STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

DOCKET NO. 474 - The Connecticut Light & Power Company d/b/a Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the Greater Hartford-Central Connecticut Reliability Project that traverses the municipalities of Hartford, West Hartford, and Newington, which consists of (a) construction, maintenance and operation of a new 115-kilovolt (kV) electric transmission line within existing Eversource, Amtrak and public road rights-of-way and associated facilities extending overhead approximately 2.4 miles and underground approximately 1.3 miles between Eversource's existing Newington Substation in the Town of Newington and existing Southwest Hartford Substation in the City of Hartford; (b) modifications to a .01 mile section within existing Eversource right-of-way of the existing overhead 115-kV electric transmission line connection to the Newington Substation (Newington Tap); and (c) related modifications to Newington Substation and Southwest Hartford Substation.	**DOCKET NO. 474** August 15, 2017

Resumes of The Connecticut Light and Power Company
Doing Business as Eversource Energy Witnesses Filing Direct Testimony
and Potential Additional Witnesses

1. Bowes, Kenneth B.
2. Frayer, Julia
3. Holmes, J. Patrick
4. Mango, Louise F.
5. Mezei, Dr. Gabor
6. Newhall, Christopher P.
7. Russo, Robert J.
8. Soderman, Christopher Paul

Resume of Bowes, Kenneth B.

BIOGRAPHICAL INFORMATION

Kenneth B. Bowes

Kenneth B. Bowes is Vice President – Transmission Performance of Eversource Energy. He is responsible for the leadership and direction of the Eversource transmission business unit with respect to short and long term customer impacts and benefits as measured by transmission performance indicators, development of plans for compliance with FERC and state regulatory requirements, and compliance of transmission operations with regulatory requirements and Eversource benchmarks. He serves as a technical consultant for various large transmission projects, and provides expert testimony in regulatory proceedings concerning them.

A native of New Hampshire, Bowes joined Eversource in July 1984 in the System Test department. He has held several engineering and management positions in the Energy Delivery organizations becoming the Director – Transmission and Distribution Maintenance in 1999, Director – Transmission Construction, Test, and Maintenance in 2002, Director – Transmission Projects in 2004, Vice President – Customer Operations in 2008, and Vice President of Energy Delivery in 2010, Vice President of Engineering in 2014.

Bowes earned a Bachelor of Electrical Engineering degree from the University of New Hampshire and a Master's Degree in Electrical Engineering from Rensselaer Polytechnic Institute. Bowes is the past Chairman of the Edison Electric Institute's Transmission Committee and presently serves on the EEI Transmission and EEI Security Committees. He was inducted into the University of Connecticut Academy of Distinguished Engineers in 2016, and was elected to the Connecticut Academy of Science and Engineering in 2017.

PUBLICATIONS AND PREVIOUS TESTIMONY

Kenneth B. Bowes

Publications:

- Bowes K., Beehler M., "Defining the Value of the Grid", IEEE, The Sixth Annual IEEE PES Conference on Innovative Smart Grid Technology, February, 2015
- Bowes K., Hogan J., "CL&P Explores Sustainable Solutions", Transmission & Distribution World Magazine, January 2012, Volume 64, Number 1, pp. 24-31.
- IEEE Working Group on Nonsinusoidal Situations, "Practical Definitions for Powers in Systems with Nonsinusoidal Waveforms and Unbalanced Loads: A Discussion", 95 WM 040-6 PWRD, 1995

- IEEE Working Group on Nonsinusoidal Situations, "A Survey of North American Electric Utility Concerns Regarding Nonsinusoidal Waveforms", 95 WM 036-4 PWRD, 1995
- Bowes, K. B., "The Effects of Temporary Overvoltage (TOV) on Consumer Products", POWER QUALITY '91 USA, Official Proceedings of the Third International Power Quality Conference, Universal City, CA, September 22-27, 1991
- Bowes, K. B., Lorusso, A., "Harmonic and Power Characteristics of Electronic Ballasts for Fluorescent Lighting Applications", POWER QUALITY '90 USA, Official Proceedings of the Second International Power Quality ASD Conference, Philadelphia, PA, October 21, 29, 1990
- Anderson, L.M., Bowes, K.B., "The Effects of Power-line Disturbances on Consumer Electronic Equipment", IEEE Transactions on Power Delivery, Volume 5, Number 2, pp. 1062-65, April 1990
- Bowes, K. B., "The Effects of Power-line Disturbances on Electronic Products", POWER QUALITY '89 USA, Official Proceedings of the First International Power Quality Conference, Long Beach, CA, October 15-20-1989 (Also edited and reprinted in Power Quality Magazine - Premier V Issue)

Mr. Bowes has testified extensively in many regulatory proceedings, including;

- Connecticut Siting Council Docket No. 461 – Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a 115-kilovolt (kV) bulk substation located at 290 Railroad Avenue, Greenwich, Connecticut, and two 115-kV underground transmission circuits extending approximately 2.3 miles between the proposed substation and the existing Cos Cob Substation, Greenwich, Connecticut, and related substation improvements.
- Connecticut Siting Council Docket No. 292 – The Connecticut Light & Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction and operation of 8.7 miles of new underground 115-kilovolt electric transmission cables extending from CL&P's existing Glenbrook Substation in the City of Stamford, through the Town of Darien, to CL&P's existing Norwalk Substation in the City of Norwalk;
- Connecticut Siting Council Docket No. 302 – Northeast Utilities Service Company, on behalf of The Connecticut Light and Power Company (CL&P) application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of the proposed Killingly 2G Substation at 193 Tracy Road and 227-257 Park Road in the Towns of Killingly and Putnam, and the proposed connections to the existing #347 345-kV line and the existing #1607 and #1505 115-kV lines;
- Connecticut Siting Council Docket No. 311 – Northeast Utilities Service Company, on behalf of The Connecticut Light and Power Company (CL&P) Application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and

operation of the proposed Wilton 35A Substation at 53 Old Danbury Road in the Town of Wilton;

- Connecticut Siting Council Docket No. 326 – The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a proposed substation located at Stepstone Hill Road, Guilford, Connecticut; and
- Connecticut Siting Council Docket No. 327 – The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a proposed substation located off Commerce Drive, Oxford, Connecticut.
- Connecticut Siting Council Docket No. 352 – The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a proposed substation located at 264 Rood Avenue and 25 Shelley Avenue, Windsor, Connecticut;
- Connecticut Siting Council Docket No. 461 - Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a 115-kilovolt (kV) bulk substation located at 290 Railroad Avenue, Greenwich, Connecticut, and two 115-kV underground transmission circuits extending approximately 2.3 miles between the proposed substation and the existing Cos Cob Substation, Greenwich, Connecticut, and related substation improvements.

- State of New Hampshire, Before the Site Evaluation Committee, Docket No. 2015-06, Joint Application of Northern Pass Transmission LLC and Public Service Company of New Hampshire d/b/a Eversource Energy For A Certificate of Site and Facility To Construct A New High Voltage Transmission Line And Related Facilities In New Hampshire.

- Commonwealth of Massachusetts, Energy Facilities Siting Board, EFSB 07-4/D.P.U. 07-35/07-36, Petition of Russell Biomass, LLC. and Western Massachusetts Electric Company for a proposed project consisting of (1) an approximately 5.3-mile, 115 kilovolt transmission line from the proposed Russell Biomass generating facility in Russell to Western Massachusetts Electric Company's ("WMECo") transmission system in Westfield, and (2) a new switching station facility in Westfield.
- Connecticut DPUC Docket No. 94-05-35 - DPUC Investigation Into Stray Voltage On Dairy Farms;
- Connecticut DPUC Docket No. 08-02-06, DPUC Investigation into The Connecticut Light and Power Company's Billing Issues;
- Connecticut DPUC Docket No. 09-12-05 - Application of The Connecticut Light and Power Company to Amend Its Rate Schedules;
- Connecticut DPUC Docket No. 10-03-08 – Investigation of the Service Response and Communications of The Connecticut Light and Power Company (CL&P) and The United Illuminating Company (UI) Following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010;

- Connecticut DPUC Docket No. 10-05-09 - DPUC Investigation of the Safety of the Connecticut Light and Power Company Underground Electric Distribution System in Waterbury;
- Connecticut PURA Docket No. 11-03-07, PURA Investigation Into The Appointment Of A Third Party Statewide Utility Telephone Pole Administrator For The State Of Connecticut; and,
- Connecticut PURA Docket No. 11-09-09 - PURA Investigation of Public Service Companies' Response to 2011 Storms;
- Connecticut PURA Docket No. 12-01-07 – Application for Approval of Holding Company Transaction Involving Northeast Utilities and NSTAR;
- Connecticut PURA Docket No. 12-01-10 - Investigation into the Tree Trimming Practices of CT Utility Companies;
- Connecticut PURA Docket No. 12-06-09 - PURA Establishment of Industry Performance Standards for Electric and Gas Companies;
- Connecticut PURA Docket No. 12-07-06RE01 – Application of the Connecticut Light and Power Company For Approval of its System Resiliency Plan – Expanded Plan;
- Connecticut PURA Docket No. 12-06-12 – PURA Investigation of the Feasibility of the Establishment of a Program to Reimburse Residential Customers for Spoilage Loss of Food items or Refrigerated Medications Caused by a Lack of Refrigeration During Electric Service Outages;
- Connecticut PURA Docket No. 12-09-13 – PURA Investigation of the Best Practices of Other State Public Utility Commissions, Public Utility Companies and Municipal Utilities' Emergency Management Best Practices;
- Connecticut PURA Docket No. 12-11-07, PURA Investigation into the Performance of Connecticut's Electric Distribution Companies and Gas Companies in Restoring Service Following Storm Sandy;
- Connecticut PURA Docket No. 13-03-23, Petition of the Connecticut Light and Power Company for Approval to Recover its 2011-2012 Major Storm Costs;
- Connecticut PURA Docket No. 14-05-06 – Application of the Connecticut Light and Power Company To Amend Rate Schedules;
- Connecticut PURA Docket No. 14-07-18 – PURA Report to the General Assembly Concerning its Review of Each Electric Distribution Company's Vegetation Management Practices;
- Connecticut PURA Docket No. 15-01-27 - Attorney General and Office of Consumer Counsel Request for Investigation of Northeast Utilities Facilities Closures in Connecticut
- Connecticut PURA Docket No. 15-12-20 – PURA Review of Electric Companies' and Electric Distribution Companies' Plans for Maintenance of Transmission and Distribution Overhead and Underground Lines
- Public Act 15-5 - Section 103 - Grid-Side System Enhancements Demonstration Projects

Resume of Frayer, Julia

Julia Frayer

Managing Director

LONDON ECONOMICS

KEY QUALIFICATIONS:

Julia Frayer is a Managing Director with London Economics International LLC ("LEI"), specializing in economic analysis and evaluation of infrastructure assets, such as power plants, natural gas-related infrastructure, electricity transmission and distribution systems, and utilities, as well as market design and expert economic advisory services for power markets. She has worked extensively in the US, Canada, Europe, and Asia in valuing electricity generation and wires assets, water and wastewater networks, as well as gas transportation assets, and in advising on market rules, innovative rate design, and institutional best practices.

Julia manages LEI's quantitative financial and business practice area, and also specializes in market and organizational design issues related to electricity. In addition to electric generation sector market power and anti-trust analysis, sample projects include cost of capital estimation; rate-setting analysis; short- and long-term forecasting of wholesale power prices; valuation of generators and vertically-integrated utilities; assessment of retail market design including provider-of-last resort portfolios and contracts; advice on and design of energy sales agreements; and advisory on structuring request for proposals and sale processes for energy assets and derivative contracts. As part of these analyses, Julia and her team of economists and consultants have developed and applied proprietary real-options based valuation tools, portfolio risk analytics, models of strategic bidding behavior, and sophisticated power system simulation tools, as well as customized econometric models. Julia also leads many of the firm's regulatory economics projects, spanning such diverse issues as cost-benefit analysis, market power mitigation, tariff ratemaking, auction design (including competitive solicitations for procurement), wholesale market rules design, productivity analysis and efficiency benchmarking.

Prior to joining LEI, Julia was working as an Investment Banker with Merrill Lynch in New York.

EDUCATION:

Institution	Graduate School of Arts & Sciences, Boston University
Degree(s) or Diploma(s) obtained:	MA in Economics

Institution	School of Arts and Sciences, Boston University
Degree(s) or Diploma(s) obtained:	BA in Economics and International Affairs

EMPLOYMENT RECORD:

Date:	February 1998-Present
Location:	Boston, MA
Company:	London Economics International

MOST RECENT PROJECT EXPERIENCE:

Location:	Canada, USA
Company:	Private Client
Description:	LEI assisted the client to perform the competitive landscape analysis for projects participating in the Clean Energy RFP. LEI's competitive landscape study employed a three-step approach. At the Step I, LEI identified the potential projects that can qualify for the Clean Energy RFP and production of a matrix of competitors. The comparative analysis then graded each project from Step I, using the type of criteria listed in the evaluation and selection process section of the Clean Energy RFP. In summary, LEI's comparative analysis looked at both the (a) minimum threshold requirements and (b) the characteristics of each project relative to the quantitative and qualitative benefits enumerated in the Clean Energy RFP. Lastly, based on the rankings from the comparative analysis in Step II, LEI concluded with the SWOT analysis for the client's project relative to possible competitors and examine the relative strengths, weaknesses, opportunities, and threats in the Clean Energy RFP.

Location:	New England
Company:	Private Client
Description:	LEI was retained to provide a 20-year market outlook report for New England. The market outlook report is to include a 20-year regional price forecast for the energy and capacity markets, summary of recent market developments, comparison of monthly and peak versus off-peak prices, and a Tier-1 Renewable Energy Credits ("RECs") forward price forecast.

Location:	Massachusetts
Company:	Eversource
Description:	As a follow up to the NTA report analysis prepared by LEI and filed by the Utilities for the Mystic-Woburn project, LEI was asked to assist the utilities in answering a number of questions "IRs" as part of the Discovery

Location:	Connecticut
Company:	Eversource

Description:	LEI was hired by Eversource to perform a non-transmission alternative study to the Frost Bridge – Naugatuck Valley & Housatonic Valley – Norwalk/Plumtree solution. LEI was asked to evaluate the potential and viability of replacing the solution with supply-side and demand-side resources. Eversource planners have identified two substations within the subarea of study that would be suitable to accommodate an NTA. Under this engagement, LEI reviewed the technical attributes and operational profiles of a range of technologies to evaluate their suitability for resolving overloads and thermal voltage identified by ISO-NE in the SWCT Needs

Location:	Texas and New Jersey
Company:	Private Client
Description:	LEI was hired to forecast the potential energy revenues of two wind farms in Texas. In addition, LEI also needs to provide energy, capacity, and solar renewable revenues for a solar plant in New Jersey.

Location:	New York
Company:	Private Client
Description:	For an infrastructure investment fund, LEI reviewed due diligence materials for the client's potential acquisition of a cogeneration plant participating in the NYISO markets.

Location:	Ohio
Company:	Private Client
Description:	LEI was hired to put together a presentation about the PJM for the Public Utilities Commission of Ohio.

Location:	New England
Company:	Private Client
Description:	LEI was engaged by a leading New England advisory firm to assist in strategizing for the upcoming Clean Energy RFP. LEI modeled a number of potential eligible projects that could offer into the RFP, and then performed a mock evaluation, with various cost-benefit ratios. Through this analysis, LEI identified key drivers and assumptions that could affect project ranking.

Location:	Maine
Company:	Main Public Utilities Commission

Description:	LEI was engaged by the State of Maine Public Utilities Commission to assist the MPUC in evaluating options for expansion of natural gas supply into Maine (with a view to reducing the cost of gas and power to Maine customers). LEI reviewed and evaluated proposals for firm natural gas transportation service by pipeline developers. These evaluations included LEI's review of commercial terms include in the pipeline Precedent Agreements that underpin capacity expansion projects; review of contract provisions for Firm Transportation Agreements and Negotiated Rate Agreements; and evaluation of the status of the FERC and state-level permitting process for each pipeline proposal. The project also included natural gas network modeling (using GPCM, an industry-standard network model of the North American natural gas system) and power simulation modeling (using LEI's proprietary POOLMod model) to arrive at a quantitative cost-benefit analysis of proposals. The Regional Analysis was an additional modeling excercise, to extend the analysis to address the impact on Maine if it were to go forward under a regional initiative to procure pipeline capacity.

Location:	New England
Company:	National Grid
Description:	As a follow up to the NTA report analysis prepared by LEI and filed by the Utilities, LEI was asked to answer a few questions "Irs" as part of the Discovery

Location:	New York
Company:	Private Client
Description:	For a transmission project developer, LEI performed an analysis of congestion in the NY markets for proposed renewable generation resources as well as a new transmission link. LEI relied on results from a power flow study to properly model the proposed resources and transmission constraints in POOLMod

Location:	New York, United States
Company:	Private Client
Description:	For a private transmission developer, LEI analyzed the impact of a new transmission project between upstate and downstate New York. LEI used its proprietary energy and capacity market simulation models to assess the impact of the proposed transmission line on New York energy and capacity markets over a 20-year horizon. LEI further prepared a forecast of revenues for potential shippers from the results of the simulations.

Location:	Canada
Company:	Private Client
Description:	LEI evaluated the impact of changes to Alberta's climate change and carbon emission regulations on the portfolio of the power sector as a whole, and electricity consumers. The analysis included modeling various scenarios using POOLMod relating to different specific regulations and assumptions to determine the financial impact on selected plants as well as the prevailing Pool Price forecasts for the province.

Location:	Alberta, Canada

Company:	Private Client
Description:	LEI is assisting a large provincial institution in the development and assessment of alternative risk management and investment strategies for its trading and investment businesses. As part of this work LEI will complete a Risk Assessment Survey of the Board of Directors as well as additional Value-at-Risk (VaR) modeling, scenario and stress testing.

Location:	Delaware, United States
Company:	Delaware Public Services Commission
Description:	LEI was retained by Delaware Public Services Commission ("PSC") to assist with review of the procurement process for the provision of Delmarva Power & Light Company ("Delmarva Power")'s standard offer services, and to provide information and analysis regarding alternative long-term electricity procurement options for Delmarva Power to meet its Standard Offer Service residential and small commercial retail load.

Location:	Southeastern United States
Company:	Private Client
Description:	LEI was retained to advise on market power screening analysis in contemplation of large scale utility merger; LEI provided advise on analytical approach and potential mitigation strategies for horizontal market power concerns.

Location:	United Kingdom
Company:	DECC
Description:	DECC was interested in whether US power markets evaluate generation bids based on criteria other than the price bid, specifically, if the length of contract had a role in the auctions. LEI reviewed capacity market rules for PJM, ISO-New England and the New York ISO. LEI also examined whether and for how long a "lock-in" options for the first year capacity price is offered to new generation assets bidding into the auctions. We also reviewed international spectrum auctions, North American gas transmission open season rules, and international auctions for toll roads to examine whether and how duration or length of contract is incorporated into bidding rules and auction clearing processes.

Location:	New England and New Jersey, United States
Company:	Private Client
Description:	LEI was retained to forecast delivered gas prices in New England (Connecticut) and PJM (New Jersey) and locational marginal prices as well as retail electricity prices in Connecticut.

Location:	United States
Company:	Private Client

Description:	LEI was engaged by a private equity company to provide a briefing paper that compares the opportunities and tradeoffs of the "Buy" versus "Build" investment decision in the IPP sector. The paper contains quantitative and qualitative research and analysis, based on market data on purchase prices from recent transactions (focused on New York, New England, and PJM), versus the cost of new build assets.

Location:	New England, United States
Company:	Private Client
Description:	LEI was retained to conduct a comprehensive cost-benefit analysis of a proposed transmission project in New England using simulation-based analysis of the ISO-NE wholesale power markets. LEI's analysis included detailed examination of the benefits to consumers from lower energy and capacity prices, as well as emissions reductions and local economic impacts (associated with spending during construction and lower retail costs of electricity).

Location:	New England
Company:	Private Client
Description:	LEI was retained by a renewable investor to review REC prices in the New England region and provide a forecast for various classes of REC prices for purpose of investment appraisal.

Location:	Midwest, United States
Company:	Private Client
Description:	LEI was hired to provide assistance developing marketing materials for a transmission developer's roadshow. As part of this engagement, LEI developed a series of ready-to-share slide decks tailored to the specific target customers. Three categories of customers were considered: traders, utilities and wind developers.

Location:	New England, United States
Company:	Private Client
Description:	LEI was hired to conduct a Non-Transmission Alternatives ("NTA") analysis for the two transmission projects, which are components of a larger transmission solution in New England. The objective of the NTA analysis was to determine the feasibility and viability of other non-transmission resources – such as new generation and new demand-side resources – to be developed in lieu of these two specific transmission projects to relieve transmission reliability concerns. The NTA analysis was to be filed as part of the client's application with the Connecticut Siting Council.

Location:	New England, United States
Company:	Private Client

Description:	LEI was engaged by two New England incumbent utilities to determine the economic viability of non-transmission alternatives ("NTAs") to address reliability and performance issues in the Greater Boston area, in liue of preferred transmission solutions. A combination of supply-side and demand-side resources were considered for the study, this included: distributed solar PV, utility-scale solar PV, energy efficiency and active demand response, conventional generation (gas CCGT and peakers), as well as energy storage devices. LEI started the analysis by screening prospective NTA technologies based on their technical characteristics, their relevance in the New England market and their technical applicability with regards to the operational criteria required by the grid to address contingency events (i.e., volume of available capacity/energy, time of response, duration of response, flexibility etc...). Next, LEI conducted a comparative cost analysis to estimate the levelized cost per kW-month over the economic life of each of the technologies. Finally the most probable combinations of NTA technologies identified in the selection process were further evaluated based on their probability of materialization taking into account a spectrum of criteria including physical constraints such as land availability, siting issue, financing hurdle, etc.

Location:	New York, United States
Company:	HVSEC
Description:	LEI was hired by a community coalition to investigate the costs and benefits of proposed transmission line projects across New York State. The study included reviewing the proposed projects from each of the applicants to identify key characteristics of each project. LEI also undertook simulation-based modeling of the New York market to assess the potential magnitude of future congestion on the New York system under varying levels of projected gas prices.

Location:	New England, United States
Company:	Private Client
Description:	LEI was hired by a New England transmission & distribution utility to prepare a two-day workshop for company executives detailing the current state of the New England markets, major players across all sectors of the industry, major investment drivers and investment analysis methodology. LEI staff prepared workshop material and traveled to the client's office to present the material and answer client's questions

Location:	United States
Company:	Private Client

Description:	LEI was asked to conduct a simulation-based modeling exercise to determine the potential revenues for the proposed transmission project wheeling power from western MISO to eastern MISO (and eventually PJM). LEI evaluated both the revenue opportunities to the investors (e.g., private benefits of the line based on market price differences and the market value of the transmission) as well as social benefits to the MISO system (i.e., wholesale price reductions and capacity market price differences); and evaluated the incremental value of the business strategy of selling the energy (and capacity) out of East MISO to third parties who will serve customers ultimately in PJM. LEI's modeling exercise entailed evaluating intrinsic revenues (originating from power markets), extrinsic revenue (originating from price volatility), along with the green value of the Project (originating from the purchase of low cost renewable energy).

Location:	New England and PJM, United States
Company:	Private Client
Description:	LEI was engaged by a private equity firm to conduct due diligence on a 3,000 MW portfolio of gas-fired assets in PJM and ISO-NE. LEI was responsible for developing the model that was used in the pro forma financial statements.

Location:	New England, United States
Company:	Maine Public Utility Commission
Description:	LEI was engaged by the State of Maine Public Utilities Commission ("MPUC") to assist the MPUC in evaluating options for expansion of natural gas supply into Maine (with a view to reducing the cost of gas and power to Maine customers). LEI reviewed and evaluated proposals for firm natural gas transportation service by pipeline developers. These evaluations included LEI's review of commercial terms include in the pipeline Precedent Agreements that underpin capacity expansion projects; review of contract provisions for Firm Transportation Agreements and Negotiated Rate Agreements; and evaluation of the status of the FERC and state-level permitting process for each pipeline proposal. The project also included natural gas network modeling (using GPCM, an industry-standard network model of the North American natural gas system) and wholesale power market simulations (using LEI's proprietary POOLMod model) to arrive at a quantitative cost-benefit analysis of proposals.

Location:	United States
Company:	Private Client
Description:	For all the US regions where the client (international IPP) is currently active, LEI was engaged to support the client's Regulatory Group in its administering of the company's compliance program. LEI provided a monthly report covering developments by regional market and products which included: energy, capacity, long-term transmission service, FTR auctions, ancillary services, diesel oil, PRB coal, natural gas commodity, transmission, and storage, RECs, and CO2. The purpose of this monthly update was to ensure that client's transactional and business groups were made aware of market rules and regulatory risks.

Location:	Midwest, United States

Company:	Private Client
Description:	LEI was retained to assess the impact of the continued operations of nuclear plants in the Midwest with state subsidies versus the closure of these nuclear plants in the electricity rates and the state's local economy.

Location:	Germany
Company:	Private Client
Description:	LEI was commissioned by a private client to provide asset valuation due diligence and market analysis in support of the evaluation of geothermal resource opportunities in Germany as well as other investment initiatives in the region. LEI's scope included a comprehensive review of Germany's electricity sector, renewable energy policies, and integration within surrounding European power markets.

Location:	Alberta, Canada
Company:	ENMAX
Description:	ENMAX retained LEI to act as an independent expert on matters related to proposed auctioning for the Load Following Service ("LFS") product. LEI provided an independent evaluation of the proposed auction, including evaluation of the both the product being auctioned and the auction mechanism and key parameters. The LFS product as proposed to be auctioned was meant to represent the "shape risk" in the RRO service. LEI's evaluation considered whether the product and auction mechanism would result in an efficient, competitive and fair outcome for the Alberta market, RRO providers, potential suppliers of the auctioned product, and customers of the RRO service. LEI prepared a report titled "Independent assessment of proposed market-based determination of shape risk in RRO supply" dated January 24, 2014, which was filed in Application No. 1610120, Proceeding No. 2941 to the Alberta Utilities Commission ("AUC") by EEC on January 27, 2014.

Location:	New England, United States
Company:	Private Client
Description:	LEI was engaged by a private client to conduct a price driver analysis and strategy optimization exercise to enhance the bidding and dispatch strategy on a jointly-owned gas-fired asset. This included a report on ISO-New England's Winter Reliability Program to identify and evaluate key wholesale price drivers in the New England region. LEI also examined the generating asset's financial data to help optimize its bidding strategy.

Location:	United States
Company:	Private Client
Description:	LEI prepared a quantitative analysis to test the efficacy of a proposed cross hedging strategy for a merchant transmission project that will be bringing energy from Canada. The proposed strategy is to use natural gas futures contracts to hedge energy market exposure and revenues. Analysis will include ordinary least squares regressions as well as an error correction model to determine the appropriateness of the hedge.

Location:	United States
Company:	WIRES
Description:	LEI was engaged by WIRES to prepare a White Paper on Market Resource Alternatives ("MRAs") which provides external parties with a clear understanding of MRAs and a concise description of how MRAs can work effectively alongside transmission investment in US power markets to support market development, reliability, and cost-effective supply.

Location:	Western United States
Company:	Private Client
Description:	LEI was engaged by a private equity company in association with asset valuation, due diligence support, and market analysis for a wind generation and HVDC transmission project proposing delivering wind-based renewable energy from Wyoming into California.

Location:	Canada
Company:	Corporate Knights
Description:	LEI was retained by Corporate Knights Inc. to perform a high-level estimation and analysis of potential opportunity for developing clean energy exports from Canadian markets to target US power markets. Julia Frayer presented a preview of her analysis at the ABB Energy and Automation Forum in September 2014.

Location:	Texas, United States
Company:	Private Client
Description:	LEI was engaged by a global investment firm to provide a market outlook for a portfolio of assets located in ERCOT. LEI provided a 10-year detailed market revenue forecast for the assets under base case assumptions. LEI also used its Real Options model to estimate a scarcity premium that would be included in addition to the intrinsic energy revenues.

Location:	New England, United States
Company:	Private Client
Description:	LEI assisted a New England incumbent utility in evaluating the economic benefits of two solutions aiming to relieve energy congestion in the metropolitan area of Boston, Massachusetts. LEI modeled various transmission solutions. The objective of the economic analysis from the energy market perspective was to examine whether there are any production cost savings or market price ("LMP") impacts from either proposal, and to describe under what conditions (assumptions) these benefits are realize.

Location:	New England, United States
Company:	Private Client (transmission developer)

Description:	LEI prepared a 10-year energy market price outlook for the New England wholesale power market and forecast the impact of a proposed project on New England market prices. LEI also determined the benefits of the proposed transmission project on employment, economic activity, and tax revenues in New England. LEI utilized the dynamic input-output ("I/O") economic model developed by Regional Economic Models, Inc. ("REMI") to measure the economic benefits to various New England states from the project on employment, economic activity, and tax revenues. LEI separated the economic impact caused by the construction of the project, and the impact caused by the reduction in energy prices due to the commercial operation of the project, taking into account issues such as usage of electricity in residential, commercial, and industrial sectors in the region, and also existing long-term energy contracts that would limit the impact of the project.

Location:	Midwest, United States
Company:	Private Client
Description:	LEI was retained to analyze revenue/gross margin modules for a district cooling asset being considered for acquisition in Ohio. Under this engagement, LEI performed a due diligence review of the information received from the seller (including documentation from the data room) and designed a series of models aiming at quantifying the asset's potential revenues. Part of LEI's scope work also consisted of identifying and assessing the opportunities to enhance and extend the customers base within the Cincinnati existing and future market conditions. LEI also evaluated the risks associated with prospective/existing customers forgoing the asset's services in exchange of self-supplying their cooling needs.

Location:	Chicago, Illinois
Company:	Private Client
Description:	LEI was retained to analyze revenue/gross margin modules for various district energy assets in Illinois being considered for acquisition. LEI reviewed information received from the client, including detailed documents in the data room, and presented analysis in a slide deck relating to contract revenues (prices and volumes) and fuel costs (electricity) along with revenue and cost drivers. LEI also presented sensitivity analysis for high/low sales volumes, new customers, expiry dates of existing contracts, fuel costs etc.

Location:	Canada
Company:	Private Client

Description:	LEI was hired by a large Canadian IPP to prepare a report providing an overview of past and current initiatives pertaining to pollutants emissions regulation with the purpose to inform the potential paths forward for future carbon regulation in the US. The engagement was initiated following the Executive Office of the President released the President's Climate Action Plan ("CAP") to reduce greenhouse gas ("GHG") emissions, and to prepare for the impacts of climate change. Under this engagement, LEI performed a detail literature review of the President's directive, past Environment Protection Agency ("EPA") regulations, as well as exiting regional carbon reduction programs. The overarching purpose of this exercise was to estimate the potential shape of a future carbon rule in the US (with associate features such as timing, mechanisms, and regulatory framework) based on EPA's legal authority scope, procedures and lessons learned from failed or successful rules implementation. LEI identified various market-based and non-market-based regulatory frameworks/scenarios and ranked them on their relative likelihood based on a set of established criteria including affordability of the regulatory scenario, impact on generation retirement and system reliability, alignment with EPA's precedents, congruency with Presidential directives, consistency with EPA's jurisdiction, and political palatability.

Location:	Canada
Company:	Private Client
Description:	LEI was hired by a large Canadian IPP to evaluate the impact of the implementation of potential future Federal regulation limiting carbon emissions on ERCOT's energy markets and on Energy Future Holdings' ("EFH") portfolio. LEI used its dispatch and simulation model POOLMod to develop forecasts of energy prices in ERCOT under a variety of potential frameworks under which carbon emissions could be regulated. The purpose of this exercise was twofold: a) evaluate the impact of a carbon rule (of any shape) on wholesale energy prices, and on the performance of the EFH' portfolios; b) determine the most impactful carbon rule regulatory framework.

Location:	West Virginia and Ohio
Company:	Private Client
Position:	Project Manager
Description:	LEI was hired by a large infrastructures investment vehicle to provide due diligence analysis and support on the acquisition of a portfolio of small hydropower plants in the PJM region. The portfolio consisted of a mix of mini and small run-of river hydropower plants. LEI's scope of work was threefold. Firstly LEI provided an overview of PJM RTO market, describing market fundamentals, key players, supply mix, retirements and new built, as well as discussing historical market trends. Then, we used our proprietary dispatch and simulation cost production model POOLMod to simulate power market dynamics and develop forecasts of energy prices in the assets' location over a 20 year horizon. As part of this modeling exercise, LEI used its in-house capacity market to develop capacity prices forecasts over a similar horizon. Finally given the conventional storage capability of one of the unit, the client requested LEI to provide a description of the frequency regulation market in PJM and to determine potential revenue opportunities for the plant. LEI provided results of its modeling exercise in Excel format and prepared a slide deck summarizing key messages, key findings and recommendations to the clients.

Location:	Alberta, Canada

Company:	TransAlta
Description:	London Economics International LLC ("LEI") was retained by a market participant in Alberta to develop comments on MSA's Strawdog for the Framework for the Assessment of Market Harm. More specifically, LEI was asked to comment on the economic issues associated with the proposed Strawdog pertaining to the definition of harm in the context of Alberta's market design and the impact of the implementation of the Strawdog on wholesale power market design, market manipulation and market power abuse.

Location:	United States
Company:	Private Client
Description:	LEI was engaged by a Japanese research institute to provide expert analysis and insight on how the restructuring of the US electricity markets has affected the economics of nuclear power plants. LEI provided a Briefing Memo that responded to discrete questions related to the role of government, and the impact restructuring had on nuclear plant operations and financing.

Location:	New York, United States
Company:	Private Client
Description:	LEI was retained to do a 30-year (2015-2044) energy price forecast for Western New York, capacity price forecast for the Rest of the State, and revenue forecasts for a small hydroelectric plant in preparation for an asset sale process.

Location:	Ontario, Canada
Company:	Private Client
Description:	LEI assessed the economics of the proposed Lake Erie HVDC transmission project to investors and potential customers, by projecting revenue streams associated with the sale of energy, capacity and other products via transit on the Lake Erie HVDC transmission project ("LEP"). The LEP is a 100-km long 1,000 MW bi-directional HVDC transmission line that will connect the Ontario energy market with the PJM market. LEI prepared a comprehensive report that includes a review of the Ontario and PJM markets, a 20-year (2017 to 2036) market outlook and prices for electricity, capacity and renewable energy credits in Ontario and the relevant zone/s in PJM; the total gross arbitrage value for the energy congestion rents, the capacity revenue potentials for PJM, and the renewable energy credits revenue potential in PJM.

Location:	New England, United States
Company:	NEPOOL
Description:	LEI was retained by NEPOOL to provide expert insight in the Federal Energy Regulatory Commission ("FERC") proceed related to Performance Incentives in ISO New England's Forward Capacity Market. LEI submitted a written affidavit to FERC discussing the relative benefits of keeping the capacity product primarily as a standalone planning tool rather than moving the capacity market design closer to that of a real-time energy market. (Docket No. ER14-1050 at FERC)

Location:	Midwest, United States

Company:	Private Client
Description:	LEI was asked to conduct an independent rigorous modeling exercise to determine the potential revenues for the proposed transmission project wheeling power from western MISO to eastern MISO (and eventually PJM). LEI evaluated both the revenue opportunities to the investors (e.g., private benefits of the line based on market price differences and the market value of the transmission) as well as social benefits to the MISO system (i.e., wholesale price reductions and capacity market price differences); and evaluated the incremental value of the business strategy of selling the energy (and capacity) out of East MISO to third parties who will serve customers ultimately in PJM. LEI's modeling exercise entailed evaluating intrinsic revenues (originating from power markets), extrinsic revenue (originating from price volatility), along with the green value of the Project (originating from the purchase of low cost renewable energy). LEI's overall analysis was comprehensive and included a series of sensitivity scenarios testing key value drivers.

Location:	Northeast United States
Company:	Private Client
Description:	For a utility in the northeastern US, LEI prepared a cost-benefit analysis of a proposed transmission line with the potential to change existing market arrangements. In the analysis, LEI developed a base case and multiple project cases based on different configurations of the transmission project. Using its proprietary modeling tool, POOLMod, LEI simulated energy and capacity prices in each configuration over a 15-year timeframe, and compared the price differences against various cost allocation scenarios for the transmission line's construction. LEI also tested the statistical significance of the project case results against the base case results, and conducted further analysis on the economic effects of additional renewable generation projects that construction of the transmission line would make possible.

Location:	Ontario, Canada
Company:	Ontario Power Generation
Description:	LEI assisted an Ontario electricity generator in performing a productivity study on their hydroelectric assets to fulfill the mandate of the Ontario Energy Board ("OEB"). LEI proposed a structured approach to address how productivity should be measured, what methods are available, identify a relevant peer group, and ultimately provide the client with a productivity study for filing with the OEB.

Location:	New England, United States
Company:	Private Client
Description:	LEI worked with private equity investor on an M&A due diligence review of a combined heat and power generation unit in New England. LEI provided market analysis, price forecasting services, and supported the investor in its valuation of the asset.

Location:	Canada

Company:	Private Client
Description:	LEI was engaged by the client to review its risk management practices and provide meaningful insights with regards to the risk management related issues. Analysis included quantification of the magnitude and probability of risks being faced by trading and other operational activities of the client, as well as research into the best practices of other similar organizations.

Location:	Canada
Company:	Private Client
Description:	LEI was retained to provide to assist a private client in assessing the economics of this proposed transmission project and determining additional revenue streams or value adders from the perspective of third-party shippers. LEI was specifically asked to isolate and measure the spot market volatility premium.

Location:	United States
Company:	Private Client
Description:	LEI was retained to perform a due diligence and market study for three hydro units in PJM. LEI's tasks included reviewing the merchant prices and REC prices, evaluating the power purchase agreement and capacity charges and providing energy, capacity and REC forecasts.

Location:	Maine, United States
Company:	Private Client
Description:	For an infrastructure investment fund, LEI reviewed due diligence materials for the client's potential acquisition of a portfolio of hydro facilities located in Maine, and provided an independent valuation of the projects based on forecast energy market dynamics and REC opportunities.

Location:	Ontario, Canada
Company:	Enbridge Gas Distribution Inc.
Description:	LEI performed a review and analysis of rate making approaches applied to the client's capital expenditure profile including demonstration of the negative potential impact of "I-X" rate making approaches on a utility's ability to earn a fair return. The objective of this engagement will be to demonstrate to stakeholders and the Ontario Energy Board the reasonableness of the revenue cap per customer model that the client has previously relied upon and planned to propose in its next ratemaking review Furthermore, the secondary objective was to conceptualize the insufficiency of the "I-X" regime, even with a revenue cap per customer model, in consideration of the fair return standard and given the client's business is operating in an environment where substantial capital expenditure needs are projected over the next Incentive Regulation Plan ("IRP") period. Docket Number EB 2012-0459

Location:	Texas, United States

Company:	Private Client
Description:	LEI was engaged by a global investment firm to provide a market outlook for three assets located in ERCOT. LEI provided a 10-year detailed market revenue forecast for the three plants under base case assumptions.

Location:	New England, United States
Company:	Private Client
Description:	LEI was engaged by a utility to prepare 10-year (2014-2023) energy and capacity markets price outlooks for the New England market. This report presents results of a base case and low case long term price forecasts for the New England market using updated market information, as well as underlying assumptions, methodology, and a brief overview of the market along with a review of relevant regulatory considerations.

Location:	New England, United States
Company:	Private Client
Description:	LEI conducted a comprehensive review of the NESCOE Gas Electric Phase Three study in order to ensure that the appropriate economic models and techniques were being used to accurately model the hydro and gas solutions. LEI also aided the client in identifying any assumptions and modeling approaches which may be suboptimal, and communicated how these issues can be addressed and improved in future studies.

Location:	United States
Company:	Private Client
Description:	LEI was engaged by an infrastructure investment fund in association with asset valuation, due diligence support and market analysis. Work involved reviewing documents in a virtual data room, and analysis related to drivers of gross margin for the asset: macroeconomics, weather fluctuations, fuel and electricity cost projections, and overview of gas and electricity market in the region where the asset was located.

Location:	Texas, United States
Company:	Entergy, Inc./Public Utility Commission of Texas
Description:	Julia and her team of economists were engaged by Entergy, Inc. to provide independent review and assessment of cost-benefit analysis related to termination of certain PPAs between Entergy Texas Inc. and Entergy Louisiana. LEI's assessment was requested by the Public Utility Commission of Texas, as follow on to previous consultative services that LEI has provided.

Location:	California, United States
Company:	Pacific Gas & Electric

Description:	LEI served as Independent Evaluator ("IE") for Pacific Gas & Electric Company ("PG&E") for PG&E Electric Fuels Department's Natural Gas Storage Services Request for Offer ("RFO"). Specifically, LEI worked with PG&E to ensure that Offers were evaluated consistently and appropriately in accordance with the solicitation protocol and in accordance with applicable rules and processes of the California Public Utilities Commission ("CPUC").

Location:	Ontario, Canada
Company:	Enbridge
Description:	LEI was engaged to provide an analysis of building block incentive ratemaking approaches used in Australia and the UK, and how they would apply to the client's circumstances in Ontario. LEI's report supported the client's distribution tariff proposal submission to the Ontario Energy Board for a second-generation Customized Incentive Regulation ("IR") plan for the period of five years (2014-2018). The testimony set out the theory behind as well as the practical experience of using the building blocks approach in incentive regulation regimes. Julia will provide the testimony for this project.

Location:	New Mexico, United States
Company:	The New Mexico Express
Description:	Julia testified in front of the New Mexico Finance Authority Oversight Committee regarding the potential economic benefits of new investment in transmission in the state of New Mexico; Julia considered the impacts of local spending during construction of the proposed HVDC project on the state economy, using BEA RIMS multipliers to estimate the boost to economic activity. Julia also employed the DOE's JEDI model to estimate the potential for new jobs and GDP growth as a result of new renewables development in state (wind and solar) as a result of the transmission access that would be provided by the HVDC project.

Location:	Texas, United States
Company:	ERCOT
Description:	Julia prepared a study of the Value of Lost Load ("VoLL") in ERCOT and evaluated current utility practices for manual load shedding. LEI's report on VoLL was filed with the PUCT in June 2013 under PUCT Docket 40000.

Location:	New York, United States
Company:	NRG

Description:	LEI was engaged by NRG to provide an independent review of the economic analysis in two reports: "Report and recommendations comparing repowering of Dunkirk Power LLC and transmission system reinforcements", published by National Grid ("NG") on May 17, 2013, and "NRG Dunkirk Repowering Project Economic Impact Analysis", published by Longwood Energy Group LLC ("LEG") on March 20, 2013. Both reports forecasted market benefits, production cost savings and macroeconomic benefits. LEI's review compared methodologies and assumptions used by each report, and how these may have affected their results; LEI's review was subsequently submitted by NRG to Case 12-E-0577 at the New York Public Service Commission.

Location:	New England, United States
Company:	Brookfield Renewable Energy Marketing
Description:	Julia and her team of economists supported the client in preparation of a merger application to the Federal Energy Regulatory Commission ("FERC") under Section 203 of the Federal Power Act, in conjunction with the client's acquisition of a Maine-based hydroelectric generation portfolio. LEI performed a full Delivered Price test analysis for the ISO New England control area. LEI's analysis was filed with FERC and the Merger Application was approved in February 2013.

Location:	United States and Canada
Company:	Private client
Description:	LEI performed economic advisory in a matter relating to market design strategy for a large incumbent generator in Alberta. LEI performed a case study-oriented comparative review of energy-only and energy and capacity markets in North America and abroad, and take stock of lessons learned from other jurisdictions. LEI's work plan called for the simulation modeling of three forms of market design: an energy-only market, an energy and capacity market akin to Eastern US RTO markets, and a hybrid market with long term contracts and a spot market for capacity. The third phase involved the creation of a customized tool for future analysis, based on the simulation modeling results.

Location:	United States
Company:	Private client
Description:	LEI was engaged by a Japanese research institute to research the environment for investment and financing of new generation in the US competitive electricity markets as well as the types of approaches used to manage investment risk. The LEI team researched the impact of market restructuring in the US on generation investment, methods for financing new generation, and analyzed policies promoting generation investment. LEI also performed four case studies on projects that were successfully financed and built in recent years, including assets in California (CAISO), Maryland (PJM), New York (NYISO) and Texas (ERCOT).

Location:	Western United States
Company:	Duke-American Transmission Company

Description:	Julia was part of a team of economists that performed a macroeconomic analysis to estimate the local economic benefits accruing to taxpayers, residents, and businesses along the 800+mile route during construction of the Zephyr HVDC project, which runs from Wyoming to Colorado, Utah, and Nevada. LEI performed the analysis using the REMI P1+ model.

Location:	New England, United States
Company:	Private client
Description:	Julia led the preparation of a market study to support financing of a renewable generation portfolio in New England. The market analysis supported a successful multi-million dollar debt raise for the client.

Location:	United States
Company:	Private client
Description:	LEI was hired to review regulatory and market drivers of energy and capacity prices in PJM, and forecast prospective revenues of a portfolio of pumped storage and conventional hydro generation facilities offered by FirstEnergy, over a 20 year horizon.

Location:	Alberta, Canada
Company:	FortisAlberta, Inc.
Description:	Julia provided support to FortisAlberta Inc. ("FAI"), a Canadian electricity utility, in its filing for its capital tracker application. LEI also reviewed the submissions of the interveners and advised FAI on how to address the issues raised by these interveners.

Location:	Alberta, Canada
Company:	Morgan Stanley Capital Group
Description:	Julia provided testimony in support of transmission operating rules and curtailment protocols for interties into Alberta, as proposed by the Alberta Electricity System Operator ("AESO"), in order to support a fair, efficient and openly competitive power market. The testimony was made in front of the Alberta Utilities Commission ("AUC"), on behalf of Morgan Stanley Capital Group ("MSCG"), a customer of the Montana-Alberta Transmission Line. Julia's analysis considered commercial as well as operating protocols in deregulated power markets and considers how market rules incentivize new entry and produce dynamic efficiency gains related to more intense competition The AUC issued a favorable decision to MSCG in early 2013. AUC Docket Number 1607958

Location:	Texas, United States
Company:	Public Utility Commission of Texas

Description:	Julia served as testifying witness and lead author in evaluating Entergy's decision to join the Midwest Independent Transmission System Operator ("MISO") Regional Transmission Organization ("RTO") on the behalf of the Public Utility Commission of Texas. LEI is evaluating several existing cost/benefit studies related to Entergy's decision to join MISO over the Southwest Power Pool ("SPP") and will be providing quantitative and qualitative analysis of specific costs/benefits attributable to ETI and its customers following membership in either MISO or SPP, including but not limited to net trade benefits, transmission cost allocation, governance issues, and continued participation in the Entergy Service Agreement following RTO membership. SOAH Docket No. 473-12-6206; PUC Docket No. 40346

Location:	California, United States
Company:	Pacific Gas & Electric
Description:	Julia and the LEI team served as the Independent Evaluator for PG&E Request for Offers for natural gas storage which was successfully concluded in January 2013. Julia reported on the RFO process and selection of winning bidder to the Peer Review Group and Energy Division staff at the California Public Utilities Commission ("CPUC").

Location:	United States/Europe
Company:	Private Client
Description:	Julia and the LEI team prepared a white paper outlining the concept of a Virtual Power Plant product and auction format, as part of a multi-consultant engagement in support of restructuring of the Greek power sector.

Location:	Japan/United States
Company:	Private Client
Description:	For a Japanese client, Julia is leading a team to assess market opportunities for industry-scale battery storage technology in the US and selected European jurisdictions for energy arbitrage and ancillary services provision. Under this assignment, LEI modeled the operation regime of a battery operating in energy and ancillary services markets in order to monetize added revenues for a wind and solar generators. Findings and modeling results were analyzed and presented before the client's management team and were then deployed to develop strategy for marketing battery technology to renewable developers and utilities. Another objective of the project was to identify most suitable markets and products to optimize the strategy of the battery's market entry.

Location:	Northeast United States
Company:	Private company

Description:	Julia led a comprehensive ratepayer-focused cost-benefit study of integrating a remote service territory of a single-state utility into a Northeast RTO's footprint. The cost-benefit analysis looked that at the long-run the benefits of joining an RTO versus the costs of new infrastructure that would be needed to accomplish the integration. LEI's analysis was used with regulators and state policymakers to pursue a transmission investment strategy by the utility.

Location:	New England, United States
Company:	Private company
Description:	Julia managed a market study reviewing historical electric rates (and projecting forward electric rates) for large commercial customers in the New England market. The electric rates analysis was composed of a number of components, such as the commodity costs of electricity, compliance costs for certain state programs (like RPS), delivery charge for delivering electricity, and ancillary services and administrative supply charges. LEI created projection for each of these components and considered state retail sales requirements for renewables, etc.

Location:	United States
Company:	NRG, Inc.
Description:	Julia led a team of economists to assess the wholesale power market impacts of the merger of NRG, Inc. and GenOn. LEI staff, under Julia's direction and guidance, performed Delivered Price Tests analysis for the Federal Energy Regulatory Commission ("FERC") under Section 203 of the Federal Power Act and submitted extensive analysis to FERC in the summer of 2012. The Merger Application was successfully approved by FERC in December 2012. Docket No. EC12-134-000 Subsequently, LEI assisted the client in preparation of the 205 market-based rate authority analysis.

Location:	Connecticut, United States
Company:	NRG, Inc.
Description:	Julia provided written testimony and oral testimony at the Connecticut Public Utility Regulatory Authority ("PURA") related to the market power consequences of proposed merger of NU-NSTAR. PURA Docket No. 12-01-07

Location:	Ontario, Canada
Company:	Ontario Power Generation
Description:	LEI was engaged by Ontario Power Generation ("OPG") to support senior management through regulatory processes related to performance-based rates. Julia and her team of experts prepared a discussion paper on incentive regulation mechanisms ("IRM") currently in place in Ontario for electricity and natural gas distribution utilities and presented it at a technical workshop at the Ontario Energy Board ("OEB").

Location:	Alberta, Canada

Company:	TransAlta
Description:	Julia prepared testimony and testified in support of TransAlta in relation to a settlement for contravention of FERC Regulation related to timing of exports from 2010. The settlement was crafted by the Market Surveillance Administrator and filed with the Alberta Utilities Commission for approval in December 2011. LEI assessed the economic and policy considerations of the settlement and its appropriateness in context of enforcement and sufficiency of penalty payment. Docket Number AUC – 2012-182

Location:	Maine, United States
Company:	MPUC
Description:	Pursuant to An Act To Reduce Energy Prices for Maine Consumers, P.L 2011, ch.413, sec. 6 (Act) , the Maine Public Utilities Commission ("MPUC" or the "Commission") was directed by the Legislature to study Maine's renewable portfolio requirement established in 35-A M.R.S.A. § 3210 (3-A). London Economics International LLC ("LEI") was engaged by MPUC to conduct an in-depth analysis of the renewable portfolio standards ("RPS") required by the Act which would support the Commission's study and report to the Legislature. Julia led the team in preparation of the report, which was submitted to the Commission in January 2012 and later testified at the state legislature on the key findings of that report.

Location:	Alberta, Canada
Company:	FortisAlberta, Inc.
Description:	Julia provided expert testimony in support of FortisAlberta Inc. ("FAI"), a Canadian electricity utility, in its filing for a performance-based ratemaking ("PBR") plan with the Alberta Utilities Commission ("AUC"). The testimony provided detailed data analysis (including inflation and TFP trends), underpinning PBR economic theory, and reviews of best practices in various North American and International jurisdictions. The testimony offers back up elements for each of the various components of the PBR plan that is being proposed by FAI. Julia testified at the AUC in Spring of 2012.

Location:	USA, Canada, the Netherlands, UK, Australia
Company:	Private Company
Description:	Julia managed the writing of a white paper for Canadian electricity regulators and utilities on the comparative advantages and drawbacks of various tariff-setting regimes, from performance-based regimes to cost-of-service. This project involved a general overview of tariff-setting practices across Canadian provinces as well as highly detailed Canadian and international case studies and an examination of the key-lessons to be learned from each case. Detailed case studies covered the tariff-setting regimes in place in the UK, the Australian National Electricity Market and the Netherlands. As part of its deliverables, two workshops were conducted with a variety of regulators and utilities.

Location:	New Hampshire, United States
Company:	Public Service of New Hampshire

Description:	On behalf of Public Service of New Hampshire, Julia testified in front of the new Hampshire Senate Committee on issue of eminent domain generally and more specifically, on the power market context and near term outlook for the New England power market and reasons for the development of a new proposed transmission project known as Northern Pass.

Location:	New York, United States
Company:	Private Client
Description:	LEI developed simplified HHI screens looking at summer peak period for a client's potential acquisition of a gas-fired facility in New York. Several scenarios were developed to test the impact on HHI.

Location:	United States
Company:	Various Private Client
Description:	Triennial market power analysis: in support of various clients' application to renew market-based rate authorization under the provision of the Federal Energy Regulatory Commission ("FERC"), LEI performed Pivotal Suppliers Analysis and Market Share Analysis for the Northeast region, including New England, New York, PJM as well as the Connecticut, NYC and PJM East submarkets; as well as California and Southwest US markets.

Location:	Japan/United States
Company:	Private Client
Description:	For a Japanese client, LEI provided a study on electricity sector unbundling in the US. The study starts with an overview of the electricity sector unbundling in the US, including the history of restructuring and unbundling efforts, the categorization of unbundling, and the organizational impact of unbundling. Three case studies were also provided on specific unbundling experiences of TXU Corp., Commonwealth Edison, and Consolidated Edison.

Location:	New England, United States
Company:	Private Client
Description:	Julia led a modeling analysis, in which the market price impact of incremental wind resources was projected. LEI staff completed a simulation-based forecast of the New England system for a future test year (2015) with varying levels of wind generation. Using the multi-scenario approach, we then estimated the energy market price reductions across a range of incremental wind generation scenarios. The simulation modeling was further supplemented with statistical analysis. The one year analysis was also supplemented with sensitivities employing different baseline assumptions with respect to fuel prices.

Location:	Maine, United States
Company:	Private Client

Description:	LEI performed a fifteen (15) year simulation analysis to estimate the market impacts resulting from a new transmission interconnection (covering the timeframe 2015-2029) and project the impact on Maine customers (including Northern Maine customers). LEI evaluated the market evolution with and without the interconnection and described the potential ramifications for purchasing electricity for Northern Maine customers. The analysis also estimated the potential impact on ratepayers from the re-allocation of the ISO-NE Pool Transmission Facility rate to incorporate the Northern Maine load and franchise area under a pro forma 10-year transitional agreement. LEI performed the modeling using our up-to-date ISO-NE simulation model (which covers the energy and capacity markets), extended to represent in detail the Maritimes control area.

Location:	Arizona, United States
Company:	Private Client
Description:	Evaluation of fair market sales value of a coal-fired unit in Arizona, as required by a lease that expires in 2015. Results from LEI's proprietary modeling tool, PoolMod, on market prices and dispatch were used as inputs in the financial model, which used discounted cash flow techniques. Two cases (Base Case and High Case) were created to develop a range of value with a weighted average point estimate. In addition to the discounted cash flow model, the market approach, which looks at comparable transactions, and the cost approach, which looks at the cost of building the same facility were considered.

Location:	United States
Company:	Private Client
Description:	LEI supported the negotiation of fuel supply and energy sales agreements for a biomass to energy facility. In particular, LEI's analysis focused on the appropriateness and risk associated with price and cost escalation factors. Reviewed similar power purchase agreements and analyzed a suite of available indices.

Location:	United States
Company:	Private Client
Description:	Provided valuation services for a waste coal facility located in the Pennsylvania-New Jersey-Maryland ("PJM") regional market. Specific tasks consist of i) due diligence review of documents such as past financial statements, operational statistics report, fuel agreements and power purchase agreements ("PPA"); ii) forecasts energy and capacity prices in the PJM regional market; iii) create a pro forma financial model to evaluate the market value of the plant as of expiration of its PPA; iv) writing a final report documenting assumptions, methodologies used and modeling results.

Location:	New England, United States
Company:	Private Client

Description:	LEI prepared presentation material on the electricity market impacts and the benefits of Northern Pass Transmission project for New Hampshire and New England consumers. In addition, LEI staff assisted the client in preparation of an op-ed piece for dissemination to New Hampshire press outlets. LEI staff also attended an internal company meeting and testified on behalf of the client. Lastly, LEI staff assisted in the preparation for and attended the live New Hampshire Public Radio program "The Exchange" to discuss the benefits of the Northern Pass Transmission over the hour-long live show.

Location:	United States
Company:	Private Client
Description:	LEI provided extensive late stage development due diligence for investor in four potential merchant transmission investments. LEI prepared three presentations analyzing four proposed merchant HVDC transmission projects across the US. Analysis included detailing the development roadmap for HVDC projects and the current status of the proposed projects, identifying potential competitive threats from other similar competing transmission lines and proposed local generation, and examining the renewable needs and willingness to pay of utilities in the "sink".

Location:	New York, United States
Company:	Transmission Developers, Inc. ("TDI")
Description:	Julia led the detailed cost-benefit analysis and macroeconomic impact analysis in support of the Champlain Hudson Power Express ("CHPE") application for siting approval at the New York Department of Public Service ("DPS"). LEI's analysis on economic effects was the cornerstone of the settlement agreement reached between TDI and a number of New York agencies. Julia acted as independent expert on behalf of TDI and prepared updated study results on energy market impacts, capacity market impacts and also macroeconomic benefits stemming from the operation of the CHPE project. Julia's testimony was used in the DPS proceeding in the summer of 2012 and CHPE was successfully granted its Article VII permit. NY PSC Case 10-T-0149

Location:	Southwestern United States
Company:	Tres Amigas
Description:	Julia and her team assisted Tres Amigas LLC, a start-up company on the revenue forecasting and modeling for the second stage financing. The start-up company aims to develop, own and operate a unique three-way AC/DC transmission facility located in New Mexico. In 2010, for the feasibility analysis stage, LEI provided extensive transmission evaluation, financial modeling, price forecasting, and market analysis for the markets, including the Arizona/New Mexico/Southern Nevada sub region of the Western Electricity Coordinating Council, the Electric Reliability Council of Texas, and the Southwest Power Pool. LEI's analysis support over $15 million of development stage funding. LEI continues to serve as economic advisor to Tres Amigas, as it seeks debt and equity financing to support construction of Phase I.

Location:	Maine, United States
Company:	Maine Public Utilities Commission

Description:	LEI advised Maine Public Utilities Commission on methodologies for transmission cost allocation by comparing and contrasting alternative planning approaches and pricing models employed within the US and one international jurisdiction, the United Kingdom. The final report provided a 'strawman' recommendation for an effective cost allocation methodology, which was used by the Maine PUC to guide it in its filings at FERC related to Order 1000 and the preceding NOPR on the same issue.

Location:	Northeast United States
Company:	Private Client
Description:	Market power analysis as a result of a proposed merger: in support of a client's opposition of a proposed utility merger in the Northeast US, LEI provided a white paper analyzing the impact of the merger on competition. The white paper covers analysis on buyer market power, concerns with utility's returning to rate base generation and vertical market power.

Location:	Massachusetts, United States
Company:	Private Client
Description:	Julia Frayer served as lead expert witness for a private equity investor in matter related to a contractual dispute regarding a long term power purchase agreement between a municipal utility located in New England and a landfill gas generator. Ms. Frayer analyzed key contractual terms of the PPA and provided an expert's review of how those terms compared to the industry norm when the contract was signed and became effective. Ms. Frayer provided an independent estimate of potential contractual damages. The case was scheduled be heard in Massachusetts Superior Court, however, Julia's analysis helped support a successful settlement.

Location:	United States
Company:	NRG (various acquisitions)
Description:	In support of various acquisitions, Julia prepared expert testimony for filing with FERC, related to Market-based Rate Authorization applications, Triennial Reviews, and Section 203 filings. All applications were successfully accepted by FERC.

Location:	Northeast United States
Company:	Private Clients
Description:	In support of various acquisitions by Brascan and Emera in the Northeast announced in 2004, Julia prepared expert testimony for Market-based Rate Authorization applications, Triennial Reviews, and Section 203 filings.

Location:	Alberta and Ontario, Canada; UK; Australia
Company:	Private Company
Description:	For a Canadian client, Julia prepared a report that looks into the different capital expenditure recovery mechanisms utilized in four markets namely Australia, New Zealand, Ontario, and the UK for electric network utilities. The report also provided different options that the client can propose for its performance-based ratemaking filing.

Location:	Greece

Company:	Private Client
Description:	Market design in support of electricity sector restructuring in Greece, specifically consideration of alternatives to physical divestiture of generation assets. On behalf of PPC, the government-owned vertically integrated national utility, LEI examined the following options: virtual power plant ("VPP") auctions, contract for difference ("CFD") and physical energy swaps. In case study format, the various options were compared against the following criteria: instrument objective, contract structure, contract terms, sale platform, settlement structure and the extent of physical control right transfer. Real-world experience from France, UK, Belgium, Denmark, Netherlands, Australia, and Alberta (Canada) helped shape the discussion of comparative advantages and disadvantages, taking into account the unique concerns for Greek policymakers.

Location:	Louisiana, United States
Company:	City of New Orleans
Position:	Co-Project Manager
Description:	Julia acted as manager for LEI's engagement with the City of New Orleans. LEI was engaged to act as the independent monitor for Entergy New Orleans' solicitation of a Third Party Administrator to implement and deliver conservation and demand management programs on behalf of the utility. LEI provided guidance to Entergy and the City on the development of the request for proposals, including mandatory requirements and commercial terms. LEI oversaw the bid receipt as well as the review and selection process. A final report was provided outlining LEI's opinion as to the fairness of the overall process.

Location:	New England, United States
Company:	Private Client
Description:	Julia and her team assisted the client with certain matters pertaining to FERC investigation. Specifically, the scope of this retention includes economic and market analysis in support of a market participant in ISO New England's day ahead load response program ("DALRP"). Julia also provided affidavits and deposed in connection with FERC investigation of behind-the-fence industrial generator and participation in a wholesale power market in New England. Julia helped the client to respond to assertions of market manipulation and estimate market benefit provided through its participation in demand response program.

Location:	Northeast United States
Company:	Shell Energy
Description:	Julia provided expert testimony before FERC related to Shell Energy's sale of capacity commitments from facilities in New York to New England in an alleged market manipulation case. Julia examined market rules, operating procedures, and pricing arrangements in New England and New York at the time of the investigation, and examined the participation of Shell in the capacity markets and compliance offers in the energy markets, commenting on the economic rationale behind the client's must offer strategies in the energy market for capacity compliance.

Location:	Ontario, Canada
Company:	Coalition of Large Distributors in Ontario
Description:	Julia advised the Coalition of Large Distributors in Ontario on 3rd generation Incentive Regulation Mechanism proceedings of the Ontario Energy Board. The work involved expert testimony filed with the Board with detailed analysis of the theory behind the various components of PBR system, including inflation and efficiency gains factors, treatment of capital expenditures among others. The analysis was supplemented with comparison of actual factors and indices, and determination of the more robust and appropriate indices for the Ontario's distribution industry, including total factor productivity analysis for the sector. OEB Docket Number EB-2007-0683

Location:	Maryland, United States
Company:	Maryland Public Utilities Commission
Description:	Julia submitted testimony on behalf of the Staff of the Maryland Public Service Commission ("MPSC") to the MPSC to conduct a cost-benefit analysis in relation to the proposed transaction between Constellation Energy Group, Inc. ("CEG") and Électricité de France ("EDF") whereby EDF would purchase from CEG a 49.99% interest in Constellation Energy Nuclear Group, LLC ("CENG"). Benefits related to the decreased likelihood of a Baltimore Gas & Electric ("BGE") downgrade, increased likelihood of the Calvert Cliffs expansion being completed and several macroeconomic benefits stipulated to by EDF. Costs related to the limitation on the allocation costs of CEG corporate support services to CENG, increased risk of capital deprivation and reduced quality of service, and implications of CEG's more aggressive nuclear development. (2009; MPSC, Case No. 9173)

Location:	Eastern United States
Company:	Private Client
Description:	LEI advised a major transmission company on financial implications of proposed new 400kV transmission line to New York City and Connecticut. LEI analyzed the impact of new transmission, assuming it delivered 100% carbon-free energy, on electricity prices and emissions levels in New York and New England.

Location:	United States
Company:	Private Client
Description:	LEI was asked to evaluate third-party energy price forecast for the New England and Texas (ERCOT) regions, with a specific eye on the underlying assumptions. LEI recommended that certain key assumptions should be updated, including demand projections and CO2 price forecasts. We also argued that some underlying assumptions were unrealistic given actual market conditions, and should be adjusted or eliminated.

Location:	Maine, United States
Company:	Maine Public Utilities Commission

Description:	As the team leader of this project, Julia assisted the Maine Public Utilities Commission in developing an electric resource adequacy plan to aid MPUC in the development of a strategy for the pursuit of the long-term contracts. LEI submitted a report that builds up a set of recommendations for a long-term investment strategy based on an analysis of the current supply-demand situation, a review of the existing wholesale market rules for energy and the Forward Capacity Market, an examination of historical price trends, and review of the investment needs assessments prepared by the utilities and ISO-NE, as well as relevant sub-regional planning studies.

Location:	United States
Company:	Private Clients
Description:	Julia led a due diligence team and assisting in the exclusivity negotiations with respect to an acquisition of a 400+ MW coal fired plant in the PJM market by a group of private investors. Julia's role included management of LEI's economic appraisal, coordination of preliminary technical due diligence, negotiations with third parties on possible off-take arrangements, and oversight over financial modeling.

Location:	United States
Company:	NRG
Description:	LEI was engaged by NRG Energy, Inc. to provide testimony in opposition to the proposed acquisition of NRG by Exelon Corp (Exelon). LEI performed a preliminary Herfindahl-Hirschman Index (HHI) test for market power for all regions affected, and a Delivered Price Test (DPT), including a more detailed HHI test, for the PJM East and ComEd regions. In addition, LEI examined Exelon's post-merger optimal bidding strategies using our proprietary model of strategic, known as CUSTOMBid. LEI also assessed the impact of changes in the parent company Exelon's cost of capital on the activities of the company's two regulated subsidiaries: ComEd and PECO. LEI also estimated the impact on customer costs from potential debt downgrades following the merger, and assessed the effectiveness of Exelon's proposed ring-fencing measures.

Location:	New England, United States
Company:	Private Client
Description:	Using LEI's proprietary simulation model of electricity wholesale markets in ISO New England, LEI forecast future cash flows for a portfolio of electricity generation assets and applied the net present value analysis to evaluate the portfolio's economic value under different potential future market conditions. This analysis supported the investment fund's decision to acquire and hold the generation portfolio's distressed debt.

Location:	United States
Company:	Private Client
Description:	Julia investigated opportunities for portfolio of biomass plants to earn renewable energy revenues from RECs, capacity markets, and carbon offsets given regulations in all states belonging to MISO, PJM, and ISO-NE. Engagement also involved formulating strategies for client to optimize the generation assets' revenue potentials by exploiting the identified renewable energy opportunities.

Location:	Eastern United States
Company:	Private Client
Description:	Julia led a team analyzing potential revenues of pumped storage hydroelectric facilities (energy, capacity, ancillary services) proposed in various locations in ISO-NE and NYISO. The analysis included detailed simulations of the wholesale electricity markets, application of sophisticated statistical tools to estimate the volume and the price level of various ancillary services.

Location:	United States/Canada
Company:	Private Client
Description:	Julia led a team that assisted a major Canadian renewable power company in its economic valuation of a New England based renewable company, prior to acquisition. Work involved due diligence, analyzing the revenue potential of the potential acquiree's assets over the 2009-18 period across all major ISO-NE product markets, and separately analyzed the market power implications of the acquisition in preparation of a potential FERC application, including analysis of market power issues in ancillary services market.

Location:	United States
Company:	Private Client
Description:	Julia evaluated potential value of assets available under various regional auctions for a dominant IPP player. Julia worked with the client in composing a bid proposal by assessing market risks posed by various factors, such as fuel price shifts, merchant plant construction scenarios, site conversion potential, and transmission constraints and through extensive production cost modeling.

Location:	Maryland, United States
Company:	Maryland Public Utilities Commission
Description:	Julia submitted testimony on behalf of the Staff of the Maryland Public Service Commission (MPSC) to the MPSC to conduct a cost-benefit analysis in relation to the proposed transaction between Constellation Energy Group, Inc. ("CEG") and Électricité de France ("EDF") whereby EDF would purchase from CEG a 49.99% interest in Constellation Energy Nuclear Group, LLC (CENG). Benefits related to the decreased likelihood of a Baltimore Gas & Electric (BGE) downgrade, increased likelihood of the Calvert Cliffs expansion being completed and several macroeconomic benefits stipulated to by EDF. Costs related to the limitation on the allocation costs of CEG corporate support services to CENG, increased risk of capital deprivation and reduced quality of service, and implications of CEG's more aggressive nuclear development. (2009; MPSC, Case No. 9173)

Location:	Canada
Company:	Brookfield Power
Description:	In the matter of Hawk Nest Hydro LLC acquisition of Hawk Nest-Glen Ferris Hydroelectric Project Julia and the LEI team prepared the MBR Authorization for the FERC filing. (Docket No. ER06-1446-000)

Location:	Ontario, Canada

Company:	Private Clients
Description:	Julia prepared a market study of the Ontario electricity market for a major potential investor in Ontario's generation assets. This report contained an overview of the Ontario electricity market, including a description of market evolution, a summary of key institutions, regulatory and policy initiatives that have impacted the market landscape, and a long term projection for the market going forward.

Location:	Canada
Company:	Private Client
Description:	Julia advised a major utility in Canada in its call for tenders strategy for procuring firm capacity over a long term horizon from neighbouring jurisdictions. Julia evaluated the opportunity for purchasing capacity from interconnected jurisdictions and devising a procurement that would efficiently overcome seams issues and market design issues that attach different counting and valuation methods for capacity across jurisdictions.

Location:	New England, United States
Company:	Private Client
Description:	New England wholesale electricity markets were simulated in order to determine whether the Greater Springfield Reliability Project ("GSRP") would produce economic benefits to the New England region. In order to ensure that economic benefits were not subject to the forced outage and availability schedule of the simulated energy markets, LEI simulated the energy market with 30 different random forced outage and availability schedules. Using these simulations, a distribution of results was used to calculate confidence intervals and hypothesis tests run on the results, hence increasing the robustness of our findings. The study results were used to produce written testimony to the CSC and oral testimony was provided in late August and early September 2009.

Location:	California, United States
Company:	California Energy Commission
Description:	LEI prepared for the California Energy Commission a background report on the design evolution of a capacity market in California and its potential future impact on the generating assets in Mexico that import into the California ISO market.

Location:	Utah, United States
Company:	PacifiCorp
Description:	Julia was part of a consortium that is serving as the Independent Monitor for PacifiCorp's renewable solicitation process for the 2008R-1 solicitation process for additional renewable power supplies. The Independent Monitor will report to the Utah Public Service Commission. This process includes review and assessment of the solicitation process, documents, and modeling methodologies; valuation of the bidder pre-approved process; development of review criteria, monitoring, auditing, and validation of bid evaluation process; bid evaluation; contract negotiation. Final report and testimony has been filed with the Utah PSC. (Public Utility Commission of Oregon, Docket No. UM1368)

Location:	United States
Company:	Brascan Power Generation LLC
Description:	Bear Swamp Power Company LLC (Bear Swamp) asked Julia to perform a market power analysis in conjunction with Bear Swamp's application for market-based rate authorization. A similar study was done for Carr Street Generating Station L.P. ("Carr Street"), Erie Boulevard Hydropower L.P. ("Erie Boulevard"), and Brascan Power St. Lawrence River LLC ("St. Lawrence River"). Also for Brascan another MBR was filed that year: Brascan Power and Piney and Deep Creek LLC. (Docket No. ER05-639-000)

Location:	Kentucky, United States
Company:	Kentucky Public Service Commission
Description:	To satisfy the requirements of a recently passed statutory mandate, Julia and the LEI team conducted a broad-based analysis of current practices and the potential for reform within Kentucky's electricity industry in four areas: (i) energy efficiency and demand side management; (ii) use of renewables; (iii) full cost accounting; and (iv) tariffs. Reported results to the state's regulatory commission, including a full set of recommendations in each of the four areas for overcoming existing impediments to legislative objectives for improvements in the industry's overall efficiency and reductions in its environmental impact.

Location:	New England, United States
Company:	Private Client
Description:	LEI served as an independent economic expert, opinion on specific matters related to a market participant's participation in the day ahead demand response program implemented by ISO-NE. LEI staff reviewed the specific facts of the case related to how the customer baseline was developed and the offering strategy of the market participant in the demand response program. LEI conducted independent analysis of the decision making process that had been undertaken in support of the customer baseline and offer strategy. LEI also prepared an analysis of the market benefits created for the market as a whole through the demand reductions offered by the market participant (a customized VBA model was created to reconstruct day-ahead ("DAH") and real-time ("RT") energy market clearing prices using public historical hourly offer and bid data).

Location:	Alberta, Canada
Company:	Private Client

Description:	Julia led a team that provided a comprehensive analysis of the proposed market power mitigation measures for Alberta's electricity market for a major utility. Julia and her team looked at various scenarios and presented the likely outcomes given various generation portfolio configurations under each proposal and whether these mitigation measures will result in the desired results. Led by Julia, the LEI staff made a case that more rigorous and robust approaches are needed than the proposed measures. Additionally, Julia's team conducted a comparative analysis of the procurement processes and compensation schemes of the different ancillary services products in eight markets, namely: New York, New England, Pennsylvania-New Jersey-Maryland, Texas, UK, Alberta, Australia, and Ontario. The results of this analysis were used to support the client in the Alberta's stakeholder process to redesign a system operator's procurement process.

Location:	Ontario, Canada
Company:	Ontario Energy Board
Description:	Julia provided comments on the benchmarking methodology suggested by OEB consultants, looking at the analytical aspects of defining and benchmarking the performance of multiple utilities across long period of time. The critique provided details on how each criterion affects the benchmarking study and what are the remedies available to improve the results.

Location:	Ontario, Canada
Company:	Ontario Energy Board
Description:	Julia led a team that reviewed industry best practices in other jurisdictions and the current situation in Ontario to advise OEB on the appropriateness of the uniform transmission rate, as well as on the feasibility of moving to long-run zonally-differentiated marginal cost pricing. As part of this process, LEI undertook a comprehensive stakeholder review.

Location:	United States
Company:	Various Private Clients
Description:	Over the course of 2007 and 2008, LEI prepared over a dozen MBR filings for various markets coming under the FERC's triennial schedule as established in Order 697.

Location:	Quebec, Canada
Company:	Brascan Energy Marketing, Inc.
Description:	In the context of a transmission rate case at the Regie (Quebec) and consideration of alternative transmission rate designs, Julia led the economic analysis for the client investigating the impact on trade from increased transmission costs, involving multi-factor regression analysis of nodal electricity prices, price spreads across markets, and interchange flows (imports and exports) across borders. Julia also considered the impact of the elasticity of demand for transmission services between Canadian provinces and US markets in the Northeast for maximizing revenues in rate setting. Julia provided testimony at the Regie.

Location:	United States
Company:	Private Client

Description:	LEI was engaged by a major US utility to conduct a capacity market modeling exercise to evaluate the potential impacts to the client of different resource adequacy mechanisms. The objective of the study was to identify a market design that would provide the maximum profits at the lowest possible risk, including market and regulatory risk. LEI modeled market prices, market revenues, and gross profits under three supply-demand scenarios and tried to simulate the impact of market intervention policies on such market revenues in order to understand the potential risks and benefits to the client's baseload fleet under different market designs.

Location:	Oklahoma, United States
Company:	Oklahoma Municipal Power Authority
Description:	Julia concluded that the mitigation offer, as it was proposed, was inadequate in size and scope due to the potential for strategic behaviour and generation market power abuses. She argued that "if competitive harm created by the acquisition was to be reversed, transmission capacity upgrades were need to create sufficient competition to defeat the strategic bidding opportunities that Westar will obtain with its acquisition of the Spring Creek plant." (Docket No. EC06-48-000)

Location:	California, United States
Company:	California Independent System Operator
Description:	Julia led LEI's advisory services to the California Independent System Operator, where she and her team devised an innovative approach for evaluating the economics, environmental, and siting costs and benefits of transmission (and generation investment). Building upon the traditional economic framework for cost-benefit analysis, the LEI team devised an approach to quantitative value the expected net benefits from various infrastructure projects, taking into account market uncertainties as well as the classic deregulated market coordination problem of planning for transmission give uncertain generation investment and vice versa. A scoring technique for environmental permitting and siting issues was also developed, in order to quantify the potential impact of the proposed project on the local environment and economy, as well as to measure the impact of such factors on the project timetable and eventual net benefits to society. Real option techniques were also considered in this engagement to assess the potential value of uncertainty and the benefits for delaying various investment strategies. The methodology was also expanded to handle the potential to evaluate numerous competing projects, in recognition of the fact that transmission and generation investments (and other potential investments) could be both complements and substitutes.

Location:	Connecticut, United States
Company:	Connecticut Department of Public Utility Control

Description:	LEI evaluated projects submitted in the context of a competitive solicitation (RFP) for new capacity, aimed at reducing Connecticut consumers' Federally Mandated Congestion Charges ("FMCC"). LEI drafted and administered the RFP. LEI then served as an independent evaluator on behalf of the DPUC and performed a comprehensive evaluation of the proposed projects, using LEI's proprietary production cost model, POOLMod. Julia testified at the Connecticut Department of Public Utility Control ("DPUC") regarding the RFP process and recommended selection of winners and award of contracts.) **[DPUC, Docket No. 05-07-14PH02; FERC, ER03-563-000]**

Location:	California, United States
Company:	Private Client
Description:	For an infrastructure fund, LEI used our propriety production cost simulation model to forecast electricity prices and generation from each plant. In addition, LEI provided capacity price forecasts for California based on the Resource Adequacy Requirement (RAR) at the system and local level.

Location:	United States
Company:	Barrick Goldstrike Mines
Description:	Julia wrote the report that served as an Addendum to the market power analyses that were filed with FERC in Docket No. ER05-665-001. The objective of this Addendum was to address the items requested by FERC in the deficiency letter issued on June 23, 2005 in this docket.

Location:	California, United States
Company:	California Energy Commission
Description:	LEI was contracted by CEC to study the capacity products that have been traded in other jurisdictions, and more broadly examine trading platforms that may be useful models for California if a voluntary trading mechanism was implemented to assist market participants in trading capacity to achieve compliance with Resource Adequacy Requirements. Additionally, LEI produced a report to cover the functional requirements for a bulletin board posting and trading platform for bringing buyers and sellers together and allow trading of the various capacity products supported by RAR in California, such as System RA Capacity and Local RA Capacity, and possibly some form of Import RA Capacity. LEI also covered the functional requirements for a tracking system, including title tracking, certification of transactions, and possibly, compliance filing.

Location:	California, United States
Company:	California Energy Commission

Description:	LEI advised the California Energy Commission and other stakeholders on the design and development of a web-based software system supporting the trading of an electricity capacity product tracked by state regulators in connection with resource adequacy requirements. LEI analyzed similar systems in other jurisdictions, defined potential core functionalities of the California system – including, for example, posting of bids and offers. The engagement also required LEI to track titles, examine bilateral and/or multi-lateral trades and compliance reporting. LEI conducted a survey of industry participants to identify required and desired system capabilities.

Location:	Texas, United States
Company:	Texas Public Utilities Commission
Description:	In September 2005, Julia's proposal for pricing safeguards in the wholesale market, referred to as the Peaker Entry Test, was submitted to the Public Utility Commission of Texas as an alternate to the Commission staff's proposal initially under Project No. 24255 which was later moved to and renamed by the PUCT a Project No. 31972. In April 2006, the PUCT adopted a variant of this proposal for use as pricing safeguards – the Scarcity Pricing mechanism (as specified in the above mentioned project). Under Project No. 29042 in September 2005 Julia looked at the Pivotal Supplier Test and supplied a critique of the PUCT staff's initial market power mitigation proposal. In June 2005, Julia participated on panel discussing market monitoring issues, as well as market power safeguards for wholesale electricity markets. In 2004, she also provided testimony on pricing safeguards proceeding, which looked at alternative market power testing procedures for market power, analyzed implications on investment, and discussed efficiency consequences of certain bidding behavior. She also prepared and filed comment testimony and quantitative analysis on questions of market definition and market integration for the Public Utility Commission review in Project No. 29042. In November 2005, by the PUCT decision, both, Project Nos. 24255 and 29042 were rolled into the Project No. 31972.

Location:	Connecticut, United States
Company:	Connecticut Department of Public Utility Control
Description:	The Department of Public Utility Control retained the services of LEI to assist the DPUC in monitoring the power procurement processes for Connecticut Light & Power's (CL&P) Transitional Standard Offer auction in November 2004 for services in 2005 and 2006, and once again selected LEI in September 2005 to monitor the November 2005 auction for services in 2006. Julia led LEI's team in providing advisory services to the DPUC, including guidance on communications protocols, design of sales contract agreement (between CL&P and winning bidders), and also valuation of final bids vis-à-vis the forward market alternatives available to the utility. In November 2004 and 2005, Julia filed an affidavit after completion of the procurement process which the Commissioners used to approve the process and the contracts between CL&P and the winning bidder. [DPUC, Docket No. 03-07-18PH02]

Location:	United States
Company:	Private Clients

Description:	Testimony at FERC on market power issues on behalf of intervener in proposed Exelon-PSEG merger per Section 203 of the Federal Power Act. In May 2005, Julia provided direct and supplemental testimony outlining key considerations relating to the potential for adverse competitive effects in light of the proposed merger and recommended additional mitigation measures to cure horizontal market power concerns through independent analysis of merger's impact on wholesale energy and capacity markets in PJM.

Location:	United States
Company:	Private Client
Description:	Julia headed the analysis of long-term price forecasts and energy market dynamics for many of the regions in the US and Canada, including New England, Pacific Northwest, California, Alberta, Southwest Power Pool, SERC, the Midwest US (ECAR, MAIN, and MAPP), Maritimes, Ontario, New England, and PJM. In this practice area, she manages a team of economists that use a variety of modeling tools to forecast one-year to fifteen-year wholesale energy, capacity (where relevant), and market-based ancillary services price forecasts. As part of the modeling effort, LEI proprietary dispatch simulation model, POOLMod, as well as other tools that have been developed by LEI, such as CUSTOMBid, ConjectureMod, ViTAL, and LEI's real options spark-spread module. This type of modeling effort required detailed investigation of the micro and macro-economic issues facing these regional markets: demand profiling, growth forecasting, reserve margin and new entry activity assessment. Such analyses are used by clients in establishing market values for assets they have targeted to acquire, consideration of portfolio risk and exposure, and assessments of procurement opportunities. This same modeling has supported regulatory analysis of utility acquisitions and planning strategies, consideration on the impact of market rules and as "reservation prices" for sale processes.

Location:	Alberta, Canada
Company:	Alberta Department of Energy
Description:	As part of the LEI team, Julia managed the theoretical analysis and quantitative simulation modeling in the design and testing of recommended new regulatory regime. Analysis and recommendations will be presented to stakeholders in the spring of 2005.

Location:	California, United States
Company:	California Public Utility Commission
Description:	Julia served as an expert witness on economic issues related to pricing, investment signaling and data confidentiality in Resource Adequacy and Procurement Proceedings at the California Public Utility Commission in November-December 2005 on behalf of the California Energy Commission. Julia authored direct and rebuttal testimony on these issues and testified in San Francisco in late November 2005.

Location:	Canada
Company:	Private Clients

Description:	In response to government proposed policies on what defined a "fair, efficient, and openly competitive" market, LEI prepared a detailed white paper and market analysis on the proposed market power tests to be added regulation, and specifically demonstrating the adverse effects of the 20% hard cap market share limit proposed by Department of Energy ("DOE"). White paper was filed as testimony with the DOE in their consultation on Section 6 of the Electric Utilities Act.

Location:	Southwestern United States
Company:	Private Client
Description:	Economic advisory on market power mitigation tests for a large US-based utility in the Southwestern part of the US, consulting on market design features related to a proposed nodal market, including most significantly the market power analysis framework. LEI proposed strategy and is assisting in the development of an implementation framework for the local market, including prepared reports for the market design team and state commission. In addition, the approach will be proposed for federal review at FERC.

Location:	United States
Company:	Numerous Clients – FERC
Description:	In support of numerous acquisitions by various Independent Power Producers and generators across the US, Julia prepared expert testimony for Market-based Rate Authorization applications, Triennial Reviews, and Section 203 filings. All Market-based Rate Authorization applications were successfully accepted by FERC.

Location:	United States
Company:	Private Client
Description:	LEI prepared and filed testimony and quantitative analysis on questions of market definition and market integration. In June 2005, Julia participated on a panel discussing market monitoring issues, as well as market power safeguards for wholesale electricity markets. In 2004, she also provided testimony on pricing safeguards proceeding, which looked at alternative market power testing procedures for market power, analyzed implications on investment, and discussed efficiency consequences of certain bidding behavior.

Location:	Connecticut, United States
Company:	Connecticut Department of Public Utility Control
Description:	In her affidavits in 2004 and 2005 before the Connecticut Department of Utility Control, Julia described the procurement processes of Connecticut Power and Light Company ("CL&P") TSO. Her testimony outlined best practice and procurement processes for DPUC to adopt in order to have the most efficient and competitive process which would result in the lowest price possible for the electricity consumers under CL&P's TSO.

Location:	United States/Canada
Company:	Private Client

Description:	For a major Canadian utility, Julia undertook a comprehensive market assessment of the New England REC markets, and specifically the Massachusetts and Connecticut markets, under three different scenarios, the status quo, with the utility's resource commercialization schedule, and assuming sporadic participation by the utility.

Location:	United States
Company:	Private Clients
Description:	Using LEI's proprietary simulation model of electricity wholesale markets in ISO New England, LEI forecast future cash flows for a portfolio of electricity generation assets and applied the net present value analysis to evaluate the portfolio's economic value under different potential future market conditions. This analysis supported the investment fund's decision to acquire and hold the generation portfolio's distressed debt.

Location:	United States
Company:	Private Client
Description:	LEI was engaged by a large industrial customer to help review of power purchasing options at one of its Southeastern facilities over the next three years. We assessed the probability of a supply interruption over the next three years due to the state of the transmission system in this region. We also assessed the facility's options for purchasing power for this load in the wholesale market.

Location:	United States
Company:	Private Client
Description:	LEI conducted an indicative valuation of a proposed new transmission line, known as the International Transmission Line. LEI forecasted the revenues associated with the project and combined this revenue forecast with the estimated costs of the project to arrive at an estimate of the net present value of the project and return on investment.

SPEAKING ENGAGEMENTS:

When	Description
July 30, 2015	Julia Frayer "Implications of Energy Infrastructure Investment on Local Economies in New England", REMI E3 Conference 2015: Energy, the Environment and the Economy, Amherst, Massachusetts, United States
June 15, 2015	Julia Frayer "Renewables: No Longer a Noble Way to Lose Money?" Moderator. SuperReturn US 2015 Conference, Boston, Massachusetts, United States
April 8, 2015	Julia Frayer "Perspectives on future trade opportunities between Canada and the US, and benefits to US consumers" EUCI US/Canada Cross Border Power Summit Conference, Boston, Massachusetts, United States
April 1, 2015	Julia Frayer "Are transmission expansions and upgrades compatible with both small and large scale clean energy?" Panelist. Southwest Clean Energy Transmission Summit, Albuquerque, New Mexico, United States

Sept 10, 2014	Julia Frayer "CEO Panel" Moderator. ABB Energy & Automation Forum, Calgary, Alberta, Canada
June 18, 2014	Julia Frayer "International Views and Addressing the Need for More Underground Transmission in the US" Panelist. Platts 2014 Transmission Planning and Development Conference: Ensuring Grid Reliability, Planning Timelines, and a Robust Market's Relationship with New Build, Arlington, Virginia, United States
Sept 23, 2013	Julia Frayer "System Operator's Response to 1000 – How Can the Various Regions Work Together?" Moderator. Platts 2013 Transmission Planning and Development Conference, Washington DC, United States
Jan 11, 2013	Julia Frayer "Merchant Transmission: Planning and Development and Lessons Learned from North America", Integrated Transmission Planning and Delivery, Imperial College - Workshop for OFGEM, London, United Kingdom
Sep 5, 2012	Julia Frayer and Shawn Carraher "Demand for wind in New England: an economist's perspective", AWEA Regional Wind Energy Summit, Portland, Maine, USA
May 22, 2012	Julia Frayer, "Cost effective procurement of Renewables to Meet Policy Requirements", NECPUC Symposium, Rockport, Maine, USA
Mar 16, 2012	Julia Frayer, Shawn Carraher, and Yifei Zhang, "Best Practices for Transmission Asset Valuation", Transmission Grid Conference, London, United Kingdom
Oct 10, 2011	Julia Frayer "How effective is US technology policy on clean energy." 30th USAEE/IAEE North American Conference, Washington, DC, USA
Jun 21, 2011	Julia Frayer "Are Markets Ready for New Energy Storage Technologies?" 34th IAEE, Stockholm, Sweden
Jun 7, 2010	Frayer, Julia, Furhana Husani, and Yunpeng Zhang "Long Term Market Impact of Demand Response" 33rd IAEE International Conference, Rio de Janeiro, Brazil
Jun 21-24, 2009	Frayer, Julia, Zvika Neeman, and Matthew Wittenstein "Applications of Information Policy Principles from Auction Theory in the Deregulated Electricity Market" 32nd IAEE International Conference, San Francisco, California
Jun 10, 2005	Frayer, Julia "Prepared Presentation of Julia Frayer for Market Monitoring and Surveillance in the context of Market Design." Panelist, PUCT Workshop for Project #28500, Austin, Texas
Jan 27, 2005	Frayer, Julia "Written Statement of Julia Frayer for the January 27th 2005 Technical Conference in Docket RM04-7-000" Panelist, FERC Technical Conference, Washington D.C.
Nov 24, 2004	Frayer, Julia "Competitive procurement options for Ontario's LDCs" Speaker, APPrO 2004 Conference, Toronto, Ontario (Canada)
Nov 2004	Frayer, Julia, Nazli Uludere, and Sam Lovick "Beyond market shares and cost plus pricing: designing a horizontal market power mitigation framework for today's electricity markets." *Electricity Journal*
Mar 30, 2004	Frayer, Julia "The World Changed on August 14th: the (Second) Great Northeast blackout." Chairman of Panel Session, Electric Power Conference 2004, Baltimore, Maryland
Mar 31, 2004	Frayer, Julia "Alternative to LMP pricing for transmission: a case study of the ICRP approach used by National Grid Company in the UK." Speaker, Electric Power Conference 2004, Baltimore, Maryland

Mar 12, 2003	Frayer, Julia "Big ticket leasing - what next for the future?" Panelist, Big Ticket Leasing 2003, London (United Kingdom)
Nov 28, 2001	Frayer, Julia "Evaluating the Electron Highway" Speaker, IPPSO 2001 Conference, Richmond Hill, Ontario (Canada)
Nov 2001	Frayer, Julia and Nazli Uludere "What is it worth? Application of real options theory to the valuation of generation assets" Electricity Journal
Jul 15 2001	Goulding, A.J., Julia Frayer, Jeffrey Waller "X Marks the Spot: How UK Utilities Have Fared Under Performance-Based Ratemaking" *Public Utilities Fortnightly*
Mar 22, 2001	Frayer, Julia "How much is it worth? Applying real options valuation framework to generation assets" Speaker, Electric Power 2001, Baltimore, Maryland
Mar 1, 2001	Goulding, A.J., Julia Frayer, Nazli Z. Uludere "Dancing with Goliath: Prospects After the Breakup of Ontario Hydro" *Public Utilities Fortnightly*

Resume of Holmes, J. Patrick

J. PATRICK HOLMES

Project Manager

Mr. Holmes serves Burns & McDonnell as a project manager in the Construction Design-Build Division. Mr. Holmes has worked on numorous transmission line projects, including the $1 billion New England East-West Solution (NEEWS) Program, the $630 million Susquehanna-Roseland Project, the $1.1 billion Middletown-Norwalk Transmission Line Project and the $1.2 billion Bergen-Linden Corridor (BLC) Project. In addition to his transmission experience, he also has a background in nuclear operations. Mr. Holmes is currently serving as a project manager for Eversource on the Bloomfield-Windsor Upgrade Project and the Greater Hartford Central Connecticut Reliabilty Project.

EDUCATION

- B.S., Mechanical Engineering

10 YEARS WITH BURNS & MCDONNELL

21+ YEARS OF EXPERIENCE

A summary of his experience is provided below.

Greater Hartford Central Connecticut (GHCC) | Eversource Energy
Hartford Connecticut | 2015-Present

Project Manager. Mr. Holmes currently serves as a project manager on the $39 million Bloomfield -Windsor Upgrade Project which consists of approximately 6.9 miles of 115kV double circuit tower separation and rebuild, breaker modifications at Bloomfield and North Bloomfield Substations and the 115kV transmission line loop in at the Rood Avenue Substation. Mr. Holmes also currently serves as project manager on the $61 million Greater Hartford Central Connecticut Reliability Project which scope consists of an approximately 3.7 mile (1.1 miles of underground XLPE cable and 2.6 miles of overhead) new 115kV transmission line from Newington Substation to South West Hartford Substation.

Bergen-Linden Corridor Project | PSE&G
Northeast New Jersey | 2014-2015

Project Manager. Mr. Holmes served as a Project Manager for the $400 million underground (UG) transmission cross-linked polyethylene (XLPE) and high-pressure fluid filled (HPFF) portion of the $1.2 billion Bergen-Linden Corridor (BLC) Project. Mr. Holmes supported the initial planning, scheduling, engineering, preliminary field investigations and contract procurement phases of the UG BLC Project. The BLC project will replace the existing electric transmission system from Bergen to Linden, NJ, ensure reliable electric service, eliminate anticipated transmission constraints, and respond to PJM/Federal Energy Regulatory Commission (FERC)-mandated infrastructure expansion. The project will eliminate electric system capacity issues in Northern New Jersey, providing better power quality in the region. The UG portion of the Project involved the installation of 21.5 circuit miles (64.5 total miles) of 345kV XLPE underground transmission cable including two 5,000kcmil, 6,700ft long sections under Newark Bay which will be the longest continuous 345kV cable sections installed by trenchless method in North America.

The Susquehanna-Roseland Transmission Project | PPL Electric / Delaware Water Gap (DEWA) National Park Service
Bushkill, Pennsylvania | 2013-2014

Project Manager Mr. Holmes served as a project manager on the Susquehanna-Roseland Transmission Project. Mr. Holmes managed the segment of the Project that consisted of four miles of 500-kV and 230-kV transmission lines constructed in

J. PATRICK HOLMES

(continued)

accordance with a National Park Service's Special Use Permit. He was responsible for managing contracts, construction, real estate and directly coordinating with the client and park service personnel.

The Manchester to Meekville Project | Eversource Energy (formerly Northeast Utilities)

Connecticut | 2012-2013

Project Manager Mr. Holmes served as the project manager on the Manchester to Meekville Transmission Project, part of the overall $1 billion New England East-West Solution Program. The Project installed 2.7 miles of new 345-kV transmission line along with substation upgrades. He was responsible for managing contracts, construction, real estate, permitting, project controls and client interfacing.

Land-Based Steaming System | Electric Boat

Groton, Connecticut | 2011-2012

Project Manager Mr. Holmes served as a project manager and provided project management and client liaison support for the design, construction and start-up services of a complete steam boiler system to support the testing and commissioning of nuclear submarines during their construction phase. The Project's design concept aided in decreasing the overall construction schedule of submarines by allowing certain commissioning activities to be performed on land versus in the water.

The New England East West Solution (NEEWS) | Eversource Energy (formerly Northeast Utilities)

Connecticut and Massachusetts | 2008-2011

Project Manager/Real Estate Manager Mr. Holmes served as both a project manager and the real estate manager on the $1 billion dollar New England East-West Solution Program in Massachusetts and Connecticut for Northeast Utilities. The project consists of 100+ miles of 345-kV overhead transmission, 45+ miles of 115-kV overhead transmission and approximately 17 substation upgrades.

The Middletown-Norwalk Transmission Project | Northeast Utilities

Southwest Connecticut | 2007-2008

Project Manager Mr. Holmes served as one of the project managers on the 34- kV XLPE underground transmission portion of the $1.1 billion Middletown-Norwalk Project. Burns & McDonnell was the program manager on the project with full responsibilities of the detailed design, procurement, public relations, land acquisition, field investigations and construction management. Mr. Holmes was the project manager responsible for overseeing four horizontal directional drills under rivers and railroads and one horizontal boring of a railroad crossing. The $400 million-plus underground portion of the project consists of 24 miles of 345-kV XLPE and 1 mile of 115-kV XLPE.

Amgen, Biopharmaceutical | Hart Design Group*

West Greenwich, Rhode Island | 2006-2007

Project Manager Mr. Holmes served as a project manager and was responsible for planning and managing utility projects for a biopharmaceutical plant. He was also responsible for cost estimates and management presentations for execution funding. He coordinated plant support organizations, project engineering, maintenance, operations and subcontracts. He simultaneously managed multiple projects involving civil, electrical and mechanical disciplines.

J. PATRICK HOLMES

(continued)

Dominion Nuclear Power Station | Spear Group*

Waterford, Connecticut | 2006

Mechanical and Civil Construction Representative Mr. Holmes served as a mechanical and civil construction representative for large nuclear reactor coolant system component replacement. He was responsible for overseeing the mechanical, structural, heavy rigging and electrical implementation associated with the Unit 2 Reactor Coolant System Pressurizer (100 ton) Replacement Project. He was responsible for installation of all project piping and structural steel. He coordinated daily activities with site departments including safety, engineering, contractors, procurement, trade personnel, quality control and operations department. He oversaw onsite contractors and vendors for material fabrication and contract compliance.

Connecticut Yankee Decommissioning Project | TSSD*

1999-2006 | 2004-2006

Project Manager Mr. Holmes served as a project manager for the Decommissioning and Dismantlement of the Connecticut Yankee Nuclear Power Station (est. $55 million). He oversaw prime subcontractors for Reactor Building Demolition & Interior Commodities Removal, Groundwater Remediation Project and Remediation and Dredging of Canal, which included design of waste water treatment and filtration systems for dredge spoils. He was accountable for tracking schedule adherence, tracking personnel and equipment and the review of subcontractor document submittals. He coordinated and led interdepartmental meetings and weekly action item meetings. He generated requests for proposals and reviewed bid submittals. He coordinated subcontractor mobilization and training.

Radiation Safety & Control Services*

2003-2004

Project Field Engineer/Manager Mr. Holmes served as a project field engineer and manager. He was responsible for project activities and assignments of seven field engineers, the operations department and site administrator. He was also responsible for the packaging, removal and shipment of plant Reactor Pressure Vessel; 1100 Ton lift. He served as the lead field engineer responsible for detailed planning, engineering and schedule maintenance. He oversaw subcontractors. He engineered site building ventilation units. He was also responsible for the modification and testing of waste water treatment system.

Bechtel Power Corporation*

1999-2003

Field and Mechanical Engineer Mr. Holmes served as a field and mechanical engineer. He was the engineer responsible for design and operation of filtration systems supporting refueling cavity cleanup. He engineered and oversaw contractor operation of large scale filtration system to de-sludge highly radioactive material from refueling cavity. He engineered and coordinated design for the first-time use of diamond wire to cut steel nozzles from reactor pressure vessel. He was also the engineer in charge of design, construction and system operation of 400 gpm pump and piping system. He served as the systems engineer for the reactor coolant system.

Connecticut Yankee Full System Chemical Decontamination | Duke Engineering & Services*

Marlborough, Massachusetts | 1996-1999

Mechanical Engineer Mr. Holmes served as the mechanical engineer in support of CT Yankee Full System Chemical Decontamination. He designed ASME B3 1.1pump and piping systems, performed thermal fluid calculations, and generated change packages and operation procedures. He designed and performed startup testing of pump and piping systems to support decontamination efforts. He oversaw contractors.

J. PATRICK HOLMES

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Yankee Rowe Nuclear Power Station | Duke Engineering & Services*

Marlborough, Massachusetts | 1996-1999

Mechanical Engineer Mr. Holmes served as a mechanical engineer at Yankee Rowe Nuclear Power Station responsible for coordinating design and field construction and startup of propane tank farm and piping system to support Radwaste Temporary Evaporator Island; sized supply piping and regulating systems for required and future gas usage.

Commonwealth Gas Company*

Southborough, Massachusetts | 1995-1996

Mechanical Engineer Mr. Holmes served as a mechanical engineer and designed intermediate and low pressure natural gas distribution piping systems for trans bridge applications which included pipe stress analysis, permitting, material and component selection, budget, cost control and field implementation. Interfaced with municipal, state and railroad agencies throughout bridge design/refurbishment phases to identify utility bays and support structures. He researched existing gas lines for potential interferences/obstructions for highway construction projects.

**denotes experience prior to joining Burns & McDonnell*

Resume of Mango, Louise F.

LOUISE F. MANGO

EDUCATION

MBA, State University of New York at Buffalo
M.S., Natural Resource Planning, Michigan State University
B.S. /B.A., Botany & Economics, Duke University

SUMMARY OF EXPERIENCE

Ms. Mango, who in 1989 founded and presently serves as President of Phenix Environmental, Inc. (Phenix), is experienced in conducting environmental analyses for a wide range of energy development projects for clients in both the public and private sectors. She has particular expertise on projects in the northeastern U.S. (including Connecticut), as well as in New York State, but has completed successful environmental studies throughout the country. She has prepared and supported detailed siting and permitting applications for electric transmission facilities, natural gas and oil pipelines, among others, and has coordinated environmental compliance for project construction.

Ms. Mango specializes in providing environmental services as part of multidisciplinary project teams, and excels in project coordination, report writing, environmental planning, permitting, and environmental oversight during construction. She has prepared and managed feasibility studies, multidisciplinary technical analyses, environmental impact evaluations, and regulatory applications for projects such as natural gas/oil transmission pipelines, electric transmission facilities (including overhead and underground transmission lines, substations, and switching stations), highways, urban redevelopments, and infrastructure facilities.

Ms. Mango brings to all of her work a unique combination of environmental management proficiency and practical, hands-on experience in ecologically-sound project development. She has managed or performed work in a wide variety of environmental areas, including wetland studies, stormwater permitting, cultural resource analyses, coastal zone consistency review, biological studies, land use/socioeconomic evaluations, visual resource investigations, construction oversight and monitoring, and hazardous materials management. She also has routinely worked as part of project teams to prepare detailed project feasibility studies, alternatives analyses, capital cost assessments, constructability reviews, environmental permit applications, and construction monitoring plans.

She conducted environmental studies and environmental monitoring for the Connecticut Siting Council (Council), and has prepared and supported detailed applications to the Council on behalf of private utility companies. She has served as an expert environmental witness before various energy siting boards, including the Council and the New York State Public Service Commission, and also was the designated natural gas transmission pipeline industry representative to the Connecticut Governor's Task Force on Long Island Sound (in 2002-2003). As part of her work on the Task Force, Ms. Mango evaluated the feasibility of alternatives to traditional energy sources, including wind energy, resource recovery, photovoltaics, and fuel cells, as well as methods to reduce the demand for energy through conservation, load management, and demand response programs.

In addition, Ms. Mango has decades of experience in providing environmental input to and/or managing the preparation of federal, state, and local permit applications, and has served as the project manager for scores of Environmental Impact Statements (EISs), Environmental Assessments (EAs) and Environmental Reports (ERs). She has assisted clients in submitting applications for U.S. Army Corps of Engineers (USACE) Section 10/404 permits, state coastal zone consistency and water resource management agencies approvals (Section 401 water quality certifications, storm water management permits), and cultural resource approvals (from State Historic Preservation Offices and the Advisory Council on Historic Preservation).

She also has supervised the preparation and implementation of various special mitigation and monitoring plans, for both linear energy developments and other facilities. These have included detailed Development and Management (D&M) plans as required for Council-approved projects; wetland survey and multi-year (post-construction) monitoring plans; spill prevention plans; cultural resource surveys and data recovery/public education plans; endangered species surveys and mitigation plans; visual impact mitigation programs; invasive species (vegetation) control plans; erosion/sediment control and revegetation plans; and right-of-way (ROW) management plans. In addition, Ms. Mango has conducted third-party oversight and planning services for energy development facilities throughout the U.S.

REPRESENTATIVE PROJECT EXPERIENCE

ELECTRIC TRANSMISSION LINES

Greater Hartford-Central Connecticut Reliability Project, CT: Working for The Connecticut Light and Power Company doing business as Eversource Energy (Eversource), for the past two years, Ms. Mango has been part of a multi-disciplinary team planning and developing the Greater Hartford-Central Connecticut Reliability Project (GHCCRP), which involves an approximately 3.7-mile new 115-kilovolt (kV) transmission line in Newington, West Hartford, and Hartford, CT, as well as proposed related modifications to two existing substations and a tap. As part of a team of project engineers (Burns & McDonnell), specialized environmental consultants, and Eversource legal experts, assessed alternative routes and line design configurations, including the use of a portion of an Amtrak railroad corridor occupied by both rail lines and the Connecticut Department of Transportation's (ConnDOT's) busway (CT*fastrak*). Conducted field reviews and worked with the team to prepare a Municipal Consultation Filing (MCF), per Council requirements, and to refine and assess a route for the new transmission line involving a hybrid underground/overhead configuration in order to maximize the use of ROWs through the densely-developed Greater Hartford area and, thereafter to prepare (working with others on the team) the project application to the Council.

Southwest Connecticut Reliability Project, CT: For this Eversource project involving a new, approximately 3.4-mile new overhead 115-kV transmission line between Plumtree Substation and Brookfield Junction (along an existing Eversource ROW in the municipalities of Bethel, Danbury, and Brookfield, CT), as well as related modifications to Stony Hill Substation (located in the Town of Brookfield) and Plumtree Substation (in the Town of Bethel), worked with Eversource's project team to identify and assess the viability of alternative routes and line design configurations in this densely developed area of western CT, assisted in drafting or reviewing environmental and other sections of the MCF and application to the CSC, performed field reviews of the Project route and alternatives, and served as an expert witness during the Council hearing on the project. Working with others on the project team, prepared a D&M Plan for the project, after the receipt of the Council's approval.

Frost Bridge to Campville 115-kV Transmission Project, CT: For this 10.4-mile new Eversource 115-kV line in north-central CT, worked directly for Eversource, coordinating with project engineers (Burns & McDonnell) and specialized environmental consultants to assess alternatives, prepare a MCF (per CSC requirements), prepare a visual resource assessment, and then complete an application to the CSC. Assisted in responding to CSC interrogatories concerning the application and subsequently testified before the CSC as the lead environmental witness. After the CSC approved the project, worked with the project team to prepare separate D&M Plans for the transmission line and substation work. All work for the application and D&M Plans was completed as scheduled. Subsequently, assisted in planning for the commencement of construction; currently working as part of the environmental compliance/oversight team during the construction of the project.

Towantic 1730/1710 Line Upgrades Project, CT. For this line upgrades project (required to avoid line overloads as a result of changes to power flows on the transmission grid after Competitive Power Ventures Towantic Energy Center's 785-megawatt generating facility in the Town of Oxford is put into service in 2018, coordinated with Eversource and project engineering/environmental consultants to prepare a detailed Petition for a declaratory ruling to the Council. Conducted field reviews of the proposed line upgrades in the City of Milford and Town of Stratford and worked with the project team to assure that the Petition mapping and text provided a clear and concise description of the required line upgrades. The Council concurred with Eversource's request for a declaratory ruling.

Interstate Reliability Project, CT, MA, and RI: As a subcontractor to Burns & McDonnell, working for Northeast Utilities (NU, now Eversource), was involved in all aspects of this new 345-kV transmission line project, ranging from work on initial feasibility studies, through siting/permitting, and construction. Initially, coordinated with corporate counsel and Project engineers and environmental consultants to compile overall systems alternatives analyses of different 345-kV transmission system options in CT, MA, and RI; served as primary editor in the preparation of a MCF and Application for a Certificate from the CSC (Project involved 11 towns in northeast CT); assisted in the preparation of the Project's USACE Section 404 Clean Water Act permit application; and coordinated with the USACE to prepare a federal Environmental Assessment regarding a 1.5-mile alignment through properties owned by the federal government in the towns of Mansfield and Chaplin. Served as expert environmental witness during the CSC evidentiary hearings; and, after the CSC's approval, worked with Project engineers to prepare detailed D&M Plans. Worked with the Project team to compile the application to the Connecticut Department of Energy and Environmental Protection (CT DEEP) for a Clean Water Act Section 401 permit for the Project. Involved in construction compliance program. Subsequently, served as the compliance manager for the construction of the project, leading a team of environmental inspectors and coordinating closely with project engineers and construction contractors. The project was completed over a two-year period, and put into service on schedule, on budget, and with no environmental regulatory compliance issues.

Development & Management Plans: Bloomfield to Windsor 115-kV Transmission Line Upgrades Project, CT: This project involves upgrades to three substations and to two 115-kV transmission lines in the towns of Bloomfield and Windsor, CT. After the CSC issued a Declaratory Ruling indicating that a D&M Plan was required for the proposed transmission line and substation upgrades, worked directly for Eversource and coordinated closely with Burns & McDonnell and other project consultants to prepare both a D&M Plan for the three substation upgrades and a separate D&M Plan for the 115-kV transmission line upgrades. All work for the D&M Plans was completed as scheduled.

Greater Springfield Reliability Project, CT and MA: On behalf of Northeast Utilities (NU), worked with the Project engineering team and legal advisors to prepare 345-kV and 115-kV Project environmental and alternatives analyses, as well as in the preparation and review of environmental

portions of Municipal Consultation Filings and Applications to the Council and to the Massachusetts Energy Facilities Siting Board (EFSB). Conducted field reconnaissance of alternative routes, including underground and overhead configurations for both the 345-kV and 115-kV components. Served as expert environmental witness during testimony before the COUNCIL and in joint hearings before the Council and the EFSB. Also prepared environmental portions of Findings of Fact for the Council, as well as legal briefs for the Council and the EFSB.

Application, Expert Witness, and Council and Stormwater Environmental Inspector, Glenbrook Cables Project, CT: Provided consulting services to The Connecticut Light and Power Company (CL&P) and subsequently to Burns & McDonnell, Inc. for all environmental aspects of the project, including the Council's required Municipal Consultation Filing and subsequent application for the construction and operation of a new, 8.9-mile 115-kV underground cable system, aligned within congested urban areas of Norwalk, Darien, and Stamford. Conducted environmental analyses; attended open houses concerning the project; and prepared sections of the application. Prepared responses to interrogatory questions; drafted pre-filed testimony; served as an expert witness during hearings; and assisted in the preparation of CL&P's Finding of Fact and brief. In addition to the Council process, coordinated with other involved agencies, and compiled data for permit application submissions to the USACE and the Connecticut Department of Environmental Protection (CTDEP). Subsequently, performed environmental inspections on behalf of the Council. Work included inspection for compliance with stormwater pollution control requirements, as well as with federal and state permit conditions. Provided weekly inspection reports, over a 2.5-year period.

Middletown – Norwalk Electric Transmission Project, CT: Provided consulting services to CL&P and UI during the preparation of a municipal consultation filing and then an application to the Council for the construction and operation of a new 69-mile 345-kV transmission line to serve southwest Connecticut. Performed environmental analyses; compiled environmental and other sections of the Council application; provided expert witness testimony; and assisted in the preparation of project applications for other state and federal permits, including those from the USACE and CTDEP Office of Long Island Sound Programs (OLISP) for crossings of the coastal resources in lower Fairfield County, including the Housatonic, Pequonnock, and Saugatuck rivers. Provided expert environmental witness testimony during adjudicatory hearings before the CTDEP regarding the navigable river crossings. After the Project was approved, worked under the direction of the Council in conducting weekly inspections of electric transmission line construction sites to assess compliance with Connecticut environmental requirements, including the *2002 Connecticut Soil and Erosion Control Guidelines*. Work spanned two years and included site inspections throughout the route of the underground transmission line in Bridgeport and Stratford, as well as the preparation of weekly compliance reports (accompanied by photographic documentation) that were submitted to the Council and to the involved municipalities.

Bethel – Norwalk 345 kV Transmission Project, CT: For the 345 kV transmission line between Bethel and Norwalk, worked for CL&P (2001 – 2003) on the preparation and support of select portions of the Council application. Assessed project need and prepared descriptions of effects of project on New England power grid and on provision of new capacity to southwestern Connecticut. Conducted analyses of consistency of project with local land use plans, provided technical input on environmental matters during testimony before the Council and assisted in preparation of Findings of Fact and project brief.

Shelton (Pootatuck) Substation, Shelton, CT: For The United Illuminating Company (UI), conducted alternatives analysis and prepared environmental evaluations in support of an application to the CSC for a new substation, located on a former brownfields site adjacent to the Far Mill River and State Route 8. Conducted biological studies of current site conditions, identifying a jurisdictional

wetland, which became established (after site remediation) over a former asphalt parking area. Worked with UI to prepare applications to the CSC (served as expert environmental witness) and for the USACE for a Category II General Permit.

Environmental Field Studies and Plans, P & MK Electric Transmission Line, NY: For a major regional electric utility in the Hudson River valley, conducted detailed environmental field studies (e.g., land use, endangered species, wetlands, streams), assisted in preparation of permit applications (e.g., USACE Section 404 permit, stormwater management permit, cultural resource approvals) and, working with engineering and ROW experts, prepared an Environmental Management and Construction Plan (EM & CP), per NYSPSC requirements, that identified construction and mitigation procedures for transmission line work. Unique plans for construction included use of helicopters to transport equipment and supplies to remote areas of the Catskill Mountains, as well as special field studies, monitoring, and construction timing restrictions to avoid impacts to an endangered species of rattlesnake.

South Norwalk Electric Works (SNEW) Electric Substation Application, CT: As part of a team headed by Northeast Generating Services (NGS) Company, conducted environmental studies and coordinated the preparation of submissions to the Council for a new electric substation. Performed analyses of energy options, reviewed alternative sites for the substation, and evaluated different site configurations and types of substation equipment. Identified and assessed environmental impacts, coordinating the input of local and state officials. Worked closely with NGS engineers and SNEW representatives, as well as with local officials regarding pre-filed project materials.

PIPELINES

Millennium Pipeline Project, NY: For this interstate natural gas pipeline project traversing New York State's Southern Tier and Hudson River Valleys, served as a management and environmental consultant to the Vice President and Construction Manager. As part of a team comprised of both pipeline construction experts and environmental specialists, in 1999 and again in 2005-2009, conducted independent reviews of permit applications, environmental data, engineering plans, material procurement scenarios, and budgeted costs for the planned construction of the original Millennium Project, a 400-mile natural gas pipeline that was proposed for location across Lake Erie and the Southern Tier of New York. For the 1999 project sponsors, prepared a confidential report that detailed the results of the review. After project was delayed and then modified to include a phased construction schedule, re-hired (2005) by the new Millennium partnership to conduct studies of the new 181-mile project. Over a four-year period, provided assistance prior to, during, and after natural gas pipeline installation. Reviewed and assisted in the development of environmental field studies, construction plans, and mitigation assessments. Coordinated with the project team to update Environmental Construction Standards to reflect the conditions of federal and state permits and approvals. Worked with construction engineers to prepare detailed plans and contingency approaches for 13 horizontal directional drills of major rivers and wetland complexes; assisted in the design of a variance approval process to facilitate agency approvals of construction modifications; and prepared various detailed plans, such as for the pipeline installation and restoration across the Appalachian Trail and the black dirt (peat) areas of Orange County. Also evaluated the potential effects of a proposed High Voltage DC line (the New York Regional Interconnect), which was proposed to follow portions of the Millennium pipeline right-of-way.

Environmental Field Studies and Permitting for Pipelines, Dutchess and Orange Counties, NY: For two proposed natural gas pipelines, including one involving a crossing of the Hudson River, conducted stream and wetland surveys, compiled environmental data, and assisted in preparation of technical portions of applications for permits and certificates (e.g., USACE Section 10/404, NYSPSC

Article VII, coastal zone consistency certification, 401 water quality certification). Worked with project engineers to develop an EM & CP, which specified methods for the Hudson River crossing, as well as for other stream and wetland crossings. All permits and approvals were obtained in a timely manner and the project was successfully completed on schedule.

Yankee Gas Services Meriden Pipeline Project Council Development & Management (D & M) Plan, CT: Coordinated the preparation of a Development & Management (D&M) Plan for Yankee Gas's 4-mile natural gas pipeline in the communities of Southington, Berlin, and Meriden. The D&M Plan was required by the Council, as a condition of that agency's approval of the pipeline project. Successfully completed the D&M Plan in accordance with Yankee Gas's schedule, which required the preparation of and Council approval of the Plan within less than 90 days. .

NY-NJ Pipeline Lateral Project, New York City Metropolitan Area: As part of an engineering – environmental team providing third-party services for three major energy companies, analyzed and provided a report concerning two competing pipeline proposals for providing additional natural gas supplies to New York City in order to relieve current pipeline capacity constraints, which become critical during periods of high load. Reviewed and compared the two different pipeline lateral proposals based on overall conformance with the companies' objectives for providing additional gas deliveries to lower Manhattan and for increasing the diversity of natural gas supply sources to the region, taking into consideration factors such as risk, cost, environmental / regulatory (permitting) issues, construction engineering considerations, and scheduled in-service date. As part of these analyses, met with representatives of the competing pipeline lateral teams to review the technical aspects of each proposal and to obtain information regarding proposed construction methods, timing, cost, environmental / regulatory issues, and the status of public / agency outreach efforts; conducted separate field reconnaissance reviews of the proposed pipeline lateral routes and route alternatives; performed research and evaluations regarding potential construction, environmental, and permitting issues and risks associated with each proposal; and examined and compared estimated capital costs. Presented the results of the analyses to the companies in a detailed written report.

GENERAL ENERGY AND ENVIRONMENTAL ANALYSES

Environmental Life Cycle Cost Study, CT: Under subcontract to Acres International, an engineering firm working directly for the Council, prepared environmental portions of life cycle cost and environmental externalities study of construction and operation of 115-kV electric transmission lines (overhead vs. underground). Consulted with representatives of major Connecticut electric transmission utilities; reviewed representative environmental conditions along major transmission corridors in different geographic regions of Connecticut; and researched availability and effectiveness of environmental externality and life cycle costing models in general. In conjunction with transmission engineers, prepared a concise report that evaluated costs and benefits of different transmission line configurations and recommended methods for better incorporating environmental costs into utility project planning and evaluation.

Task Force on Long Island Sound, Hartford, CT: Served as interstate natural gas transmission industry representative to Governor Rowland's Task Force. Participated in Task Force meetings and discussions, and assisted in the preparation of a final assessment report (issued June 2003) concerning Long Island Sound's resources and existing and future energy infrastructure development and energy options in Connecticut. Work included detailed inventories of Long Island Sound resources and potential impacts as a result of energy development, as well as the review of alternative energy options, including different types of energy (e.g., wind, fuel cells, photovoltaics) and demand side energy management and conservation programs.

Resume of Mezei, Dr. Gabor

Exponent®
Engineering & Scientific Consulting

Gabor Mezei, M.D., Ph.D.

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Professional Profile

Dr. Mezei is a physician and epidemiologist with over 25 years of experience in research of clinical outcomes and environmental and occupational health issues. He designed, conducted and evaluated epidemiologic investigations and directed multidisciplinary research programs related to children's health (including childhood leukemia and brain cancer), adult cancers (e.g., leukemia, brain and breast cancer), neurodegenerative diseases (e.g., Alzheimer disease and amyotrophic lateral sclerosis [Lou Gehrig disease]), reproductive health outcomes (including birth defects), occupational injuries and ergonomics. He has been involved in studies of various occupational and environmental exposures, including electromagnetic fields (EMF), mineral fibers (asbestos), air pollutants and metals (welding fumes). Dr. Mezei has expertise and experience in quantitatively and qualitatively aggregating epidemiologic evidence (via literature reviews, meta-analyses, and pooled analyses) for environmental and occupational risk assessments. Dr. Mezei appeared as an expert in hearings at several state (US) and provincial (Canada) public utility commissions and a parliamentary committee in Ireland.

Prior to joining Exponent, Dr. Mezei directed a multidisciplinary scientific research program at the Electric Power Research Institute designated to address potential human and animal health effects associated with residential and occupational exposure to power frequency and radiofrequency EMF. He also directed occupational health and safety research focusing on injury surveillance, ergonomics evaluations, and occupational exposure assessments. Earlier, at the Toronto Western Hospital, University of Toronto, he conducted research to identify clinical factors affecting hospital stay, adverse clinical and surgical outcomes and hospital readmissions following ambulatory surgery. He was a practicing physician at the National Institute for Dermatology in Budapest, Hungary.

Dr. Mezei trained as a physician (M.D.) at the Semmelweis University of Medicine in Budapest, Hungary, and as an epidemiologist (Ph.D.) at the School of Public Health of the University of California in Los Angeles (UCLA). He was the recipient of Fogarty and Fulbright Fellowships. He served as an affiliate associate professor in the Department of Environmental and Occupational Health Sciences of the University of Washington in Seattle, Washington, as a visiting scientist at the Hungarian National Research Institute for Radiobiology and Radiohygiene in Budapest, Hungary, and as an associate editor at the Journal of Exposure Science and Environmental Epidemiology. Dr. Mezei lectured at Stanford University, the UCLA School of Public Health, and the Electrotechnical Committee of the Hungarian Academy of Sciences. Dr. Mezei is an author or co-author of over 60 scientific publications and book chapters on topics related to the epidemiology of environmental and occupational exposures and chronic diseases (such as cancer and neurodegenerative diseases), adverse clinical outcomes, and environmental exposure assessment.

Academic Credentials & Professional Honors

Ph.D., Epidemiology, University of California, Los Angeles (UCLA), 1995

M.D., Medicine, Semmelweis University of Medicine, 1990

Fogarty Fellowship, 1992-1995

Fulbright Fellowship, 1994-1995

Languages

Hungarian

Publications

Mezei G, Chang ET, Mowat FS, Moolgavkar SH. 2017. Epidemiology of mesothelioma of the pericardium and tunica vaginalis testis. Ann Epidemiol 27(5):348-359.e11.

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Book Chapters

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Resume of Newhall, Christopher P.

Christopher P. Newhall, PWS, CPESC
Senior Project Manager

Education

Trinity College (CT), BS Biology

Univ. of Massachusetts, Amherst, New England Regional Soil Science Certificate Program (Graduate Level coursework in Soil Science)

Years of Experience

12

Technical Specialties

Baseline & Benchmark Field Studies

Environmental Impact Assessment & Statements

Federal, State, Province & Local Regulatory Interface & Negotiation

Impact Mitigation Planning

Major Capital Projects Permitting

Project Feasibility, Siting & Planning

Project Quality Assurance/Quality Control

Project Support & Consulting

Site, Stream & Wetland Restoration

Professional Affiliations

Association of Massachusetts Wetland Scientists

Society of Soil Scientists of Southern New England

Society of Wetland Scientists

Training and Certifications

Professional Wetland Scientist (PWS) #2215

Certified Professional in Erosion and Sediment Control (CPESC) #7160

48-hr. U.S. Army Corps of Engineers Wetland Delineator Certification Training

Christopher Newhall is a senior project manager experienced in environmental consulting and permitting throughout the Northeast U.S. He has specific experience with Federal, State and local permitting in CT, MA, NH, NY, NJ, PA, and RI. Mr. Newhall has extensive field experience conducting environmental inspection/monitoring of construction sites for compliance with applicable permit conditions, and implementation of best management practices related to erosion and sedimentation control and restoration of ecologically-sensitive areas. Mr. Newhall has a strong background in conducting wildlife habitat surveys, threatened and endangered species surveys, and wetland delineations.

Experience

Eversource Energy, Electric Transmission Line Maintenance Projects, Central and Southeastern Connecticut. Project manager for multiple ongoing overhead electric transmission line structure replacement projects located in central and southeastern Connecticut. Project work involved assessment/development of necessary scope of work and cost estimates for Connecticut Siting Council Petition for Declaratory Ruling filings, environmental permitting requirements, completion of wetland and waterbody field delineations, development of GIS mapping depicting project facilities, management of cultural resources assessment documentation and subcontractors, development of U.S. Army Corps of Engineers Connecticut General Permit documentation, and management of construction phase environmental permit compliance inspections.

The Connecticut Light & Power Company, Greater Springfield Reliability Project, Bloomfield, East Granby and Suffield, Connecticut. Lead Environmental Inspector responsible for supervising three inspection staff tasked with environmental construction inspection and environmental permit compliance for construction of approximately 12 miles of new 345-kV transmission line and decommissioning and removal of an existing 115-kV transmission line from Bloomfield to Suffield, CT. The project included numerous wetland and water body crossings, installation of transmission line towers in wetlands, steep slopes, threatened and endangered species habitat, and culturally sensitive areas. Coordinated and escorted regulatory agency inspections.

The Connecticut Light & Power Company, Manchester to Meekville Project, Manchester, Connecticut. Lead Environmental Inspector responsible for supervising one inspection staff tasked with environmental construction inspection and environmental permit compliance for construction of approximately three miles of new 345-kV transmission line and decommissioning and removal of an existing 115-kV transmission line in Manchester, CT. The project included numerous wetland and water body crossings, and installation of transmission line towers in wetlands. Coordinated and escorted regulatory agency inspections.

The Connecticut Light & Power Company, Connecticut Interstate Reliability Project, Eastern Connecticut. Conducted environmental field

PADI Open Water SCUBA Diver Certification

Wilderness First Aid

FERC Environmental Compliance Seminar Certificate

FERC Regulatory Overview and Guidance Seminar Certificate

surveys and natural resource data collection, including vernal pool evaluations and sampling, for the installation of new 345-kV transmission lines, including expansion of existing substations and rebuilds of existing 115-kV transmission lines in eastern Connecticut.

The Connecticut Light & Power Company, Day Street Substation Distribution Line Project, Brooklyn and Pomfret, Connecticut. Conducted environmental field surveys, including inland wetland delineations, along approximately 1.0-mile of proposed new 115-kV line alignment within the Towns of Brooklyn and Pomfret, Connecticut. Additional responsibilities included recording survey data for wetland flag locations using hand-held Global Positioning System (GPS) technology.

National Grid, B-154S/C-155S 115-kV Line Refurbishment Project, Danvers, Peabody and Salem, Massachusetts. Conducted environmental field surveys, including inland and coastal wetland delineations, along an approximately 3.0-mile existing 115-kV line alignment within the Towns of Danvers, Peabody, and Salem, Massachusetts. Additional responsibilities included recording survey data for wetland flag locations using hand-held Global Positioning System (GPS) technology.

National Grid, C-181N/D-182S Mansfield Taps Refurbishment Project, Mansfield and Attleboro, Massachusetts. Conducted environmental field surveys, including inland wetland delineations, along an approximately 0.4-mile existing 115-kV line alignment within the Towns of Attleboro and Mansfield, Massachusetts. Additional responsibilities included recording survey data for wetland flag locations using hand-held Global Positioning System (GPS) technology.

National Grid, E-183 Mink Street Tap Refurbishment Project, Seekonk, Massachusetts. Conducted environmental field surveys, including inland wetland delineations, along an approximately 0.1-mile existing 115-kV line alignment within the Town of Seekonk Massachusetts. Additional responsibilities included recording survey data for wetland flag locations using hand-held Global Positioning System (GPS) technology.

Constitution Pipeline Company, Constitution Pipeline Project, Pennsylvania & New York. Prepared FERC Environmental Report and associated support documents, federal and state permitting for wetlands and waterbodies, including rare species surveys, for approximately 125 miles of new 30-inch-diameter pipeline in Pennsylvania and New York. Project involves multiple federally- and state-regulated waterbody and wetland crossings. Prepared draft and final Environmental Reports. Consulted with federal, state and local agencies regarding the Project, including preparation of a Biological Assessment for impact to the northern bat (*Myotis septentrionalis*) for formal consultation with the U.S. Fish and Wildlife Service New York Field Office under Section 7 of the Endangered Species Act. Prepared federal and state Joint Permit applications in NY for applicable authorizations, including Section 401/404 authorizations, Article 15 (Protection of Waters) and Article 24 (Freshwater Wetlands), State Pollution Discharge Elimination System, and hydrostatic pressure testing water withdrawals.

Algonquin Gas Transmission, LLC, Kleen Energy Lateral Project, Middletown, Connecticut. Provided comprehensive environmental permitting services for installation of a new 1.13-mile 20-inch diameter natural gas transmission pipeline in Middletown, Connecticut. Permitting services included successful acquisition of a Certificate of Public Necessity and Need from the Federal Energy Regulatory Commission, an Inland Wetlands Permit under the CT Freshwater Wetlands Act and applicable local by-law, consultation and negotiation with the CT Natural Diversity Database relative to State-listed rare species, CT DEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, and Emergency Authorization for the Discharge of Hydrostatic Pressure Testing Wastewaters.

Resume of Russo, Robert J.

Robert J. Russo, P.E
Phone: (860) 728-4617
E-mail: robert.russo@eversource.com

Summary:

- Professional engineer for 29 years in the electric utility industry including 24 years of long-term and operational transmission planning experience in Connecticut.
- Manager of the Eversource Energy's Transmission & Distribution Planning Studies Group for Connecticut and Western Massachusetts.
- Eversource Energy's alternate representative on the Northeast Power Coordinating Council's Task Force on System Studies.

Professional Experience and Accomplishments:
Eversource Energy, Hartford, CT

March 2006 to Present: Manager – Transmission and Distribution Planning

- Perform 345-kV and 115-kV transmission planning studies for Northeast Utilities' subsidiary; Connecticut Light & Power Company.
- Develop transmission line and substation equipment reinforcement plans to comply with the North American Reliability Corporation's mandatory transmission planning standards.
- Perform and coordinates system impact studies for merchant generating plants.
- Oversee development of long-term plans for bulk substations.
- Technical mentor to junior staff engineers and engineering technicians.
- Member of ISO/TO Study Coordination Group.
- Eversource alternate representative on Northeast Power Coordinating Council's Task Force on System Studies.

March 2004 to March 2006: Senior Engineer – Transmission Planning

- Perform 345-kV and 115-kV transmission planning studies for Northeast Utilities' subsidiary; Connecticut Light & Power Company.
- Obtain technical and cost allocation approval of transmission planning studies from ISO-NE.
- NU representative on Northeast Power Coordinating Council's Task Force on System Studies

June 2003 to March 2004: Engineering Analysis Team Lead/Senior Engineer – CONVEX

- Oversee day-to-day activities and work plan for the CONVEX Engineering Analysis Group.
- Perform operational planning studies and develop guidelines which ensure secure and reliable operation of the transmission system including development of thermal and voltage transfer limits.
- Provide technical expertise to System Operations Supervisors, Transmission Planning, and other Transmission Business Unit Engineers.
- Responsible for maintenance of CONVEX Energy Management System engineering applications.
- Member of NEPOOL Voltage Task Force.

July 2001 to June 2003: Senior Engineer – CONVEX

- Perform operational planning studies and develop guidelines which ensure secure and reliable operation of the transmission system including development of thermal and voltage transfer limits.
- Maintained ESCA state-estimator solution for use in real-time transmission thermal and voltage analysis.
- Provided technical support to CONVEX System Operations Supervisors, various groups at Northeast Utilities, United Illuminating, and ISO-NE.
- Responsible for maintenance of engineering applications related to CONVEX Energy Management System.
- Member of NEPOOL Voltage Task Force.

Professional Experience and Accomplishments:
The United Illuminating Company, Shelton, CT

February 2001 to July 2001: Principal Engineer – Transmission Services

- Responsible for the completion of long range Transmission plans including cost estimates and alternatives.
- Responsible for all UI Company responses to NEPOOL for NERC/NPCC Reliability Compliance Program.
- Member of NEPOOL Reliability Committee
- Member of NEPOOL Planning Process Subcommittee
- Member of NEPOOL Stability Task Force.
- Member of NEPOOL OASIS Working Group
- Member of NEPOOL Voltage Task Force.

April 1997 to February 2001: Lead System Planning Engineer

- Performed thermal and voltage load flow analysis to promote an efficient and economical operation of the transmission and distribution system while ensuring consistency between Transmission and Distribution Operations.
- Assisted Northeast Utilities and The Connecticut Valley Exchange (CONVEX) in the development of operating guidelines for operation of Connecticut's bulk transmission system.
- Operated and maintained the Open Access Same Time Information System (OASIS).
- Performed Transmission and Distribution Operations Engineers' responsibilities as needed.
- Performed transmission and distribution fault locating using digital fault recorders and Power Quality Nodes.
- Member of NEPOOL Stability Task Force.
- Member of NEPOOL Voltage Task Force.
- Member of NEPOOL Transmission Maintenance and Outage Coordination (Ad Hoc Committee of the NEPOOL Reliability Committee).
- Member of NEPOOL Information Policy Working Group.
- Member of NEPOOL OASIS Working Group

November 1991 to April 1997: Protection, Control & Metering Engineer

- Project manager and lead engineer of several transmission and distribution protective relaying projects. Projects resulted in improved system dependability, security, and reliability.
- Analyzed protective relay performance resulting from transmission system disturbances.
- Maintained short-circuit database used for fault calculations.

July 1988 to November 1991: Transmission Planning Engineer

- Created seasonal, thermal, and voltage operational guidelines for efficient and economical operation of the Southern Connecticut bulk transmission system.
- Provided electric system transmission operating personnel with guidance when planning outages affecting the Southern Connecticut bulk transmission system.

Professional Affiliations

- Registered Professional Engineer by the State of Connecticut since 1995.
- Received Engineer-In-Training Certificate in 1990.
- IEEE Member since 1988.
- IEEE Power Engineering Society Member since 1998.

Education

- B.S., Electrical Engineering, May 1988, Worcester Polytechnic Institute, Worcester, MA
  Major: Electrical Power Systems.
- Completed a two-year series of seminars covering a wide range of Power System engineering topics - seminars taught by Power Technologies, Inc. of Schenectady, NY.

Related Skills

- Extensive working knowledge of PSS/E loadflow and IPLAN software, short-circuit digital transient recorders and their associated software.
- Basic knowledge of SCADA system operation.

Resume of Soderman, Christopher Paul

Work (860) 728-6172
Email: christopher.soderman@eversource.com

Christopher Paul Soderman, P.E.*

Education:

Rensselaer Polytechnic Institute (Troy, NY)
Bachelor of Science Degree in Mechanical Engineering

Worcester Polytechnic Institute (Worcester, MA)
Master of Science in Electrical Engineering

University of Hartford (West Hartford, CT)
Master of Engineering (Civil Engineering)

University of Hartford (West Hartford, CT)
Master of Business Administration

Relevant Work Experience:

2/2003-Present Eversource Energy Service Company
Lead Engineer – Transmission Line & Civil Engineering: Engineering and support for design of new transmission lines and operation and maintenance of existing transmission lines.

Current Engineering Assignments:

- Team Lead – Transmission Line Engineering
  - Lead a team of 6 engineers, designers and drafters with engineering support of transmission line construction, operation and maintenance
- PLS-CADD Subject Matter Expert
- Wind Induced Conductor Motion Subject Matter Expert
- Direct Embedded Pole Design Subject Matter Expert
- Electric and Magnetic Fields Subject Matter Expert
- Grounding and Lightning design for Transmission Lines Subject Matter Expert
- Electromagnetic Compatibility/Interference Subject Matter Expert

EMF Project Experience:

- Seacoast Reliability Project (2014-Present; Madbury-Newington, NH)
- Southwest Connecticut Reliability Project (2016; Bethel/Brookfield, CT)
- Greenwich Substation and Line Project (2014-Present, Greenwich, CT)
- Stamford Reliability Cable Project (2013; Stamford, CT)
- 1990 Line Structure Replacement Project (2013: Monroe-Watertown, CT)
- Maine Power Reliability Project (2011; Eliot, ME)

Selected Transmission Project Experience:

- Interstate Reliability Project (2004-2014, AC/Electromagnetic Interference Study)
- 1990 Line Rebuild (2010-2014 – Project Engineer)
- Greater Springfield Reliability Project (2006-2013 – T-Line Engineer)
- Middletown-Norwalk 345-kV Transmission Line Project (2003-2008 – Transmission Line Engineer (T-Line Engineer), CT)
- Barbour Hill 345-kV Substation Project (2005-2008 – T-Line Engineer, CT)
- 1466 Line Rebuild between Carpenter Lane Junction and North Wallingford S/S (2/2007-8/2007 – Project Engineer, T-Line Engineer)
- Mansfield 69-kV Terminal Uprate (5/2006-9/2006 – Proj Engineer, T-Line Engineer, CT)
- Glenbrook 115-kV Cables Project Siting (2004-05 – Transmission Line Engineering Support, CT)
- University of Connecticut Interconnection 69-kV (2005 – Project Engineer, CT)

2/2002-2/2003 Tech-Aid Corporation for ESCO

Project Coordinating Engineer (Contract): Coordinated engineering efforts of consultants and internal engineering staff for the Middletown-Norwalk 345-kV transmission Line. Performed route analyses and prepared reports for submittal to the Connecticut Siting Council. Field contact for customer questions regarding project.

5/2001-2/2002 Tech-Aid Corporation for ESCO

Mechanical Engineer (Contract): Perform energy balance analysis, heat transfer and HVAC System studies. Perform tests to check for compliance with the 1995 CABO Model Energy Code and US Department of Energy Star™ Homes program.

Publications:

Chisholm, W. A., Martin-Sturmey, K., Soderman, C.P., Bologna, F; *"Results of Transient Resistivity Testing On Steel Lattice, Wood and Steel Pole Towers"*, International Conference on Grounding and Earthing & 7th International Conference on Lightning Physics and Effects, Porto de Galinhas, Brazil, June 2016.

Testifying Experience:

- Connecticut Siting Council
  - Docket 426 – Third Taxing District of Norwalk: Fitch St Substation (6/14/2012)
  - Docket 431 – South Norwalk Electric Works: SONO Substation (12/11/2012)
  - Docket 435 – Connecticut Light & Power Co.: Stamford Reliability Project (3/28/2013)
  - Docket 466 – Connecticut Light & Power Co.: Frost Bridge – Campville 115-kV Line (2/23/2016)
  - Docket 468 – Connecticut Light & Power Co.: Southwest CT Reliability Project (9/22/2016)
- Maine Public Utilities Commission
  - Docket 2008-255 – Public Service of New Hampshire – Maine Power Reliability Project (1/11/2012)

Professional Registrations:

- Licensed Professional Engineer in the State of Connecticut (Lic. # PEN.24928)
- Certified Level II User of CDEGS Specializing in Electromagnetic Interference from Transmission Lines (http://www.sestech.com/Training/CertifiedUsersII.htm)

* Professional Engineer's License is in Connecticut Only