RESUME

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Mr. Mosenthal has 24 years experience in energy efficiency consulting, including facility energy management, utility and state planning, program design, implementation, evaluation and research. He has particular expertise in the commercial, industrial and institutional sectors. Mr. Mosenthal has developed numerous utility, state and region integrated resource and DSM plans, and designed and evaluated residential, commercial and industrial energy efficiency programs throughout North America and in Europe and China. He has also been the lead analyst on numerous energy efficiency potential assessments. Mr. Mosenthal has played key roles in utility collaboratives and has successfully worked to build consensus among diverse parties in various assignments. Mr. Mosenthal also has designed program implementation procedures, managed implementation contracts, trained efficiency program and planning staff, and performed over 400 commercial and industrial facility energy efficiency analyses for end users.

PROFESSIONAL EXPERIENCE

1996 – present
Founding Partner, **Optimal Energy, Inc**., Bristol, VT.
Consult with electric and gas utilities, governments and other non-utility parties on energy efficiency, resource planning and regulatory issues. Develop strategies for achieving energy efficiency and least-cost resources, including administrator funding and incentive mechanisms, and program and market design and analysis. Projects include lead work on utility DSM collaboratives; development of utility, state and regional IRP and DSM filings; expert testimony in contested regulatory proceedings; program design, implementation, planning, monitoring and evaluation; energy efficiency resource assessment; and advisory roles on the development of energy policy. Current or recent projects include: Lead researcher on energy efficiency issues for EPA's Clean Energy Partnerships with State and Local Government to advance State Clean Energy Action Plans; Manager of electric and natural gas efficiency and renewable potential assessments for New York State Energy Research and Development Authority; Lead consultant for C&I gas program design, development and analysis for NYSERDA; Chief architect of Efficiency Vermont, the nation's first and only state efficiency utility, as well as advisor on C&I planning and program design to Efficiency Vermont; Advising two provincial governments in China on development of efficiency efforts that would serve as a model for long term national efforts; and Team Leader for Commercial and Industrial sectors in the NSTAR Collaborative.

1995 – 1996
Senior Research Associate, **Resource Insight, Inc**., Middlebury, VT.
Consulted on DSM planning, program design, monitoring and evaluation, and resource characterization, specializing in the commercial and industrial sectors. Projects performed on

behalf of utility and non-utility parties, in both cooperative settings and in contested regulatory proceedings.

1990 – 1995
Chief Consultant, **Xenergy, Inc**. **(now Kema)**, Allendale, NJ.
Managed the consulting division for Xenergy's (now Kema's) Research, Planning and Evaluation Group (RP&E) in its Mid-Atlantic Region. Responsibilities included direct utility consulting, as well as marketing, administration and staff management for RP&E. Consulting activities focused on assessment of DSM technology potential, DSM planning, program design and development, and process and impact evaluation for electric and gas utilities.

1990
Research Associate, **Center for Energy and the Environment**, **University of Pennsylvania**, Philadelphia, PA.
Supported design and analysis of a performance-based hook-up fee program for the New York Power Pool. Activities included modeling building energy use and peak loads; identifying residential and commercial new construction baseline practices; identifying barriers to efficiency in residential, commercial and industrial new construction and analyzing the economic, energy efficiency and legal impacts of the potential program.

1989
Independent Researcher, **Natural Resources Defense Council**, New York, NY.
Developed report on potential incentives for commercial energy efficiency improvements in New York City. Analyzed technical lighting efficiency potential in New York City commercial buildings; identified existing regulatory, institutional and market barriers to improved efficiency; and proposed potential regulatory, legislative and market incentives at the state, city and utility levels to encourage increased efficiency.

1988 – 1990
Private Consultant, Philadelphia, PA.
Clients included non-profit, governmental and private entities. Performed energy-related research, developed and analyzed potential energy efficiency programs, wrote reports and proposals, aided in contract negotiations and performed building energy audits.

1986 – 1988
Acting Executive Director, **Community Energy Development Corp. (CEDC)** with simultaneous positions as General Manager, **Citizens Coalition for Energy Efficiency (C2E2)** and General Manager, **Community Energy Consumers (CEC)**, Philadelphia, PA.
Managed all aspects of CEDC, C2E2 and CEC operations including: program design and development; program implementation; provision of energy efficiency consulting services for multifamily and institutional building owners; and delivery of a fuel oil cooperative program. CEDC and C2E2 were non-profit organizations providing direct energy efficiency services and energy policy research, respectively. CEC was a for-profit CEDC subsidiary that brokered fuel oil for commercial and residential customers.

1983 – 1986
Director of Technical Services, **Pennsylvania Energy Center**, Philadelphia, PA.
Managed, designed and developed energy services for the Southeast Regional branch of the Pennsylvania State Energy Office. Designed and developed technical energy services for

commercial, industrial and institutional building owners; supervised staff of energy auditors and subcontractors; performed over 400 commercial and industrial energy audits; and taught energy management workshops.

EDUCATION

M.S., Energy Management and Policy, University of Pennsylvania, Philadelphia, PA, 1990, 4.0 GPA.
B.A., Design of the Environment, University of Pennsylvania, Philadelphia, PA, 1982.

Certificate in Electrical Engineering, Pennsylvania State University, Ambler, PA, 1984.

HIGHLIGHTS OF PROJECT EXPERIENCE

EFFICIENCY PROGRAM DESIGN AND PLANNING

- Lead advisor to the Ohio Office of Energy Efficiency on planning and program design on behalf of U.S. EPA's Clean Energy Partnerships with State and Local Government's to advance State Clean Energy Action Plans. Project includes reviewing past performance and current plans and funding, and advising on new programs and funding commitments. (2006 – present)

- Manager of program design, development and planning for Efficiency Vermont, the world's first Energy Efficiency Utility, as part of multi-organizational enterprise operating under a $27 million contract with the Vermont Public Service Board to deliver statewide energy-efficiency programs for the customers of Vermont's twenty-one electric utilities. Includes design, development and start-up of programs to serve the commercial, industrial, institutional and agricultural sectors in Vermont. (2000 – present)

- Team Leader for the commercial and industrial programs for the NSTAR Energy Efficiency Collaborative, on behalf of the Massachusetts Collaborative Non-Utility Parties. Responsible for leading a team of consultants representing non-utility parties interests on the design, development, implementation and evaluation of NSTAR's portfolio of C&I programs. This project involves supporting the utility in developing and implementing a set of SBC-funded C&I programs. Took a lead role in the technology assessment of NSTAR C&I achievable potential and its 1999, 2000 and 2001 Energy Efficiency Plan filings to the MA DTE. (1999 – present)

- Manager of NY statewide gas resource assessment and program design and analysis for all gas territories in NY. Responsible for coordinating a large multidisciplinary team to assess residential, commercial and industrial gas efficiency potential, and design and analyze a portfolio of efficiency programs to be delivered statewide. For NYSERDA (2005 – present)

- Managed redesign and development of new incentive offerings and forms for Cape Light Compacts C&I efficiency programs. Included promotion of Energy Star products and new emerging technologies. For Cape Light Compact (2005 — 2006)

- C&I consultant for the MECO, WMECO, and NSTAR Collaboratives, representing the Massachusetts Collaborative Non-Utility Parties, on the regional CoolChoice and MotorUp programs. Lead planning, program design and goal setting negotiations related to MA participation in these programs. Also provide consulting on cross-utility program and planning and policy issues. (1999 – present)

- Consulting team C&I leader on development and assessment of demand-side management investment portfolios for China, for the Natural Resources Defense Council. This project includes developing and analyzing the potential for a portfolio of efficiency programs to serve as model programs for China. It includes addressing political and regulatory barriers, long term funding mechanisms and development of an administrative organizational structure. (July 2003 – present)

- Designing a portfolio of C&I program incentive forms for Cape Light Compact. Revising current offerings to improve and expand, and to bring greater consistency with other MA utility programs. (2005)

- Assist the Connecticut Municipal Electric Consortium to design and develop a portfolio of municipal efficiency programs. This project includes analysis of opportunities and design and development of program designs, and implementation services including development of tracking systems and provision of technical services directly to C&I customers. (2005 – present)

- Assist the Vermont Electric Power Company to analyze and propose resource solutions to address a T&D constrained area in southern VT. Analyzed the efficiency potential in the region and proposed and designed a portfolio of efficiency programs to avoid or defer the need for substantial T&D upgrades. (2005 – present)

- Report and testimony on performance of DSM initiatives and proposed shareholder performance incentives for administrators of conservation and load management programs in Connecticut, on behalf of Connecticut Office of Consumer Counsel. Led C&I analysis. (2003 – 2004)

- Led the development and analysis of a portfolio of C&I market transformation and retrofit programs for the Long Island Power Authority. Currently advising the project team on implementation issues related to the development and delivery of these initiatives. This project includes program design of utility and regional market transformation programs targeting new and replacement building and equipment markets, and the estimation of the achievable potential for selected markets on Long Island. (1998 – 2000)

- Economic advisor to Northeast Energy Efficiency Partnerships, a not-for-profit regional consortium of utilities pursuing market transformation in efficiency markets. Economic analysis and report on cost-effectiveness of NEEP initiatives involving high-efficiency motors, CoolChoice unitary HVAC, clothes washers, and residential lighting. (On and off 1998 – 2004)

- Commercial programs consultant for the Cape Light Compact energy efficiency programs. Advised on planning, program design, measures, cost-effectiveness, implementation issues and goal setting. (2003 – 2004)

- Commercial and industrial analysis and report on gas energy efficiency programs for Consolidated Edison of New York, on behalf of New York City Economic Development Corporation, NRDC, Pace Energy Project, Association for Energy Affordability and Public Utility Law Project. (April – May 2004)

- Commercial advisor on program planning and implementation of multi-year statewide energy-efficiency programs in the New Jersey Clean Energy Collaborative involving all the state's electric and gas utilities and the Natural Resources Defense Council. (April 2000 – June 2003, on behalf of NRDC). Co-directed collaborative work on program development, planning, and implementation for Conectiv. (November 1996 – 2000)

- Consultant to Citizens Utilities Corporation's Arizona Electric Division, developing a program strategy to capture maximum achievable potential among targeted sectors to effect immediate load reductions in response to energy shortages and rate shock from the California electric market. This project included assessing the efficiency and load reducing opportunities, and developing implementation strategies to capture them, among food processing and storage, wastewater treatment and school facilities. (2000 – 2001)

- Led the design and analysis of a portfolio of commercial, industrial and residential core DSM programs for the Vermont Department of Public Service to create the first ever efficiency utility. The project involved program design and development; measure characterizations; analysis of program impacts and costs; assessment of achievable market-driven and retrofit potential; modeling of program participation; economic screening; and development of monitoring and evaluation guidelines. In addition, developed criteria for the delivery of the core programs during a transition to the efficiency utility and electric utility restructuring, and established the proposed structure and role of the efficiency utility. (1995 – 2000)

- Consultant to the California Board for Energy Efficiency in development of a portfolio of statewide non-residential programs and program elements. These programs, designed around markets and market players, rather than intervention strategies, would target a comprehensive package of C&I opportunities among all market segments. They include strategies to transform equipment markets and to enhance and spur the creation of independent energy service providers. (1998 – 1999)

- Analyst energy and business strategy and planning for Energy Cooperative Association of Pennsylvania, a buyers' cooperative offering electricity, fuel oil, energy-efficiency and renewable energy to residential and non-profit consumers in eastern and western Pennsylvania. Collaborated on a feasibility analysis and preliminary business plan. (1997 – 1998)

- Technical and market support for Energy Co-op of Vermont (ECVT) in developing competitive energy efficiency products and services for residential and small commercial markets. ECVT will deliver a full range of energy services to its members, including electricity, fossil fuels, efficiency and on-site renewable energy. Activities included identifying potential products and services; developing appropriate and cost effective marketing and delivery strategies; analyzing the economics and likely market adoption of products and services, including solar systems; and support in the development of a detailed business plan. (1998)

- Program support to the Citizens Utilities Company Vermont Electric Division in developing strategies for regulated and unregulated energy service offerings during a transition to, and after electric utility restructuring. Services included supporting DSM planning, characterization of efficiency resources, program design, evaluation of program design and implementation procedures, and detailed implementation planning. Programs included both remedial DSM programs and potential new DSM programs targeted to CUC's total territory and also specifically designed to target areas undergoing transmission and distribution constraints. (1998 – 2000)

- Program support for the Burlington (VT) Electric Department in development of its 1997 Energy Efficiency Plan. Services included developing strategies for new programs to complement statewide core programs and to develop transition strategies for modifying existing programs under both existing and restructured utility environments. Services included program planning, measure characterization and program design. (1998 – present)

- Performed a critical review of Jersey Central Power and Light DSM plans and recommended program modifications to key C&I programs, on behalf of the Mid-Atlantic Energy Project and NJ Public Interest Research Group. This project involved negotiations with the utility and non-utility parties on program design details, culminating in formal testimony before the New Jersey Board of Public Utilities, in which most recommendations were ultimately adopted in BPU decision. (1995)

- Developed program designs, resource planning assessments, detailed implementation manuals and guidelines, and monitoring and evaluation plans for Maryland utilities in DSM collaboratives, primarily for Potomac Electric Power and Maryland Office of People's Counsel. Separate projects included work on behalf of both utilities and the Maryland Office of Peoples' Counsel. Programs designed included direct installation and financial incentive programs targeted for residential, commercial and industrial customers. Detailed implementation plans and guidelines were developed for small commercial and residential direct installation programs and a residential point of sale program. Utilities worked with included Potomac Electric Power Company, Baltimore Gas and Electric, Delmarva Power Company, and Potomac Edison. (1990 – 1997)

- Worked with Florida Power Corporation to develop alternative DSM program design strategies meeting its multiple rate impact, cost-effectiveness and budgetary constraints. (1996)

- Negotiated with Interstate Power, MidAmerican Energy Company, and Iowa Electric Systems on IRP and DSM program design issues, on behalf of the Iowa Office of Consumer Advocate. Successfully developed, and obtained agreement to implement, an innovative Comprehensive Early HVAC Retirement programs for the C&I market with IP and MEC. Completed program designs, developed financial and marketing strategies, and quantified all program impacts and costs, and performed economic analysis of the program. (1995)

- Designed, developed and planned a portfolio of energy efficiency programs for the nationalized wholesale electric utility in Spain and its retail utility companies, for Grupo Endesa. This project included development of Spain's first ever DSM programs. Consensus was built among diverse utility parties, including representatives from separate retail

companies. (1995)

- Designed, and developed detailed implementation and evaluation plans for, American Electric Power C&I programs providing detailed technical assistance and financial strategies to promote energy efficiency. This project included development of marketing strategies and materials; identification of resource requirements; and development of delivery, tracking and evaluation strategies. (1994)

- Designed a portfolio of commercial and residential DSM programs for the Southern Minnesota Municipal Power Agency (SMMPA). Characterized and screened extensive efficiency measures covering lighting, motors and HVAC end uses for the commercial and industrial classes and lighting, hot water, HVAC and shell measures for the residential class. Developed program concepts and detailed implementation plans by building consensus among SMMPA's 18 member retail utilities, serving a variety of communities -- from small, rural farming towns to a city of approximately 40,000 people. Final deliverables included customized implementation plans and staff training to ensure that each retail utility would be able to easily implement the programs. Programs included residential lighting and water heating, and commercial and industrial HVAC, lighting and motors programs. (1993)

- Designed a high-efficiency lighting program for Public Service of New Mexico. This direct-installation program was designed to support state and federal facilities throughout New Mexico with compliance of an executive energy conservation order. The program included a turn-key service, including auditing, detailed lighting design, construction management and installation services, and low-interest financing. Developed a pilot project implementation. In addition to program-design services, supported the formulation of a strategy for lost revenue and cost-recovery for PSNM, and developed a cost-recovery proposal presented to Commission staff. (1992)

- Managed the design of a dual-fuel heat pump program for Georgia Power Company. Directed modeling of commercial building energy consumption, and customer and trade ally market research; designed marketing, incentive and program delivery approaches; quantified program costs and impacts; and developed a program plan. (1992)

- Designed, and produced a detailed implementation procedures manual for a residential direct installation program for Ontario Hydro. This $100 million program was at the time the largest and most aggressive residential DSM program in the world. It included offering audits to all residential households in the Ontario Province, with follow-up direct installation of measures for customers identified as high use. The procedures manual developed detailed implementation plans for all aspects of program delivery, including marketing, audit completion and mailing, crew dispatch and installations, measure procurement and warehousing, and development and maintenance of an MIS system to track and report program data. (1991)

- Designed portfolio of commercial and residential DSM programs for Omaha Public Power District, including complete development of program plans and implementation requirements. Program plans were based upon a comprehensive DSM technology assessment that included estimating the technical and economic potential of cost-effective DSM measures in the residential, commercial and industrial market segments. Technologies were screened and identified to match Omaha Public Power District's goals and customer

service objectives. Programs and plans were eventually developed for residential new construction, audit and direct load control programs, and for a commercial and industrial lighting program. (1991)

RESOURCE PLANNING AND POLICY

- Advisor to the Natural Resources Defense Council on development of New York States 15% savings by 2015 initiative. Efforts include developing frameworks and models for NY to pursue aggressive efficiency programs, establishing baseline forecasts and goals, developing performance incentive mechanisms, and estimating the efficiency potential from different program and policy tools. (2007 — present)

- Lead energy efficiency analysis, research and product develoment for EPA's Clean Energy Partnership with State and Local Governments to advance State Clean Energy Action Plans. Current projects include development of a Clean Energy Fund Manual to guide state planners in development of Clean Energy Action Plans; development of an energy efficiency potential assessment white paper on the use, value and performance of efficiency and renewable potential assessments; and development of multi-year plans for efficiency programs for Ohio Office of Energy Efficiency. For EPA (2006 — present)

- Principal investigator and author of an assessment of electric efficiency potential for Texas. Analyzed the residential, commercial and industrial potential for electric load reductions from efficiency programs, appliance standards, enhanced building codes, demand response and combined heat and power programs as an alternative to coal plants to meet reliability constraints. Also recommended policy and programatic changes to advance efficiency in Texas. For NRDC and Ceres (2006 –- present)

- Manager of NY statewide gas resource assessment and program design and analysis for all gas territories in NY. Responsible for coordinating a large multidisciplinary team to assess residential, commercial and industrial gas efficiency potential, and design and analyze a portfolio of efficiency programs to be delivered statewide. For NYSERDA (2005 – present)

- Developed an innovative "efficiency rate tariff" designed to benchmark commercial facilities energy efficiency and price electricity to them based on their efficiency levels. This electric rate would develop threshold efficiency levels by facility type with increasing block rates that remove current disincentives to efficiency that exist with traditional electric rate design. For Wal-Mart™ (2005 — 2006)

- Consulting team C&I leader providing technical assistance supporting rulemaking to implement energy-efficiency provision of renewable portfolio standard for Pennsylvania, on behalf of Citizens for Pennsylvania's Future (PennFuture). Developed mechanisms and sample verification protocols for inclusion of efficiency resources to meet RPS standards. (February 2005 – present)

- Assist the Vermont Electric Power Company to analyze and propose resource solutions to address a T&D constrained area in southern VT. Analyzed the efficiency potential in the region and proposed and designed a portfolio of efficiency programs to avoid or defer the need for substantial T&D upgrades. (2005 – present)

- Commercial analysis project lead for consulting team assessing technical, achievable and economic potential for energy-efficiency and renewable resources in New York State and five sub regions over 5, 10 and 20 years, on behalf of New York State Research and Development Authority. This project set the standard for national efficiency potential efforts, analyzing over 2000 commercial measures throughout NY. (January 2002 – August 2003)

- C&I project lead, including report and testimony, for consulting team projecting potential for demand-side resources to defer the need for major transmission upgrades, on behalf of Vermont Electric Power Company. This project included analyzing the economic and achievable potential in a transmission-constrained area to determine the least cost solution to reliability problems. (November 2001 – December 2004)

- C&I project lead for consulting team updating statewide projection of economically achievable efficiency potential for state of Vermont, on behalf of the Vermont Department of Public Service. (October 2001 – 2003)

- C&I project lead for consulting team supporting utilities in targeting demand-side resources to optimize distribution investment planning in statewide distributed utility planning collaborative, on behalf of the Vermont Department of Public Service. This project included developing a unique "distributed utility screening tool" that allowed small municipal and cooperative utilities to easily estimate rough achievable potential in their jurisdiction as a first step in least cost distributed utility planning. (September 2001 – December 2002)

- Analyzed the C&I electric efficiency achievable potential for the State of Maine, on behalf of the Office of Consumer Advocate. This project included estimated economic and achievable opportunities over 10 years, in support of development of a statewide efficiency administration model. (2002)

- Analyzed the C&I electric efficiency achievable potential for the State of Michigan, on behalf of the American Council for an Energy Efficient Economy (ACEEE). This project included estimated economic and achievable opportunities over 10 years, in support of potential development of a statewide efficiency administration model. (2002 - 2003)

- Consultant to the Northeast Energy Efficiency Partnerships, a non-for-profit regional consortium of utilities pursuing market transformation in efficiency markets. Conduct technology assessments and economic analysis of the effects of codes and standards in the Northeast, and of NEEP initiatives involving high-efficiency motors, and C&I Unitary HVAC. (1998 – present)

- Consultant on commercial and industrial technology protocols and cost-effectiveness for the New Jersey Statewide Utility Collaborative, for the Natural Resources Defense Council. This project included developing engineering algorithms and baseline assumptions for all prescriptive gas and electric technologies promoted in the statewide C&I Construction program. In addition, participated in the cost-effectiveness analysis of the C&I programs supporting the New Jersey July 2001 Compliance Filing to the NJ BPU. (2000 – present).

- Modeled carbon output from end use energy consumption in Vermont, and identified potential revenue resulting from a "carbon/Btu tax" imposed on all fossil fuels and on hydro

and nuclear electricity. Presented findings to a committee of Vermont legislators and other interested parties. (1996, for Friends of the Earth)

- Performed a critical review of Centra and Union Gas Company's joint DSM resource plan. This project involved assessing the appropriateness and completeness of the methods and data used, and the resulting outcomes, for the Green Energy Coalition. It focused on the development, analysis and screening of its proposed commercial and industrial DSM programs. The project included formal testimony before the Ontario Energy Board (EBRO 493/494), which included proposed improvements to the planning process, and recommended regulatory mechanisms to encourage the improvement of future plans. (1996)

- Performed a cogeneration penetration and potential study for Consolidated Edison of New York. Modeled the costs and benefits of cogeneration among five commercial building types and numerous equipment and operating scenarios to assess the likelihood of large existing customers self-generating. Supported the utility in analyzing the likely prime motivators for decisions to self-generate, and strategies to develop value-added services customer would prefer. (1995)

- Completed separate electric and gas DSM resource assessments for Public Service Electric and Gas Company. Studies identified the technical, economic and market potential for electric and gas energy efficiency and fuel switching measures, for residential, commercial and industrial customers, and for both new and existing construction. Projections of likely free market activity were also made. (1995)

- Performed a study of the forest products industry. Identified the impact on different sectors of the forest products industry of energy pricing and tax policy, by geographic region. Identified energy efficiency opportunities for paper, lumber, and furniture manufacturers and the typical cost effectiveness of these opportunities, for the New York State Energy Office. Focus groups and other market research techniques, along with a literature search, were used to identify the efficiency potential of the industry, as well as likely forest products industries' response to changes in energy, employment and tax policy in New York State including likely probability of companies' relocation. (1995)

- Performed a gas DSM resource assessment for Orange and Rockland Utilities. This project identified the technical, economic and market potential for gas energy efficiency and for electric-to-gas fuel-switching measures. These potentials were estimated separately for residential, commercial and industrial customers, and for both new and existing construction. Projections of likely free market activity, by sector, were also made. (1993)

- Performed DSM planning services in support of Consolidated Edison Company's 1991 and 1993 biennial DSM Plan filings with the NY Public Service Commission. These projects included estimating the technical, economic and market potential of energy efficiency, program design and development, and modeling of program participation, costs and impacts for a portfolio of residential, commercial and industrial programs with an annual combined budget of approximately $130 million. (1991 and 1993)

- Developed long-range DSM Plan. Project included development of measure costs and impacts, program designs, integration of demand-side plans with supply resource costs,

training utility staff in the use of a proprietary demand-side resource planning model, and regulatory filing support, for the New York Power Authority. The project resulted in development of a portfolio of commercial, industrial, and municipal DSM programs. (1993)

- Performed a critical review of Florida Power and Light's integrated resource plan, for the Legal Environmental Assistance Fund. This project involved assessing the completeness and appropriateness of FPL's IRP process and outcomes, focusing on the development, analysis and screening of its proposed commercial and industrial DSM programs. (1995)

- Developed an integrated resource plan (IRP) approach for Midwest Energy. This "scoping study" involved devising a method for this small cooperative utility to meet the Kansas Corporation Commission IRP requirements in a cost effective and appropriate way, given their limited resources. The project included design of sampling and date collection strategies, development of analytical methods to address both supply and demand resources, identification of staffing and economic requirements, and support in the development of testimony to the Kansas Corporation Commission on appropriate alternatives to IRP rules. (1994)

- Performed a critical review of the Tennessee Valley Authority's integrated resource plan, for the Tennessee Valley Public Power Agency. This project involved assessing the completeness and appropriateness of TVA's IRP process and outcome, as well as its likely impact on TVA's 160 full-requirements retail distribution utilities. Areas addressed included residential, commercial and industrial DSM planning and design, forecasting, and integration of demand and supply resources. (1994)

- Established a method, and developed a scoping plan, for estimation of technical, economic and market energy efficiency potential for Wisconsin Gas Company. This project specified innovative methods to leverage secondary data, while maintaining precision, thereby reducing the costs of formal data collection. (1994)

- Researched and estimated typical energy demand and consumption for a comprehensive list of residential electrical equipment and appliances, for Atlantic Electric. (1993)

- Analyzed the economic, legal, regulatory, utility and institutional barriers to energy efficiency in New York City, for the Natural Resources Defense Council. Quantified economic potential for commercial energy efficiency in New York City, and determined the primary reasons this potential was not being captured. The report identified appropriate market, legal and regulatory solutions to these barriers at the local, state and federal levels. These included restructuring commercial leasing laws in New York City, developing a lost revenue, cost recovery and savings incentive mechanism for utility DSM, and changes to tax codes. (1989)

- Analyzed the economic, environmental and efficiency impacts of implementing a fee-based capacity charge on all new construction to obtain electric service in New York State, for the New York Power Pool. Identified cost-effective efficiency opportunities in the commercial and residential sectors and their likely adoption under different "hook-up" fee scenarios. Project also identified then-current baseline practices in new construction, the likely economic impact on both builders/developers and building occupants/purchasers, as well as the likely impact on building activity throughout the state. (1989)

EVALUATION, MONITORING AND ASSESSMENT

- Advisor to Massachusetts electric utilities and the CT Municipal Electric Energy Cooperative on development of M&V protocols for submittal to the New England ISO forward capacity market. (2006-present)

- Development of M&V protocols and mechanisms for two Chinese provinces to sell energy efficiency portfolio carbon dioxide savings into the Clean Development Mechanism (CDM) established under the Kyoto Protocol. For Natural Resources Defense Council (2004 — present)

- Market assessment support to the NYSERDA Small C&I Lighting Program. This project included advising on scope of analysis and interpretation of interview and survey data, and review and recommendations on program design and implementation. (2003 - present)

- Lead advisor to Efficiency Vermont on C&I evaluation planning and coordination with Department of Public Service on evaluation and savings estimation and verification. Lead negotiator for Efficiency Vermont with the VT DPS on C&I savings estimates and verification. (2000 – present)

- Lead advisor to Long Island Power Authority on its C&I baseline analysis and market assessment. Project included support in developing program and market theory, evaluation plans and RFP, review of proposals, and ongoing advise and critique on third party analysis. (1999 - 2001)

- Assessment of Citizens Utilities Company's Vermont Electric Division's small C&I retrofit program. Process and market evaluation of the effectiveness of CUC's design and delivery strategies. This project included detailed quantitative analysis of program implementation data on measures recommended and installed, measure costs and savings, participant demographics and electric loads, and program services and features. This implementation data was supplemented with on-site data collection and interviews with participants and utility staff and contractors. Statistical relationships were identified allowing inferences about the likely success of alternative program designs and implementation strategies. (1998)

- Separate reviews and analyses of the C&I DSM performance of Green Mountain Power and Central Vermont Public Service. These projects included review of utility databases and paper records, assessment of the level and quality of utility implementation performance, and review of planning, design, monitoring and evaluation efforts. These projects have culminated in formal testimony filed (in Docket Nos. 5983, 6018 and 6107) on behalf of the Vermont Department of Public Service, criticizing GMP and CVPS for specific implementation and planning failures. Testimony has also offered detailed cost-effectiveness analyses of additional, specific C&I efforts GMP and CVPS could and should have performed. (1997 – 1998)

- Assessment of the energy and peak demand impacts, lost revenue and program costs of Baltimore Gas and Electric's 1996 DSM programs, for Maryland Office of Peoples Counsel. This includes review of all calculations and engineering algorithms, and assumptions used. (1997)

- Reviewed and revised Potomac Electric Power Company's monitoring and assessment of 1994 and 1995 DSM impacts and net benefit determinations, for Maryland Office of Peoples Counsel. This project involved developing and negotiating engineering algorithms to estimate program impacts for all Pepco DSM initiatives, and review of Pepco data collection processes, and impact and net benefit calculations, ultimately resulting in the establishment of cost recovery surcharges. (1995 – 1996)

- Jointly developed monitoring and evaluation strategies for assessing residential, commercial and industrial utility DSM programs, for the Vermont Department of Public Service. This project involved negotiations with utilities to develop joint evaluation methods for Green Mountain Power, Central Vermont Public Service, and other Vermont utilities to evaluate similar programs offered in each territory. (1995)

- Evaluated design of all ten residential and commercial programs offered by Dayton Power and Light, for the Dayton Power & Light Collaborative Evaluation Working Group. Project included a critical assessment of current approaches and implementation results, as well as detailed recommendations on program design modifications. Presented results to the full collaborative. (1994)

- Researched and analyzed the electronic fluorescent ballast lighting market and North American lighting DSM activity from 1988 to 1994, for Fried Frank, et. al. In support of civil litigation, identified typical costs and savings from adoption of electronic ballasts for different sectors and time periods, projected expected free market penetration of electronic and dimmable ballasts both with and without utility DSM programs, identified the likelihood for continued utility DSM subsidies, and projected sales of high efficiency lighting products given current utility regulatory climate. (1994)

- Completed both process and impact evaluations for all of Orange and Rockland Utilities' six commercial and industrial DSM programs. Project included development of engineering algorithms and parameter values to estimate program impacts. Default parameter values were estimated through detailed analysis of over 1,000 C&I energy audits. It also incorporated the first practical use of an innovative technique, "error propagation analysis," to estimate the contribution of each parameter to overall impact uncertainty. Process evaluations included design and implementation review, staff interviews, and market research including customer and trade ally surveys. Presented results before Public Service Commission Staff and intervenor groups. (1993)

- Process evaluation of Pennsylvania Power & Light's low income weatherization program. Project included development of participant survey instruments, completion of participant surveys, and interviews with utility and contractor staff. (1991

PERFORMANCE CONTRACTING AND FACILITY ENERGY MANAGEMENT

- Advising on development of business plan, financial model, and monitoring and verification needs for start-up private energy service company (ESCO) in Jiangsu Province, China. Project includes development of performance contracting offers, development of marketing

and implementation procedures and materials, staff training, development of M&V protocols, and project marketing and analysis. (2004 – present)

- Managed development of a shared energy savings program for the Philadelphia Housing Authority. This project to install energy conservation measures in over four million square feet of inner-city public housing was the largest and most innovative public housing energy program in the U. S. at the time. It established precedents at the U. S. Department of Housing and Urban Development (HUD) for the provision of performance contracting in all HUD capitalized public housing projects. Tasks included project strategy development and planning, development of an RFP, and review and selection of energy service companies (1988)

- Provided technical engineering, construction management and financial services to commercial, non-profit and multifamily building owners, for Community Energy Development Corporation. Services included identification of cost effective energy efficiency opportunities, estimation of measure savings and installation costs, support in identifying and procuring financial assistance including grants and low interest loans, and construction management oversight of installation of energy efficiency measures. (1986 – 1988)

- Performed over 400 detailed commercial and industrial energy audits, for the Pennsylvania Energy Center. These audits identified cost effective energy efficiency opportunities in all types of C&I facilities, addressing all end uses and fuels. Audits included identification of project costs, savings, and equipment needs. Clients ranged from small commercial facilities to large office buildings and industrial facilities over 1,000,000 square feet. In addition to directly performing audits, managed and trained a staff of in-house and subcontract auditors, and developed and implemented marketing strategies to increase audit demand. (1983 – 1986)

- Performed approximately 25 site reviews of potential solar energy applications, for the Pennsylvania Governor's Energy Council. Included feasibility assessment of cost-effectively operating residential solar hot water systems, and verification of eligibility for state and federal tax credits. (1985)

EDUCATION AND TRAINING

- Instructor, Principles of Demand-Side Management Course, Association of Energy Service Professionals. Courses cover DSM Planning, Monitoring and Evaluation, Program Design, Program Implementation, and Energy Efficient Technologies. On-going trainings for utility and industry professionals.

- Instructor, Gas Efficiency Programs, National Best Practices, Association of Energy Service Professionals On-Line Seminars, Forthcoming, April 2006.

- Instructor and lead presenter, China State Grid Corporation DSM Instruction Center. Produced 2 instructional videos for utility staff throughout China on DSM. "Introduction To Demand-Side Management: The Usa Experience" and "Long-Term Energy-Efficiency Dsm Investment In The Northeastern U.S.", November 2004.

- Instructor, "On Target" DSM Workshops. Taught course sessions on DSM planning, program design, implementation and evaluation to utility personnel and other parties. (1994 – 1995, for Association for Demand-Side Management Professionals).

- Trained international team of utility personnel in DSM program planning and implementation. Training included identifying implementation needs among five different retail utilities in Spain. (1995, for Grupo Endesa)

- Designed and taught DSM and energy management workshops targeted to architects, engineers and building owners. Topics have included efficient lighting, multifamily building submetering; boiler efficiency improvements and weatherization techniques. (1983 – 1986, for the Pennsylvania Energy Center)

- Trained community action agencies to perform small commercial energy audits. This project to provide efficiency information to inner city neighborhoods included training addressing energy end-uses and fuels. (1985, for the Pennsylvania Energy Center)

PROFESSIONAL AFFILIATIONS

Co-Chair, Association of Energy Service Professionals, Marketing and Program Development Committee, 1996.
Project Leader, Association for Demand-Side Management Professionals, Committee on Program Design, Marketing and Implementation, 1995.
Chair, Association for Demand-Side Management Professionals, Innovative Program Design Committee, 1994.
Instructor, Association for Demand-Side Management Professionals, "On Target" DSM Workshops, 1994.
Member, Southeast Pennsylvania Regional Energy Advisory Board, 1986 - 1989.
Member, Mayor's Committee on Energy and Housing, Philadelphia, PA, 1986 - 1988.
Member, American Institute of Architects, Research and Technology Committee, 1984 - 1987.

PUBLICATIONS

"Energy Efficiency Potential Studies: Why, How and So What?," presented at the Energy Efficiency as a Resource Fourth National Conference, American Council for an Energy Efficient Economy, Berkeley, CA, October 2007.

"Integrated Resource Solutions to Localized Transmission and Distribution Reliability," presented at the 2007 International Energy Program Evaluation Conference, August 2007.

"Removing Disincentives for Efficiency from Electric Rate Design," (with Galura, J., Gupta, A., Loiter, J.), 17th National Energy Services Conference Proceedings, Las Vegas, NV, February 2007.

Power to Save: An Alternative Path to Meet Electric Needs in Texas, published by Natural Resources Defense Council and Ceres, New York, NY, January 2007.

"Gas Efficiency Potential and a Portfolio of Integrated Gas and Electric Statewide Programs for New York," (with Hogan, E.), American Council for an Energy Efficiency Economy 2006 Summer Study Proceedings, Pacific Grove, California, Forthcoming August 2006.

"Demand-Side Management Strategic Plan for Jiangsu Province, China: Economic, Electric and Environmental Returns from an End-Use Efficiency Investment Portfolio in the Jiangsu Power Sector," (with Finamore, B., Plunkett, J., Moscowitz, D., Slote, S., Wyatt, F.), American Council for an Energy Efficiency Economy 2006 Summer Study Proceedings, Pacific Grove, California, Forthcoming August 2006.

"Purchasing Efficiency Power Plants in Jiangsu," (with Finamore, B., Plunkett, J., Moscowitz, D., Slote, S., Wyatt, F.), Greener Management International, Forthcoming August 2006.

"Purchasing Efficiency Power Plants in Jiangsu and Shanghai" with (Song, H., Chen, R., and B. Finamore), Rightlight 6 International Energy Efficiency Lighting Conference, Shanghai, China, Forthcoming May 2005.

"Transmission System Integrated Resource Planning: Leveling the Playing Field" (with S. Slote), ACEEE 2002 Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August 2004.

"Long-Term Energy-Efficiency and DSM Investment in the Northeast United States," (with J. Plunkett), presented at the China-US Workshop on DSM Policy Research, sponsored by the China State Grid Corporation, Beijing, China, March 2004.

"The Big Picture: An Overview of Energy Savings Opportunities," PACE University Energy Law Center, presented as plenary session at PACE Recharge Energy Conference, September 2003.

"Energy Efficiency and Renewable Energy Resource Development Potential in New York State" (with C. Donovan, N. Elliott, D. Hill, S. Nadel, C. Neme, J. Plunkett), New York State Energy Research and Development Authority, August 2003.

"Documentation of the Northwest Energy Efficiency Alliance Efforts to Support Energy Codes and Participate in the Federal Standards Setting Process" (with S. Slote and D. Baston), Northwest Energy Efficiency Alliance, 2003.

"Efficiency And Renewable Electricity Potential Studies: Approaches, Results, Uses And Implications," ACEEE 2003 Electricity Reliability Conference, Berkeley, California, June 2003.

"The Technical and Economic Potential for Energy-Efficient Products and Services," ACEEE 2003 National Symposium On Market Transformation, Washington DC, April 2003.

"Light-Years Ahead: A New Approach to Transform Commercial Lighting" (with P. Richards and S. Lacey) ACEEE 2002 Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August 2002.

"A Modified Delphi Approach to Predict Market Transformation Program Effects" (with R. Prahl, C. Neme and R. Cuomo) ACEEE 2000 Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August 2000.

"A Systematic Application of Theory-Based Implementation and Evaluation of Market Transformation Programs," (with S. Hastie and R. Prahl), ACEEE 2000 Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August 2000.

"The Link Between Program Participation and Financial Incentives in the Small Commercial Retrofit Market," (with M. Wickenden), 1999 International Energy Program Evaluation Conference, Denver, Colorado, August 1999.

"Delivering Statewide Efficiency Programs In a Competitive Environment — Vermont's Model," 1997 Annual Conference of the Association of Energy Service Professionals, Boca Raton, Florida, December 1997.

"Marketing with Community Involvement," (with Shel Feldman, Jane Peters, Lynn Goldfarb and Bill Stieglemen), Panel presentation and discussion at the Association of Energy Service Professionals 1997 Annual Conference, Boca Raton, Florida, December 1997.

"Vermont 'Efficiency Utility' to Deliver Core Efficiency Programs," (with S. Parker), Strategies, Vol. 8, No. 3, Association of Energy Service Professionals, Summer 1997.

"The Power to Save: A Plan to Transform Vermont's Energy-Efficiency Markets" (with J. Plunkett), Vermont Department of Public Service, May 1997.

"Capturing Comprehensive Benefits from Commercial Customers: A Comparative Analysis of HVAC Retirement Alternatives" (with J. Plunkett and M. Kumm). 1996 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA, August 1996.

"Achieving Market Transformation with Pepco's Save and Save Again Program" (with A. Flinchum). Association of Energy Service Professionals´1995 Implementation Conference, Dallas, TX, March, 1995.

"Potomac Electric Power Company's Early Chiller Retirement Option" (with G. Simpson), 1994 Annual Member Meeting of the Association for Demand Side Management Professionals, San Diego, CA, December 1994.

"Innovative DSM Programs," Moderator of presentation session at the 1994 Annual Member Meeting of the Association for Demand Side Management Professionals, San Diego, CA, December 1994.

"Home Energy Rating Systems," Moderator of presentation session at the 1994 Affordable Comfort Conference, Philadelphia, PA, March 1994.

Demand-Side Management Planning and Implementation Guide, Association of Demand-Side Management Professionals, Boca Raton, FL, December 1991.

Performance Based Hook-Up Fees: Issues and Options (with R. Wirtshafter, et al.). New York Power Pool and Staff of the New York Public Service Commission, Schnectady and Albany, NY, August 1990.

Buyer's Guide to Energy Efficient Gas Furnaces. Citizens Coalition for Energy Efficiency, Philadelphia, PA, 1987.

"Hot Water Heating Energy Savings", Pennsylvania Energy Report, Citizens Coalition for Energy Efficiency, Philadelphia, PA, Summer 1986.

"Lighting: Sorting Through the Options", Pennsylvania Energy Bulletin, Pennsylvania Energy Center, Philadelphia, PA, January 1985.