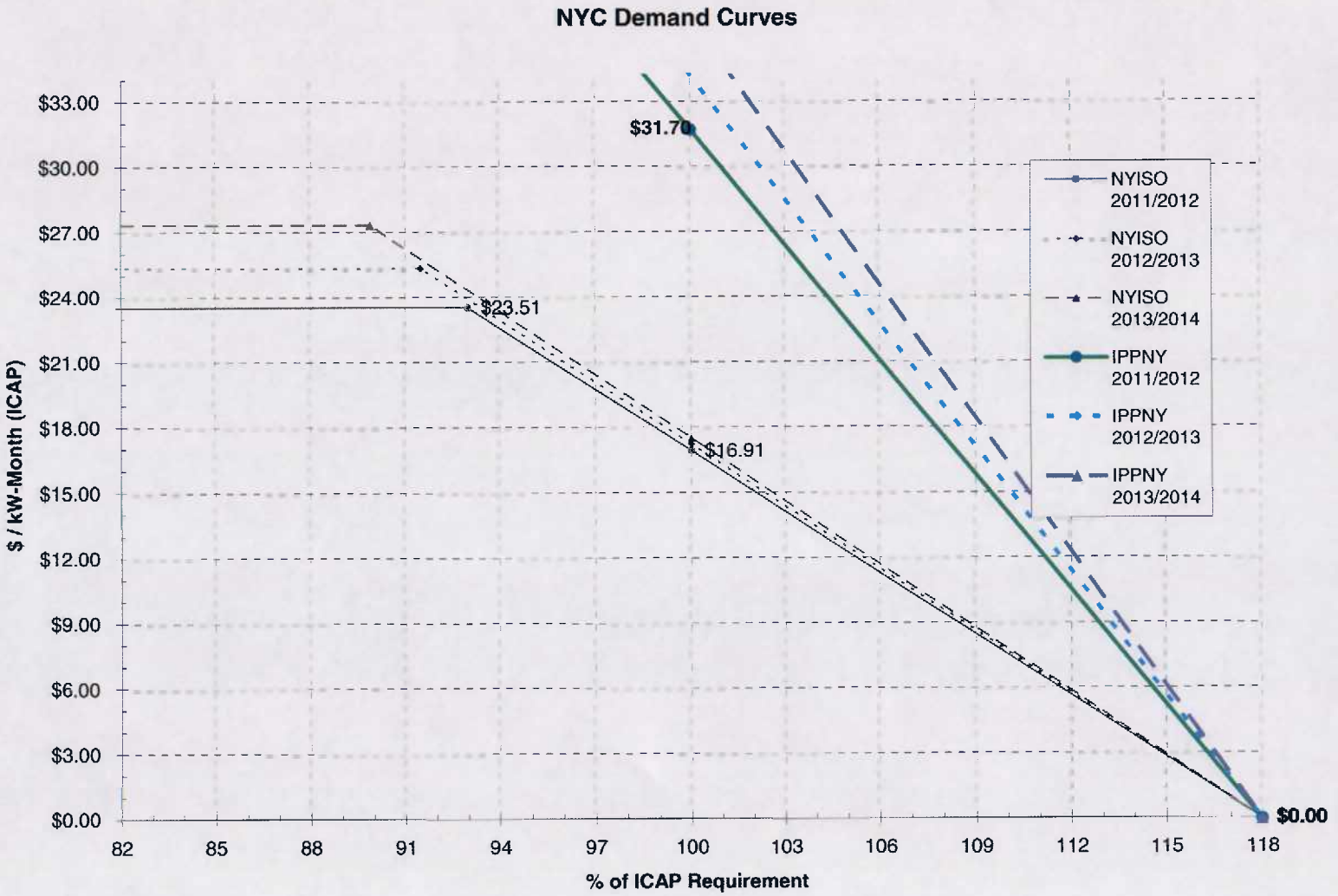

Figure 3 – NYC Demand Curves, NYISO Recommended vs. IPPNY Proposed

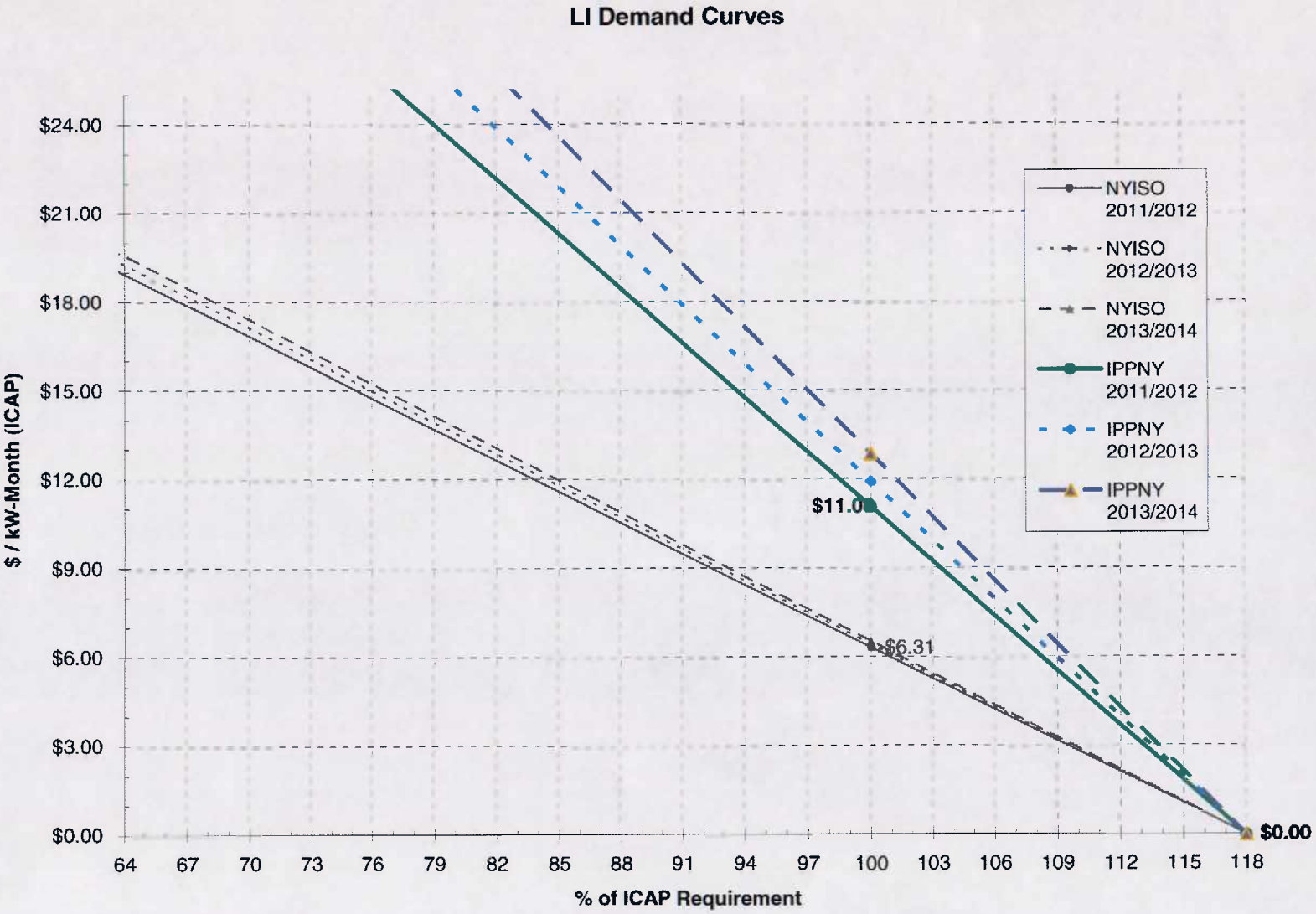

Figure 4 – LI Demand Curves, NYISO Recommended vs. IPPNY Proposed

ATTACHMENT 3

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. Docket No. ER11-2224-000

AFFIDAVIT OF CHRISTOPHER D. UNGATE

Mr. Christopher D. Ungate declares:

1. I have personal knowledge of the facts and opinions herein and if called to testify could and would testify competently hereto.

I. Purpose of this Affidavit

2. The purpose of my Affidavit is to discuss: a) the eligibility of the Zone J[1] peaking unit for New York City ("NYC") tax abatement under the heat rate criteria established by the NYC Industrial Development Agency ("NYCIDA"), b) how site remediation costs were factored into the costs of the Zone J peaking unit, c) the basis for estimating the interconnect costs for the Zone J peaking unit, and d) recent publicly available data supporting the proposed inflation rate for escalating the ICAP Demand Curve in future years.

II. Qualifications

3. I am a Senior Principal Management Consultant with Sargent & Lundy LLC ("Sargent & Lundy" or "S&L") and have over thirty years of experience in electric utility operations, planning, and consulting. Prior to joining Sargent & Lundy in 2006, my professional work experience included management of generation resource planning for

[1] Terms with initial capitalization not defined herein have the meaning set forth in the NYISO's Market Administration and Control Area Services Tariff, and if not defined therein, then as defined in the NYISO's Open Access Transmission Tariff ("OATT").

a 30,000 MW portfolio of nuclear, coal, hydro and gas generation, providing annual power supply plans, monthly cost forecast updates, and system reliability analyses; hydro operations business planning; re-engineering and process improvement initiatives in utility planning and operations; and laboratory and prototype testing for hydro and thermal generating plants.

4. My consulting practice at Sargent & Lundy focuses on the areas of integrated resource planning, financial modeling and analysis for the assessment of power generation technologies, project development, asset transactions, operational reviews, and facility modifications and refurbishment projects. I also perform due diligence reviews of new technology development, new projects, modification and refurbishment of existing facilities, asset transactions, and operational assessments.

5. I managed Sargent & Lundy's recent and ongoing efforts with respect to the 2007 and 2010 NYISO update processes for the NYISO ICAP Demand Curves. As part of that work, I managed the estimation of capital costs, fixed operations and maintenance costs, and other fixed costs for quantifying the cost of new entry in NYISO Zones J and K, and Rest of State ("ROS").

6. My resume is attached as Exhibit A hereto.

III. Heat Rate of Peaking Unit in Zone J

7. I reviewed the Affidavit of David Perri[2] regarding the eligibility for New York City property tax abatement of an LMS100 unit that the US Power Generating Company plans to construct in Zone J, based on the Third Amended and Restated Uniform Tax

[2] The Perri Affidavit is Attachment C to the Protest of Astoria Generating Company, the NRG Companies, and TC Ravenswood (collectively referred to herein as the "In-City Incumbent Generators") filed in this docket.

Exemption Policy ("UTEP") of the New York City Industrial Development Agency ("NYCIDA"). The LMS100 unit is proposed to be constructed as part of the South Pier Improvement Project ("SPIP"). Mr. Perri concludes that the SPIP will meet neither the UTEP subsection (aa) heat rate criterion of not exceeding "7,850 btuLHV/kWh (ISO 59, 60% RH, zero losses, sea level) as measured at the generator terminals..." nor the subsection (bb) heat rate criterion of not exceeding "8,250 btuLHV/kwh (9,150 btuHHV/kwh) as measured net of power plant parasitic loads...." Because the SPIP unit and the Zone J peaking unit are the same technology (the LMS100), Mr. Perri concludes that the Zone J peaking unit would not meet the UTEP's performance criteria and would not be eligible for tax abatement.

8. The gas turbine performance of the Zone J peaking unit is almost identical to the performance of the SPIP unit presented in the Perri affidavit. Mr. Perri uses essentially the same ambient conditions, and has very similar inlet and exhaust losses. The peaking unit and the SPIP unit use the same fuel gas. The SPIP gross heat rate at the generator of 7,906 Btu/kWh (LHV) is essentially the same as the 7,902 Btu/kWh (LHV) heat rate of the peaking unit, and the power outputs differ by only 2 kW. I concur with Mr. Perri that neither the peaking unit nor the SPIP unit will meet the 7,850 Btu/kWh (LHV) heat rate of the subsection (aa) requirement.

9. I differ with Mr. Perri regarding his second claim that the LMS100 peaking unit will not meet the net plant heat rate of 8,250 btuLHV/kwh (9,150 btuHHV/kwh) – the subsection (bb) requirement. I agree with Mr. Perri that the policy language says "zero losses", which implies that heat rates would be based on new and clean conditions. (Note that the heat rates quoted in the NERA and Sargent & Lundy ICAP Demand

Curve reset report[3] ("NERA/S&L Report") are not for new and clean conditions, but are increased by 1.3 percent to account for average heat rate degradation experienced in unit operation between overhauls). Also, Mr. Perri and I calculate the net plant heat rate in the same manner. Where we differ is in the estimate of parasitic losses for the LMS100.

10. The LMS100 base auxiliary power requirement for the Zone J peaking unit at the same ambient conditions is 1,425 kW, which is lower than Mr. Perri assumes for the SPIP. The Zone J peaking unit value is the same as used for the 2007 ICAP Demand Curve study,[4] and is in line with typical rules-of-thumb used by Sargent & Lundy for aeroderivative peaking units. The net plant heat rate for the base auxiliary power requirement is 8,895 Btu/kWh (HHV) for new and clean conditions. To be directly comparable to the SPIP calculations, I added the auxiliary power required by a gas compressor, which is estimated at 1,300 kW, and the cooling system for the LMS100 intercooler, which is estimated at 200 kW. Increasing the auxiliary power to 3 MW to account for the gas compressor and cooling for the intercooler, the heat rate increases to 9,036 Btu/kWh (HHV) for new and clean conditions. This heat rates meets the section (bb) requirement. The auxiliary power has to increase to approximately 4,240 kW before the section (bb) heat rate requirement cannot be met. Mr. Perri assumes an auxiliary power requirement for SPIP of 6 MW.

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[3] *See* Table A-2 in November 30 Filing at Attachment 2, "Independent Study to Establish Parameters of the ICAP Demand Curve for the New York Independent System Operator," September 3, 2010 (revised September 7, 2010), prepared by NERA Economic Consulting; also available at http://www.nyiso.com/public/webdocs/committees/bic_icapwg/meeting_materials/2010-09-16/Demand_Curve_Study_Report_9-3-10_clean.pdf.

[4] *See New York Independent System Operator, Inc.*, Tariff Revisions to Implement ICAP Demand Curves for 2008/2009, 2009/2010, and 2010/2011, Docket No. ER08-283-000, Attachment 4 – Exhibit B.

11. The Zone J peaking unit is based on the LMS100 technology with assumptions regarding site conditions and operating conditions. An actual unit, such as the SPIP, will differ in cost and performance to some degree, so variations – for example, variations in auxiliary power – are not unexpected.

IV. Site Remediation Costs in Zone J

12. I reviewed the Motion to Intervene, Protest, and Comments of the City of New York filed in this Docket ("City of New York Motion") regarding site remediation costs for the Zone J peaking unit. The City of New York states that "the NYISO Filing proposes a 50 percent adder to the land costs of the NYC proxy peaking unit to account for an assumption that the owner of such unit, as lessee, would accept full responsibility for all site remediation costs."[5] The City of New York Motion goes on to state that "this assumption is unreasonable and should be rejected by the Commission, together with the cost adder to the lease rate for the NYC proxy unit associated therewith."

13. Table A-11 of the NERA/S&L Report[6] shows that the Site Remediation Cost assumed for the Zone J peaking unit is $2,005,500, and is less than one percent of the $276,318,000 Total Engineering Procurement and Construction ("EPC") cost for the plant.

14. The $2,005,500 site remediation cost is included in the $6,017,000 Site Preparation cost shown for the Zone J peaking unit in Table A-3 of the NERA/S&L Report. The $2,005,500 site remediation cost amounts to a 50 percent adder to the Site Preparation cost of $4,011,000 exclusive of site remediation.

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[5] City of New York Motion at 11.

[6] NERA/S&L Report at 111-112.

15. Table II-3 of the NERA/S&L Report[7] shows that the Total Capital Investment estimated for the Zone J peaking unit is $326,206,000. If the $2,005,500 site remediation was removed from the EPC or Direct Cost, the Total Capital Investment cost would be reduced to $323,843,500. On a $/kW basis, this would reduce the Total Capital Investment cost from $1,807/kW to $1,794/kW.

16. Section II.E.1.a of the NERA/S&L Report states that "site leasing costs in Zone J were based on market data."[8] Zone J site leasing costs do not include an explicit cost adder to the lease rate for site remediation that can be removed.

V. Interconnect Costs in Zone J

17. I have reviewed the Affidavit of Mark D. Younger ("Younger Affidavit"),[9] which states that interconnect costs should be increased based on interconnection cost determinations for three of the four Class Year 2009 and 2010 Zone J projects published by NYISO on November 30, 2010, and December 2, 2010, respectively. I have been informed by the NYISO that the SUF costs in Mr. Younger's Affidavit are draft estimates and are subject to the approval of the NYISO Operating Committee, and as of the date of this Affidavit, they have not yet been approved.

18. I estimated interconnect costs in June 2010 prior to the publishing of the NERA/S&L Report on September 3, 2010, and revised on September 7, 2010. These interconnection costs include costs for System Upgrade Facilities ("SUFs"), but do not include the costs for System Deliverability Upgrades ("SDUs"). SUF costs are itemized

[7] NERA/S&L Report at 27-28.

[8] NERA/S&L Report at 30.

[9] The Younger Affidavit is Exhibit 2 to the Motion to Intervene and Protest of Independent Power Producers of New York, Inc. filed in this docket ("IPPNY Protest").

as "Electrical Interconnect and Upgrades" in the capital cost estimates shown in Table A-3 of the NERA/S&L Report.[10] Mr. Younger correctly identifies the SUF costs for the Zone J peaking unit as $4,800,000 in his affidavit.[11]

19. The SUF costs for the Zone J peaking unit were estimated based on the average of the SUF costs for historical Zone J capacity interconnection projects. As described below, those costs were then escalated to 2010 dollars. At the time SUF costs were estimated for the NERA/S&L Report, the most recent Zone J historical precedents were three projects from Class Year 2001. The reason for applying the escalated dollar amount of the average SUF cost of the historical projects on a $/kW basis to the Zone J peaking unit for the current ICAP Demand Curve reset was that the historical projects were high capacity factor combined cycle units, not simple cycle combustion turbines; the historical projects had larger capacity in terms of MW; and the SUF cost on a $/kW basis varied significantly among the three projects, reflecting considerable variation due to site characteristics. Mr. Younger also shows considerable variation in SUF costs on a $/kW basis.

20. The SUF costs of the historical projects were escalated to 2010 dollars by applying the Producer Price Index to materials and equipment costs, and the Consumer Price Index ("CPI-U") to labor costs, assuming 70 percent of the cost is materials and equipment and 30 percent is labor.

21. The average cost of the historical projects was applied on a $/kW basis to the three technologies considered for the Zone J peaking unit: the LMS100, the LM 6000, and

[10] NERA/S&L Report at 101-102.

[11] Younger Affidavit at 24, P 85.

the Trent 60. The SUF cost for the Zone J peaking unit was estimated as the average of the SUF costs calculated for these three technologies. The reason for using the average of the SUF cost estimates of the candidate technologies is that the variation in the magnitude of the SUF cost among the three technologies was small because the size of the peaking units was similar (100-200 MW).

22. I have estimated the effect of including the three interconnection projects from Class Years 2009 and 2010 in addition to the three interconnection projects from Class Year 2001 escalated to 2010 dollars. Using the same methodology described above, the SUF cost for the Zone J peaking unit would be $8,300,000. On a $/kW basis, this would increase the Total Capital Investment cost shown in Table II-3 of the NERA/S&L Report from $1,807/kW to $1,830/kW. If only the three interconnection projects from Class Years 2009 and 2010 were used, the SUF cost for the Zone J peaking unit would be $11,200,000 using the above methodology, and the Total Capital Investment shown in Table II-3 would increase to $1,849/kW.

23. The SUF costs stated in the NERA/S&L Report and incorporated into the proposed ICAP Demand Curves are based on the approved costs of historical projects. The SUF cost data from the historical projects provides a representative basis from which to estimate the SUF costs for the peaking unit, particularly given the wide variation in SUF costs demonstrated in the data used.

VI. Data Supporting Assumed Inflation Rate

24. I have reviewed the Affidavit of Jonathan A. Lesser, Ph.D., ("Lesser Affidavit")[12] who argues that the average annual change for the Handy-Whitman index for gas turbogenerators between 2008 and 2010 of 7.8 percent should be used to make annual cost adjustments for the Net Cost of New Entry ("CONE") values.[13] Dr. Lesser states that NYISO's reason for using a general inflation index in its recommendation for the 2010 ICAP Demand Curve update conflicts with the NYISO's own position in the 2007 ICAP Demand Curve update.[14]

25. I submitted an affidavit dated November 29, 2007, providing updated cost assumptions for the LMS100 peaking unit that was the basis for NYISO's proposal at the time to use the LMS100 technology as the basis for the Zones J and K peaking unit.[15] I stated that equipment costs rose an average of 3.3 percent in the four months between May 2007 and September 2007, for an annualized equipment cost increase of 10.3 percent. Including an average year-to-year increase of 3.8 percent for labor costs, I estimated that the weighted average annual cost increase at that time was 6.35 percent. This value supported NYISO's determination in 2007 to propose an escalation rate of 7.8 percent in the 2007 ICAP Demand Curve update.

26. Recent data support the lower inflation rate of 1.7 percent proposed by NYISO for the 2010 ICAP Demand Curve update. The Gas Turbine World 2010 GTW Handbook

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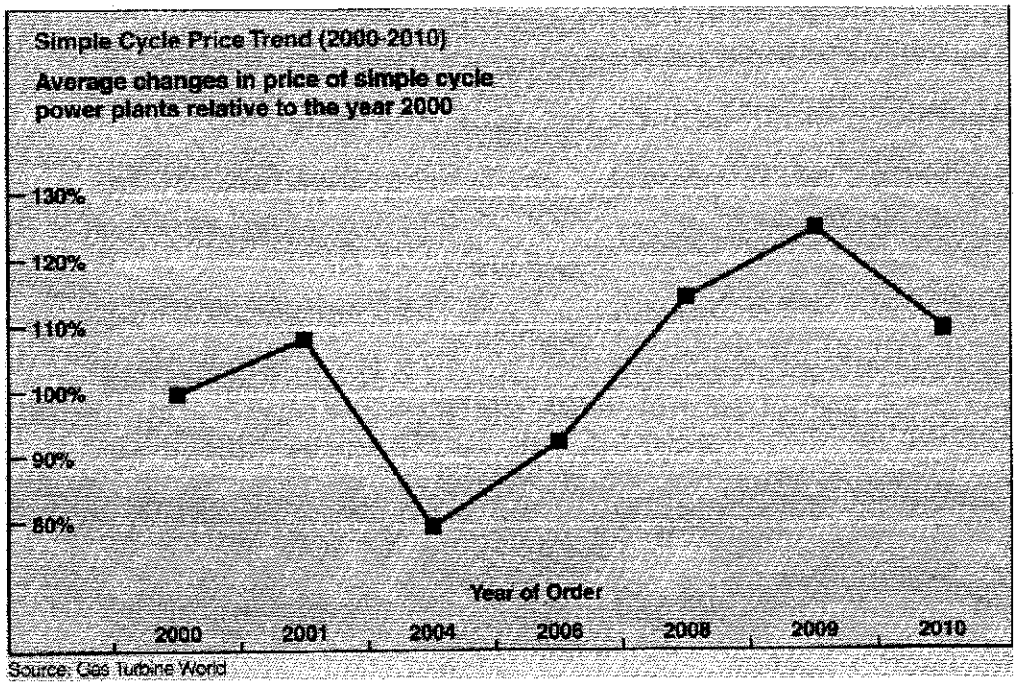
[12] The Lesser Affidavit is Exhibit 1 to the IPPNY Protest.

[13] Lesser Affidavit at 41, P 89.

[14] *Id.* at 39, P 84.

[15] *New York Independent System Operator, Inc.*, Tariff Revisions to Implement ICAP Demand Curves for 2008/2009, 2009/2010, and 2010/2011, Docket No. ER08-283-000, Attachment 5.

shows Simple Cycle Price Trends for 2000 to 2010.[16] As described by Gas Turbine World, the prices are a consensus of what project developers, owner-operators, consultants and OEM suppliers agree are reasonable for budgeting purposes. The prices quoted are equipment-only prices for a single unit package of a standard, basic pre-engineered package design. Equipment costs are approximately 40 percent of total EPC or Direct Costs, as shown in the study report.



27. The 2010 GTW Handbook shows significant equipment price increases for simple cycle combustion turbines starting in 2004 and peaking in 2009, substantiating the cost increases for those years noted in the Handy-Whitman index and as described by Dr. Lesser. The 2010 GTW Handbook notes, however, that "the latest price index figures for January 2010 indicate that shipments for the year 2009 lost most of the 15% price increase that occurred in 2008 and is likely to continue. According to our

[16] Gas Turbine World, "Gas Turbine World 2010 GTW Handbook," Perquot Publishing, Inc., Volume 28, July 2010.

research, new gas turbine orders over the next 12 months are expected to firm up and hold at about 9 to 10% lower price level compared with 2009 prices for gas turbines." The 2010 GTW Handbook goes on to state that "given these very recent market developments, Gas Turbine World has adjusted its pricing assessment, forecasting an approximate 9 to 10% overall decrease in prices for 2010. We expect to see this reflected in gas turbine shipment price levels during 2011 and 2012."

28. S&L's equipment cost estimate for each combustion turbine technology for the 2010 ICAP Demand Curve reset includes add-on options not included in the 2010 GTW Handbook budget price estimates. These add-ons are for dual fuel combustion in Zone J, and emissions control equipment for all zones that allow the candidate peaking units to operate with New York's site and environmental restrictions. We also used the latest combustion turbine models rather than the typical models whose prices form the basis for the 2010 GTW Handbook price index. The latest models offer improved performance and lower emissions which allow for siting of each technology in New York. I expect that equipment costs for the models used for the 2010 ICAP Demand Curve update have not decreased in price as shown by the 2010 GTW Handbook price trend, and also have not increased at a rate as high as the 2004 to 2009 equipment price trends or the Handy-Whitman index trends for the same period.

29. As stated previously, equipment costs are about 40 percent of the EPC or direct cost of the peaking units. The remaining 60 percent of cost is materials and labor and other costs. Most of that 60 percent is labor costs. As stated previously, I have used the Consumer Price Index as a basis for forecasting labor costs for other inputs to the 2010 ICAP Demand Curve update. The Third Quarter 2010 Survey of Professional

Forecasters published by the Federal Reserve Bank of Philadelphia shows a median CPI forecast of 2.0 percent for 2010-2014.[17] The 2011 Annual Energy Outlook published by the U.S. Energy Information Administration uses an average annual escalation rate of 1.9 percent for CPI-U over the same period.[18]

30. I conclude that the expected inflation of Total Capital Investment costs for the 2010 ICAP Demand Curve reset is significantly different and substantially lower than the expected inflation for Total Capital Investment costs for the 2007 ICAP Demand Curve update. A moderate inflation rate (1.5-2.0 percent) is best supported by the available data.

This concludes my Affidavit.

[17] Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters, Third Quarter 2010, August 13, 2010. The Fourth Quarter forecast, released November 15, 2010, is unchanged for this parameter.

[18] U.S. Energy Information Administration, Annual Energy Outlook, 2011AEO, Reference Case, Table 20. Macroeconomic Indicators, December 2010.

ATTESTATION

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information, and belief.

Christopher D. Ungate

Subscribed and sworn to before me
this 4/14 day of January 2011

Notary Public

William J. Haunert
My Commission Expires
June 14th, 2015

My commission expires: _____

EXHIBIT CDU-1

CHRISTOPHER D. UNGATE RESUME

CHRISTOPHER D. UNGATE
Senior Principal Management Consultant
Sargent & Lundy Consulting

EDUCATION

University of Tennessee, Master of Business Administration, 1984
Massachusetts Institute of Technology, M.S. Civil Engineering, 1974
Massachusetts Institute of Technology, B. S. Civil Engineering, 1973

REGISTRATIONS

Professional Engineer - Tennessee

EXPERTISE

Resource Planning
Business and Strategic Planning
Process Improvement and Re-engineering
Market Analysis and Price Forecasting
Decision Analysis
Asset Valuation and Due Diligence
Generation Portfolio Analysis
Risk Analysis

RESPONSIBILITIES

Mr. Ungate is accountable for Sargent & Lundy offerings in the Utility Planning business segment. He develops and evaluates integrated resource plans and associated analyses to identify and evaluate the optimum power supply options. He reviews and evaluates power supply planning and procurement options such as generation options available in the region (potential greenfield or plant expansion options), the viability of siting and permitting new nuclear, coal, gas, wind, solar, biomass or other alternative generation, the prospects for purchase of existing assets, and the potential for partnering with other load serving entities or power generators. He also assesses the potential and/or required renewable energy resource options, the state of transmission planning and upgrade programs, recent wholesale prices in the Client's load zone, and the fuel market and transportation capacities. He assures consistency with the Client's long-term plans and objectives and Client-specific economic factors (such as standard inflation, inflation, discount, or escalation rates).

Mr. Ungate develops financial models and analyses utilized in the assessment of power generation technologies, project development, asset transactions, operational reviews, and facility modifications and refurbishment projects. He bases the models on appropriate economic, project, operating, and client-specific inputs related to base-case scenarios, as well as associated sensitivity analyses. He also reviews existing financial models and analyses to determine if they are reasonable and appropriate, and to evaluate or develop resulting conclusions and recommendations. He also performs forward pricing analyses and evaluations, system reliability studies, load forecasting, and electric market forecasts and projections in support of power supply planning or other Client needs.

Mr. Ungate also performs due diligence reviews of new technology development, new projects, modifications and refurbishment of existing facilities, asset transactions, and operational assessments. He evaluates and develops plans to optimize the utilization of conventional hydropower plants and pumped storage plants with thermal generating units.

EXPERIENCE

Mr. Ungate has over 35 years of experience in engineering and planning for electric utilities. Since joining Sargent & Lundy in 2006, his assignments have included:

ALTERNATIVES ANALYSIS

- **San Miguel Electric Cooperative**
  - Conducted study of generation alternatives to meet federal and state requirements for justification of new coal project.

- **CPS Energy**
  - Developed cost and performance assumptions for alternative technologies for use in integrated resource planning studies. Compared published estimates of costs for new nuclear plants.

- **Entegra Power Services**
  - Conducted a planning study of adding 300 MW of natural gas-fired peaking capacity to an existing power station in the southwest US. Estimated capital costs, operating performance, and operations and maintenance (O&M) costs for three aeroderivative combustion turbine models with and without selective catalytic reduction (SCR), and two frame combustion turbine models without SCR.

- **South Mississippi Electric Power Association**
  - Reviewed renewable energy alternatives for this G&T cooperative in anticipation of future Renewable Portfolio Standard requirements. Directed the evaluation of responses to an RFP for renewable energy and capacity.

- **Department of Energy and Sandia Renewable Energy Laboratory**
  - Updated the 2003 report, "Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts" with the Dish technology.

RISK ANALYSIS

- **Various Clients**
  - Analyzing the risks associated with the cost, schedule, and performance impacts of proposed projects.

- **Globaleq**
  - Identified and quantified key drivers of increases in capital estimates for coal fired power plants.

- **American Electric Power**
  - Identified and compared key characteristics of new nuclear plant technologies. Assessed the risk of each technology relative to client objectives.

- **Allegheny Energy**
  - Developed a comprehensive risk analysis model to determine the expected outage days, generation and costs for a fleet of supercritical coal-fired units based on a high level condition assessment. The objectives were to assess the impacts of the risk issues and associated mitigation projects and to provide support the development of capital spending plans.

PLANNING AND PROJECT SUPPORT

- **PSEG**
  - Developed the need for power and energy alternatives analyses to satisfy the NUREG 1555 requirements for Environmental Reports associated with an Early Site Permit Application for a new nuclear plant project.

- **Tennessee Valley Authority, PSEG**
  - Developed the need for power analysis to satisfy the NUREG 1555 requirements for Environmental Reports associated with a Combined Operating License Application for a new nuclear plant project.

- **New York Independent System Operator**
  - Estimated the cost of new entrant peaking units used in the formulation of demand curves for capacity market. Estimated going forward costs of existing generation used in determining need for market power mitigation.

- **Eskom**
  - Surveyed major equipment suppliers with capabilities to support a large coal-fired project in Africa to assess the potential effect of current and projected production capacity, resource availability, and transportation requirements on project schedule, quality, and costs.

- **EPB**
  - Conducted seminars on selected generation, transmission and electricity market topics to prepare senior management on current trends and issues.

Prior to joining Sargent & Lundy, Mr. Ungate had over 30 years of experience at the Tennessee Valley Authority in a variety of engineering and planning assignments. Examples of assignments include the following:

POWER SUPPLY PLANNING

- Directed supply planning for 30,000 MWs of nuclear, coal, gas, renewable, and hydro generation, and determined peak season power purchase requirements. Directed the preparation of power supply plans, and the valuation of capacity additions, major projects, product offerings, and bulk power transactions. Plans provided the basis for

purchase and sale decisions; fuel purchase and inventory decisions; and hedging strategies for the commodity book.

- Led environmental controls optimization study to determine least cost approach to meeting CAIR/CAMR requirements for TVA's 15,000 MW coal generation portfolio. Alternatives included mothballing of units; increased allowance purchases; modified capital improvement programs; re-powering; and replacement with capacity and energy purchases from gas-fired units. Developed approach that resulted in reduction of projected end of period debt by more than $1 billion.
- Provided cost analysis for product pricing for industrial customers. Determined analytical approach and oversaw analyses to determine value of interruptible products, standby power, customer co-generation, long vs. short term contracts, and dispersed power products.

BUSINESS AND STRATEGIC PLANNING

- Directed business planning for portfolio of 109 conventional hydropower units at 29 sites and four pumped storage units. Portfolio supplies 10-15% of company sales with 5000 MWs of capacity. Forced outage rates, recordable injury incident rates, and reportable environmental events were increasing over the previous six years. Developed a five year business plan to increase resources to facilitate the transition to a process management maintenance strategy, and to integrate plant modernization and automation projects to change technology and workflow at the plants.
- Directed the first reassessment of the operating policies of Tennessee Valley Authority reservoirs since the system was designed in the 1930's. Stakeholders were concerned about water quality issues affecting the reservoirs and about the adverse impact of lake levels on property values and recreation-oriented businesses. Led initiative to redefine operating policies, examine environmental concerns, expand public interest and support, and more effectively meet the needs of multi-state customer base. Directed the development of an operating scheme that preserved hydropower value while improving summer lake levels for recreation and increasing minimum flows for water quality.
- Developed competitive analysis for an electric utility. Customers seeking choice of energy suppliers created need for a credible competitive analysis for electric utility monopoly. Price to customers was above competitive energy suppliers. Loss of customer load would create the risk of not recovering the high fixed costs of generation built to serve former customers. Quantified the competitive threat, and identified the circumstances under which loss of customers was most likely.

PROJECT ENGINEERING

- Directed 40-50 engineers, technicians and building trades conducting laboratory and prototype testing of thermal and hydro plant performance problems. Responsible for daily operating management, laboratory safety, quality assurance, human resources, technology acquisition and facilities management.
- Conducted field tests and physical modeling studies on the effects of thermal generating plants on rivers and reservoirs. Contributed to preparation of several environmental statements impacting authorizations for plant operations and discharge.

MEMBERSHIPS

Board of Examiners, Tennessee Quality Award, 1997-99

PUBLICATIONS

"Baseload Generation Capital Cost Trends," Electric Power Conference, May 2007.

"Resolving Conflicts in Reservoir Operations: Some Lessons Learned at the Tennessee Valley Authority," American Fisheries Society symposium, 1996.

"Tennessee Valley Authority's Clean Water Initiative: Building Partnerships for Watershed Improvement," Journal of Environmental Planning and Management, 39(1), 1996.

"'Equal Consideration' at TVA: Changing System Operations to Meet Societal Needs," Hydro Review, July 1992.

"Reviewing the Role of Hydropower in TVA Reservoir Operations," with Douglas H. Walters, Waterpower '91, An International Conference on Hydropower, Denver, Colorado, 1991.

"TVA's Lake Improvement Plan: Reviewing the Operating Objectives of TVA's Reservoir System," National Conference on Hydraulic Engineering, Nashville, Tennessee, July 1991.

"Tennessee River and Reservoir System Operation and Planning Review, Final Environmental Impact Statement," with TVA staff, December 1990.

"Field and Model Results for Multiport Diffuser Plume," with Charles W. Almquist and William R. Waldrop, American Society of Civil Engineers Specialty Conference on Verification of Mathematical and Physical Models, University of Maryland, August 1978.

"Mixing of Submerged Turbulent Jets at Low Reynolds Number," with Gerhard Jirka and Donald R. F. Harleman, M.I.T. Ralph M. Parsons Laboratory, Report No. 197, February 1975.

ATTACHMENT 4

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. Docket No. ER11-2224-000

AFFIDAVIT OF JONATHAN FALK

Mr. Jonathan Falk declares:

1. I have personal knowledge of the facts and opinions herein and if called to testify could and would testify competently hereto.

I. Purpose of this Affidavit

2. The purpose of my affidavit is to respond to assertions made by the Astoria Generating Company, the NRG Companies, and TC Ravenswood (collectively referred to herein as the "In-City Incumbent Generators")[1] through their affiant Dr. Richard Carlson of Levitan Associates regarding the econometric analysis underlying the Energy and Ancillary Services revenue calculations of the NERA Economic Consulting ("NERA") and Sargent & Lundy Demand Curve reset report ("NERA/S&L Report"[2]).[3]

II. Qualifications

3. I am a Vice President at NERA where I have been continuously employed since 1984. In that time I have carried out numerous analyses of electric markets and numerous statistical

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[1] *See* Protest of the NYC Suppliers ("In-City Incumbent Generators' Protest") at 53.

[2] *See* November 30 Filing at Attachment 2, "Independent Study to Establish Parameters of the ICAP Demand Curve for the New York Independent System Operator," September 3, 2010 (revised September 7, 2010), prepared by NERA Economic Consulting; also available at http://www.nyiso.com/public/webdocs/committees/bic_icapwg/meeting_materials/2010-09-16/Demand_Curve_Study_Report_9-3-10_clean.pdf.

[3] In-City Incumbent Generators' Protest at Attachment B ("Carlson Affidavit").

and econometric analyses, both in electricity markets and outside them. I have testified before many tribunals and regulatory bodies, including the Federal Energy Regulatory Commission (the "Commission"). Most relevantly, I am NERA's primary researcher for the econometric analyses and simulation work relating to the estimation of Energy[4] and Ancillary Services revenues in the NYISO's ICAP market. The chapter of the NERA/S&L Report regarding this estimation was substantially my own, and I carried out similar work for the NYISO in the 2007 ICAP Demand Curve reset process. A complete copy of my *curriculum vitae* is appended as Exhibit JF-1.

III. Model Analysis

4. The Carlson Affidavit claims to have identified two supposed flaws in my analysis:

5. In Dr. Carlson's words, "[f]irst, the historical period used by NERA to estimate model parameters is too short for accurate prediction of energy LBMPs and revenues. Second, NERA apparently did not employ basic statistical diagnostic tests of possible model misspecification to ensure that its predictions are reasonably accurate."[5]

6. Dr. Carlson proposes two corrections for these supposed "flaws": the use of a longer time period for estimation and the use of a lagged endogenous variable in the estimation procedure. I believe both of the changes to be unsound. Further, implementation of these changes has a result which I believe to be unsound on its face: a virtual insensitivity of Energy profits to excess reserve margins, which is not only illogical and defiant of common sense, but for which there are both factual evidence and numerous pleadings by Dr. Carlson's own clients which rebut it.

7. This affidavit will proceed in three sections, roughly paralleling the format of the Carlson Affidavit. I will not address the long history of the NERA econometric model or the extensive public comments made by Dr. Carlson and others since the NYISO's 2007 ICAP

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[4] Capitalized terms not otherwise defined herein shall have the meaning specified in the NYISO's Market Administration and Control Area Services Tariff.

[5] Carlson Affidavit at 2, P 7.

Demand Curve reset process. He summarizes some of these comments in his Affidavit,[6] and although I disagree with various characterizations that he makes, he is correct that the NERA model has undergone a number of revisions since 2007 and many of those revisions have been made at the request of NYISO stakeholders, including Dr. Carlson's clients.

8. Before I "dive into the weeds" of addressing the deficiencies in Dr. Carlson's diagnosis of the supposed flaws in the NERA analysis, it is important to note, as will be explained and supported in this Affidavit, the result of Dr. Carlson's proposed "cure" for the supposed flaws simply defies common sense. This is best seen in the chart that he presents in Figure 3[7] and essentially repeats in Figure 16.[8] If, after any set of calculations, I had derived the bottom line results that Dr. Carlson did in these two figures (and indeed, as I will describe below, the derivation of such results is not difficult), I would have rejected them for being so unbelievable as to necessarily be the result of some error is the estimation methodology.

9. In presenting Figures 3 and 16 in his Affidavit, Dr. Carlson apparently believes that the energy profits earned by efficient peaking units are almost completely insensitive to excess reserve margins. Dr. Carlson feels that the only plausible interpretation of the data mandates the conclusion that energy profits of an efficient peaking unit are almost the same when the system is seventeen percent above the required reserve margin as when it is five percent short. That conclusion is contrary to our commonsense understanding of electricity markets and would be unheard of in typical simulation models of those markets. Indeed, I am aware of no models of the electricity market in which the addition of in-merit generation does not substantially lower the market price, and certainly no models in which shortages of five percent have virtually the same impact as surpluses of seventeen percent. This includes my experience with the Ventyx (Henwood) models on which Dr. Carlson worked, as well as NERA's own proprietary models of electricity price. Dr. Carlson says (correctly) that the failure to ensure that coefficient estimates are "plausible and realistic from a theoretical

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[6] Carlson Affidavit at 15-22, P 42-68.

[7] *Id.* at 13.

[8] *Id.* at 67.

economic and empirical understanding of the object of study"[9] is a reason to reject the econometrics. On that basis, Dr. Carlson's estimates must be rejected.

10. Dr. Carlson's conclusion is also belied by numerous filings of generators that indicate that increased supply, holding demand constant, has a demonstrably deleterious effect on energy prices.

11. It is my belief that to adopt Dr. Carlson's result in the NYISO's ICAP Demand Curve reset would be a highly radical departure from the Commission's rulings (both NYISO and non-NYISO) in capacity markets, market power calculations, scarcity pricing issues, reliability must-run issues and a host of other issues. Crediting Dr. Carlson's results here would require a wholesale revamping of FERC policies in all these areas.

12. In NYISO ICAP Working Group meetings discussing NERA's methodology, I have said many times that there is no way to derive an answer to the problem of deriving Energy and Ancillary Services revenues as a function of excess reserves through econometrics alone. Dr. Carlson is correct that I have used my judgment as an electricity economist in deriving the results presented here.[10] There is no methodological imperative which so constrains the estimation process so as to make the analyst an automaton. It is appropriate to adjust models to reflect changing understanding of the underlying workings of the market and. most importantly, to reject models which give results that do not make sense. I am a practical applied statistician. If an important coefficient comes out too high or too low from the standpoint of what is known about the energy markets, the analyst who wants to defend that coefficient cannot merely assert that "the econometrics made the analyst do it." The analyst must either produce proof that the econometrics compels a result (manifestly impossible in this case, as discussed below) or present a plausible underlying theory under which people's common understanding is mistaken. Dr. Carlson cannot do the former, and has not done the latter.

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[9] *Id.* at 22, P 69. Note that he also says in this paragraph that the other purpose of diagnostics is to "ensure ... that the statistical assumptions employed in the regression estimation technique were not violated." I agree, but homoskedasticity and a lack of serial correlation are *not*, as we will see below, statistical assumptions of OLS.

[10] *Id.* at 46, P 137.

13. Dr. Carlson and I agree that the estimation of the so-called reserve margin coeficient (also referred to as the "RM coefficient") is made difficult by the relative infrequency with which it changes and the substantial overlap between its calculation for the NYCA and Zone J and Zone K. I have made choices, and those choices have been described in full in the NERA/S&L Report and at ICAP Working Group meetings during the process to develop the proposed Demand Curves. These results are objective in that they are based on a well-articulated, and, as I will discuss below, fully defensible econometric model of the NYISO energy markets. That is my only claim. I do not claim that other consultants might not have gotten coefficients which varied from mine. It would be impossible to do so. However, there is nothing in econometrics which compels the conclusion that I am wrong. I have made no econometric errors. I have instead made judgments. Dr. Carlson is free to disagree with me. But that does not undermine either the process or the result, in my opinion. By contrast, Dr. Carlson's results, implausible on their face, should serve as an indictment of his methodology.

IV. Sample Size

14. Dr. Carlson goes into great detail as to why the RM coefficient is difficult to estimate.[11] I agree that the relative paucity of changes in this variable both across time (it changes only once a month, with substantial changes occurring mostly at seasonal boundaries) and across space (it is at the same level in a given month across NYCA zones other than Zones J and K, which have their own levels determined with reference to their own required margins). His "classic solution" to this problem is to add more data.[12] If there were data which I believed would be appropriate to add, I would agree with him. But my judgment is that adding an additional three years of NYISO data in this situation would be a mistake.

15. First, there is an important issue of identification. As I expressed to the ICAP Working Group on many occasions in both the 2007 and the 2010 ICAP Demand Curve reset processes, when one has market data one must have an identification strategy or the results are meaningless. Market price occurs where the demand curve for energy crosses the supply

[11] *Id.* at 34-45, P 109-132.

[12] *Id.* at 9, P 31.

curve. Merely looking at the points of intersection leads nowhere. An identification strategy tells you what you are looking at. In the case of these econometric estimations, the NERA analysis used the fact that supply changes very slowly relative to changes in demand as an identification strategy. What we see when we control for demand is an estimate of the supply curve. This is why price rises with demand. Had we estimated the demand curve for energy, price would have fallen with demand. And we are armed only with theory and our understanding of electricity markets to justify our methodological strategy.

16. But if we are estimating a supply curve, we must use this method only in times in which the supply curve is not changing radically. If the supply curve is not (relatively) fixed, we risk mistaking changes in supply for movements along the supply curve. This would invalidate the econometrics completely, since we would no longer have any fixed meaning for supply. In practice, of course, this is at least as much art as science. The use of monthly and hourly dummy variables in the model attempts to accommodate well understood supply shifters. The use of interaction terms between NYCA-wide loads and zonal loads attempts to gauge the severity of transmission constraints that limit the utilization of supply in one region for abnormal load levels in another.

17. Extending the model backward in time creates an obvious problem since important market changes occurred over the six year period. Obvious examples are the Neptune line and Cross Sound Cable. The choices are either to incorporate, effectively, time dummies of one sort or another to pick up these changes (a methodology both Dr. Carlson[13] and I reject because of the difficulty it imposes on forecasting) or shortening the period used to keep the system roughly constant.

18. The appropriate data period is important. Too little data throws away variation in the RM variable which, as both Dr. Carlson and I acknowledge, changes very slowly. In addition, shorter periods throw away useful co-variation between the RM variable and other variables in the model. Although that result might appear to suggest going farther back in time for more data, every extension of the model backward in time carries a different risk in which changes in the supply curve undermine the identification strategy. Going too far back will

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[13] *Id.* at 18, P 52.

make the value of the RM variable decline *spuriously*. It declines spuriously because the identification strategy has been violated. Violation of the identification strategy is what I referred to as attenuation bias, because the effects are attenuated, *i.e.*, biased towards zero.

19. The model ideally would hold the supply constant so that changes in the coefficient of RM occur solely because demand increases against this curve, allowing for the measurement of what is, at its base, a peak monthly demand effect measured nowhere else in the model. (Dr. Carlson is well aware of this effect, having produced a previous memo asking me to reformulate the model in these terms, a change I rejected as merely cosmetic.) The structure of the model will incorporate such changes not as a peak monthly effect, but by changing the coefficients of the other demand variables. This biases the coefficient of RM downward towards zero, resulting in attenuation bias through a mistaken identification strategy. Expanding the dataset to capture more years of data is a profoundly poor idea, since it takes substantial supply changes, like those due to introduction in the market of the Neptune line and Cross-Sound Cable, and effectively ignores their contributions, biasing the RM coefficient downwards to the implausibly low levels Dr. Carlson finds.

20. It is possible that some of this problem residually inhabits the three years of data that I have chosen to employ. However, I would argue that the result is that the RM coefficient is probably smaller than it ought to be, *i.e.*, that Energy and Ancillary Services revenues might be expected, if anything, to be somewhat higher than the results presented in the NERA/S&L Report, not dramatically lower as implied by Dr. Carlson. However, as a practical matter, there is little to be done about this; any period shorter than three years simply does not allow enough variation to be usable.

V. Heteroskedasticity and Serial Correlation

21. Dr. Carlson's second set of complaints revolve around serial correlation and heteroskedasticity. Contrary to Dr. Carlson's assertions, neither heteroskedasticity nor serial correlation introduces bias into measured coefficients. This is a theorem[14] and is

[14] *See*, for example, Greene, William; Econometric Analysis, Sixth Edition, Prentice Hall (2007), Theorem 8.1 on p. 150

uncontroversial. Indeed, Dr. Carlson acknowledges the point.[15] But when he asserts that a reason to carry out the diagnostics he proposes is to ensure that the assumptions of the statistical technique are satisfied, [16] he apparently falsely believes that a lack of heteroskedasticity and serial correlation are assumptions of ordinary least squares ("OLS"). They are not assumptions which affect the unbiasedness of OLS.

22. Both heteroskedasticity and serial correlation do affect standard errors, *i.e.,* these problems cause a bias in the precision with which the estimated coefficients are measured. Thus, there is an unbiased measure of the magnitude of the variables, but a biased measure of how confident we should be about them. That is Dr. Carlson's first point, which is not in dispute. However, as I said, and which Dr. Carlson does not contradict, the modern methodology is to use the unbiased technique, OLS, and correct the standard errors to the extent practicable to correct the bias in precision.

23. Dr. Carlson's asserts that "due to the wider variance for the estimated parameter values, it is more difficult to make proper inferences about the model specification, such as whether to retain or drop a variable or change the functional form."[17] Dr. Carlson has not cited the authority he uses to derive this point, and I am not aware of any authority for it. At best, this assertion is correct only under a very narrow set of circumstances. First, if one is using theory to decide what variables to include in the regression, it is obviously incorrect. Second, if one is using the standard errors of particular variables to decide functional form, then the statement is true, but that is not good practice. The NERA model methodology is to look at the magnitude of estimated OLS effects and to look at the residuals from the regressions to fit the model. Standard errors and t-statistics have almost no role in this process. Accordingly, I pay them little heed. When I was asked to do so by Dr. Carlson in relation to the ICAP Demand Curve reset process, I prepared standard errors which, under certain assumptions (which I have no particular reason to believe are accurate) attempt to eliminate the bias in the estimation of standard errors. These had little effect, since they slightly widened the

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[15] *Id.* at 53, P 158.

[16] *Id.* at 22, P 69.

[17] *Id.* at 53 P 158.

estimation interval, but trivially so around the estimated values. This is all discussed in the NERA/S&L Report,[18] and the detailed runs have been turned over to Dr. Carlson.

24. Another attempted argument by Dr. Carlson is that feasible generalized least squares ("FGLS") can be used to correct for these problems,[19] but he then partly agrees with me about the failings of FGLS.[20] Indeed FGLS fails not only because one must estimate the variance-covariance matrix, but because it is only efficient in infinite-sized samples (what econometricians term "consistent").

25. Dr. Carlson's Affidavit also attempts to obfuscate the record in paragraph 182 wherein he chides NERA for using his suggestion to show in the NERA/S&L Report that FGLS makes the RM coefficient rise.[21] Since it was his suggestion during the ICAP Demand Curve reset review process, including during ICAP Working Group meetings, not NERA's, to use FGLS on this nonexistent problem, this point is irrelevant and his attempt to discredit the NERA/S&L Report is at best disingenuous.

26. In this affidavit Dr. Carlson, apparently trying to salvage his previously postulated approach, now proposes a variant on FGLS and an alternative non-FGLS method which yields an answer he now likes. Neither one makes any theoretical sense, as discussed below.

27. Overall, biased standard errors are of little concern. Standard errors are critical for inference, but by themselves, unimportant for prediction. For example, suppose you had to, on penalty of death, guess my weight accurately. You had a choice of two scales: one had a substantial amount of bias in the weight it gave, but was highly accurate about that biased weight. The other scale gave an unbiased answer about my weight, but had slightly more uncertainty around that unbiased estimate. I propose that one would use the unbiased estimate every time, particularly if both the uncertainty and the degree of bias in the uncertainty were small. We have a problem in *point prediction, i.e.*, the RM coefficient, and our uncertainty is of

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[18] *See* NERA/S&L Report at 47.

[19] Carlson Affidavit at 53, P 158-159.

[20] Carlson Affidavit at 53, P 159.

[21] Carlson Affidavit at 61, P 182, second bullet.

little concern. We are not trying to decide if the true effect of RM is nonzero. We know that it is. The OLS coefficient of -1.03 has an adjusted standard error of 0.025. Dr. Carlson's correction to an unbiased estimate is over 15 standard errors away. The fact that the OLS estimate is unbiased strongly suggests that it is the correction that is in error, not the estimate, since after all the correction has made unverifiable assumptions about the specific forms of heteroskedasticity and serial correlation.

28. Correcting standard errors are of little concern to us in this problem since we would perforce accept a measured effect for the RM variable which was not statistically significant. While I prefer more efficient estimates to less efficient ones, unlike Dr. Carlson I am unwilling to make a host of arbitrary assumptions to do so, since I begin with an unbiased method which, as I have demonstrated, has small standard errors even when adjusted to correct bias. This does not mean that my measured values are necessarily correct, as I said in the NERA/S&L Report,[22] because specification error is still a potential problem. But one certainly does not correct specification error by changing econometric methodology with regards to heteroskedasticity and serial correlation. One changes specification error by finding an OLS model which better fits the data under the appropriate identification strategy. At that point, corrected standard errors are only useful for inference, not point predictions. Dr. Carlson's fulminations about "diagnostics" are irrelevant for point predictions under OLS. Generalized correction for heteroskedasticity does not change coefficients; it only changes standard errors. One methodology for the correction of serial correlation (so-called Newey-West errors) also affects the standard errors without affecting the underlying coefficients. I did not use these before Dr. Carlson asked because there is no reason to do so. When he requested it, I performed the additional analysis: all it did was slightly widen standard errors with no effect whatsoever on the coefficients.

29. Dr. Carlson is correct that there is an older methodological tradition (by which I mean around the time that Dr. Carlson and I went to graduate school) which argues that one should "correct" for heteroskedasticity and serial correlation in the estimation process itself. The problem with that view can be simply stated: (1) you cannot correct for something explicitly

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[22] NERA/S&L Report at 47.

without making new assumptions which are almost always unverifiable; (2) the corrections will only be guaranteed to work as the data set grows to infinity, at which point the uncorrected methodology and the corrected methodology will converge anyway; and (3) in small samples, the cure can be worse than the disease, as the corrected method introduces bias (as it must, since OLS is unbiased) which only goes away as the number of observations goes to infinity. The size of this bias is unknowable, but goes a long way to explaining the anomalous answers I mention two paragraphs above.

30. It is this methodological tradition which Angrist and Pischke attack in their article (cited in the NERA/S&L Report[23]) and which the old guard (Leamer, Sims, *etc.*) defends. I acknowledge there are articles that do not agree with Angrist and Pischke; however, the quote Dr. Carlson chooses from Sims which he claims is a criticism of Angrist and Pischke, in fact makes my point – that when you want to know the expected value of y (in this case LBMP) for given values of X (in this case RM and the other independent variables) and when we believe that E(y|X) is not linear, "in that case, ordinary least square regressions…is about the best we can do."[24] Dr. Carlson goes on in the paragraph to say if we have some reason to expect that the effects are linear (which we emphatically do not in this case) or if we want to know more about the standard errors, we can use other techniques.[25] I agree completely.

31. Of course, Leamer, Sims, and other econometricians are entitled to their opinions (even when they agree with me). However, the basic fact that my estimation technique is unbiased is entirely uncontroversial and completely supports my decision to neither test for heteroskedasticity nor serial correlation since I would be unconvinced by the methodologies which then purport to correct for either under untested assumptions. Further, the standard errors for the critical RM variable are small, even after the most common corrections for bias. And neither Dr. Carlson nor any of the authorities he cites dispute in the least that a

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[23] NERA/S&L Report at 46-47, *quoting* Angrist and Pischke, *Journal of Economic Perspectives, Vol 24, No.2, Spring 2010).*

[24] Carlson Affidavit at 63-64, P 187.

[25] Carlson Affidavit at 64, P 187.

methodology which refines error estimates around an OLS estimate is in fact the standard modern method. At best, Leamer, Sims *et. al.* argue that it is a lamentable trend. I disagree with them about this, but that is not the issue. Although standard errors have been a significant topic in econometrics of the last twenty years, in the ICAP Demand Curve reset model and analysis there is strong reason to be essentially unconcerned with standard errors (at least at the magnitudes seen here), thus the use of OLS is not an error. Further, it is wholly appropriate and supported. There is no necessity to implement Dr. Carlson's recommendations, nor is there any advantage to doing so.

VI. Lagged Endogenous Variables

32. Dr. Carlson proposes to use the one-day-lagged LBMP as a regressor to "correct" serial correlation. The use of lagged endogenous variables creates so many problems, and is so antithetical to the problem which is being addressed, that I address this issue separately as a further indication of how incorrect I believe Dr. Carlson's recommendations to be. Indeed, this proposal is a particularly stark example of addressing a problem with a correction that makes the underlying problem worse.

33. Dr. Carlson introduces a one-day-lagged LBMP as a method for "correcting" for serial correlation. It should be obvious at first blush how dangerous this is. Endogenous lagged variables contain virtually no content about the price formation process beyond their perpetuation of error. The fact that high prices yesterday, all things constant, will lead to slightly higher errors today does not inform how much prices respond to installed reserves. Even to the extent they do, some of the effect of reserve margins will be compounded into the lagged endogenous variable, and one depends (at one's peril) on OLS to disentangle the effects. Further one assumes that this particular form of error propagation is what is going on. It is more likely of course that errors propagate not from a day ago but from one hour ago. And of course under this strong assumption, all sorts of variables begin to have odd, impossible magnitudes and signs.

34. This suggestion of Dr. Carlson ties back into the FGLS discussion in Section V above. In spite of it being his own and not my proposal, Dr. Carlson now grants that FGLS, the only previous recommendation he has made to me, has problems as a technique (see discussion in

Section V above and Dr. Carlson Affidavit at Paragraph 159). Nonetheless, at Dr. Carlson's request, when I implemented FGLS, it showed a substantial increase in the RM parameter, as I described in the NERA/S&L Report.[26] Dr. Carlson now complains that I did not implement FGLS the way he wanted, on a daily basis, but on an hourly basis, and when it is implemented on a daily basis, the RM coefficient declines sharply. My response: Exactly.

35. There is massive hourly serial correlation in electricity demand data for an obvious reason -- when events cause prices to rise, for example, above what they would be expected to be, the effects of that cause often linger longer than an hour. When the hourly serial correlation is estimated the effect is strongly significant, an effect of about 0.9, meaning that effects which increase the price (or decrease it) decay at the rate of about 10 percent per hour. It is Dr. Carlson's method which is completely *ad hoc.* There is no plausible mechanism by which the error for one day propagates to make the error 24 hours later (as opposed to 23 or 25) higher. In addition, there is no evidence that important economic actors use the 24-hours-previous price as an incentive to take action, which is the *theoretical* reason to include lagged endogenous prices.[27] And yet this is the result he brandishes to show that the RM effect is (counterintuitively) almost zero. This econometric game can be played all day: making spurious corrections and moving the RM coefficient about willy-nilly. Hourly corrections give a coefficient of -1.47. Daily corrections give a coefficient of -0.07. And, not surprisingly, the unbiased OLS result is generally in the middle. And each of Dr. Carlson's purportedly innocuous "corrections" require strong assumptions about the specific functional form of the serial correlation – strong assumptions about which we know nothing.

36. And, of course, none of this has anything to do with the RM parameter. Surely Dr. Carlson does not believe that the effect of excess supply on average electricity prices has anything to do with how long shocks to the system take to decay. Of course, FGLS and lagged endogenous variables assume that they do, so the RM coefficient moves about in odd, implausible ways.

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[26] NERA/S&L Report at 48.

[27] *See, e.g.*, Greene, *op. cit.*, at 670-671.

37. Further, the use of lagged endogenous variables makes forecasts almost impossible. In particular, were Dr. Carlson's recommendations in this Affidavit to be followed, NERA's strategy of implementation of the Special Case Resource adjustments would be impossible, since we'd have to know exactly when the resources are called; otherwise there would be no way of having the effects linger on for day after with some sort of decay.

VII. Summary and Conclusion

38. Dr. Carlson has proposed a set of changes to the econometric model which I reject either as unnecessary and/or likely to introduce significant error into the estimates. I have supported these findings and conclusions with econometric theory and, more importantly, by the results themselves. The art of econometrics requires that results be sensible. Dr. Carlson's are not.

This concludes my affidavit

ATTESTATION

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information, and belief.

Jonathan Falk

Subscribed and sworn to before me

this 5th day of January 2011

Notary Public

GRETCHEN P. POLK
Notary Public, State of New York
No. 5003086
Qualified In Westchester County
Commission Expires October 13, 2014

My commission expires: _____

EXHIBIT JF-1

JONATHAN FALK
CURRICULUM VITAE

JONATHAN FALK
Vice President

Mr. Falk is a Vice President in NERA's Energy Practice. He received his B.A., *cum laude*, and M.A. in Economics from Yale University. While completing Ph.D. examination requirements at Yale, he taught courses in microeconomic theory and the history of economic thought.

In NERA's electricity practice, Mr. Falk has consulted with a wide variety of electricity industry participants on a number of issues involving the statistical modeling of investment, industry structure, and both short- and long-run pricing questions. He has substantial experience in dispatch modeling for complex electric systems, especially the development of software for large linear programming-based marginal cost models, including the modeling of both run-of-river and storage hydro systems. He has been involved in the creation of novel insurance products to transfer price risk in electric markets. He was a participant in the design process for the New England Forward Capacity Market. Mr. Falk has also statistically estimated the value of reliability in restructured electric markets. In addition, he has studied market power questions in emerging electricity markets and has estimated the social benefits of real-time pricing options for electricity. His work has also addressed questions of valuation, optimization, and the financial risks associated with restructured electric markets. He has advised on the structure of market rules, including the benchmarking of contracts between affiliated entities. Finally, he has created a number of models to value flexibility in utility planning, including hydro-based uncertainty. Mr. Falk has lectured and written as well on game-theoretic strategies in electric market bidding for both energy and capacity. Mr. Falk has appeared before both state commissions, Canadian provincial commissions and the Federal Energy Regulatory Commission.

As a statistical expert, Mr. Falk has specialized in statistical estimation for both liability and damages and the creation of models to simulate economic processes. He has testified as an expert witness on both general statistical issues and industry-specific studies in electricity and telecommunications.

In NERA's Communications Practice, Mr. Falk has participated in studies on residential access demand to the telephone system, choice of service among telephone company offerings, optimal pricing structures, and estimation of the short- and long-run marginal costs of telephone service.

In environmental economics, Mr. Falk has estimated benefits in recreational activity and increased property values resulting from tighter discharge standards for paper mills and for nuclear power plants.

Mr. Falk has worked on several cases involving credit discrimination in automobile and housing markets. He has also performed statistical analyses to predict credit decisions.

Finally, in labor economics, Mr. Falk has testified both on statistical estimations of liability in termination and promotion processes and in calculations of lost earnings in both wrongful termination and wrongful death cases. In addition, he has testified in several cases on contract damages and has extensive experience in the estimation of damages arising from contract disputes.

Education

Yale University
M.Phil., Economics, 1982
M.A., Economics, 1980
B.A., Economics, 1978

Professional Experience

NERA Economic Consulting
1984- Vice President (current position)

Independent Consultant
1981-1983 Worked for various firms including PM Industrial Economics and MRR Associates on the development of econometric models in energy and financial analysis. Also consulted on installation of microcomputer systems.

Yale University
1980-1981 Teaching Assistant
Taught introductory micro-economics and history of economic thought.

US Department of Transportation
1980 Summer Research Assistant, Energy Policy Division
Analyzed energy related transportation issues, including diesel automobiles, coal slurry pipelines, fuel allocation regulations, and coal export policies.

Professional Activities

Faculty, Practising Law Institute, Employment Law Seminar

Member, American Statistical Association

Publications

"Paying for Demand-Side Response at the Wholesale Level,: *Electricity Journal, Vol.23, Issue 9*, November 2010, pp. 13-18

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Testimony

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Deposition testimony for plaintiff regarding statistical estimation of the effect of age-related factors in a reduction in force on behalf of plaintiff in *Thomas Hale v. American Telephone & Telegraph Company, AT&T Global Business Communications Systems and Ismael Velez, Jr., Superior Court of New Jersey Law Division: Bergen County Docket No. BER-L-12619-96*, April 5, 1999.

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with Mark Berkman, "Economic Impacts of GHI Employment," December 6, 1996.

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with Lewis J. Perl and Mark Berkman, "Estimating Employment Effects of Electric Price Increases in US Manufacturing Industries," June 28, 1996.

with Lewis J. Perl and Linda McLaughlin, "Econometric Issues Raised by the Further Notice," prepared for Time Warner Entertainment Company, L.P., July 1, 1993.

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Presentations

"State of the Industry: A Wall Street Perspective," presented at the Utilities Services Alliance Conference, Squaw Valley, CA, June 15, 2005.

"Is Nuclear Power Compatible with a Deregulated Electricity Market," presented at IFRI-CFE Conference on the Future of Nuclear Power in the US, Paris, France, May 25, 2004.

"Prospects for Recovery: When Will We Put More Iron in the Ground?" Presented at NACBE Annual Conference, Naples, FL, February 24, 2004.

"Impacts of Fuel Cost Trends on the Relative Economics of Nuclear vs. Conventional Power," Presented at Infocast Conference: Building New Nuclear Power Plants – Assessing the Possibilities, Washington, DC, October 16, 2003.

"Economic Impacts of Indian Point Shutdown," presented before joint session of Hudson Valley Technical Societies and Westchester Section of the American Institute of Chemical Engineers, Pleasantville, NY, September 24, 2003.

"The Crisis in Financing Independent Power, With Implications for Nuclear Power," Utilities Services Alliance Conference, Santa Fe, New Mexico, June 17, 2003.

"Electricity Regulation: The Mess We're In, How We Got There, And The Road Out," presented at a Foundation for American Communications Seminar, Washington, DC, January 27, 2003.

"A Contrarian View of Enron," Marsh, Inc. Power Group Conference, Palm Harbor, FL, February 20, 2002.

"Competitive Markets for Power 2001: An Electrical Odyssey," presented at the USA annual meeting, Key Largo, Florida, June 13, 2001.

"Electricity Restructuring: The (Pretty) Good, The (Pretty) Bad, and the (Extremely) Ugly," Marsh, Inc. Power Group Conference, Palm Harbor, FL, February 14, 2001.

"Competitive Nuclear Power", presented at the USA Nuclear Annual Meeting, Lake Tahoe, NV, June 14, 2000.

"Applying Congestion Pricing in a Decentralized Electricity System," presented at InfoCast Transmission Pricing Conference, Chicago IL, May 2, 2000.

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November 2010