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# **Bruce Edward Biewald**

**President**

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## **PROFESSIONAL EXPERIENCE**

**Synapse Energy Economics, Inc.**, Cambridge, MA. President, 1996 to present.

Consulting on issues of energy economics, environmental impacts, and utility regulatory policy, including electric power system planning, air emissions, climate change policy, market power, mergers and acquisitions, generation asset valuation and divestiture, nuclear and fossil power plant costs and performance, renewable resources, power supply contracts and performance standards, green marketing of electricity, nuclear plant decommissioning and radioactive waste issues, environmental externalities valuation, energy conservation and demand-side management, electric power system reliability, avoided costs, dispatch modeling, economic analysis of power plants and resource plans, portfolio management, risk analysis and risk management.

**Tellus Institute**, Boston, MA. Senior Scientist and Manager of the Electricity Program, 1989 to 1996, Research Associate and later Associate Scientist, 1980-1988.

Responsible for research and consulting on all aspects of electric system planning, regulation, and restructuring.

## **EDUCATION**

Massachusetts Institute of Technology,

BS 1981, Architecture, Building Technology, Energy Use in Buildings.

Harvard University Extension School,

1989/90, Graduate courses in micro and macroeconomics.

## **SUMMARY OF TESTIMONY, PUBLICATIONS, AND PRESENTATIONS**

Expert testimony on energy, economic, and environmental issues in more than one hundred utility regulatory proceedings in twenty six states and two Canadian provinces, in cases in State and Federal Courts, and in proceedings of the Federal Energy Regulatory Committee and the Nuclear Regulatory Commission's Atomic Safety and Licensing Board.

Co-author of more than one hundred reports, including studies for the Electric Power Research Institute, the U.S. Department of Energy, the U.S. Environmental Protection Agency, the Office of Technology Assessment, the New England Governors' Conference, the National Association of Regulatory Utility Commissioners, and the United Nations Framework Convention on Climate Change.

Papers published in the Electricity Journal, the Energy Journal, Energy Policy, Public Utilities Fortnightly, and numerous conference proceedings.

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Invited to speak by American Society of Heating, Refrigerating, and Air-Conditioning Engineers, American Society of Mechanical Engineers, International Atomic Energy Agency, National Association of Regulatory Utility Commissioners, National Association of State Utility Consumer Advocates, National Consumer Law Center, the Latin American Energy Association (OLADE), the Swedish Environmental Protection Agency (SNV), the U.S. Environmental Protection Agency, the European Federation of Clean Air and Environmental Protection Associations, and others.

## **TESTIMONY**

### **United States District Court for the Eastern District of Kentucky, Lexington Division (Case 5:05-cv-0075-KSF) United States v. Kentucky Utilities Company – October 2008**

Expert report on use of computer models for electric system planning, capital investment planning and economic analysis, and projections of generating unit operations.

### **Nova Scotia Utility and Review Board – August 2008**

Review of rate case issues; power plant depreciation and load forecasting.

### **Nova Scotia Utility and Review Board – March 2008**

Review of Nova Scotia Power Inc.'s demand-side management plan.

### **Indiana Utility Regulatory Commission (Cause Nos. 43114 and 43114S1) – May 2007**

Review of IGCC Plant Proposal by Duke Energy Indiana and Vectren Testimony of Synapse Witnesses. Also cross answering testimony later in the month.

### **California Public Utilities Commission (Docket No. R.06-02-013) – March 2007**

Joint testimony with William Steinhurst and Rick Hornby on electric utility long-term planning and procurement, including procurement strategy, treatment of carbon dioxide emissions, credit and collateral policies, customer risk tolerance, and resource needs.

### **New Jersey Board of Public Utilities (Docket No. EM05020106) – November and December 2005 and March 2006**

Joint testimony with Bob Fagan and David Schlissel on the market power implications of the proposed merger between Exelon Corp. and Public Service Enterprise Group.

### **Indiana Utility Regulatory Commission (Cause Nos. 42861) – October 2005**

Vectren (SIGECO) environmental compliance planning, including climate change policy and carbon price forecasting, energy efficiency and renewables as compliance options, and cost recovery issues.

### **United States District Court for the Eastern District of Kentucky, Lexington Division (Civil Action No.04-34-KSF, United States v. East Kentucky Power Cooperative – September 2005**

Expert report on state regulation of electric utilities, use of computer models for system planning, capital investment planning and economic analysis, and projections of generating unit operations.

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**United States District Court for the Southern District of Indiana (Civil Action No. IP99-1693 C-M/S, United States v. Cinergy – May 2005**

Expert report on state regulation of electric utilities, forecasting sales and resource requirements, use of computer models for system planning, capital investment planning and economic analysis, projections of generating unit operations, and the relationship between generator availability and output. Also, rebuttal report in September.

**Federal Energy Regulatory Commission (Docket No. EC05-43-000) – April 2005**

Market power analysis of the proposed merger of Exelon Corporation and Public Service Enterprise Group Incorporated. (Joint affidavit with David Schlissel.)

**Nuclear Regulatory Commission Atomic Safety and Licensing Board (Docket No. 52-007-ESP and ASLBP No. 04-821-01-ESP) – April 2005**

Affidavit on the environmental impacts and economic costs of a proposed new nuclear power project and alternatives.

**Indiana Utility Regulatory Commission (Cause Nos. 42622 and 42718) – March 2005**

Public Service Company of Indiana environmental compliance planning, including cost estimates for emission control technologies, climate change policy and carbon price forecasting, energy efficiency and renewables as compliance options, power plant retirement economics, and cost recovery issues.

**National Research Council, Division on Engineering and Physical Sciences, Board on Energy and Environmental Systems (Project No. BEES-J-03-03-A) – March 2005**

Alternatives for replacing the generation of the Indian Point Energy Center nuclear facility.

**Georgia Public Service Commission (Docket No. 18300-U) – October 2004**

Georgia Power Company's cost of service study, treatment of electrical distribution equipment, and proposed rates for the Metropolitan Atlanta Rapid Transit Authority.

**Texas Public Utility Commission (Docket No. 29526) – June 2004**

Issues in CenterPoint Energy Houston Electric LLC's true up filing, including environmental cleanup costs, excess mitigation credits, and construction work in progress. Also rebuttal testimony on June 14.

**Texas Public Utility Commission (Docket No. 28818) – April 2004**

The Independent Transmission Operator proposal of Energy Gulf States Utilities, Inc. (prefiled testimony adopted by Paul Peterson).

**Indiana Utility Regulatory Commission (Cause No. 42359) – August 2003**

Public Service Company of Indiana rate making issues including the impact of trackers on risks to shareholders and customers, costs of environmental compliance, treatment of merchant plant investment and risk, and joint dispatch issues.

**Nevada Public Utilities Commission (Docket No. 03-1014) – April 2003**

Review of Sierra Pacific Power Company's risk management and procurement of electric power in the wholesale markets.

**Nevada Public Utilities Commission (Docket No. 02-11021) – March 2003**

Review of Nevada Power Company's risk management and procurement of electric power in the wholesale markets.

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**United States District Court for the Southern District of Illinois (Civil Action No. 99-833-MJR, United States v. Illinois Power Company and Dynegy Midwest Generation, Inc.) – August 2003**

Testimony at trial on analysis and opinions in rebuttal report dated October 2002 on use of computer models for system planning, projections of generating unit operations, and the relationship between generator availability and output.

**State of Vermont, Windham Superior Court (Appeal of USGen New England, Inc. from 2001 Property Valuation by the Town of Rockingham) – September 2002**

Electricity market prices and economic valuation of hydroelectric generating plant.

**United States District Court for the Middle District of North Carolina (Civil Action No. 1:00 CV 1262, United States v. Duke Energy Corporation) – August 2002**

Expert report on use of computer models for system planning, projections of generating unit operations, and the relationship between generator availability and output. (Joint report with Phil Hayet.)

**Indiana Utility Regulatory Commission (Cause No. 41746) – July 2002**

Reply testimony on a rate case settlement agreement, dealing with issues including NiSource's financial condition, service quality, environmental commitment, and electric rate impacts.

**Connecticut Department of Public Utility Control (Docket No. 00-12-13RE01) – July 2002**

The proposed sale of Seabrook Nuclear Station to FPL Energy Seabrook, LLC. Market power issues and market modeling.

**United States District Court for the Southern District of Indiana (Civil Action No. IP99-1692-C-M/S, United States v. Southern Indiana Gas and Electric Company) – June 2002**

Declaration on confidential business information and competitive harm.

**Nevada Public Utilities Commission (Docket No. 02-2002) – April 2002**

Review of Sierra Pacific Power Company's risk management and procurement of electric power in the wholesale markets.

**Vermont Public Service Board (Docket No. 6596) – March 2002**

Used and useful policy issues, electricity market prices, and above market costs of the purchase from Hydro Quebec.

**Nevada Public Utilities Commission (Docket No. 01-11029) – February 2002**

Review of Nevada Power Company's risk management and procurement of electric power in the wholesale markets.

**Vermont Public Service Board (Docket No. 6545) – January 2002**

Economic analysis of the proposed sale of Vermont Yankee nuclear plant and an associated Purchased Power Agreement.

**New Jersey Board of Public Utilities (Docket No. EM01050308) – September 2001**

Analysis of the proposed merger between Conectiv and PEPCo. Also, surrebuttal testimony in November. (Joint testimony with David Schlissel.)

**Indiana Utility Regulatory Commission (Cause No. 41954) – June 2001**

System planning and joint operation in a partially deregulated context.

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**State of Vermont, Windham Superior Court (Dockets S 362-9-99 and S372-9-99) – May 2001**

Deposition on electricity market prices and economic valuation of hydroelectric generating plant.

**Federal Energy Regulatory Commission (Docket No. ER01-200-001) – April 2001**

Termination of the Cinergy Operating Agreement, treatment of merger savings, and affiliate relationships. Also cross-answering testimony in April.

**New Jersey Board of Public Utilities (Docket No. EM00110870) – April 2001**

Analysis of the proposed merger between FirstEnergy and GPU. Also, supplemental testimony in April. (Joint testimony with David Schlissel.)

**Vermont Public Service Board (Dockets Nos. 6120 and 6460 – March 2001**

Used and useful policy issues, electricity market prices, and above market costs of the purchase from Hydro Quebec. Also, surrebuttal testimony in April.

**United States District Court for the Northern District of New York (Civil Action No. 00-CV-1738) – January 2001**

Affidavit on the issuance and trading of SO<sub>2</sub> emission allowances under the Title IV of the Clean Air Act, in Clean Air Markets Group v. George E. Pataki et al.

**Department of Energy (Docket No. EE-RM-500) – December 2000**

Oral testimony on proposed rules for central air conditioner and heat pump energy conservation standards.

**Illinois Commerce Commission (Docket No. 00-0361) – July 2000**

Review of ComEd's funding for nuclear power plant decommissioning.

**California Public Utilities Commission (Rulemaking 99-10-025) – July 2000**

Distributed generation and related rate design issues. Also, rebuttal testimony in August.

**Massachusetts Department of Environmental Protection – July 2000**

Comments on reliability implications of proposed emission standards for power plants.

**Arkansas Public Service Commission (Docket No. 00-048-R) – June 2000**

Requirements for electricity market power analyses.

**United States District Court for the Middle District of North Carolina (1:99CV00033) – March 2000**

Expert report on replacement power costs in Carolina Power & Light Company vs. Yuasa Exide, Inc.

**Illinois Commerce Commission (Docket No. 99-0115) – September 1999**

Review of ComEd's nuclear power plant decommissioning cost estimates.

**West Virginia Public Service Commission (Case No. 98-0452-E-GI) – August 1999**

AEP and Allegheny Power restructuring, market power, divestiture of generation, electric system market price modeling, statistical analysis of comparable sales, and responsibility for stranded costs and gains.

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**Mississippi Public Service Commission (Docket No. 96-UA-389) – August 1999**

Review of Entergy Mississippi, Inc. and Mississippi Power Company stranded cost filings, divestiture of generation, statistical analysis of comparable sales, responsibility for stranded costs and gains.

**Connecticut Department of Public Utility Control (Docket No. 99-03-36) – July 1999**

Connecticut Light and Power Company standard offer service, market prices for electricity and the influence of market power, simulation analysis of the New England electricity market.

**Connecticut Department of Public Utility Control (Docket No. 99-03-35) – July 1999**

United Illuminating Company standard offer service, market prices for electricity and the influence of market power, simulation analysis of the New England electricity market.

**Utah Public Service Commission (Docket No. 98-2035-04) – June 1999**

Cost savings expectations for the proposed merger of PacifiCorp and Scottish Power.

**Washington Utilities and Transportation Commission (Docket No. UE-981627) – June 1999**

Cost savings expectations for the proposed merger of PacifiCorp and Scottish Power and assessment of whether the merger is in the public interest.

**Federal Energy Regulatory Commission (Docket Nos. EC98-40-00, et al.) – April 1999**

Horizontal market power and barriers to entry in consideration of the proposed merger of American Electric Power Company and Central and South West Corporation.

**Connecticut Department of Public Utility Control (Docket No. 99-03-04) – April 1999**

Market power, market prices, and simulation modeling as related to the application of United Illuminating Company for recovery of stranded costs.

**Connecticut Department of Public Utility Control (Docket No. 99-02-05) – April 1999**

Market power, market prices, and simulation modeling as related to the application of Connecticut Light & Power Company for recovery of stranded costs.

**Maryland Public Service Commission (Case No. 8797) – January 1999**

Simulation analysis of the ECAR market and projected market prices for electricity for estimation of Potomac Electric Company's stranded generation costs and unbundled rates.

**Maryland Public Service Commission (Case No. 8795) – December 1998**

Simulation analysis of the PJM market and projected market prices for electricity for estimation of Delmarva Power and Light Company's stranded generation costs and unbundled rates.

**Maryland Public Service Commission (Cases Nos. 8794 and 8804) – December 1998**

Simulation analysis of the PJM market and projected market prices for electricity for estimation of Baltimore Gas and Electric Company's stranded generation costs and unbundled rates.

**Vermont Public Service Board (Docket No. 6107) – September 1998**

Excess capacity, used & useful, and the economics of Green Mountain Power's purchase from Hydro Quebec.

**Mississippi Public Service Commission (Docket No. 96-UA-389) – September 1998**

Analyses of market concentration and market power, behavior of affiliated companies, need for an independent system operator.

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**California Public Utilities Commission (Application No. 97-12-020) – July 1998**

Nuclear power plant decommissioning and radioactive waste disposal. Also, rebuttal testimony in August.

**Federal Energy Regulatory Commission (Docket No. EC97-46-000) – June 1998**

Affidavit on market power implications of the proposed merger between Allegheny Power System and Duquesne Light Company.

**New Jersey Board of Public Utilities (Docket Nos. EX4120585Y, EO97070460, and EO97070463) – March 1998**

Economic and environmental benefits of energy efficiency, including estimation of marginal air emissions from the PJM System. (Joint testimony with Nathanael Greene, Edward Smeloff, and Thomas Bourgeois.)

**Vermont Public Service Board (Docket No. 6018) – February 1998**

Excess capacity and the economics of Central Vermont Public Service Company's purchase from Hydro Quebec.

**Public Service Commission of Maryland (Case No. 8774) – February 1998**

Market power implications of the APS-DQE merger.

**Federal Energy Regulatory Commission (Docket Nos. OA97-237-000 and ER97-1079-000) – January 1998**

Market power in New England electricity markets.

**British Columbia Utilities Commission – November 1997**

British Columbia Hydro and Power Authority Wholesale Transmission Services Application.

**Pennsylvania Public Utility Commission (Docket R-00973981) – November 1997**

West Penn Power Company Restructuring Plan. Environmental disclosure, consumer education, and allocation of default customers.

**Pennsylvania Public Utility Commission (Docket R-00974104) – November 1997**

Duquesne Light Company Restructuring Plan. Environmental disclosure, consumer education, nuclear decommissioning, and allocation of default customers. Also surrebuttal testimony in December 1997.

**Mississippi Public Service Commission (Docket No. 97-UA-496) – November 1997**

Petition of Mississippi Power Company for a Certificate of Public Convenience and Necessity Authorizing Construction of a Generating Plant in Jackson County.

**Pennsylvania Public Utility Commission (Docket Nos. R-00973953 and P-00971265) – November 1997**

Application of PECO Energy Company for approval of its restructuring plan and petition on Enron Energy Services Power, Inc. for approval of an electric competition and customer choice plan. Allocation of default customers.

**Vermont Public Service Board (Docket No. 5983) – October 1997**

Excess capacity and the economics of Green Mountain Power Company's purchase from Hydro Quebec. Also rebuttal testimony in December 1997 and supplemental rebuttal testimony in January 1998.

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**Pennsylvania Public Utility Commission (Docket No. R-00973953) – September 1997**

Joint petition for partial settlement of PECO Energy Company’s proposed restructuring plan and application for a qualified rate order. Environmental disclosure, nuclear decommissioning and spent fuel.

**Pennsylvania Public Utility Commission (Docket No. R-00974009) – September 1997**

Pennsylvania Electric Company’s Restructuring Plan. Environmental disclosure, customer education, and nuclear issues.

**Pennsylvania Public Utility Commission (Docket No. R-00974008) – September 1997**

Metropolitan Edison Company’s Restructuring Plan. Environmental disclosure, customer education, and nuclear issues.

**Indiana Legislature, Regulatory Flexibility Committee -- September 23, 1997.**

Testimony on “Electric Industry Restructuring To Benefit Consumers and the Environment: Stranded Costs, Nuclear Issues, and Air Emissions.”

**Pennsylvania Public Utility Commission (Docket No. R-00973954) – June 1997**

Pennsylvania Power & Light Company’s Restructuring Plan. Environmental disclosure, customer education, PJM market structure, nuclear decommissioning and spent fuel, rate design for stranded cost recovery. Also, surrebuttal testimony in August.

**Pennsylvania Public Utility Commission (Docket No. R-00973953) – June 1997**

PECO Energy Company’s Restructuring Plan. Environmental disclosure, PJM market structure, nuclear decommissioning and spent fuel.

**New York Public Service Commission (Case 96-E-0897) -- April 1997**

Consolidated Edison Company’s Plans for Electric Rate Restructuring. Analysis of market power in the New York City load pocket.

**Pennsylvania Public Utility Commission (Docket No. R-00973877) -- February 1997**

Application of PECO Energy Company for Issuance of a Qualified Rate Order. Nuclear power plant decommissioning costs, stranded cost recovery, and securitization.

**New Hampshire Public Utilities Commission (DR 96-150) -- November 1996**

Electric industry restructuring, including stranded costs, industry structure, market power, and nuclear issues.

**Massachusetts Department of Public Utilities (96-100) -- July 1996**

Nuclear plant stranded costs and decommissioning.

**Vermont Public Service Board (5854) – July 1996**

Electric industry restructuring, including stranded costs, industry structure, and environmental protection.

**Ontario Energy Board (H.R. 23) -- June 1995**

Electricity rate options (joint evidence with John Stutz).

**Pennsylvania Public Utility Commission (R-00943271) -- April 1995**

Discount rates and system benefits charge.

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**Colorado Public Utilities Commission (94A-516A) – January 1995**

Construction of new generating resources.

**Public Service Commission of Nevada (94-9002) – November 1994**

Environmental and health impacts of a proposed power plant.

**Nuclear Decommissioning Finance Committee of New Hampshire (93-001) – September 1994**

Seabrook decommissioning cost, spent fuel storage, and cost collection methodology (joint testimony with William Dougherty).

**Public Service Commission of Wisconsin (6630-CE-197 and 6630-CE-209) – September 1994**

Point Beach externalities, economics, spent fuel storage, and aging (joint testimony with William Dougherty).

**British Columbia Utilities Commission – August 1994**

Greenhouse gas emissions and environmental externalities policy

**Public Service Commission of Wisconsin (05-EI-14) – February 1994**

Cost of decommissioning Point Beach and Kewaunee nuclear power plants. Also, rebuttal and surrebuttal testimony in February.

**Delaware Public Service Commission (91-39) – September 1992**

Nuclear and fossil power plant performance targets.

**Massachusetts Department of Public Utilities (91-131) – December 1991**

Internalization of environmental externalities, greenhouse gas valuation and policy.

**Massachusetts Department of Public Utilities (91-131) – October 1991**

Environmental externalities valuation, emissions effects and global warming.

**Massachusetts Department of Public Utilities ((89-141, 90-73, 90-141, 90-194 and 90-270) – December 1990**

The incorporation of environmental externalities in specific utility RFPs.

**Massachusetts Department of Public Utilities (90-55) – June 1990**

Costs and benefits of high-efficiency gas heating equipment.

**Massachusetts Department of Public Utilities (86-36-G and 89-239) – March 1990**

Environmental externalities of electric resources.

**Florida Public Service Commission (890973-E1) – January 1990**

Integrated energy planning, power plant emissions, and nuclear plant performance.

**Pennsylvania Public Utilities Commission (R-891364) – October 1989**

Generating capacity requirements of the Philadelphia Electric Company and the Pennsylvania-New Jersey-Maryland Interconnection.

**Maryland Public Service Commission (8199) – October 1989**

Performance standards for coal, oil, and nuclear power plants.

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**Michigan Public Service Commission (U-9172) – April 1989**

Economic analysis of the Palisades Power Purchase Agreement. Ratepayer impacts, incentives, and implications for plant operation and decommissioning.

**Pennsylvania Public Utility Commission (P-870216, P-880283, P-880284, and P-880286) – March 1989**

Allegheny Power System planning and avoided costs.

**Michigan Public Service Commission (U-8880) – February 1988**

Detroit Edison Company power supply costs, economics of Fermi “buy-back” purchase, nuclear fuel expense, oil costs, and power transactions.

**Michigan Public Service Commission (U-8866) – December 1987**

Consumers Power Company power supply costs, including projections of oil prices and purchased power costs.

**Pennsylvania Public Utility Commission (R-850220) – September 1987**

Economic analysis of West Penn Power Company’s participation in the Bath County Pumped Storage Project, and Allegheny Power System capacity reserve requirements. Also, surrebuttal testimony in October.

**Arizona Corporation Commission (U-1345-85-367) – February 1987**

Palo Verde decommissioning cost.

**Michigan Public Service Commission (U-8545) – December 1986**

Consumers Power Company power costs, projected cost of oil and purchased power, economic evaluation of the Big Rock Point nuclear unit.

**Public Service Commission of Indiana (38045) – November 1986**

Northern Indiana Public Service Company system reliability and excess capacity.

**California Public Utility Commission (84-06-014 and 85-08-025) – July 1986**

Diablo Canyon decommissioning cost and collection issues.

**Michigan Public Service Commission (U-8042R) – June 1986**

Review of Consumers Power Company system operations during 1985 and economic evaluation of the Big Rock Point nuclear unit.

**Michigan Public Service Commission (U-8291) – April 1986**

Detroit Edison Company power supply costs, application of a multi-area dispatch model.

**Michigan Public Service Commission (U-8286) – February 1986**

Consumers Power Company power supply costs, application of a multi-area dispatch model.

**Maine Public Service Commission (85-132) – January 1986**

Standard and long term rates for cogeneration and small power production. Surrebuttal testimony in February.

**Arkansas Public Service Commission (84-249-U) – June 1985**

Impact of the Grand Gulf nuclear unit upon Arkansas Power and Light Company and Middle South Utilities electricity production costs.

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**Kentucky Public Service Commission (8666) – February 1984**

Production costing modeling issues.

**REPORTS**

*Avoided Energy Supply Costs in New England: 2009 Report*, prepared for AESC/ Massachusetts Avoided Energy Supply Components Study Group by Rick Hornby, David White, Bruce Biewald, Chris James, Ben Warfield, and Max Chang of Synapse, and Paul Chernick, Carl Swanson, Ian Goodman, Bob Grace, and Jason Gifford, August 21, 2009.

*Productive and Unproductive Costs of CO2 Cap-and-Trade: Impacts on Electricity Consumers and Producers*, prepared for National Association of Regulatory Utility Commissioners, National Association of State Utility Consumer Advocates, National Rural Electric Cooperative Association, and American Public Power Association by Ezra Hausman, Jeremy Fisher, Lauri Mancinelli, and Bruce Biewald, July 15, 2009.

*Incorporating Carbon Dioxide Emissions Reductions in Benefit Calculations for Energy Efficiency: Comments on the Department of Energy's Methodology for Analysis of the Proposed Lighting Standard*, prepared for New York State Attorney General by Bruce Biewald, David White, Jeremy Fisher, Max Chang, and Lucy Johnston, May 13, 2009.

*Cost and Benefits of Electric Utility Energy Efficiency in Massachusetts*, prepared for the Northeast Energy Efficiency Council by Doug Hurley, Kenji Takahashi, Bruce Biewald, Jennifer Kallay, and Robin Maslowski, August 1, 2008.

*Analysis of Indirect Emissions Benefits of Wind, Landfill Gas, and Municipal Solid Waste Generation*, prepared for U.S. Environmental Protection Agency by Ezra Hausman, Jeremy Fisher, and Bruce Biewald, July 23, 2008.

*Don't Get Burned: The Risks of Investing in New Coal-Fired Generating Facilities*, prepared for Interfaith Center on Corporate Responsibility by David Schlissel, Lucy Johnston, Jennifer Kallay, Christopher James, Anna Sommer, Bruce Biewald, Ezra Hausman, and Allison Smith, February 26, 2008.

*Tufts Cove Waste Heat Recovery Project*, prepared for the Nova Scotia Utility and Review Board by Bruce Biewald, Bill Powers, and Ben Warfield, December 4, 2007 and revised August 4, 2008.

*Avoided Energy Supply Costs: 2007 Final Report*, prepared for AESC / Massachusetts Avoided Energy Supply Components Study Group by Rick Hornby, Carl Swanson, David White, Paul Chernick, Bruce Biewald, and Jennifer Kallay, August 10, 2007.

*The Deerfield Wind Project – Assessment of the Need for Power and the Economic and Environmental Attributes of the Project*, prepared for PPM Energy by Ezra Hausman, Bruce Biewald, and Kenji Takahashi, August 1, 2006.

*Portfolio Management: Tools and Practices for Regulators*, prepared for the National Association of Regulatory Utility Commissioners by William Steinhurst, David White, Rick Hornby, Alice Napoleon, Amy Roschelle, and Bruce Biewald, October, 2006.

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***Incorporating Energy Efficiency into the ISO New England Forward Capacity Market: Ensuring the Capacity Market Properly Values Energy Efficiency Resources***, prepared for Conservation Services Group by Paul Peterson, Doug Hurley, Tim Woolf, and Bruce Biewald, June 5, 2006.

***Ensuring Delaware's Energy Future: A Response to Executive Order Number 82***, prepared for the Delaware Public Service Commission Staff by the Delaware Cabinet Committee on Energy with technical assistance from Synapse Energy Economics, March 8, 2006.

***The Proposed Broadwater LNG Import Terminal Response to Draft Environmental Impact Statement and Update of Synapse Analysis***, prepared for the Connecticut Fund for the Environment and Save The Sound by Ezra Hausman, Bruce Biewald, Kenji Takahashi, and David Schlissel, January 22, 2007.

***RPM 2006: Windfall Profits for Existing Base Load Units in PJM***, prepared for the Pennsylvania Office of Consumer Advocate by Bruce Biewald, Ezra Hausman, Paul Peterson, and David White, February 2, 2006.

***An RPM Case Study: Higher Costs for Consumers, Windfall Profits for Exelon***, prepared for Illinois Citizens Utility Board, by Ezra Hausman, Paul Peterson, David White, and Bruce Biewald, October 18, 2005.

***Considering Climate Change in Electric Resource Planning: Zero is the Wrong Value***, by Lucy Johnston, Amy Roschelle, Ezra Hausman, Anna Sommer, and Bruce Biewald, Rev 3, September 30, 2005.

***Using Electric System Operating Margins and Build Margins in Quantification of Carbon Emission Reductions Attributable to Grid Connected CDM Projects***, a Synapse Energy Economics, Inc. report for the United Nations Framework Convention on Climate Change, September 19, 2005.

***Methods for Estimating Emissions Avoided by Renewable Energy and Energy Efficiency***, a Synapse Energy Economics, Inc. report for the U.S. Environmental Protection Agency by Bruce Biewald and Geoff Keith, July 8, 2005.

***Economic Impacts and Avoided Air Emissions from Renewable Generation and Efficiency Programs in New England***, a Synapse Energy Economics, Inc. report for the Regulatory Assistance Project by William Steinhurst, Robert McIntyre, Bruce Biewald, Cliff Chen, and Kenji Takahashi. April 15, 2005.

***Electric Price Forecasts for St. Lawrence Hydroelectric Generation***, prepared for the International Joint Commission (IJC) by David White and Bruce Biewald, March 11, 2005.

***A Responsible Electricity Future: An Efficient, Cleaner and Balanced Scenario for the US Electricity System***, a Synapse Energy Economics, Inc. report for the National Association of State PIRGs, by Bruce Biewald, David White, Geoff Keith, and Time Woolf. June 11, 2004.

***Electricity Prices in PJM: Comparison of Wholesale Power Costs in the PJM Market to Indexed Generation Service Costs***, a Synapse Energy Economics, Inc. report prepared for the PJM Interconnection, L.L.C., by Bruce Biewald, William Steinhurst, David White, and Amy Roschelle. June 3, 2004.

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***Reply Comments in Docket No. 2004-147: Strategies for Procuring Residential and Small Commercial Standard Offer Supply in Maine***, a Synapse Energy Economics, Inc. report prepared for the Maine Office of Public Advocate by Amy Roschelle, Bruce Biewald, and Paul Peterson. April 21, 2004.

***Portfolio Management: How to Procure Electricity Resources to Provide Reliable, Low-Cost, and Efficient Electricity Services to All Retail Customers***, a Synapse Energy Economics, Inc. report prepared for the Regulatory Assistance Project and the Energy Foundation, by Bruce Biewald, Tim Woolf, Amy Roschelle and William Steinhurst. October 10, 2003.

***A Clean Electricity Strategy for the Hudson River Valley***, a Report for the Hudson River Foundation by Synapse Energy Economics and Pace Law School Energy Project. Geoff Keith, Bruce Biewald, David E. White, and Fred Zalzman. October 2003.

***Estimating the Environmental Benefits of Renewable Energy and Energy Efficiency in North America: Experience and Methods***, a report for the Commission for Environmental Cooperation, by Geoffrey Keith, Bruce Biewald, Anna Sommer, Patrick Henn, and Miguel Breceda, September 22, 2003.

***Comments on the RPS Cost Analyses of the Joint Utilities and the DPS Staff***, a Synapse Energy Economics, Inc. report prepared for the Renewable Energy Technology and Environment Coalition by Bruce Biewald, Cliff Chen, Anna Sommer, William Steinhurst, and David E. White. September 19, 2003.

***Modeling Demand Response and Air Emissions in New England***, a Synapse Energy Economics, Inc. report prepared for the U.S. Environmental Protection Agency, by Geoff Keith, Bruce Biewald, David White, and Mike Drunsić, August 2003.

***Cleaner Air, Fuel Diversity and High-Quality Jobs: Reviewing Selected Potential Benefits of an RPS in New York State***, a Synapse Energy Economics, Inc. report prepared for the Renewable Energy Technology and Environment Coalition by Geoff Keith, Bruce Biewald, David White, Anna Sommer and Cliff Chen. July 28, 2003.

***The New England Experiment: An Evaluation of the Wholesale Electricity Markets***, a Synapse Energy Economics, Inc. report provided to the Connecticut Office of Consumer Counsel, Maine Office of the Public Advocate, and New Hampshire Office of Consumer Advocate, by Paul Peterson, David White, Bruce Biewald, and Cliff Chen, June 2003.

***Financial Insecurity: The Increasing Use of Limited Liability Companies and Multi-Tiered Holding Companies to Own Nuclear Power Plants***, a Synapse Energy Economics, Inc. report prepared for the STAR Foundation and Riverkeeper, Inc., by David Schlissel, Paul Peterson, and Bruce Biewald, August 7, 2002.

***Predicting Avoided Emissions from Policies that Encourage Energy Efficiency and Clean Power***, a Synapse Energy Economics, Inc. report prepared for the Ozone Transport Commission, by Geoff Keith and Bruce Biewald, June 24, 2002.

***Survey of Clean Power and Energy Efficiency Programs***, a Synapse Energy Economics report prepared for the Ozone Transport Commission, by Lucy Johnston, Geoff Keith, Tim Woolf, Bruce Biewald, and Etienne Gonin, January 14, 2002.

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**"Avoided Emissions and Environmental Dispatch,"** Stephen Bernow and Bruce Biewald, presented at the Conference on "Demand-Side Management and the Global Environment," Arlington, Virginia, April 22-23, 1991.

**"Environmental Benefits of DSM in New York: Long Island Case Study,"** Bruce Biewald and Stephen Bernow, presented at the Conference on "Demand-Side Management and the Global Environment," Arlington, Virginia, April 22-23, 1991.

**"Full Cost Dispatch: Incorporating Environmental Externalities in Electric System Operation,"** Stephen Bernow, Bruce Biewald and Donald Marron, the *Electricity Journal*, March 1991.

**"EDB: A Flexible Database System for Energy-Environmental Analysis,"** Bruce Biewald, Michael Lazarus, and David Von Hippel, presented at International Atomic Energy Agency (IAEA) Technical Committee Meeting on "Development of a Database for Comparative Health and Environmental Impacts of Various Energy Systems," in Vienna, Austria, October 15-19, 1990.

**"Full Cost Economic Dispatch: Recognizing Environmental Externalities in Electric Utility System Operation,"** Stephen Bernow, Bruce Biewald, and Donald Marron, presented at NARUC Conference on Externalities, Jackson Hole, Wyoming, October 1990.

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**"An Assessment of Demand-Side Management Models and Their Use and Applicability in Canadian Utilities,"** Martin Adelaar and Bruce Biewald, in the proceedings of the Canadian Electrical Association Demand-Side Management Conference, Halifax, Nova Scotia, September 1990.

**"Avoided Cost Contracts Can Undermine Least Cost Planning,"** Stephen Bernow, Bruce Biewald, and Donald Marron, Energy Policy, September 1990.

**"Environmental Externalities Measurement: Quantification, Valuation, and Monetization,"** Stephen Bernow, Bruce Biewald, and Donald Marron, in the proceedings of the Seventh NARUC Biennial Regulatory Information Conference, September 1990.

**"Do We Really Need Nuclear Generating Companies?,"** Public Utilities Fortnightly, June 7, 1990.

**"Nuclear Power Economics: Construction, Operation and Disposal,"** Bruce Biewald and Donald Marron, March 1989.

**"Electric Utility System Reliability Analysis: Determining the Need for Generating Capacity,"** Stephen Bernow and Bruce Biewald, in the proceedings of the Sixth NARUC Biennial Regulatory Information Conference, September 1988.

**"Nuclear Power Plant Decommissioning: Cost Estimation for Power Planning and Ratemaking,"** Stephen Bernow and Bruce Biewald, Public Utilities Fortnightly, October 29, 1987.

**"Cost and Performance of Boiling Water Reactors,"** Stephen Bernow, Bruce Biewald and Tim Woolf, Public Utilities Fortnightly, August 1987.

## **PRESENTATIONS**

(Note: Presentations that were accompanied by a written paper are listed in the section for "papers," above.)

**"The U.S. Power System: Economic and Regulatory Challenges to Reducing Greenhouse Gas Emissions from the World's Largest Machine,"** presentation at Design Continuum, December 3, 2008.

**"Economics of Electric Sector CO<sub>2</sub> Emissions Reduction: Making Climate Change Policy that People Can Live With,"** presentation at the NASUCA 2008 Annual Meeting, November 18, 2008.

**"Selected Topics from Avoided Energy Supply Costs in New England 2007 Final Report,"** presentation at a MA DPU Technical Session, July 29, 2008.

**"Prudent Planning and New Coal-Fired Generation,"** presentation at the CERES 2008 Conference, April 29, 2008.

**"Climate Change Policies in the Northeast - Carbon Emission Caps and Energy Cost,"** presentation at the ASHRAE Winter Meeting, prepared for the American Society of Heating, Refrigerating and A/C Engineers, January 19, 2008.

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“Efficiency and Renewable Energy for Carbon Constrained Electric Systems 2007,” presentation at the NASUCA Annual Meeting, Anaheim, California, prepared for National Association of State Utility Consumer Advocates, November 12, 2007.

“Air Emissions Issues Associated DER in the Mid-Atlantic Region,” presentation at the Mid-Atlantic State Energy and Environment Workshop on Distributed Energy Resources, September 27, 2007.

“Exploration of Costs for Load Side and Supply Side Carbon Caps for California,” presentation at the Joint En Banc Hearing of PUC and CEC on Point of Regulation in the Electricity Sector (R.06-04-009), prepared for Regulatory Assistance Project, and California Public Utilities Commission, August 21, 2007.

“Portfolio Management: Tools and Practices for Regulators,” presentation at the NARUC 2006 Summer Meeting in San Francisco, California, and for the Annual Convention in Miami, Florida, prepared for the National Association of Regulatory Utility Commissioners, July 2006 and November 2006.

“Electricity Price Increases: Causes, Effects, and Solutions,” presentation at the Restructuring Roundtable, May 19, 2006.

“Forecasting and Using Carbon Prices in a World of Uncertainty,” presentation to Electric Utilities Environmental Conference in Tucson, Arizona on January 22, 2006.

“Energy Efficiency in the Northeast,” presentation at ACEEE National Conference on Energy Efficiency as a Resource, Berkeley, CA, September 27, 2005.

“The Shape of Things to Come: Incorporating Unproven Reserves of Efficiency Savings into Energy Models,” presentation to the East Coast Energy Group, Washington, DC, November 10, 2004.

“Displaced Emissions from Renewables and Efficiency in the Northeast United States,” presentation at a workshop convened by the Commission for Environmental Cooperation, the US Environmental Protection Agency, and the World Resources Institute, Washington DC, November 4, 2004.

“Electric Transmission Technical and Policy Issues,” presentation at National Association of State Utility Consumer Advocates conference in Austin, Texas, June 14, 2004.

“Incorporating Renewable Generation into a Risk Management Strategy,” presentation at the New England Conference of Public Utility Commissioners Symposium, Brewster, Massachusetts, May 25, 2004.

“Electricity Portfolio Management,” presentation at Illinois State University Institute for Regulatory Policy Studies Conference on “Beyond 2006,” Springfield, Illinois, May 20, 2004.

“Electricity Risk Management: Diversified Resource Portfolios,” presentation at Electric Power Supply Association Meeting, Washington, D.C., May 6, 2004.

“Quantifying Emission Reductions from Local Government Actions,” presentation to Metropolitan Washington Council of Governments Energy and Air Quality Conference, Washington DC, April 5, 2004.

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“Electricity Portfolio Management,” presentation to National Association of Regulatory Utility Commissioners’ conference in Washington, D.C., March 9, 2004.

“Portfolio Management for Electricity,” presentation at the Regulatory Assistance Project’s workshop on portfolio management, Chicago, September 18, 2003.

“Issues in Estimating Electric System Displaced Emissions,” presentation at the Commission for Environmental Cooperation Technical Meeting on Approaches to Estimating Environmental Benefits of Renewable Energy and Energy Efficiency, Washington, DC, July 27, 2003.

“Best Practices in Market Monitoring and Mitigation,” presented at the National Association of State Utility Consumer Advocates Mid-Year Meeting in Austin, Texas, June 16, 2002.

“Regulation of Waste Management at Large Electric Utilities: Modeling Industry Impacts,” US Environmental Protection Agency, August 7, 2001.

“Quality of Service in Performance-Based Regulation: US Experiences,” presented at the Seminar on Regulation of Electricity Supply Quality, Milan, Italy, June 8, 2001.

“Demand Response in Electricity Markets,” presented at the National Association of State Utility Consumer Advocates Mid-Year Meeting in Santa Fe, New Mexico, June 18, 2001.

Presentation on “Repowering the Midwest: The Clean Energy Development Plan for the Heartland,” at the National Wind Coordinating Committee Upper Midwest Transmission Workshop, Minneapolis, Minnesota, May 1, 2001.

“Observations on New England’s Electricity Markets,” National Regulatory Research Institute Market Power Conference, Columbus, Ohio, April 10, 2001.

Presentation on “Derailing Coal: The Economics of Coal-Fired Electricity Generation in the U.S.,” Tax Shift Strategy Meeting, Washington, D.C., December 2, 2000.

Presentation on “Repowering the Midwest: A Clean Energy Development Plan for the Heartland,” presentation with Howard Learner at the National Association of Regulatory Utility Commissioners Annual Meeting, San Diego, California, November 14, 2000.

Presentation on “Electricity in New England: Market Imperfections of Failure?” at National Association of State Utility Consumer Advocates Annual Meeting, San Diego, California, November 13, 2000.

Presentation on “How Green is Green? Verifying Energy Advertising Claims,” at the New England Conference of Public Utility Commissioners Symposium, Bretton Woods, New Hampshire, May 25, 1999.

Presentation on “Consumer Perspectives on Market Power – Case Studies from New England, New York, PJM, and Mississippi,” IBC Conference on Market Power, Washington DC, May 24, 1999.

Presentation on “Grandfathering and Environmental Comparability,” at the National Association of Regulatory Utility Commissioners 1998 Summer Committee Meetings, Seattle, July 26, 1998.

Presentation on “Tracking Electricity in the New England Market,” at the National Association of Regulatory Utility Commissioners 1998 Summer Committee Meetings, Seattle, July 26, 1998.

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Presentation on “Tracking Electricity in the New England Electricity Market,” at the National Council on Competition and the Electricity Industry National Executive Dialogue on Customers’ Right to Know, Chicago, May 13, 1998.

Presentation on “Comparable Environmental Regulations in a Restructured Electricity Industry: The Grandfathering Effect,” National Association of Regulatory Utility Commissioners meeting in Washington, D.C., March 1, 1998.

Presentation on “Market Power in Electricity Generation,” National Consumer Law Center Conference, Washington, D.C., February 9, 1998.

Presentation on “Electricity Market Power in New England,” Massachusetts Electric Industry Restructuring Roundtable, Boston, December 15, 1997.

Presentation on wind power development and air quality, National Wind Coordinating Committee New England Wind Issues Forum, Boston, November 7, 1997.

Invited speaker on market power, National Association of State Utility Consumer Advocates meeting in Boston, November 12, 1997.

Presentation on “Distortions to Future and Current Competitive Electric Energy Markets Due to Grandfathering Environmental Regulations of Electric Power Plants,” National Association of Regulatory Utility Commissioners meeting in Boston, November 9, 1997.

Presentation on “Electric Industry Restructuring as if the Environment Mattered,” Boston Area Solar Energy Association, October 9, 1997.

Invited speaker on “Modeling Market Power in Electricity Generation,” National Association of Regulatory Utility Commissioners meeting in San Francisco, July 22, 1997.

Presentation on “Performance-Based Regulation in a Restructured Electric Industry,” National Association of Regulatory Utility Commissioners meeting in San Francisco, July 20, 1997.

Presentation on “State Initiatives and Regional Issues,” New England Governors’ Conference Workshop on Restructuring and Environmentally Sustainable Technologies, Warwick, Rhode Island, March 25, 1997.

Invited speaker on stranded costs, National Association of State Utility Consumer Advocates meeting in San Francisco, November 1996.

Presentation on “Nuclear Power Plant Decommissioning Costs and Electricity Restructuring,” Nuclear Decommissioning Trusts conference, New York City, November 18, 1996.

Invited speaker on stranded costs, Indiana Utilities Regulatory Commission Forum, Indianapolis, November 1, 1996.

Presentation on “Electric Industry Restructuring and the Environment,” at the Indiana Energy Conference, Indianapolis, Indiana, October 10, 1996.

Presentation on "Small Customers in a Restructured Electricity Industry: Transaction Costs, Advanced Metering Technologies and Aggregation Options" to the Consumers' Energy Conference, South Portland, Maine, July 1996.

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Presentation on "Electric Generation Market Power in New England" to New England Conference of Public Utility Commissioners, Manchester Village, Vermont, May 1996.

Presentation on "Advanced Metering for Residential Customers on Electricity Restructuring" to National Consumer Law Center's 10th Annual Conference in Washington, DC, February 1996.

Presentations on "Market Power," "Environmental Aspects of Restructuring" and "Market Access for Small Customers" to Vermont Public Service Board workshops on electricity restructuring, January and February 1996.

Presentation on "Environmental Impacts of Energy: Sustainability and Social Costing" to British Columbia Utilities Commission Workshop, Vancouver, BC, March 1995.

Presentation on "Competition and Economic Efficiency" to the National Council on Competition and the Electric Industry, December 1995.

Presentation on "Compliance Planning Under Regulatory Uncertainty," to EPA "Opportunities Conference: Energy Efficiency and Renewable Energy," Washington, DC, June 1993.

Presentation on "Energy and Sustainability" to Hydro-Quebec Conference, Hampshire College, Amherst, Massachusetts, April 1993.

Invited Speaker on environmental externalities, ASME "ECO World" conference in Washington, DC, June 1992.

Invited Speaker, Association of Energy Engineers, Boston, Massachusetts, February 1992.

Presentation of Acid Rain Abatement Optimization Model to the Swedish Environmental Protection Agency, Solna, Sweden, November 1991.

Presentation on Integrated Resource Planning to Boston Gas Company, July 1990.

Training on Methods for Calculating Electric System Avoided Costs, provided to energy planners and policy makers from five Southeast Asian countries sponsored by U.S. Agency for International Development and administered by the Institute of International Education, May 1990.

Invited Speaker, National Association of State Utility Consumer Advocates (NASUCA) Mid-Year Meeting, Annapolis, Maryland, and June 1988.

Invited Speaker, Conference on New Developments in Nuclear Decommissioning Costs and Funding Methods, sponsored by the Northeast Center for Professional Education, Washington, DC, April 1988.

**Resume dated September 2009.**