

Boston, MA

+1.617.864.7900

Philip.Hanser@affiliate.brattle.com

**Philip Q Hanser** is a principal emeritus of The Brattle Group and has over forty years of consulting and litigation experience in the energy industry. He specializes in regulatory and financial economics, especially for electric and gas utilities, retail tariffs, transmission pricing, marginal and avoided costs, and integrated resource planning. In addition, he is experienced in environmental issues, forecasting, marketing, demand-side management, and other complex management and financial matters. He also assists in statistical matters, including sample design and data analysis.

He has appeared as an expert witness before the U.S. Federal Energy Regulatory Commission (FERC) and numerous state public utility commissions, environmental agencies, Canadian utility boards, arbitration panels, and federal and state courts. From 2008 to 2019, Mr. Hanser taught industry professionals about the principles and practice of cost of service calculations and rate design on behalf of the Edison Electric Institute in its Advanced Rates Course. In addition, he served for six years on the American Statistical Association's Advisory Committee to the Energy Information Administration (EIA). He is a Life Member of the Institute of Electronics and Electrical Engineers (IEEE), the American Statistical Association (ASA), and the International Association for Energy Economics (IAEE).

Before joining The Brattle Group, Mr. Hanser held teaching positions at the University of the Pacific, the University of California at Davis, and Columbia University. He was a guest lecturer at the Massachusetts Institute of Technology, Stanford University, and the University of Chicago. Mr. Hanser was a Senior Associate in the Mossavar-Rahmani Center for Business and Government at the Harvard Kennedy School. He co-led the Business and Government Policy Analysis Concentration's seminar in public policy analysis. Mr. Hanser was a Lecturer in Boston University's Questrom School of Business's Markets, Public Policy, and Law department and a Senior Fellow at B.U.'s Institute for Sustainable Energy. He is a Lecturer in the Economics Department at Northeastern University. He has also served as the manager of the Demand-Side Management Program at the Electric Power Research Institute (EPRI). He has been published widely in leading industry and economic journals. He also serves as a member of the Newton(MA) Citizens Commission on Energy.

## EDUCATION

Ph.D. Candidacy Requirements Completed, Columbia University, NY	1975
Phil.M. (Economics and Mathematical Statistics) Columbia University	1975

A.B. (Economics and Mathematics) The Florida State University, FL 1971

The University of California at Berkeley Engineering Extension Course  
*Time Series and Econometric Forecasting* September 1979

Data Analysis and Regression, American Statistical Association  
*Short Course, San Diego, CA* August 1978

**ACADEMIC POSITIONS**

Northeastern University, Department of Economics

*Lecturer* 2020-present

Boston University, Questrom School of Business, Institute for Sustainable Energy  
*Senior Fellow* 2017-2020

Boston University, Questrom School of Business, Markets, Public Policy, and Law  
*Lecturer* 2017-2020

Harvard Kennedy School  
*Senior Associate in the Mossavar-Rahmani Center for Business and Government*  
*Co-Leader BGP-150Y Business and Government Policy Analysis Concentration Seminar* 2012-2017

Massachusetts Institute of Technology, Cambridge, MA  
*Guest Lecturer, Energy Laboratory Short Courses* 1997-1998

University of California, Davis; Davis, CA  
*Visiting Lecturer, Department of Economics* 1981-1982

University of the Pacific, Stockton, CA  
*Assistant Professor, Departments of Economics and Mathematics* 1975-1980

**EXPERIENCE**

**Analysis of Electricity Generation, Contracts, and Wholesale Markets**

- Provided expert testimony in Massachusetts state court on the impacts of alleged violations of a wholesale power contract on a supplier in ISO-NE.

- For the California Department of Water Resources, provided expert testimony in federal bankruptcy court concerning the public interest standard to be applied to Calpine Corporation's rejection of its contracts. This assignment included a valuation of the contract over time through an original simulation model of the California market and an assessment of the potential reliability implications for the California market.
- For the California Department of Water Resources and the California Attorney General's Office provided expert testimony on damages resulting from Sempra Energy Resources' breaches of its power purchase agreement in both arbitration hearings and before the California state court. In addition, he analyzed two years of hourly data on energy deliveries, market prices, ISO charges, and invoice charges to identify and evaluate performance violations and invoice overcharges. Assisted counsel in developing the case theory and provided general litigation support in preparation for and during the arbitration.
- For Dominion Electric Marketing, Inc. (DEMI) assisted in responding to a complaint by United Illuminating (UI) regarding their wholesale supply contract. The dispute centered on the allocation of reliability must-run costs between UI as a load-serving entity and DEMI as a wholesale supplier.
- For The California Department of Water Resources, reviewed the California ISO's proposed implementation of locational marginal pricing (LMP) and analyzed its implications for "seller's choice" supply contracts. Developed a framework for quantifying the incremental congestion costs that ratepayers would face if suppliers delivered power to the lowest-priced nodes and estimated potential additional contract costs using a third party's GE-MAPS market simulations. Provided recommendations to the CAISO regarding how to address the issue.
- Provided expert testimony in Massachusetts state court on the damages incurred by a power plant developer due to alleged contractual violations by a supplier for a plant constructed in ISO-NE.
- For a Florida utility, providing a confidential expert report evaluating the benefits of the power from a co-generator and its potential rate implications and assisting in negotiating a co-generation contract with a large industrial customer.
- Assisted a U.S. electric utility in preparing a bid proposal to an industrial firm for leasing a new power plant. The assignment included a risk analysis of the proposal, an assessment of financial and rate impacts, and a market assessment of competitors' potential offerings.
- For a merchant generation company, provided testimony on the fairness of a resource procurement action.

## Resource Planning and Procurement

- For the Edison Electric Institute, he co-authored a report on the general inapplicability of standard financial portfolio theory to the resource portfolios of utilities.
- For the investor-owned utilities of Wisconsin, provided testimony before the Public Service Commission of Wisconsin on cost of capital issues for use in its statewide resource planning exercise.
- For an international development bank, he evaluated generation resource needs for an Eastern European country and determined alternative means to meet those generation needs. This assignment included an analysis of the impact of privatization on the country's economy, its import and export sectors, and the future development of electricity and gas resources.
- For a western utility, developed an assessment of its resource options, with a particular view towards future environmental regulation.
- For a southern utility, assessed the value of adding a gas-fired generating station.

## Environment

- For an eastern U.S. utility with substantial coal-generating facilities, provided advice concerning maintenance procedures and risk exposure to New Source Review standards under the Clean Air Act Amendments.
- For a western generator with substantial coal-generating facilities, assisted its response to allegations by the Environmental Protection Agency of failure to comply with the New Source Review standards under the Clean Air Act Amendments.
- For Illinois Power Company, provided expert testimony in federal court on the regulatory and rate base implications of the Clean Air Act Amendments in support of the calculation of noncompliance economic damages arising from New Source Review.
- For a gas utility, assisted in assessing potential manufactured gas liabilities for use in insurance recovery and estimating possible recovery under various insurance allocation theories and estimated risk distributions.
- For a gas utility, assisted in assessing the announcement effect of environmental liabilities on its cost of capital. This assignment included estimating changes in market betas for pre- and post-environmental liability announcements.

## Energy Efficiency, Demand-Side Management, and Renewables

- For a large utility in the southern United States, prepared an expert report investigating alternative cost allocation approaches for generation capacity, fuel, and demand-side management (DSM) costs through a review of the methods, surveys of practice, and the financial impacts on the utility. The cost allocation assessment included cost allocation across jurisdictions and within a jurisdiction.
- For Central Vermont Public Service provided expert testimony on the impact of its DSM programs before the Vermont Public Service Board.
- For Ameren/UE's Illinois subsidiaries, provided expert testimony on the potential for gas DSM and resulting potential rate implications.
- For a northeastern utility, developed an assessment of the potential penetration rate of microturbines. In addition, for the utility service territories under consideration, evaluated the backup generation rates and connection charges likely to be incurred for such systems to determine customer costs and benefits.
- For a utility located in the Western Electric Coordinating Council (WECC), procuring renewable resources provided a system integration study for various renewable project proposals. First, production costing and power flow modeling estimated the "deliverability" of various proposals. This assessment included estimating locational marginal prices (LMPs) and potential congestion costs. Finally, the proposed renewable power projects were ranked by their estimated benefits and costs and delivered a formal presentation to the utility's executives at completion.
- For a power marketer and developer of independent power projects in Great Britain, assisted in preparing comments on proposals by the UK pool regarding the role of demand-side bidding and the pricing of transmission losses.
- For a Texas utility provided expert testimony regarding breach of contract claims made against it by an industrial participant in an energy efficiency project. Reviewed the energy efficiency impacts of the program. The project's net present value was calculated under various rate options and market prices.
- For Connecticut Light and Power provided testimony in support of its application for a Certificate of Environmental Compatibility and Public Need for constructing a 345-kV electric transmission line and reconstructing an existing 115-kV electric transmission line. At issue was the use of distributed resources to substitute for the proposed lines.

### Analysis of Market Power

- For the California Parties, provided litigation support and testimony regarding manipulation of energy and ancillary service market prices and the outage behavior of gas-fired power plants during 2000-01. Before the Federal Energy Regulatory Commission, the proceeding involved Enron, Dynegy, Mirant, Reliant, Williams, and other suppliers in the U.S. and Canada. The analyses focused on the use by suppliers of generation outages to affect market prices through physical withholding, as well as the use of pricing to yield economic withholding.
- For the California Parties provided litigation support and testimony regarding Enron's transmission and ancillary services market manipulation strategies, including 'Death Star' and 'Get Shorty.'
- For Southern California Edison submitted testimony before the FERC describing the implications of manipulation of gas market prices on the electricity market.
- For Sierra Pacific Resources Company, provided expert testimony before the Public Utilities Commission of Nevada and the FERC regarding the market power implications of generation asset divestiture required for the merger of Sierra Pacific Power and Nevada Power Company and developed a Cournot market model to assess the market power implications of selling off alternative groupings of generation.
- For the Pennsylvania-New Jersey-Maryland Interconnection, LLC (PJM), co-authored the first annual report on the state of its markets. The report included an assessment of the market's competitiveness and potential structural deficiencies and identified potential instances of market abuse.
- For PJM, developed an ensemble of metrics for assessing market power in its markets. The metrics included an early warning system to permit PJM interventions into market abuse at the most initial possible stage.
- For PJM, developed software for unilateral market power assessment and assisted PJM in its preliminary implementation. Its use was validated through an incident involving potential market power abuse by PJM members.

### RTO Design and Participation

- For Northeast Utilities, provided testimony before the FERC about the economics of imposing local installed capacity (LICAP) requirements on ISO-NE. Also provided expert testimony before the FERC in support of its applications for market-based rate authority.

- For NSTAR, provided testimony before the FERC on several matters: first, the necessity of imposing bid caps on the New England electricity market; second, replacement energy rates for generators when the transfer capability into a transmission-constrained zone was reduced because of system upgrades; and third, the appropriateness of granting market-based rate authority to a generator in a transmission-constrained zone. In addition, developed a Cournot market model to forecast the potential impact on market prices in the transmission-constrained zone where most of NSTAR's service territory is located.
- For Nevada Power Company, provided expert testimony before the FERC for its market-based rate authority application.
- For Otter Tail Power Company, provided an affidavit to the FERC assessing how the Midwest ISO's proposed Transmission and Energy Market Tariff would affect Otter Tail Power, both operationally and financially. Based on the strategies that some market participants pursued during the 2001 California electricity market crisis demonstrated the potential to pursue similar strategies in MISO and harm Otter Tail and its customers.
- For Edison Mission Energy's subsidiary, Midwest Gen provided expert testimony to the FERC for its market-based rate authority application.
- For a Midwest utility, examined the implications of alternative configurations of the independent system operator (ISO) on potential market power concerns. The issue particularly examined was the question of seams and how different ISO configurations affected the costs of transactions.
- Co-authored a report for the New York Independent System Operator assessing the reliability implications of modifying its rules regarding installed capacity.
- Submitted testimony to the Public Utilities Commission of Texas (PUCT) regarding a proposed rule to allocate the costs of procuring replacement reserves to market participants in ERCOT.
- For the Edison Electric Institute, authored a report on standard market design and its implications for utilities within regional transmission organizations.

### Forecasting and Weather Normalization

- For the Pennsylvania-New Jersey-Maryland Interconnection, LLC (PJM), co-authored an assessment of its forecasting model
- For Florida Power and Light Co., provided testimony before the Florida Public Service Commission concerning its forecasting methodology.
- For an electric utility in the Southeast, reviewed the existing weather normalization process and diagnosed problems with weather data and regression models. Developed alternative daily and monthly normalization models, improved degree-day specification, selection of weather stations, and regression specification to double prediction accuracy and enhance the stability of the weather-normalization process.
- For PJM, conducted a review of models for forecasting peak demand and re-estimated new models to validate recommendations. As a result, developed models for 18 individual transmission zones and the entire PJM system.
- For a Southwestern utility, developed models for forecasting monthly sales and loads for residential, commercial, and industrial customer classes using primary data on customer loads, weather conditions, and economic activity.
- For the Public Service Company of New Mexico, provided expert testimony before the Public Utilities Commission of New Mexico regarding the forecasted growth of the El Paso, Texas, and Juarez, Mexico markets and their electricity requirements.
- For a Southeastern utility, he developed a model for forecasting monthly demand that incorporated the impacts of its significantly declining housing market and served as the basis for its treasurer's revenue forecast.

### Rate Design and Related Issues

- Performed Cost of Service study for Barbados Light and Power Company and provided testimony before the Barbados Fair Trade Commission. Also provided testimony on what constituted retroactive ratemaking, September 2022
- Currently serves as an advisor to the Omaha Public Power District's Board of Directors
- Served as an advisor to Salt River Projects's Board of Directors for its 2019 general rate case.
- Expert report on behalf of the Newfoundland and Labrador Board of Commissioners of Public Utilities: Review of Existing and Proposed Network Additions Policies for



Newfoundland and Labrador Hydro, with Agustin Ros and Pearl Donohoo-Vallet, November 19, 2019

- Testimony before the Virginia Corporation Commission, Case No. PUR-2019-00104, on behalf of the Virginia Electric Power Company on cost allocation of utility-scale solar projects, July 1, 2019, with Agustin Ros.
- Expert report on behalf of the Newfoundland and Labrador Board of Commissioners of Public Utilities: Embedded and Marginal Cost of Service Review, with Agustin Ros, T. Bruce Tsuchida, Pearl Donohoo-Vallet, and Lynn Zhang, May 3, 2019.
- Performed locational marginal cost of service studies to serve as the basis for customer-owned demand management reimbursement rates for Consolidated Edison of New York and Orange and Rockland Utilities, 2018.
- For a Midwest utility, provided support for its rate designs, including its cost of service development and certification of conformance with state regulations.
- For an industrial customer, provided testimony before a state public utility commission on the appropriate cost allocation and rate design approach for a municipal water utility.
- For a utility in PJM, performed a marginal cost/avoided cost study to be used in evaluating its demand-side management energy efficiency programs, demand-responsive rates, and seasonal and time-of-use rates. The study included a geographic-specific assessment of its marginal distribution and transmission costs.
- For intervenors in Toronto Hydro-Electric System Limited (THESL), provided testimony on cost allocation issues concerning THESL's suite metering program.
- For Ameren/UE's Missouri subsidiary provided expert testimony on its rate design before the Missouri Public Utility Commission. Assisted the development of company witnesses' rationale for the choice of cost of service allocation method, developed benchmarks for the rate increase against similarly situated utilities and other commodities' escalations, and evaluated proposed demand-side management programs and rate options.
- For Ameren/UE's Illinois subsidiaries, provided expert testimony on the potential for gas demand-side management. In addition, the testimony discussed the potential rate implications of such programs on the utilities' revenue.

- For the Edison Electric Institute, co-authored a series of papers concerning issues facing utilities. The reports covered the topics of fuel adjustment clauses, mitigating significant rate increase impacts, and the Energy Policy Act of 2005.
- For the City of Vernon, California, submitted testimony to the FERC regarding its revenue requirements for transmission and provided testimony regarding its formula rates.
- For the Edison Electric Institute, he served as an instructor in the Advanced Rates School on cost allocation, rate design, and marginal cost calculation.
- For the ISO-NE, served as an instructor on retail cost allocation and ratemaking.
- For Hydro Québec, provided testimony before the Régie d'Énergie regarding the conformance of its Open Access Transmission Tariff with U.S. FERC regulations.
- Before staff members of the FERC, assisted in developing a review of the implications of market restructuring on transmission assets' cost of capital and wholesale transmission rates.
- For a power marketer and developer of independent power projects in Great Britain, assisted in preparing comments on proposals by the UK pool regarding the pricing of transmission losses and the role of demand-side bidding.
- For a utility in PJM with multiple jurisdictions provided an assessment of alternative demand and energy cost allocation procedures. The report included separate assessments for each jurisdiction and an assessment for generation and transmission assets commonly shared by all jurisdictions.
- For a European transmission company, provided an analysis of the likely development of the European electricity market. Also assessed market implications for the transmission company of modifications to the transmission grid.
- For Hydro Québec, provided expert testimony before the Régie d'Énergie regarding whether a set of privately held transmission facilities constituted a looped transmission system and, thus, was subject to requests for transmission service.
- For Omaha Public Power District, assisted in the performance of its cost of service study, retail, and wholesale rate designs. Also redesigned its cost of service models. Also provided support in the redesign of its formula rates for the Southwest Power Pool.
- For Arizona Public Service, provided assistance in the development of a cost-of-service basis for separating its residential customers with rooftop solar photovoltaics into a separate rate class.
- For Nevada Power, assisted in developing a cost-of-service basis for separating its residential customers with rooftop solar photovoltaic into a separate rate class.

- For Pacific Gas and Electric, redesigned the marginal cost of service models and their software implementation for revenue cycle services and distribution system costs.
- For Wolverine Power Cooperative, provided testimony to the FERC supporting its request for formula transmission rates.
- For the Hawaii Electric Company, assessed alternative performance incentive mechanisms in a report which was submitted to the Hawaii Public Utility Commission.
- For FirstEnergy/Jersey Central Power and Light, assisted in developing their cost of service study submitted to the New Jersey Board of Public Utilities.
- For National Grid, assessed alternative performance incentive mechanisms in a report submitted to the Massachusetts Department of Public Utilities.
- For Salt River Project, assisted with its current OATT compliance with FERC regulations.

### Plant Performance and Strategy

- For the Keystone-Conemaugh Project Office, performed a benchmarking analysis to identify the areas in which Keystone and Conemaugh coal units were better performing or underperforming compared to other units with similar characteristics. The study involved comparing the historical operational and cost performance of the Keystone and Conemaugh coal units against their peer groups, identifying the areas where the performance of the Keystone and Conemaugh coal units was above and below the average quartile of their peer groups, and developing metrics and methodologies to combine the results of individual comparisons across the operational and cost performance assessments.
- For a U.S. electric utility, assisted in developing a legislative and regulatory strategy concerning restructuring. This assignment included generation asset valuation in a competitive market, development of stand-alone transmission and distribution rates under cost-of-service and performance-based regulation, and estimation of stranded costs.

### Utility Financial Issues

- For the Edison Electric Institute, he co-authored a report on the general inapplicability of standard financial portfolio theory to the resource portfolios of utilities.
- For a gas utility, assisted in assessing the announcement effect of environmental liabilities on its cost of capital. This assignment included estimating changes in market betas pre- and post-environmental liability announcement.

- For the investor-owned utilities of Wisconsin, provided testimony before the Public Service Commission of Wisconsin on cost of capital issues for use in its statewide resource planning exercise.
- For the developer of a synthetic natural gas plant in Indiana, provided testimony before the Indiana Utility Regulatory Commission on the appropriate approach to assessing financial risk for the plant.
- For the developer of a synthetic natural gas plant in Illinois provided a series of testimonies before the Illinois Commerce Commission on the appropriate cost of equity for the plant.
- For the developer of a synthetic natural gas plant in Illinois, provided testimony before the Illinois Construction Development Board on the appropriate range of capital costs and operations and maintenance expenses.

#### Other Energy Experience

- For the Edison Electric Institute, conducted its annual workshop for the Electric Rate Advanced Course, “Introduction to Efficient Prices,” University of Wisconsin, Madison, July 2009 - 2019.
- For the Edison Electric Institute, conducted its annual workshop for the Electric Rate Advanced Course, “Rate Class Cost Allocation,” University of Wisconsin, Madison, July 2009 - 2019.
- For the Edison Electric Institute, conducted its annual workshop for Electric Rate Advanced Course, “Ratemaking by Objective: It Can Be Done,” University of Wisconsin, Madison, July 2009 - 2019.
- For the Edison Electric Institute, conducted Pre-Course Workshop for Electric Rate Advanced Course, “Traditional Embedded Costing and Pricing Concepts,” University of Wisconsin, Madison, July 26, 2009.
- For the Edison Electric Institute, conducted a workshop for its Electric Rate Advanced Course, “Unbundling Methodologies,” University of Wisconsin, Madison, July 26, 2009.
- For the Edison Electric Institute, conducted the webinar “Long-Term Energy Forecasts: Challenges and Approaches” on June 17, 2009.
- For the Indiana Energy Conference, presented “It Ain’t Your Father’s IRP, Meeting Today’s Challenges,” October 2, 2008.
- For the NEPOOL Forecasting Committee Summer Meeting, presented “I’m a Forecaster – And You Can Too!,” July 17, 2008.

- For the Electric Power Research Institute (EPRI), he developed and directed a research program to provide electric utilities with the following capabilities: marketing research, pricing and rate design, integrated resource planning, capital budgeting, environmental impacts of electric utilities and end-use technologies, load research, forecasting, and demand-side management through software tools, database development, and technology development. Assisted in developing the Load Management Strategy Testing Model (LMSTM) and served as its project manager. In addition, served as the project manager for the development of DSManager, a software for assessing efficiency programs for electric, gas, and water utilities, and enhancements to the Electric Generation Expansion Analysis Model (EGEAS). Co-wrote reports on the environmental impacts of electric technologies, environmental externalities, cost-benefit analysis of DSM programs, rate design, and costing, integrated resource planning, operational impacts of interruptible and curtailable rates, product differentiation, activity-based costing, DSM program evaluation, efficiency program development for electric, gas, and water utilities and others.
- For EPRI, served as project manager of the Edison Electric Institute (EEI), National Rural Electric Cooperatives Association (NRECA), American Public Power Association (APPA), and National Association of Regulatory Utility Commissioners (NARUC) jointly sponsored Electric Utility Rate Design Study (EURDS). In addition, represented the Institute before various regulatory commissions, federal agencies, and utility executives. Also, for EPRI, he served on the Environmental Protection Agency's advisory committee for the Clean Air Act Amendments. He also served as the operating agent for Annex IV, Improved Methods for Integrating Demand-Side Options into Utility Resource Planning, of the International Energy Agency Agreement on Demand-Side Management.
- For a California utility, supervised short- and long-term forecasts of sales and peak demand for use in resource and corporate planning. Supervised and helped prepare forecast documentation for public hearings before the California Energy Commission and represented the utility to the Commission on the forecast. Managed the design and implementation of long-term strategic planning and financial models, prepared both marginal and embedded cost of service studies for the utility, and assisted in their use to design customer rates. Evaluated the impact of energy conservation programs and legislation on long-term system resource requirements. Designed and implemented the residential survey of appliance holdings and commercial customer equipment survey.

## Statistics and Sampling

- Designed a statistically valid database sampling procedure for assessing the validity of insurance claims arising from mass tort actions. The database contained summary information on the claims, and, for each claim, there was, at times, voluminous information on the individual cases. The sampling procedure was used to determine which records would be chosen and assess the individual's claim eligibility. That would then be a basis for calculating an appropriate rate per dollar claim.
- Assessed the liability risk of an insurance company that provided coverage relevant to a mass tort suit. First, a Markov chain model was developed to estimate the size of the potential population, and then a risk model was developed to calculate potential exposure.
- Developed a time-to-failure model to test the claims of generators during the California Electricity Crisis that their outage rates were not abnormal.
- Submitted testimony in bankruptcy court regarding the inventory estimation subject to reclamation by a wholesale pharmaceuticals supplier, which was sold to a bankrupt retail drug chain. The retail chain failed to maintain proper inventory records. Developed a statistical approach to estimate inventory levels, combining comprehensive inventory data and the supplier's shipment and replenishment records.

## TESTIMONY AND REGULATORY FILINGS

Cost of Service study on behalf of Barbados Light and Power Company in support of its general rate case before the Barbados Fair Trade Commission, September 2022.

Expert report on behalf of Barbados Light and Power Company concerning retroactive ratemaking in support of its general rate before the Barbados Fair Trade Commission, September, 2022.

Expert report on behalf of the Newfoundland and Labrador Board of Commissioners of Public Utilities: Review of Existing and Proposed Network Additions Policies for Newfoundland and Labrador Hydro, with Agustin Ros and Pearl Donohoo-Vallet, November 19, 2019.

Before the New York Department of Public Service, Granular Distribution Marginal Costs for Orange and Rockland Utilities, July 2019

Testimony before the Virginia Corporation Commission, Case No. PUR-2019-00104, on behalf of the Virginia Electric Power Company on cost allocation of utility-scale solar projects, July 1, 2019, with Agustin Ros. (Incorporates previously unfiled report for Virginia Electric Power.)

Expert report on behalf of the Newfoundland and Labrador Board of Commissioners of Public Utilities: Embedded and Marginal Cost of Service Review, with Agustin Ros, T. Bruce Tsuchida, Pearl Donohoo-Vallet, and Lynn Zhang, May 3, 2019.

Before the Salt River Project Board of Directors, Board Advisor report regarding SRP management's proposed rates, December 2018

Before the New York Department of Public Service, Granular Distribution Marginal Costs for Consolidated Edison with T. Bruce Tsuchida, July 2018

Before the Pennsylvania Public Utility Commission, Class Cost of Service Analysis for Philadelphia Gas Works, February 2017.

Before The Minnesota Public Utilities Commission, Docket No. E017/CG-16-1021, Expert Testimony on Behalf of Otter Tail Power, In the Matter of a Complaint by Red Lake Falls Community Solar Hybrid, LLC Regarding Potential Purchased Power Agreement (PPA) Terms and Pricing with Otter Tail Power Company.

Prepared Expert Report on Behalf of Nova Scotia Power Incorporated (NSPI), regarding the review and assessment of performance measures, July 13, 2016.

Before the New Jersey Board of Public Utilities, filed "Prepared Direct Testimony of Philip Q Hanser on behalf of Jersey Central Power & Light Company," regarding Cost of Service/Class Allocation, April 2016.

Before the United States District Court for The District of Montana Billings Division, Case no: CV 13-32-BLG-DLC-JCL, filed "Expert Report of Philip Q Hanser on Behalf of Defendants," regarding the evaluation of potential impacts of capital maintenance, repair, and replacement projects on emissions from four Colstrip Units, November 14, 2014.

Before the Hawai'i Public Utilities Commission, Docket No. 2013-0141, filed "Targeted Performance Incentives: Recommendations to the Hawaiian Electric Companies" with William P. Zarakas regarding the analysis of the application of performance incentives to electric utilities, September 15, 2014.

Before the Federal Energy Regulatory Commission, Docket No. ER15-249-000, filed "Prepared Direct Testimony of Philip Q Hanser on behalf of Wolverine Power Supply Cooperative, Inc." regarding a Request for Change in Rates to Distribution Cooperative Member-Owners, October 30, 2014.

Before the Public Utilities Commission of the State of Colorado, Proceeding No. 13F-0145E, "Answer Testimony and Exhibits of Philip Q Hanser on behalf of Tri-State Generation and Transmission Association, Inc.," regarding an Analysis of Complaining Parties' Responses to Tri-State Generation and Transmission Association, Inc., September 10, 2014.

Before the Public Service Commission of Wisconsin, Docket No. 3720-WR-108, filed "Direct Rebuttal and Surrebuttal Testimony of Philip Q Hanser on behalf of MillerCoors L.L.C." regarding the Application of Milwaukee Water Works for Authority to Increase Water Rates, June 2014.

Before the District Court for the Eastern District of Missouri, Civil Action No. 4:11-cv-00077-RWS filed “Expert Report of Philip Q Hanser on behalf of Ameren Missouri” regarding the New Source Review enforcement case on May 16, 2014.

Before the Illinois Commerce Commission of the State of Illinois, Docket No. 13-0387, filed “Rebuttal Testimony of Philip Q Hanser on behalf of Commonwealth Edison Company,” regarding their tariff filing to present the Illinois Commerce Commission with an opportunity to consider revenue-neutral tariff changes related to rate design authorized by subsection 16-108.5(e) of the Public Utilities Act, August 19, 2013.

Before the Public Utilities Commission of the State of South Dakota, EL 11-006, filed “Wind Integration Services - Summary of Industry Practices in North America, on behalf of NorthWestern Energy,” in the Matter of the Complaint by Oak Tree Energy LLC against NorthWestern Energy for refusing to enter into a Purchase Power Agreement, July 8, 2013.

Before the Régie de l'énergie, R-3848-2013, filed “Direct Testimony of Philip Q Hanser on Behalf of Hydro-Québec Distribution” regarding their Application for approval of characteristics of Wind Integration Services and acquisition analysis of other wind integration services, June 2013, January 2014.

Before the Federal Energy Regulatory Commission, “Prepared Direct Testimony of Philip Q Hanser on behalf of NV Energy Operating Companies,” regarding whether the use of a 12-CP cost allocation method is appropriate for the NV Energy transmission system from a cost allocation perspective, May 2013.

Before the Federal Energy Regulatory Committee, Prepared Direct and Rebuttal Testimony and Exhibits of Philip Q Hanser in Support of the Refund Claims of the City of Seattle, Washington, for the Period January 1, 2000 through December 24, 2000, on behalf of the City of Seattle, Washington, EL01-10-085, March 12, 2013, June 3, 2013, July 26, 2013.

Before the Commonwealth of Massachusetts Department of Public Utilities, “Review and Analysis of Service Quality Plan Structure In the Massachusetts Department of Public Utilities Investigation Regarding Service Quality Guidelines for Electric Distribution Companies and Local Gas Distribution Companies,” with David E. M. Sappington and William P. Zarakas, as part of the Initial Comments of National Grid, DPU12-120, March 2013.

Before the Bonneville Power Administration, Direct and Rebuttal Testimony of Philip Q Hanser, John D. Martinsen, Felicie NG, James M. Russell, and Paul Wrigley on Behalf of Benton County Public Utility District No. 1, Iberdrola Renewables, LLC, Tacoma Power, Seattle City Light, and Snohomish County Public Utility District No. 1, Docket No. BP-14-E-JP12-01, January 28, 2013, March 11, 2013.

Before the Illinois Commerce Commission, Report of Philip Q Hanser on Behalf of Chicago Clean Energy, LLC, on the Reasonableness of Chicago Clean Energy’s Cost of Equity, October 2011; Supplemental Report on Behalf of Chicago Clean Energy, LLC, November 2011; Response Report of Philip Q Hanser on Behalf of Chicago Clean Energy, November 2011, Certified Affidavit on Behalf of Chicago Clean Energy, LLC, December 2011.



Before the Louisiana Public Service Commission, Direct Testimony of Philip Q Hanser on Behalf of Calpine Corporation, Docket No. U-31971, November 22, 2011. (Testimony was withdrawn as part of the settlement between Calpine and Entergy.)

Before the Illinois Construction Development Board, Supplemental Report of Philip Q Hanser on Behalf of Chicago Clean Energy, LLC, on the Reasonableness of Chicago Clean Energy's Estimate of Capital Costs, November 2011. Supplemental Report of Philip Q Hanser on Behalf of Chicago Clean Energy, LLC, on the Reasonableness of Chicago Clean Energy's Estimate of Operations and Maintenance Expenses, November 2011.

Before the Indiana Utility Regulatory Commission, Rebuttal Testimony of Philip Q Hanser on Behalf of Indiana Gasification, LLC, IURC Cause No. 43976, June 2011.

Before the State of Illinois Commerce Commission, Prepared Direct Testimony of Philip Q Hanser on behalf of Interstate Power and Light Company with regard to their Petition For Approval Of Sale of Utility Assets Pursuant to Sections 7-102 Of The Public Utilities Act; and Approve the Discontinuance of Service Pursuant to 8-508 of the Public Utilities Act, 2011.

Before the Federal Energy Regulatory Commission, Supplemental Comments, Re: Notice of Proposed Rulemaking regarding Demand Response Compensation in Organized Wholesale Energy Markets," Docket Nos. RM10-17-000 and EL09-68-0, October 4, 2010, and May 13, 2010.

Before the Régie de l'énergie, Prepared Expert Report of Philip Q Hanser on Behalf of Hydro-Québec TransÉnergie ("HQT"), Regarding HQT's Methodology for ATC Coordination, June 2010.

Before the Commonwealth of Massachusetts Trial Court, testified on behalf of MMWEC regarding the management and ownership of investor-owned utilities ("IOUs"), MMWEC, and municipal light departments ("Municipals") in Massachusetts before and after the passage of the Electric Industry Restructuring Act of 1997, as well as the impact of electric industry restructuring in Massachusetts on IOUs, MMWEC, and Municipals with respect to contract buyouts in the matter of MASSPOWER v. Massachusetts Municipal Wholesale Electric Company (MMWEC), Civil Case No. 07-3243 BLS2, March 2010.

Before the Ontario Energy Board, Prepared Witness Statement on Behalf of the Smart Sub-Metering Working Group in the Matter of Toronto Hydro-Electric System Limited's 2010 Electricity Distribution Rate Application, December 15, 2009.

Before the Superior Court of the State of California for the County of San Diego, Prepared Second Addendum Report to Expert Report of Philip Q Hanser for the Office of the Attorney General of the State of California on Behalf of California Department of Water Resources, Case No. GIC 789291, September 30, 2009.

Before the Florida Public Service Commission, on behalf of Florida Power and Light Company, Prepared Rebuttal Testimony of Philip Q Hanser, Docket No. 080677-EI, August 6, 2009.

Before the Federal Energy Regulatory Commission on behalf of the City of Vernon, California, Prepared Petition for Declaratory Order and Request for Waiver of Filing Fee of City of Vernon, California, Docket No. EL09-\_\_\_-000, July 15, 2009.

Before the Régie de l'énergie, Prepared Supplemental Expert Report of Philip Q Hanser on Behalf of Hydro-Québec TransÉnergie, in Response to Newfoundland and Labrador Hydro's Complaint P-110-1692, June 2009.

Before the Federal Energy Regulatory Commission, on behalf of The People of the State of California, ex rel. Edmund G. Brown Jr., Direct Testimony of Philip Q Hanser regarding emergency purchases the state authorized the California Energy Resources Scheduling Division of the California Department of Water Resources ("CERS") to make when the California investor-owned utilities (IOUs) could not purchase the power needed to serve their customers, Docket No. EL09- \_\_ ("Brown Complaint"), May 22, 2009.

Before the Florida Public Service Commission, on behalf of Florida Power and Light Company, Prepared Direct Testimony of Philip Q Hanser, Docket No. 080677-EI, April 23, 2009.

Before the Superior Court of the State of California for the County of San Diego, for the Office of the Attorney General of the State of California on Behalf of California Department of Water Resources, Prepared Addendum to Expert Report of Philip Q Hanser, Case No. GIC 789291, March 31, 2009.

Before the Pennsylvania Public Utility Commission on Behalf of Pennsylvania Electric Company, Prepared Rebuttal Testimony of Philip Q Hanser and Metin Celebi Concerning the Causes and Pricing of Transmission Congestion, Docket No. P-2008-2020257, January 16, 2009, March 10, 2009.

Before the Régie de l'énergie, Prepared Expert Report of Philip Q Hanser on Behalf of Hydro-Québec TransÉnergie, in Response to Newfoundland and Labrador Hydro's Complaints P-110-1565, P-110-1566, P-110-1597, P-110-1678, and P-110-1692, December 2008.

Before the Pennsylvania Public Utility Commission, on Behalf of Pennsylvania Electric Company, Prepared Direct Testimony of Philip Q Hanser Concerning the Causes and Pricing of Transmission Congestion, Docket No. P-2008-2020257, July 30, 2008.

Before the Régie de l'énergie, Prepared Affidavit on Behalf of Hydro-Québec Regarding the Public Availability of SIS Reports Performed by a Transmission Provider, June 19, 2008.

Before the Federal Energy Regulatory Commission, Prepared Direct Testimony on Behalf of the City of Vernon's Revised Transmission Revenue Requirement Filing with the FERC, Docket No. EL08-\_\_\_-000, April 3, 2008.

Before the Régie de l'énergie, Prepared Expert Report on Behalf of Hydro-Québec TransÉnergie to Assess Whether the Transmission Facilities Owned by ELL may be considered as a "Radial Generator Lead," Case No. R-3636-2007, March 13, 2008.

Before the Illinois Commerce Commission, Prepared Direct Testimony on Behalf of the Illinois Power Company d/b/a AmerenIP in regard to the energy efficiency programs implemented by natural gas distribution utilities in the U.S., Docket No. 07-\_\_\_, November 2, 2007.

Before the American Arbitration Association, Prepared Rebuttal Report on Behalf of the California Department of Water Resources to Evaluate the Reports that William Hogan, Jeffrey Tranen, and Ellen Wolfe Provided on Behalf of Sempra Generation, Case No. 74Y1980019606MAVI, June 4, 2007.

Before the American Arbitration Association, Prepared Expert Report on Behalf of the California Department of Water Resources to evaluate certain claims made by the California Department of Water Resources (“DWR”) in its Demand for Arbitration regarding the performance of Sempra Energy Resources, now known as Sempra Generation, under the Energy Purchase Agreement between the parties, and to calculate amounts that Sempra would owe to DWR assuming liability is established, Case No. 74Y1980019606MAVI, May 14, 2007.

Before the United States Bankruptcy Court, Northern District of Ohio, Eastern Division, Prepared Expert Report in regard to McKesson’s Inventory Reclamation in the Phar-Mor Bankruptcy, Case Nos. 01-44007 Through 01-44015, March 9, 2007.

Before the Public Utility Commission of Texas, Prepared Rebuttal Testimony on Behalf of Constellation New Energy, Inc.’s Appeal and Complaint of ERCOT Decision to Approve PRR 676, PRR 674 and Request for Expedited Relief, Docket No. 33416, January 11, 2007.

Before the Public Utility Commission of Texas, Prepared Direct Testimony on Behalf of Constellation NewEnergy, Inc. to analyze and discuss the flaws and potential negative impacts of the allocation methods under Protocol Revision Request (“PRR”) 676, which relates to procurement costs for Replacement Reserve Service (“RPRS”) and Out of Merit Capacity, Docket No. 33416, November 22, 2006.

Before the American Arbitration Association, Prepared Rebuttal Report on Behalf of the California Department of Water Resources vs. Sempra Energy Resources, Case No. GIC 789291, July 11, 2006.

Before the State Office of Administrative Hearings, Prepared Expert Report on Behalf of TXU Energy Solutions, Regarding their Demand-side Management Program and the Difference Between the Actual and Projected Savings in the Energy Bill of the University of Texas, July 7, 2006.

Before the Missouri Public Service Commission, Prepared Direct Testimony on Behalf of Union Electric Company with regard to Ameren UE’s Rate Design Proposals, Case No. ER-2007-0002, July 5, 2006.

Before the Superior Court of the State of California for the County of San Diego, for the Office of the Attorney General of the State of California on Behalf of California Department of Water Resources, Prepared Expert Report, Case No. GIC 789291, June 9, 2006.

Before the Superior Court of the State of California, Prepared Declaration in Support of California State Agencies’ Opposition to Motion on Shortened Time and Motion in Support of Preliminary Approval of Class Action Settlement, J.C.C.P. Nos. 4221, 4224, 4226, and 4228, June 8, 2006.

Before the Superior Court of the State of California, Prepared Declaration in Support of California State Agencies' Opposition to Proposed Publication Notice, J.C.C.P. Nos. 4221, 4224, 4226, and 4228, January 13, 2006.

Before the United States Bankruptcy Court, Prepared Declaration on Behalf of Calpine Corporation with regard to the Public Interest Standard for the Rejection of the Contract, Case No. 05-60200 (BRL), December 30, 2005.

Before the FERC, Prepared Direct Testimony on Behalf of Dominion Energy Marketing, Inc. (DEMI), regarding a dispute between DEMI and The United Illuminating Company as to which party is responsible for paying certain costs associated with Reliability Must-Run agreements under a December 28, 2001, Power Supply Agreement between the two parties, Docket No. EL05-76-001, December 5, 2005.

Before the American Arbitration Association, Prepared Expert Report on behalf of the California Department of Water Resources vs. Sempra Energy Resources with regard to Damages from Multiple Contract Breaches, Case No. 74Y1980019304VSS, May 2005.

Before the Federal Energy Regulatory Commission (FERC), Comment - "A Marginal - Value Approach to Pricing Reactive Power Services in Principles for Efficient and Reliable Reactive Power Supply and Consumption," Docket No. AD05-1-000, April 4, 2005 (with Martin Baughman and Philip Hanser).

Before the FERC, Prepared Supplemental Testimony on Behalf of the California Parties with regard to Enron's Circular Scheduling and Paper Trading Gaming Practices, Docket No. EL03-180-000, January 31, 2005.

Before the FERC, Prepared Affidavit on Behalf of Northeast Utilities Service Company and Affiliated Companies' Market-based Rate Authorization, Docket No. ER96-496-010 et al., September 27, 2004, Revised December 9, 2004.

Before the Connecticut Siting Board, Prepared Testimony on Behalf of Connecticut Light and Power in support of its application for a Certificate of Environmental Compatibility and Public Need for the construction of a 345-kV electric transmission line and reconstruction of an existing 115-kV electric transmission line between Connecticut Light and Power Company's Plumtree Substation in Bethel, through the Towns of Redding, Weston, and Wilton, and to Norwalk Substation in Norwalk, Connecticut, Docket No. 217, November 2004.

Before the FERC, Prepared Affidavit on Behalf of Otter Tail Power Company (OTP) Regarding Problems that May Result from the Implementation of MISO's Markets Tariff in OTP's Region, Docket No. ER04-691-000, May 7, 2004.

Before the FERC, Prepared Joint Affidavit with Judy W. Chang on Behalf of Devon Power LLC, et al., Docket No. ER03-563-030, March 24, 2004.

Before the FERC, Prepared Direct Testimony on Behalf of the California Parties with Regard to Enron's Circular Scheduling and Paper Trading Gaming Practices, Docket No. EL03-180-000, February 27, 2004.

Before the Commonwealth of Massachusetts, Prepared Expert Report on Behalf of Alstom Corporation and Black and Veatch vs. Meriden Corporation, LLC, Review of “*Value of the Meriden Power Project*,” Case No. 99-6016, January 9, 2004.

Before the FERC, Prepared Declaration on Behalf of The California Parties, Re: Gaming Activities Of Modesto Irrigation District, Docket No. EL03-159-000, October 2003.

Before the FERC, Prepared Affidavit on Behalf of Otter Tail Power Company For Otter Tail Power Company, Assessing how the Midwest ISO’s Proposed Transmission and Energy Market Tariff will Affect Otter Tail Power both Operationally and Financially, Docket No. ER03-118-000, September 15, 2003.

Before the Pennsylvania Environmental Hearing Board, Prepared Expert Report on Behalf of Pennsylvania Power and Light, New Jersey Department of Environmental Protection vs. Pennsylvania Department of Environmental Protection and Lower Mount Bethel Energy, LLC, Docket No. 2001-280-C, May 2, 2003.

Before the FERC, Prepared Rebuttal Testimony on Behalf of Southern California Edison for the California Parties Regarding Manipulation of Energy and Ancillary Service Market Prices and the Outage Behavior of Gas-Fired Power Plants, Docket No. EL00-95-069, March 20, 2003.

Before the FERC, Prepared Testimony on Behalf of Southern California Edison for the California Parties Regarding Manipulation of Energy and Ancillary Service Market Prices and the Outage Behavior of Gas-Fired Power Plants, Docket No. EL00-95-069, February 24, 2003.

Before Southern District Court of Illinois, Prepared Expert Report for Department of Justice, Environmental Protection Agency vs. Illinois Power Company and Dynegy Midwest Generation Regarding the Likely Rate Treatment of Pollution Control Equipment Expenditures, Docket No.99-833-MBR, July 29, 2002.

Before the FERC, Prepared Direct Testimony on Behalf of Edison Mission Energy and Edison Mission Marketing and Trading, Inc. on Behalf of Midwest Generation’s Application for Market-based Rate Authority, Docket No. ER99-3693-000, April 1, 2002.

Before the FERC, Prepared Rebuttal Testimony on Behalf of NSTAR on the Appropriate Rates for Generators During Transmission Upgrades or Enhancements Requiring Substantial and Sustained Reduction in Transfer Capability, Docket No. ER01-890-000, September 21, 2001.

Before the FERC, Prepared Affidavit on Behalf of NSTAR, in its Intervention of the Granting of Market-based Rate Authority to Sithe, Docket No. EL01-79-000, May 2001.

Before the FERC and the Public Utilities Commission of Nevada, Prepared Affidavit on Behalf of Sierra Pacific Resources Company, Regarding the Market Power Implication of Generation Asset Divestiture Required for the Merger of Sierra Pacific Power and Nevada Power Company, Docket No. EC0-173-000, February 23, 2001.

Before the California Energy Commission, Prepared Expert Report on Behalf of Calpine Corporation, Socioeconomic Resources: Economic Benefits of the Metcalf Energy Center, October 27, 2000.

Before the FERC, Prepared Affidavit on Behalf of NSTAR with regard to the Necessity of Imposing Bid Caps on the New England Electricity Market, Docket No. EL00-83-000, June 23, 2000.

Before the FERC, Prepared Direct Testimony on Behalf of Nevada Power Company in Support of the Divestiture of its Generation Assets, Docket No. ER99-2338-001, June 24, 1999.

Before the FERC, Prepared Direct Testimony on Behalf of Nevada Power Company in Support of the Divestiture of its Generation Assets, Docket No. ER99-2338-001, March 30, 1999.

Before the Vermont Public Service Board, Prepared Rebuttal Testimony on Behalf of Central Vermont Public Service Corporation on the Impact of its Demand-side Management Programs, Docket No. 6018, April 10, 1998.

Before the New Mexico Public Utility Commission, Prepared Direct Testimony on Behalf of the Public Service Company of New Mexico Regarding Forecasted Growth of the El Paso and Juarez, Mexico Markets, Case No. 2769, 1997.

Before the FERC, Prepared Affidavit on Behalf of Southern California Edison Describing the Implications for the Electricity Market of the Manipulation of Gas Market Prices, Docket No. RP95-363-015, 1996.

Before the Public Service Commission of Wisconsin, Prepared Direct Testimony on Behalf of Investor-owned Utilities of Wisconsin on the Utilities Cost of Capital, Docket No. 05-EP-7, May 8, 1995.

## PROFESSIONAL AFFILIATIONS

<i>Association of Energy Service Professionals</i> , Board Member	1991-1995
<i>Journal of ADSMP</i> , Editor	1995
<i>American Statistical Association</i>	1974-current
Member of ASA Committee on Energy Statistics	1993-1999
<i>Conseil International des Grands Reseaux Electriques (CIGRE)</i>	2005-current
Working Group C5-8, Working Group on Renewables and Energy Efficiency in a Deregulated Market	2008-2009
<i>Institute of Electrical and Electronics Engineers (IEEE)</i>	1986-current

*International Association for Energy Economics*

2000-current

**ACADEMIC HONORS AND FELLOWSHIPS**

Teaching Incentive Award, University of the Pacific	1979
Teaching Assistantship in Econometrics, Columbia University	1974
National Science Foundation Research Traineeship	1972 – 1974
Undergraduate and Graduate Research Assistantships, Florida State University	1968 – 1972
Omicron Delta Epsilon, Economics Honor Society	1971

**PUBLICATIONS**

“A Brief Comment on ‘Percent Change as a Measure of Price Escalation in Water and Energy Utilities’ by Jordi Honey-Rosés and Claudio Pareja,” *Journal of Public Works Management and Policy*, (October 2019).

“Re-evaluating the implied Cost of CO<sub>2</sub> by clean energy investments” (with Mariko Geronimo and Onur Aydin) *The Electricity Journal* 30 (2017) 17-22.

“The Practicality of Distributed PV-Battery Systems to Reduce Household Grid Reliance,” (with Roger Lueken, Will Gorman, and James Mashal), *Utilities Policy*, 2017.

“The Repurposed Distribution Utility: Roadmaps to Getting there,” with Kai E. Van Horn, in *Future Utilities - Utilities of the Future*. F. P. Sioshansi, ed. (New York, Academic Press, 2016)

“The Next Evolution of the Distribution Utility,” with Kai E. Van Horn in *Distributed Generation and its Implications for the Utility Industry*, F. P. Sioshansi, ed. (New York: Academic Press, 2014.)

“Annual Report on Wholesale Market Prices and Trends in the Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company Service Area” (with Mariko Geronimo Aydin), prepared for Met-Ed, Penelec, Penn Power, and West Penn Power, November 2015.

- “Reducing Utility Rate Shocks,” (with Lawrence Kolbe), *Public Utilities Fortnightly*, June 2013.
- “Redefining Normal Temperatures,” (with Robert E. Livezey), *Public Utilities Fortnightly*, May 2013.
- “Rates, Reliability, and Region: Customer satisfaction and electric utilities,” (with William P. Zarakas and Kent Diep), *Public Utilities Fortnightly*, January 2013.
- “What Price, GHGs?: Calculating the implied value of CO2 abatement in green energy policies,” (with Mariko Geronimo), *Public Utilities Fortnightly*, Volume 150, October 2012.
- “Rate Design by Objective: A purposeful approach to setting energy prices,” *Public Utilities Fortnightly*, September 2012.
- “State Regulatory Hurdles to Utility Environmental Compliance,” *The Electricity Journal*, Vol. 25, Issue 3, April 2012.
- “Riding the Wave: Using Demand Response for Integrating Intermittent Resources,” (with Kamen Madjarov, Warren Katzenstein, and Judy Chang in *Smart Grid: Integrating Renewable, Distributed and Efficient Energy*, F.P. Sioshansi, ed. (New York: Academic Press, 2011).
- “Marginal Cost Analysis in Evolving Power Markets: The Foundation of Innovative Pricing, Energy Efficiency Programs, and Net Metering Rates,” (with Metin Celebi), *The Brattle Group, Inc. 2010 No. 2 (Energy)*.
- “Assessing Ontario’s Regulated Price Plan: A White Paper,” (with Ahmad Faruqui, Ryan Hledik, and Jenny Palmer), *The Brattle Group, Inc.*, December 8, 2010.
- “On Dynamic Prices: A Clash of Beliefs?” *The Electricity Journal*, Vol. 23, Issue 6, July 2010.
- “Virtual Bidding: The Good, the Bad, and the Ugly,” (with Metin Celebi and Attila Hajos), *The Electricity Journal*, Vol. 23, Issue 5, June 2010.
- “Utility Supply Portfolio Diversity Requirements,” (with Frank Graves), *The Electricity Journal*, Vol. 20, Issue 5, June 2007.
- “Electric Utility Automatic Adjustment Clauses Revisited: Why They Are Needed More Than Ever,” (with Frank Graves and Greg Basheda), *The Electricity Journal*, Vol. 20, Issue 5, June 2007.
- “Rate Shock Relief,” (with Frank Graves and Greg Basheda), *Electric Perspectives*, May/June 2007.
- “Rate Shock Mitigation,” (with Frank Graves and Greg Basheda), prepared for Edison Electric Institute, May 2007.
- “Electric Utility Automatic Adjustment Clauses: Benefits and Design Considerations,” (with Frank Graves and Greg Basheda), Edison Electric Institute, August 2006.



“Can Wind Work In An LMP Market?” (with Serena Hesmondhalgh and Dan Harris), *Natural Gas & Electricity*, November 2005.

“The CAISO’S Physical Validation Settlement Service: A Useful Tool for All LMP-Based Markets,” (with Jared des Rosiers, Metin Celebi, Joseph Wharton), *The Electricity Journal*, September 2005.

“LMPs/FTRs Alone Will Not Solve Transmission Problems Blackout Showed,” *Natural Gas and Electricity*, Volume 20, Number 4, November 2003.

“A Summary of FERC’s Standard Market Design NOPR,” Edison Electric Institute, August 2002.

“The Design of Tests for Horizontal Market Power in Market-Based Rate Proceedings” (with James Bohn and Metin Celebi), *The Electricity Journal*, May 2002.

“The State of Performance-Based Regulation in the U.S. Electric Industry” (with David Sappington, Johannes Pfeifenberger, and Greg Basheda), *The Electricity Journal*, October 2001.

“Deregulation and Monitoring of Electric Power Markets” (with Robert Earle and James Reitzes), *The Electricity Journal*, October 2000.

“Shortening the NYISO’s Installed Capacity Procurement Period: Assessment of Reliability Impacts,” NYISO, May 2000.

“PJM Market Competition Evaluation White Paper,” (with Frank Graves), prepared for PJM, L.L.C., October 1998.

“Lessons from the First Year of Competition in the California Electricity Market” (with Robert Earle, W.C. Johnson, and James Reitzes), *The Electricity Journal*, October 1999.

Comments to the FERC concerning Regional Transmission Organizations Notice of Proposed Rule Making, RM99-2, (with Peter Fox-Penner), September 17, 1999.

“In What Shape is Your ISO?” (with Johannes Pfeifenberger, Greg Basheda, and Peter Fox-Penner), *The Electricity Journal*, Vol. 11, No. 6, July 1998.

“What’s in the Cards for Distributed Resources?” (with Johannes Pfeifenberger and Paul Ammann), in Special Issue of *The Energy Journal*, *Distributed Resources: Towards a New Paradigm of the Electricity Business*, January 1998.

“One-Part Markets for Electric Power: Ensuring the Benefits of Competition,” (with Frank Graves, E.G. Read, and Robert Earle), in *Power Systems Restructuring: Engineering and Economics*, ed. M. Ilic, F. Galiana, and L. Fink, Boston, MA: Kluwer Academic Publishers, 1998.

“Insurance Recovery for Manufactured Gas Plant Liabilities,” (with Gayle Koch and Kenneth Wise), *Public Utilities Fortnightly*, April 1997.

“Real-Time Pricing - Restructuring’s Big Bang?” (with Joseph Wharton and Peter Fox-Penner), *Public Utilities Fortnightly*, March 1997.

“Reengineering DSM: Opportunities Through Integration and Information” (with Wade Malcolm and Roger Levy) *Electricity Journal*, (November 1993)

“Load Impact of Interruptible and Curtailable Rate Programs,” (with D.W. Caves, J.A. Herriges, and R.J. Windle), *IEEE Transactions on Power Systems*, Vol. 3, No. 4, November 1988.

“Estimating Hourly Electric Load with Generalized Least Squares Procedures,” (With N. Toyama and C.K. Woo.), *The Energy Journal*, April 1986.

“Transfer Function Estimation Using TARIMA,” *SAS User’s Group International*, 1982 Proceedings, Cary, North Carolina: SAS Institute, Inc., 1982.

“Invited Editorial Response to Behavioral Community Psychology: Integrations and Commitments,” by Richard Winett, *The Behavior Therapist 4(5)*, Convention, 1981.

*Statistics Through Laboratory Experiences* (with D. Christianson and D. Hughes), Stockton, CA: University of the Pacific 1976-1977.

“Unsolved Advanced Problem,” *American Mathematical Monthly*, May 1975.

“Introduction to Multivariate Data Analysis Techniques,” Bureau of Applied Social Research, Columbia University, New York, NY, 1973.

Ten EPRI reports and approximately 20 articles in EPRI Reports and Conference Proceedings, including:

Environmental Externalities: An Overview of Theory and Practice

Environmental Impacts of Electric Technologies

Environmental Impacts of Electric Vans (TEVan) in the Los Angeles Air Basin (South Coast Air Quality Management District)

Technical Assessment Guide (TAG), Vol.4: Cost-Benefit Analysis of End-Use Technologies

Impact and Process Assessment of Energy Efficiency Technologies

Innovative Rate Design

Integrated Value-based Resource Planning

## SELECTED PRESENTATIONS

“The Impact of Global Warming on Electric Utility Operations,” National Climate Data Center, National Oceanic and Atmospheric Administration Conference on “The New Weather Normals,” Asheville, North Carolina, November 2016

“Smart EDU: Smart Technology, Smart Data, Smart Prices,” SGIP Inaugural Conference Progress through Collaboration, Palm Beach Gardens, Florida, November 6, 2013.

“Customer-Facing Developments of the Smart Grid,” (with Ahmad Faruqui and Sanem Sergici), Massachusetts Department of Public Utilities Electric Grid Modernization Workshop, Boston, Massachusetts, November 14, 2012.

“The Midwest ISO Capacity Market: Wither It Goest,” Bruder, Gentile & Marcoux’s 18<sup>th</sup> Annual FERC Briefing Midwest Edition, Chicago, Illinois, October 23, 2012.

“ISO Markets, Operations, and Settlements,” SNL Inside Utility Accounting Program, Charlotte, North Carolina, October 17, 2012.

“Revenue Sources,” SNL Inside Utility Accounting Program, Charlotte, North Carolina, October 16, 2012.

“Impact of U.S. LNG on International Gas Prices,” EIA International Natural Gas Workshop, Washington, DC, August 23, 2012.

“Framework for Assessing Capex and Opex Forecasts as Part of a “Building Blocks” Approach to Revenue/Price Determinations,” (with Paul R. Carpenter, Toby Brown, and Pinar Bagci), Australian Energy Market Commission, June 2012.

“Policy Challenges Associated with Renewable Energy Integration,” 2011 MITEI Symposium: Managing Large-Scale Penetration of Intermittent Renewables, (with Judy Chang, Kamen Madjarov, and Peter Fox-Penner).

“Renewable Integration Model Presentation,” (with Judy Chang), California Public Utilities Commission (CPUC) California Long-Term Procurement Plan Workshop, San Francisco, California, August 25, 2010.

“Renewable Integration Model and Analysis,” (with Judy Chang, Kamen Madjarov, Ross Baldick, and Antonio Alvarez), IEEE 2010 Transmission and Distribution Conference and Exposition, New Orleans, Louisiana, April 21, 2010.

“Wire We Here? Coal in the West,” Law Seminars International, Coal in the West Conference, Denver, Colorado, March 30, 2007.

“Does SMD Need a New Generation of Market Models? Or How I Learned to Stop Worrying and Enjoy Carrying a Pocket Protector,” SMD Conference, Washington, D.C., December 5, 2002.

“Standard Market Design in the Electric Market: Some Cautionary Thoughts,” SMD Conference, May 10, 2002, Chicago, Illinois.

“Multiattribute Utility Theory and Earthquake Mitigation Policy,” (with T. Munroe), Western Economic Association Conference, June 1978.