

# REQUEST FOR PROPOSAL

**RULEMAKING TO CONSIDER THE APPROPRIATENESS AND  
POTENTIAL SCOPE OF THE LOUISIANA PUBLIC SERVICE  
COMMISSION'S REVIEW AND PRE-APPROVAL OF UTILITY  
CONTRACTS REGARDING THE CONSTRUCTION AND/OR  
ACQUISITION OF SIGNIFICANT GENERATION AND TRANSMISSION  
RELATED ASSETS**

**RFP 16-22 | DOCKET NO. R-34246**

*Prepared for*

**Louisiana Public Service Commission**

*By*



**London Economics International LLC**

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**December 12, 2016**



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Baton Rouge, Louisiana 70821-9154

December 12, 2016

Dear Ms. Richardson,

London Economics International, LLC ("LEI") is pleased to propose our services to represent the Louisiana Public Service Commission ("LPSC") as an independent technical consultant on the *rulemaking to consider the appropriateness and potential scope of the Louisiana Public Service Commission's review and pre-approval of utility contracts regarding the construction and/or acquisition of significant generation and transmission related assets*. LEI is uniquely qualified to advise the LPSC in this engagement given our longstanding history of expertise when it comes to the design and evaluation of energy related contracts.

We understand you are not bound to accept any proposal you receive. For information regarding this proposal please contact me at [marie@londoneconomics.com](mailto:marie@londoneconomics.com).

Sincerely,

Marie Fagan  
Managing Consultant and Lead Economist  
London Economics International, LLC

# Rulemaking to consider the appropriateness and potential scope of the Commission’s review and pre-approval of utility contracts regarding the construction and/or acquisition of significant generation and transmission related assets



prepared for Louisiana Public Service Commission by London Economics International LLC

December 12, 2016

*London Economics International LLC (“LEI”) hereby expresses its interest in serving as a consultant to the Louisiana Public Service Commission (“LPSC”). LEI is uniquely qualified to carry out this engagement based on its worldwide experience in similar projects as well as in other engagements in the infrastructure and public service sector. We have advised on energy procurement processes for governmental entities, industrial actors, as well as electric utilities, independent power producers and energy merchant firms. LEI also has considerable experience in the MISO market, including ratemaking and other regulatory issues, and modeling.*

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# 1. Qualifications, experience, and capability

## 1.1 About London Economics International

LEI is a global economic, financial, and strategic advisory professional services firm specializing in energy, water, and infrastructure. The firm combines detailed understanding of specific network and commodity industries, such as electricity generation and distribution, with sophisticated analysis and a suite of proprietary quantitative models to produce reliable and comprehensible results. The firm has its roots in advising on the initial round of privatization of electricity, gas, and water companies in the UK. Since then, LEI has advised private sector clients, market institutions, and governments on privatization, asset valuation, deregulation, tariff design, market power, and strategy in virtually all deregulating markets worldwide. LEI's areas of expertise include:

- Procurement;
- Regulatory economics and performance-based tariff setting regimes;
- Expert testimony and litigation support;
- Market design and power sector restructuring/unbundling;
- Asset valuation, price forecasting and market analysis;
- Wholesale power market analysis;
- Renewable energy policy evaluation; and
- Transmission and distribution.

The following attributes make LEI unique:

- *clear, readable deliverables* grounded in substantial topical and quantitative evidence;
- *internally developed proprietary models* for electricity price forecasting incorporating game theory, real options valuation, Monte Carlo simulation, and sophisticated statistical techniques;
- *balance of private sector and governmental clients* enables LEI to effectively advise both regarding the impact of regulatory initiatives on private investment and the extent of possible regulatory responses to individual firm actions;
- *ability to design and implement rate mechanisms* enables LEI to provide recommendations and assist public utilities commissions on rate impact analyses;
- *worldwide experience* backed by multilingual and multicultural staff.

## 1.2 Relevant experience; corporate résumé

### 1.2.1 Experience with contract design/analysis

LEI has a longstanding history of expertise when it comes to the design and evaluation of energy related contracts, below is a brief list of recent engagements:

- ***Power contract dispute:*** LEI acted as an expert on behalf of the counsel for the appellant in a power contract dispute. LEI provided a valuation of the power purchase agreement ("PPA") for a coal-fired power generation facility within the historical context of when the PPA was first acquired. LEI reviewed the terms of the contract, the broader economic environment, and the power market fundamentals at that point in time. LEI utilized three separate valuation techniques: discounted cash flow analysis, replacement cost, and comparable transactions. LEI provided two written deliverables: 1) a memorandum reviewing and critiquing previous expert witness reports and 2) an expert report highlighting LEI's analysis and conclusions regarding the value of the contract.
- ***Feasibility of potential Service Contracts:*** LEI was engaged by a major Southeastern US financial institution to assess the feasibility of one or more potential Service Contracts related to several electricity transmission and distribution networks and a gas transportation network all located in the in the Netherlands. LEI was asked to determine, among other things, the availability of potential counterparties, what contractual mechanisms would be necessary to provide sufficient assurances to the Counterparty, and what rate of return or discount rate these counterparties were likely to apply to such an investment. LEI also provided examples of analogous transactions from other industries and countries.
- ***Review of the "heritage contracts" in Ontario:*** LEI prepared for a major Canadian investment firm a detailed review of the "heritage contracts" that have been used across Canada to ensure that consumers continue to benefit from low-cost generation resources. In Ontario, a new mechanism was required to address concerns over market power and to moderate high consumer prices due to the government's commitment to public ownership. LEI provided recommendations on how to incorporate elements of the British Columbia, Quebec, and Alberta contract models into the Ontario system to deliver benefits to both consumers and market participants.
- ***Procurement process design, including RFP and associated contracts:*** LEI supported the State of Connecticut's Department of Public Utility Control ("DPUC") in determining the range of investment needs that could be required in Connecticut over the next 15 years due to localized ISO-NE markets for capacity and forward reserves. LEI then designed a procurement process, including the RFP and associated contracts, to solicit for that capacity from both supply side and demand side resources. LEI served as the RFP manager for the process, being the main contact point for bidders, evaluating the bids, and recommending the winning portfolio. LEI also served as the DPUC's expert witness in the hearings approving the winning portfolio in 2008.

- **Case study of alternative options to physical divestiture in market design:** LEI was retained by a global energy consulting group to provide market design scenarios 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 differences (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.
- **Biomass asset management:** LEI was retained by a US renewable energy investment group to provide asset management services for two biomass power plants in California. LEI was involved in all aspects of the business including financing, fuel contract and PPA negotiations, emissions compliance and operations among other responsibilities.
- **Implications of standard service supply code:** LEI was retained by a UK nuclear plant operator to examine the implications of a proposed Ontario Standard Service Supply Code for generators seeking to design contracts with retailers. The study analyzed the impact of OPG market dominance on market volatility and on the willingness of generators to contract. LEI also reviewed modeling assumptions to determine whether any adjustments were necessary.

### 1.2.2 Experience with acquisition of generation and transmission assets

LEI has been hired by several entities to manage the acquisition process of different types of assets, below is a brief list of recent engagements:

- **Merchant review and valuation:** LEI was engaged by a private equity firm to provide a critical, high level review and valuation of the merchant revenue potential and commercialization risk regarding a potential acquisition of a wind farm. Work included providing independent energy and capacity price forecasts, an assessment of available firm transmission, and evaluation of REC regulations and pricing as well as contract issues. The acquisition was completed, as part of a portfolio, in a deal worth over \$2 billion CAD.
- **Acquisition of hydroelectric facility in Maine:** Under a long-term management agreement, LEI was hired by a New England based renewable energy developer to manage its Maine hydroelectric generating facility. LEI staff led the acquisition of the project which involved purchase price negotiations, financing, and closing. Following the takeover, LEI staff assumed all financial and operational responsibilities. These ranged from cash flow management and product marketing to tax management, staffing, and all FERC related matters.

- ***Acquisition of hydroelectric facility in New Hampshire:*** LEI was hired by a New England based renewable energy company to lead the acquisition of a 680 kW hydroelectric project in New Hampshire. Following the takeover, LEI staff assumed all financial and operational responsibilities which include cash flow management, product marketing, tax management, staffing and all FERC related matters.
- ***Acquisition of coal plant in PJM:*** LEI led a due diligence team and assisted 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. LEI conducted economic appraisals, coordination of preliminary technical due diligences negotiations with third parties on possible offtake arrangements, and oversight over financial modeling. The analysis included long term fuel and electricity prices, plant emissions and current and forecasted emission prices, and environmental regulations for NO<sub>x</sub>, SO<sub>2</sub>, and mercury emissions and their impacts on plant operations.
- ***Acquisition of coal plant in Southern California:*** LEI was retained by a major US financial institution to carry out a detailed analysis of the forecast of market prices and plant revenues prepared by a management consulting group for a US utility's acquisition of several generation plants in Southern California. LEI compared the forecasted plant performance details to historical statistics and examined forecasted energy prices in the context of current market dynamics.
- ***Expert witness on acquisition arbitration case:*** LEI served as an expert witness in an arbitration case involving disputed contract amendments related to an IPP acquisition in Thailand. LEI analyzed the proposed damage claims presented by the opposing side and presented an assessment of damages arising from undisclosed changes. LEI provided in-depth support to the attorneys including research pertaining to the Thai power industry and petrochemical industry.
- ***Leading the initial acquisition of hydroelectric facility:*** LEI was commissioned under a long-term management agreement to manage a 5 MW run-of-river hydroelectric facility. LEI staff led the initial acquisition of the project which involved purchase price negotiations, financing, and closing. Following the takeover, LEI staff assumed all financial and operational responsibilities. These range from cash flow management and product marketing to tax management, staffing, and all FERC related matters.
- ***Acquisition of a hydro plant in New York:*** For a private equity power sector investor, LEI assisted in conducting due diligence in the bidding process with respect to an acquisition of a +32 MW hydro plant in the New York market by a group of private investors. LEI conducted economic appraisals, coordination of preliminary technical due diligences, worked closely with strategic advisors of the private equity investor, and conducted oversight of financial modeling. The analysis included long term fuel and electricity prices, major maintenance and coordination of engineering analysis, financial modeling, analysis of operating agreements and review of relevant reports.

### 1.2.3 Work performed before regulatory agencies

- ***Real options analysis for sale:*** LEI was retained by Alberta's electricity transmission regulator to conduct a real options-based valuation of the Clover Bar unit so as to provide a realistic, market-based foundation for determining the reservation price of the Clover Bar unit contracts. LEI's analysis suggested that the value of Clover Bar is intimately related to the flexibility of the plant.
- ***Intervention support for an acquisition:*** LEI was retained by a leading law firm to prepare testimony before the Federal Energy Regulatory Commission and quantitative analysis on an intervention of Exelon's proposed acquisition of PSEG. The testimony included analysis of potential post-merger market power in pertinent markets and recommendations on required mitigation that would be sufficient to cure market power screen failures.
- ***Transitional Standard Offer project for Connecticut's Department of Public Utility Control:*** LEI was hired by the State of Connecticut's Department of Public Utility Control (DPUC) to oversee the Transitional Standard Offer (TSO) auction by Connecticut Light and Power (CL&P) for its 2005 and 2006 load (more than 5,000 MW peak demand). The scope of the project included approving the RFP and communication protocol, participating in all bidder calls and negotiations, analyzing the New England market and developing scenarios for likely bids, and verifying CL&P's decision-making process for selecting winning bids. LEI also provided testimony to the DPUC based on its assessment of the auction process and its accordance with DPUC principles of competition.
- ***Regulatory policies review for Kentucky's Public Service Commission:*** LEI was retained by Kentucky's power utility regulator to review regulatory policies and tariff structures with a view to determining how they can be altered to elicit demand reductions and renewables implementation. The engagement included stakeholder interviews to solicit feedback from all relevant stakeholder groups on the necessary updates to the planning and approval process to meet legislative mandate to increase the use of renewable resources and reduce demand. The review process consisted of analyzing the current processes for renewable and distributed generation and DSM programs and proposing recommendations to improve the efficacy of these programs.
- ***Biomass procurement analysis for Maine Public Utilities Commission:*** LEI was engaged by the regulator to estimate the macroeconomic impact of biomass generation within the state. This included direct, indirect, and induced impacts on: permanent direct jobs, payments to municipalities, payments for fuel harvested in the State, payments for in-state resource access, in-state purchases of goods and services, and construction-related jobs and purchases. LEI used the macroeconomic model known as IMPLAN to capture the economic impacts on industries including logging, sawmills, and other forestry-related industries and well as on state and local taxes.
- ***Information release supporting California Energy Commission:*** LEI prepared a series of reports, filings, and testimonies to support the California Energy Commission's petition

to the California Public Utilities Commission (“CPUC”) to force additional disclosures about future expected demand conditions by the state's investor owned utilities: Southern California Edison, San Diego Gas & Electric, and Pacific Gas & Electric. LEI analyzed other publicly available information sources to support our experts' determination that the information release would provide a net benefit to California consumers. LEI staff provided direct testimony and rebuttal testimony to the CPUC on several occasions.

- ***Regulatory review and impact study on acquisition before the Maryland Public Service Commission:*** LEI contributed to a regulatory review and impact study on the acquisition of Constellation Energy Group by MidAmerican Holdings Company, before the Maryland Public Service Commission.
- ***Testimony on behalf of the Maryland Public Service Commission:*** LEI staff 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.[MPSC, Case No. 9173]
- ***Economic consulting service for the Utah Public Service Commission:*** LEI serviced as economic consultants to support the Utah Public Service Commission (“UPSC”) with the competitive procurement process for PacifiCorp.

#### 1.2.4 Work performed in MISO

- ***Asset evaluation:*** LEI was engaged by an investment firm 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.
- ***Long-term market outlook for MISO and other regions:*** LEI was hired by a private utility to perform an independent market analysis for a number of assets located in NYISO, MISO, CAISO, and ERCOT. Specifically, LEI conducted a 20 year price forecasting horizon and provide forecasts of plants’ output, load factor, and realized prices.
- ***Congestion analysis for parts of MISO:*** LEI was retained by a private client to analyze the congestion within the Chicago area and MISO zones surrounding Lake Michigan.
- ***Due diligence analysis:*** LEI was engaged by a private client to provide analytical support on their due diligence process. The supporting tasks entailed: providing an

updated outlook on energy prices and intelligence on recent developments in selected US power markets (PJM and MISO); conducting REC price forecasts; and reviewing requirements and risk exposure to hydropower facilities in selected capacity markets.

- **Revenue opportunity for gas-fired cogeneration units in MISO:** The purpose of the assignment was to inform the client on potential risks associated with the plants upon termination of their power purchase agreements. Under this engagement, LEI simulated MISO's energy and capacity markets and derived forecast of wholesale energy prices and capacity prices relevant to the units' geographic location.
- **Economic analysis for a proposed transmission project in MISO:** LEI conducted a modeling exercise to determine the potential revenues for a proposed transmission project wheeling power from western MISO to eastern MISO (and eventually PJM). LEI evaluated both the revenue opportunities to the investors as well as social benefits to the MISO system; and evaluated the incremental value of the business strategy of selling the energy (and capacity) out of East MISO to third parties in PJM.
- **Costs/benefits analysis of Entergy joining MISO:** LEI was hired by the Texas Public Utility Commission to provide a cost benefit analysis pertaining to the announced decision by Entergy ("EIT") to join MISO. LEI provided quantitative and qualitative analyses of specific costs/benefits attributable to Entergy Texas Inc. and its customers following membership in MISO or SPP.
- **Review of ETI's impact analysis of termination of PPA on consumers:** LEI was hired by the PUCT to conduct a due diligence review of the analyses performed by ETI on the impact of termination of certain PPAs while a member of MISO. LEI's scope of work included a review of ETI's inputs & results, methodology and interpretation of MISO market rules.

### 1.3 Qualification of Key Staff

LEI has a wealth of knowledge and experience that uniquely qualifies us for this engagement. We have advised on energy procurement processes for governmental entities, industrial actors, as well as electric utilities, independent power producers and energy merchant firms. In many cases, the advisory role started at the initial stages of RFP design and contract drafting. In many of these projects, quantitative analysis of the bids and selection of the winning bids are part of our mandate. LEI has also advised on the sale of physical assets, as well as on the advantages and disadvantages of various auction formats for the sale of electricity contracts and other derivative instruments.

Below is a short biography of some of LEI's key professionals available for this engagement:

- **Julia Frayer**, Principal and Managing Director of LEI. Julia manages LEI's quantitative business practice area, and also specializes in market issues related to electricity. Sample projects include short- and long-term forecasting of wholesale power prices; valuation of generators, vertically-integrated utilities, energy sales agreements; and structuring sale processes for energy assets and derivative contracts. She also leads many of the firm's market design engagements, spanning such diverse issues as market power mitigation,

auction design (including competitive solicitations for energy procurement), wholesale market rules design, and competitive market efficiency benchmarking. Julia has testified on behalf of clients before a number of regional and national energy regulatory agencies, including the Public Utility Commission of Texas, the California Public Utilities Commission, the Maine Public Service Commission, the Connecticut Department of Public Utilities Control, and FERC.

- **Bridgett Neely**, Senior Advisor at LEI. With more than 10 years of experience in energy sector advising on strategic, economic, and policy issues, Bridgett has a comprehensive understanding of wholesale and retail power market dynamics and implications for power prices and asset valuations; capacity and generation procurement processes; renewable project economics; and energy efficiency policy and programs. Prior to founding Firefly Energy Consulting LLC, Bridgett was the Senior Advisor of Strategic Planning for a national retailer. She also served as the Vice President, Energy Efficiency and Renewable Energy for the New York City Economic Development Corporation.
- **Marie Fagan**, PhD, Managing Consultant and Lead Economist at LEI. Marie has over 25 years of experience in analysis of gas and power markets in North America, and has advised regulators on gas and power market issues. She has provided policy analysis, support for regulatory proceedings, and expert witness services in regulatory proceedings. Marie leads LEI's ERCOT analysis and is responsible for production of LEI's semi-annual market updates and price forecast for the ERCOT wholesale energy market.
- **Barbara Porto**, Consultant at LEI. Barbara performs economic and financial research, analysis, critical review and provides regulatory advisory services for electricity, natural gas, infrastructure and renewable energy markets. Barbara has been actively engaged in multiple regulatory economics projects such as the workshop on IR implementation for a Malaysian utility and a total productivity factor study for one of the largest Canadian power producers.
- **Tianying Lan**, Research Associate at LEI. Tianying supports the firm technical engagements with regulators, utilities and private equity firms on issues regarding market design, project evaluations, and wholesale price analysis. Specifically, she is the primary modeler of Midcontinent Independent System Operator (MISO) market, where she is responsible for modeling the energy and capacity markets and analyzing changes in market rules and system dynamics.

Detailed curriculum vitae are provided in Appendix A.

## 2. Minimum Requirements

In addition to the minimum requirements provided in RFP and the Commission's General Order dated November 10, 2014, the following qualifications demonstrate LEI's ability to meet the additional requirements for this RFP:

- **LEI has extensive experience working for public utility commissions and providing expert testimonies or witness services in a wide range of energy, infrastructure, and network economics-related litigation matters:** LEI has testified before and on behalf of a number of public utilities commissions including but not limited to those in California, Connecticut, Maine, Maryland, New Hampshire, New York, Pennsylvania, Texas, Ontario (Canada), and Alberta (Canada). This includes serving as a testifying witness and lead author in evaluating Entergy's decision to join MISO Regional Transmission System ("RTO") on behalf of the Public Utility Commission of Texas. On behalf of the Maryland Public Service Commission LEI provided expert testimony to support its cost-benefit analysis in relation to the proposed transaction between Constellation Energy Group, Inc. and Électricité de France. Also, on behalf of Public Service of New Hampshire, LEI testified in front of the New Hampshire Senate Committee on issues of eminent domain and more specifically, in 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.
- **LEI has a longstanding history of expertise when it comes to the design and evaluation of energy related contracts:** Recently, for the CT DPUC, LEI designed a power purchase agreement incorporating a hybrid physical and financial structure. For the Ontario Power Authority, LEI advised on the design of peaking incentive mechanisms in hydro-electric generation contracts.
- **LEI understands the constraints and specific dynamics of MISO South region, and is familiar with the generation and transmission fleet in Louisiana:** LEI conducts bi-annual reviews of each electricity market in North America, including MISO, to provide updates on major developments that affect its clients. Under this exercise LEI produces 10-year forecasts of wholesale electricity and capacity prices for these regions. This effort makes. LEI also performed a cost-benefit study of Entergy operating Companies joining MISO as part of its work for the Public Utility Commission of Texas.

### **3. Understanding of the work to be performed**

LEI understands that LPSC is seeking an outside consultant and regulatory counsel to assist the Commission in reviewing the issues related to the rulemaking docket no. R-34246: *Rulemaking to consider the appropriateness and potential scope of the Louisiana Public Service Commission's review and pre-approval of utility contracts regarding the construction and/or acquisition of significant generation and transmission related assets.*

#### **3.1 Plan of Action**

LEI's approach to project management is client-focused. The primary objective is to deliver thorough, articulate, and meaningful results on time and within budget. LEI will appoint a dedicated project manager who will be the direct point of contact for the duration of the engagement and who will manage all day-to-day activities.

##### **Component 1: Formulating issues list(s)**

LEI will review the defined contracts analyzing the dynamics of current stakeholders, institutional and legal framework, policy arrangements and performance of the system in place. LEI will further identify relevant issues from different perspectives, including financial, operational, administrative, systematic, and of a public policy perspective. Lastly, LEI will compose a list of issues pertinent to discovery request and will coordinate with LPSC's staff the issues that should go forward.

##### **Component 2: Drafting discovery requests to intervenors and reviewing responses to such requests**

After coordinating with LPSC on the pertinent issues, LEI will draft formal discovery requests to intervenors. LEI understands that formal discovery shall be conducted in adjudicatory proceedings in accordance with the Louisiana Code of Civil Procedure but may be limited at the discretion of the administrative law judge. LEI will then review the responses from intervenors to confirm they are satisfactory and suggest additional discovery requests, if needed.

Lastly, in accordance to the rules of practices and procedures of the LPSC, LEI will mail copies of the requests to all parties of record and keep the originals.

##### **Component 3: Reviewing comments filed by intervening and interested parties**

LEI will also review the record that has been developed and all comments filed by intervening and interested parties for each discovery request.

##### **Component 4: Participating in any technical conferences scheduled**

LEI will assign two key experts to participate in any technical conference(s) scheduled to assist LPSC in addressing any questions and/or presenting issues regarding the discovery process.

LEI will also assist LPSC in the preparation of any material needed for the technical conference(s), including but not limited to: agenda, presentations, and questions list.

**Component 5: Drafting and reviewing reports and recommendations**

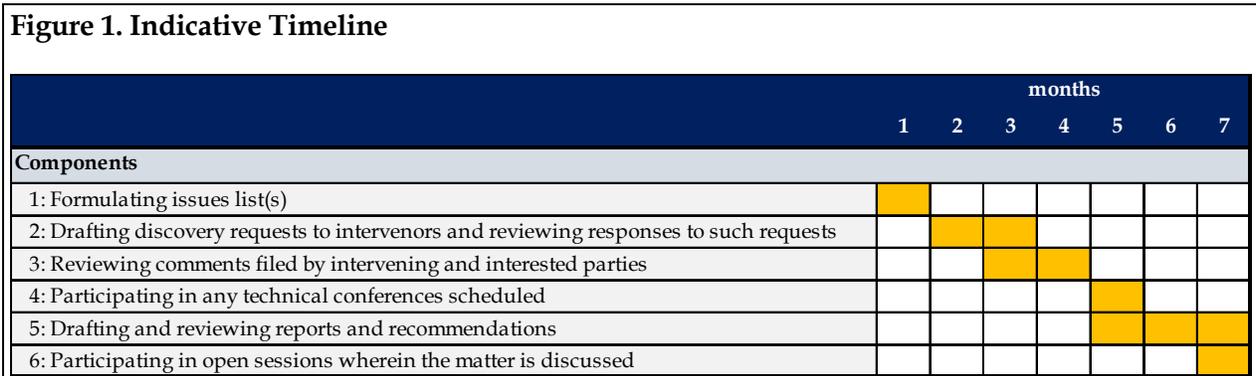
LEI will assist in the preparation and review of the discovery process reports as well as the recommendations for the utility’s contracts. LEI experts will present and discuss its recommendations with LPSC and each key stakeholder involved in the process before submitting the final report.

**Component 6: Participating in open sessions wherein the matter is discussed**

Similar to Component 4, LEI will assist LPSC in the preparation of any materials needed for the open session(s) and will assign two key experts to participate in the event.

**3.2 Timeline**

It is not possible to know exactly the amount of time required to perform the tasks of the engagement, as it will depend on the number and complexity of the issues that will be raised and addressed. However, LEI estimates around 7 months to perform work. Please note that this timeline is merely indicative and does not take into consideration the natural development of the process, as well as the dates of technical conference(s) and open session(s) still to be scheduled.



## 4. Proposed Budget

LEI's professional hourly rates are provided below.

**Figure 2. LEI hourly rate**

Position	Hourly Rate
President/Managing Director	\$ 450
Director	\$ 425
Managing Consultant/Senior Advisor	\$ 400
Senior Consultant	\$ 300
Consultant	\$ 250
Research Associate	\$ 195
Admin	\$ 100

It is not possible to know precisely the total cost of the engagement, as the hours that will be required will depend on the number and complexity of the issues that will be addressed. However, to provide the LPSC with an indication of the fees that may be associated with the engagement, below is an **indicative** budget, broken down for each component in this engagement, is presented below. Please note the estimated budget range is merely indicative, based on previous similar engagements, and we will work at the direction of LPSC and update the budget as needed.

**Figure 3. Professional estimated budget range**

Professional estimated budget	Range	
Component 1	\$ 20,000	\$ 30,000
Component 2	\$ 25,000	\$ 40,000
Component 3	\$ 20,000	\$ 30,000
Component 4	\$ 15,000	\$ 25,000
Component 5	\$ 30,000	\$ 50,000
Component 6	\$ 15,000	\$ 25,000
<b>Total</b>	<b>\$ 125,000</b>	<b>- \$ 200,000</b>

Invoices will be submitted on a monthly basis, based on the accrued work completed by the LEI project team. Invoices will contain sufficient detail regarding the tasks completed and the number of hours spent by each team member. Reimbursable expenses for travel and lodging, data acquisition, and other costs, are all subject to LPSC's approval, and will be invoiced at cost.

## 5. Conflict of Interest

LEI currently has no known or potential conflicts of interest associated with this engagement and the proposed scope of work that would prevent us from meeting the responsibilities outlined in the RFP. Likewise, no member of the project team is currently representing clients before the Commission.

## Appendix A: Curriculum Vitae of key experts

**Julia Frayer**

*Managing Director*

### 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 HISTORY:

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

### SAMPLE PROJECT EXPERIENCE:

Date:	2016
Location:	New York, United States
Company:	Private Client
Description:	On behalf on an electricity marketer, LEI contacted the NYISO Market Monitoring & Analysis (MMA) department to get the MMA's opinion as to the legitimacy of potential trading activities in the energy market.

Date:	2016
Location:	Connecticut, United States
Company:	Eversource and National Grid
Description:	As a follow up to a change made in the analysis carried out by Eversource planners, LEI was required to update its analysis, along with the accompanying report, which will be used as Affidavit during the hearing.

Date:	2016
Location:	New England, United States
Company:	Private Client

Description:	LEI conducted an empirical analysis of New England wholesale electricity market dynamics, including long term modeling of the New England energy and capacity markets under various future market conditions, and provide tabular summaries of simulated market outcomes and financial data. The client used LEI's modeling results to perform policy analysis and prepare a research report that the client plans to release publicly.
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Date:	2016
Location:	New York, United States
Company:	OneGrid
Description:	LEI was retained by a transmission developer to serve as Independent Examiner for a proposed merchant transmission project open solicitation process. The project entailed designing the solicitation process, meeting with potential shippers on the line to garner early interest, drafting announcements and press releases, conducting information sessions, updating the solicitation website, evaluating and ranking bids, assisting with bilateral negotiations with shippers, and submitting a report to FERC as part of the developers' Section 205 filing.

Date:	2016
Location:	United States
Company:	Private Client
Description:	LEI was retained by a transmission developer to perform a high-level analysis of the cost-competitiveness of HVDC transmission as a regulated solution with respect to generation resource. The work included comparing the revenue requirement for HVDC transmission projects with the net Levelized Cost of Entry (LCOE) of comparatively sized and located generation resources.

Date:	2016
Location:	Massachusetts, United States
Company:	Eversource
Description:	LEI was hired by Eversource to support the company in its siting filing for the [Northborough project]. LEI's scope of work consisted of drafting the section of the petition involving alternatives to the proposed project.

Date:	2016
Location:	Massachusetts, United States
Company:	Eversource
Description:	As a follow up to the NTA report analysis prepared by LEI and filed by the Utilities for the Wakefield-Woburn project, LEI was asked to assist the utilities answering a number of questions "Irs" as part of the Discovery

Date:	2016
Location:	New York, United States

Company:	Private Client
Description:	LEI provided advisory service to a transmission developer looking to position its project in New York. LEI provided an overview of the current regulatory and legislative framework, and assisted in identifying and targeting potential shippers on the line.

Date:	2016
Location:	New York, United States
Company:	Private Client
Description:	LEI performed an analysis of benefits to NY consumers from a proposed transmission line between New York State and New England, analyzing the impacts from the proposed project's investments on GDP, jobs, tax revenues, and system reliability. LEI also performed a cursory review of the proposed project's environmental impact, based on criteria established by the NY DPS Staff in previous cases before the Public Service Commission

Date:	2016
Location:	PJM, United States
Company:	Private Client
Description:	LEI was retained by an infrastructure fund to do a 20-year energy and capacity price forecast in support of a potential acquisition of a planned gas-fired plant in Pennsylvania. The results will also be used to update the firm's valuation of its other plant in Ohio.

Date:	2016
Location:	PJM/MISO, United States
Company:	Private Client
Description:	London Economics International LLC ("LEI") was retained to do a resource analysis in the Chicago area and to analyze the congestion within the Chicago area and MISO zones surrounding Lake Michigan.

Date:	2016
Location:	Ontario
Company:	Ontario Power Generation
Description:	In December 2014, London Economics International LLC ("LEI") prepared a report for Ontario Power Generation ("OPG") entitled "Empirical Analysis of Total Factor Productivity Trends in the North American Hydroelectric Generation Industry." The purpose of this report was to share findings from LEI's TFP study, which estimated TFP trends for a select group of peers from the North American hydroelectric generation industry. Data for this study covered an eleven year period from 2002-2012. The purpose of this new engagement is to update this study for newly available data (encompassing operating costs and other statistics for calendar years 2013 and 2014).

Date:	2016
Location:	WECC, United States
Company:	Private Client
Description:	Julia Frayer led an LEI team that performed a forward analysis and market simulation of potential wholesale revenues for a proposed wind project in Wyoming; analysis was used by developer to attract potential counterparties for a long term PPA

Date:	2016
Location:	New York, United States
Company:	Private Client
Description:	Julia Frayer led an LEI team that provided strategic support and analysis of various regulated and unregulated business models for proposed new HvDC transmission line, including identification of potential shippers and RFP opportunities, as well as categorization of potential private and social benefits of the project

Date:	2016
Location:	Alberta
Company:	Private Client
Description:	LEI provided research, analytical and advisory support to a client in Canada as the Alberta government implemented its climate change policy, which will shut down coal plants early, ramp up renewable generation, and put province-wide carbon tax in place.

Date:	2016
Location:	PJM, United States
Company:	Private Client
Description:	A private client was interested in acquiring a pumped storage hydro generation facility owned by LS Power in the PJM region. The client asked London Economics International LLC ("LEI") to prepare a proposal that will forecast the energy and capacity prices for the next 20 years of the relevant zone for this target asset. The price forecast exercise required LEI to model both energy and capacity markets on integrated basis, as well as using a Real Options Model to simulate the target unit's operational decision in arbitraging the peak versus off-peak hours in the energy market.

Date:	2016
Location:	New England, United States
Company:	Private Client
Description:	LEI analyzed the potential investment opportunities for a large IOU in energy storage in New England. Through intensive research and analysis, including simulation-based modeling, LEI identified potential opportunities for energy storage investment in New England and prepared estimate of societal benefits from such investment.

Date:	2015
Location:	New England, United States and Canada
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.

Date:	2015
Location:	New England, United States
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.

Date:	2015
Location:	Massachusetts (New England), United States
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 [Docket DPU 15-64/15-65]

Date:	2015
Location:	Connecticut (New England), United States
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

Date:	2015-2016
Location:	Connecticut (New England), United States
Company:	Eversource
Description:	LEI was hired to conduct a Non-Transmission Alternatives (“NTA”) analysis for the two transmission projects, which are a component of larger transmission solution being proposed by Eversource for the Greater Hartford and Central Connecticut (“GHCC”) area. 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] filed as part of Eversource’s application with the Connecticut Siting Council (“CSC”) for each of these transmission projects.

Date:	2015
Location:	Texas (ERCOT) and New Jersey (PJM), United States
Company:	Private Client
Description:	LEI was hired to forecast the potential energy revenues of two proposed wind farms in Texas. In addition, LEI also analyzed the merchant energy, capacity, and solar renewable revenues for a solar plant in New Jersey.

Date:	2015
Location:	New York, United States
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. LEI further performed an analysis to forecast future fuel and operating costs for the plant, revenues from the sale of energy and capacity in the wholesale markets, and revenues from the sale of steam to an off taker.

Date:	2015
Location:	Ohio (PJM), United States
Company:	Private Client
Description:	LEI was hired to put together a presentation about the PJM market and investment opportunities in generation for the Public Utilities Commission of Ohio.

Date:	2015
Location:	New England, United States
Company:	Private Client
Description:	LEI was engaged by a leading New England law 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.

Date:	2015-2016
Location:	Maine (New England), United States
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 exercise, to extend the analysis to address the impact on Maine if it were to go forward under a regional initiative to procure pipeline capacity. Testimony was filed in February 2016 and LEI testified in March 2016. [Docket 2014-00071]

Date:	2015-2016
Location:	Massachusetts (New England), United States
Company:	National Grid
Description:	As a follow up to the NTA report analysis prepared by LEI and filed by National Grid in Massachusetts, LEI was asked to answer interrogatories as part of the Discovery. [Docket DPU 15-44/45]

Date:	2015
Location:	New York, United States
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.

Date:	2015
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.

Date:	2015
Location:	Alberta, 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.

Date:	2015
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.

Date:	2015-2016
Location:	Delaware (PJM), 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. [Docket 14-0283]

Date:	2015
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.

Date:	2015
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.
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Date:	2015
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.

Date:	2015
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.

Date:	2014-2015
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).

Date:	2015
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.

Date:	2015
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.

Date:	2015
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. [Docket N5179515]

Date:	2014 and 2015
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 lieu 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.

Date:	2015
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. [Case 13-E-0488]
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Date:	2015
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

Date:	2014 and 2015
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).

Date:	2015
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.

Date:	2014
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.
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Date:	2014
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.

## Bridgett Neely

### Senior Advisor

#### EDUCATION:

Institution:	Columbia University
Date:	May 2000
Degree(s) or Diploma(s) obtained:	MA, Finance and Economic Development
Institution:	Tufts University
Date:	May 1996
Degree(s) or Diploma(s) obtained:	BA, International Relations

#### EMPLOYMENT HISTORY:

Date:	August 2015 - Present
Location:	Dallas, TX
Company:	London Economics International LLC
Position:	Senior Advisor

Date:	July 2011-Present
Location:	Dallas, TX
Company:	Firefly Energy Consulting LLC
Position:	Owner and President

Date:	August 2009-June 2011
Location:	Austin, TX
Company:	Green Mountain Energy Company
Position:	Senior Advisor, Strategic Planning

Date:	March 2008-July 2009
Location:	New York City, NY
Company:	New York City Economic Development Corporation (NYC EDC)
Position:	Vice President, Energy Efficiency and Renewable Energy

Date:	March 2003 - December 2007
Location:	Boston, MA/New York City, NY
Company:	London Economics International LLC
Position:	Managing Consultant/Senior Consultant

Date:	August 2000 - March 2003
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Location:	Paris, France
Company:	Roland Berger Strategy Consultants
Position:	Senior Consultant

Date:	October 1996 - August 1998
Location:	Cambridge, MA
Company:	Cambridge Energy Research Associates (CERA)
Position:	Coordinator, Special Projects

### **SAMPLE PROJECT EXPERIENCE:**

Date:	August 2015 - present
Location:	Alberta
Company:	International utility
Description:	Analyzing policy options for Alberta carbon reduction targets: For a large market participant in Alberta, analyzing all possible policies to reduce carbon and other greenhouse gas emissions. Conducting case studies of California cap and trade, UK carbon levy, Renewable Portfolio Standards in Texas, Montana, and Massachusetts, California's efforts to increase energy efficiency and solar distributed generation, and Feed In Tariffs in Germany. Recommendations will be calibrated by extensive economic modeling of the Alberta electricity sector.

Date:	February - August 2015
Location:	Dallas, TX
Company:	South-Central Partnership for Energy Efficiency as a Resource (SPEER)
Description:	Provided day to day management to launch the Dallas 2030 District. Activities included creating leadership council with appropriate committees, developing sustainable funding plan, assessing stakeholders needs and interests and reflecting those in marketing documents, developing dues and sponsorship structure, developed 2015 plan for events and trainings, identified staffing needs and developed budget.

Date:	January - May 2015
Location:	US - National
Company:	J.D. Power

Description:	Strategic assessment of data service geared at retail energy providers: For a national data service provider, assessed their product, delivery mechanisms, pricing and marketing targeted at retail energy providers. Interviewed internal staff and current and past clients as part of review process. Developed a series of recommendations to increase sales of the product, including a reconfiguration of the product, its pricing and its marketing. Supporting on implementation of these recommendations on an as needed basis.
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Date:	August 2014-January 2015
Location:	US - National
Company:	International utility
Description:	Monitored regulatory and legislative developments affecting the renewable energy credit (REC) and carbon markets across the US: For an international power producer, monitored ongoing regulatory and legislative activities across the US, with a focus on implications for the company's proprietary trading and the profitability of its own power plants in the US. As part of this process, helped client understand the business implications impending or potential regulatory changes and legislation.

Date:	June 2014 - February 2015
Location:	New York
Company:	Government organization
Description:	Developed cash flow and social benefits model for new ratepayer surcharge structure in New York: Developed a model to transition from a system of multiple different benefit surcharges (RPS, EEPS, SBC) to one all-inclusive ratepayer surcharge (Clean Energy Fund), based on NY Public Service Commission (NYPSC) guidance, pre-existing commitments, and Governor's Office policy objectives; analyzed benefit contributions (energy reductions, emissions reductions, bill savings, etc.) from different potential program allocations and made recommendations about how to optimize; helped draft filing to the NYPSC for a 10 year \$5 billion program.

Date:	May -August 2014
Location:	New York
Company:	Government organization
Description:	Analyzed market for real-time energy monitoring services: For a government entity providing ratepayer-funded incentives, analyzed market for real-time energy monitoring services, including firms using "big data" analytics. Identified full range of activities in this market segment, categories of firms by activity range, and which specific services needed to be incentivized to grow the market. Commented on proposals for new program to increase real-time energy monitoring services by offering targeted incentives.

Date:	May - December 2013
Location:	International
Company:	International NGO
Description:	Assessing building energy rating schemes to determine financial impact on building value: For an intergovernmental organization, assessed building energy rating programs around the world to assess effectiveness and link to change in building valuations. Work included extensive review of public assessments of benchmarking programs and academic literature on links between benchmarking and asset values. Presented preliminary findings at international workshop of key international policy experts and private sector representatives to obtain feedback and refine findings. Developed recommendations for improving building energy rating regimes such that their impact is more directly seen in building valuations.

Date:	January - December 2013
Location:	New York
Company:	New York Power Authority (NYPA)
Description:	Developed business case and implementation plan for a building energy management center: For a public utility in New York, assessed the costs and benefits of developing a real-time building energy management center to monitor and better control the government's high energy consuming buildings. This process entailed issuing a Request for Information to assess the status of relevant technologies; getting all stakeholders aligned on required functionality for the center; developing a Request for Proposals to procure needed systems and services; analyzing the business case for initiative; gaining CEO and Board approval for a pilot; hiring and managing the vendor; launching the project; working with vendor to get first pilot sites online; and developing hiring specs for full-time manager.

Date:	January 2012 - January 2013
Location:	New York
Company:	NY Governor's office/ New York Power Authority

Description:	Designed and helped to launch BUILD SMART NY, a key NY Governor's Office initiative to reduce energy consumption in New York State's 17,000 buildings by 20% within 7 years. Served as the project manager for this initiative for its first year: Assessed the status of energy efficiency efforts in state buildings, obstacles to further penetration, and the resources and organization needed to achieve the Governor's target; helped draft the Executive Order that mandates the 20% reduction; developed and launched an implementation plan to achieve the target; oversaw first round of benchmarking of New York's 200 M square feet of real estate and identified key findings from benchmarking results; developed recommendations for staffing and budget to manage the initiative; recruited and helped interview for full-time Director of BuildSmartNY office.
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Date:	February - May 2012
Location:	National
Company:	Energy services company
Description:	Assessed the market for on-bill energy efficiency financing: Analyzed the status of on-bill financing across the country, identified the most successful programs and their key success factors, recommended potential partners and M&A targets for an energy company interested in expanding its activities to energy efficiency financing, and identified potential challenges and risks in this market.

Date:	January 2012- December 2013
Location:	National
Company:	National retailer
Description:	Monitored regulatory and legislative developments affecting the renewable energy sector and the retail energy markets in the Northeast: For a national retail energy company, monitored ongoing regulatory and legislative activities in states across the Northeast affecting renewable energy development and the retail energy market. Helped draft industry association filings in regulatory proceedings and helped client understand the business implications impending or potential regulatory changes and legislation.

Date:	September - November 2012
Location:	National
Company:	Energy services company
Description:	Valuation of Demand Response companies: For a large national energy company, assessed the demand response market, analyzed its business model and profit potential, and identified potential acquisition targets. For one specific target, researched possible reasonable metrics for valuing that firm based on publicly available information. Firm was eventually acquired.

Date:	July 2011 - December 2012
Location:	National
Company:	Various clean energy companies
Description:	Developed business case for new potential products or market entry: Supported several private sector companies in the energy efficiency and renewable energy space evaluate new business expansion concepts, ranging from identifying new potential areas of activity (both geographic and functional), developing “back-of-the-envelope” assessments of such opportunities to determine which merited more research, conducting detailed financial models of high potential opportunities, presenting on new business opportunities to senior company management, and developing detailed launch plans for approved new business ventures.

Date:	August 2009 - July 2011
Location:	National
Company:	National retailer
Description:	Developed new natural gas product offering: Bridgett assessed supply options for carbon free gas product, analyzed environmental credibility, supply constraints, and evaluated implications for business economics. Bridgett ultimate developed the launch plan to get the business initiated, including finding appropriate partners and vendors.

Date:	August 2009-July 2011
Location:	National
Company:	Green Mountain Energy Company
Description:	Analyzed new markets for expansion: For this national retailer, Bridgett analyzed new geographic markets for expansion: assessed possible profit contribution, competitive landscape, and likely operational constraints; made recommendations to CEO and management team; when relevant, created action list for market launch

Date:	August 2009 - July 2011
Location:	National
Company:	Green Mountain Energy Company
Description:	Analyzed new potential markets and services options: Bridgett was responsible for assessing new products and services, including: developing business case; analyzing competitive landscape; making recommendations to the CEO and management team; when relevant, creating detailed financial forecasts, developing implementation plan, and identifying potential partners or acquisition targets

Date:	2008-2009
Location:	New York, NY
Company:	NYC Economic Development Corporation

Description:	Served as senior policymaker for NYC government under Mayor Bloomberg: As part of the senior policy team on energy issues in New York City, Bridgett identified and implemented policies to increase energy efficiency and renewables in NYC, such as innovative financing mechanisms, legislation to mandate building efficiency, marketing & outreach strategies. These strategies were driven by Mayor Bloomberg's ambitious efforts highlighted in PlaNYC.
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Date:	2008-2009
Location:	New York, NY
Company:	NYC Economic Development Corporation
Description:	Advocated on behalf of NYC before NYPSC: As part of the senior policy team on energy issues in New York City, Bridgett advocated for NYC before the NY Public Service Commission regarding state-funded energy efficiency and renewable programs; collaborated with program administrators to optimize program design for NYC specific needs

Date:	2006-2007
Location:	United States
Company:	CT DPUC
Description:	Served as procurement manager for large all source procurement process in CT: LEI supported the State of Connecticut's Department of Public Utility Control (DPUC) in determining the range of investment needs that could be required in Connecticut over the next 15 years due to localized ISO-NE markets for capacity and forward reserves. LEI then designed a procurement process, including the RFP and associated contracts, solicit for that capacity from both supply side and demand side resources. LEI served as the RFP manager for the process, being the main contact point for bidders, evaluating the bids, and recommending the winning portfolio. LEI also served as the DPUC's expert witness in the hearings approving the winning portfolio.

Date:	2006-2007
Location:	Saudi Arabia
Company:	Ministry of Energy
Description:	Provided overview of possible market reforms, including extensive benchmarking to other countries: LEI developed for the Saudi Arabian government a blueprint for industry restructuring, which included an unbundling of the current monopoly of a vertically integrated utility, introduction of wholesale competition, and creation of a single buyer.

Date:	2005-2006
Location:	United States
Company:	Dept. Of Public Utility Control-Connecticut

Description:	Served as market monitor for large scale Connecticut procurement: The Department of Public Utility Control of Connecticut 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. Bridgett worked as part of 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, the LEI team 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.
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Date:	2003-2004
Location:	Romania
Company:	International Utility
Description:	Helped value 2 distribution systems in Romania and to negotiate revised regulatory structure for distribution tariffs as part of international transaction: LEI designed a PBR tariff structure for Romania's electric distribution system, incorporating reasonable assurances of capital recovery for investors. The proposal included extension of the current regulatory regime for 2004, with tariff increases to reflect inflation and initial capital investments. Following 2004, a PBR regime in the form of RPI-X+K+Z would be implemented, in which RPI is a measure of Romanian consumer price inflation, X a targeted level of efficiency, K represents approved increases to ratebase due to approved capital investments, and Z a parameter to account for extraordinary events. The new tariff regime would be phased in, with the first generation lasting from 2005-2007 and the second generation from 2008-2012. Service quality standards would be based on actual historical performance. Returns would be subject to an earnings sharing mechanism.

Date:	2006
Location:	Ontario, Canada
Company:	Ontario Energy Board
Description:	Benchmarked default supply procurement processes: For the Ontario Energy Board, Bridgett analyzed the process of managing default supply auctions across the US with the focus of understanding the regulator's role and responsibility. Bridgett analyzed case studies in Maine, Massachusetts, California, Connecticut, and New Jersey to develop key lessons for the Ontario regulator.

Date:	2006
Location:	Hong Kong
Company:	Government

Description:	Analyzed and made recommendations on a variety of regulatory reform topics: In preparation for 2008, when the contracts governing Hong Kong's electricity sector expire, Bridgett and her team provided detailed briefing papers to the Government on a variety of topics ranging from the appropriate allowed rate of return, calculating the ratebase, establishing efficiency, performance, and environmental incentives, and assessing the merits of the Development Fund and the Fuel Clause Adjustment. The project culminated in a series of recommendations regarding the industry's regulatory structure, which were publicly issued as part of the Government's consultation process.
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Date:	2005
Location:	Canada
Company:	Alberta DOE
Description:	Analyzed possible options for retail market reform: Bridgett supported the Alberta Department of Energy (ADOE) in an attempt to select the most appropriate way to further deregulate its retail market. We analyzed the economic impact of five different options being considered by ADOE on customer bills by using historical data as well as developing a cost benefit analysis model that looked at both quantitative and qualitative issues that were prioritized by the ADOE. We provided a ranking of options and recommendations as to which would best meet ADOE needs.

## Marie N. Fagan, PhD

### *Managing Consultant and Lead Economist*

#### EDUCATION:

Institution	The American University
Date:	1995
Degree(s) or Diploma(s) obtained:	PhD in Economics

Institution	The University of Connecticut
Date:	1984
Degree(s) or Diploma(s) obtained:	B.S. in Business Administration (Finance)

#### EMPLOYMENT HISTORY:

Date:	2014-Present
Location:	Boston, MA
Company:	London Economics International LLC
Position:	Managing Consultant and Lead Economist

Date:	2003-2014
Company:	IHS, Inc (formerly Cambridge Energy Research Associates)
Position:	Director, North American Gas (2003-2004); Director/Senior Director, CERAVIEW Institutional Investor (2004-2007); Senior Director, North American Gas and Power (2007-2012); Senior Director, Upstream Strategy (2012-2014)

Date:	2001-2002
Company:	International Human Resources Development Corporation
Position:	Director, Global Gas Program

Date:	1996-2001
Company:	Cambridge Energy Research Associates
Position:	Associate, Global Oil (1996-1998); Associate Director, Global Oil (1998-2001)

Date:	1994-1996
Company:	Energy Information Administration
Position:	Economist

Date:	1989-1994
Company:	Decision Analysis Corporation of Virginia
Position:	Research Associate (1989-1990); Associate (1991-1994)

Date:	1988-1988
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Company:	United States Department of Energy
Position:	Intern, Office of Policy Planning, and Analysis

### SAMPLE PROJECT EXPERIENCE:

Date:	October 2016
Location:	California/Kansas
Company:	Law firm
Description:	Marie prepared an expert report in support of litigation in Case 15CV-04225 in the District Court of Johnson County, Kansas. LEI was retained by counsel to examine the value of the green attributes of landfill gas ("LFG") produced by a project in Kansas City and sold under long-term contract to the Sacramento Municipal Utility District ("SMUD"). Marie's report demonstrated several flaws in the opposing counsel's expert's methodology. Marie proposed an alternative, more appropriate methodology for valuing the green attributes of LFG, based on market fundamentals driven by the California RPS requirements.

Date:	August-October 2016
Location:	Maine
Company:	Public Utilities Commission
Description:	Marie led an engagement to estimate the macroeconomic impact of biomass generation within the state of Maine (Maine PUC Docket No. 2016-00084). This included direct, indirect, and induced impacts on: permanent direct jobs, payments to municipalities, payments for fuel harvested in the State, payments for in-state resource access, in-state purchases of goods and services, and construction-related jobs and purchases. Marie used the macroeconomic model known as IMPLAN to capture the economic impacts on industries including logging, sawmills, and other forestry-related industries and well as on state and local taxes.

Date:	May 2016
Location:	North America/ERCOT
Company:	Canadian energy company

Description:	Marie conducted a case study assessing the current ancillary services (“CAS”) market in ERCOT, outlining the structure of ERCOT’s proposed Future Ancillary Services Nodal Protocol Revision Request (“FAS-NPRR”), and examining the implications of ERCOT’s experience so far for the Alberta electricity market. This involved examining the drivers of ancillary services supply and demand in ERCOT, the price-setting mechanisms and procurement processes, and the technical requirements of the various ancillary services in ERCOT. Findings included the following: While it was widely expected that the addition of large amounts of wind (and other non-synchronous generation) on the ERCOT system would significantly increase the need for ancillary services, by 2015, ERCOT’s procurement of CAS products had not increased compared with 2011. However, the need for synchronous inertial response (“SIR”) which is not part of CAS did increase somewhat over the time period, though ERCOT noted that volumes of SIR are still sufficient and did not include SIR in its FAS-NPRR.
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Date:	April/May 2016
Location:	North America/ERCOT
Company:	Renewable power investor
Description:	LEI was hired to perform due diligence for an investor interested in wind assets in ERCOT. Marie examined the political, legislative, and economic drivers of ERCOT’s Competitive Renewable Energy Zones (“CREZ”) and provided an assessment of state-level support for further expansion of CREZ transmission lines. She also provided assessment of and outlook for ERCOT’s and the Public Utility Commission of Texas’s views of the “system cost” of wind (the potential increased need for ancillary services and firm capacity on the system).

Date:	June 2014-April 2016
Location:	Maine
Company:	Public Utilities Commission
Description:	Marie served as project manager, independent market expert, and expert witness for the Maine Public Utilities Commission, in the evaluation of the costs and benefits of alternatives for expansion of natural gas supply into Maine pursuant to the Maine Energy Cost Reduction Act (MPUC Docket #2015-00071). Marie 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. Marie provided expertise in upstream natural gas (exploration and production), midstream natural gas (interstate pipelines) and global energy markets including oil and LNG markets, to provide a solid grounding for LEI’s long-term outlook for New England natural gas prices. Marie directed the 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. She authored reports provided to the Commission; responded to discovery from other

	parties; prepared discovery questions and cross-examined witnesses; reviewed testimony by other parties and provided assessments of the issues presented; and she served as an expert witness in the proceedings.
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Date:	November-December 2015
Location:	North America
Company:	Renewable power developer
Description:	LEI was hired by a wind developer to provide a quantitative assessment, based on an economic dispatch model, of congestion/curtailment risk for a wind asset in Maine. LEI used its proprietary dispatch model, PoolMod, to provide an outlook from 2016 through 2020 of hourly LMPs, as well as the components of LMP (energy, losses, and congestion). We incorporated information from the interconnection impact study to examine system limits for the plants in question. We also provided an assessment of risk of outages based on NERC outage data for NPCC. Marie led the project.

Date:	October-November 2015
Location:	North America
Company:	Private equity company
Description:	LEI was hired to forecast the potential energy revenues of two wind farms in Texas, using its proprietary dispatch model, PoolMod. Marie led the project, and also examined the implications of the PPA related to the two wind farms.

Date:	May 2015
Location:	North America
Company:	Private equity company
Description:	Marie evaluated contracts for firm gas transportation capacity for gas-fired plants in Virginia and Connecticut.

Date:	April 2015
Location:	North America
Company:	Private equity company
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. Marie served as lead gas market analyst.

Date:	August 2014- January 2015
Location:	North America
Company:	Canadian energy company
Description:	LEI was engaged to support this client's Regulatory Group in its administering of the company's compliance program. The purpose of the engagement was to ensure that client's transactional and business groups were made aware of market rules and regulatory risks. This involved creating and delivering a monthly report covering

	developments by regional market and traded 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. Marie served as project manager and executive editor of the monthly report and monthly conference call, and provided the research and insight on US gas, oil, and coal markets, and FERC.
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Date:	October 2014
Location:	North America/New England
Company:	Private equity company
Description:	To support potential acquisition of hydropower assets, Marie provided analysis of ISO-New England's Locational Forward Reserves Market ("LFRM").

Date:	April-June 2014
Location:	North America/MidWest
Client:	Private equity company
Description:	LEI was engaged by an investment firm in association with due diligence related to a district cooling system in the Midwest. Marie reviewed contracts and developed a model for projecting revenues and gross margins for the asset. Marie provided insight by identifying the potential for lower customer contract prices at renewal (in contrast to the seller's assumptions) and other areas of revenue risk.

Date:	June 2014
Location:	North America
Client:	Law firm representing a Canadian energy company
Description:	LEI was engaged by a law firm on behalf of a Canadian electricity transmission company to provide market advisory for an investigation related to the timing of outage scheduling under PPAs. Marie provided research and expertise covering US Federal Energy Regulatory Commission ("FERC") practices related to monitoring, enforcement, and definition and prosecution of alleged market manipulation.

Date:	April-May 2014
Location:	Nova Scotia
Client:	Provincial government
Description:	LEI was retained by the Nova Scotia Department of Energy to perform analysis of the organization and governance of electricity systems both cross-jurisdictionally and within the province of Nova Scotia. Marie provided a detailed overview of the Nova Scotia gas and power sectors, including governing institutions, the legal and regulatory framework, recent developments and challenges, and SWOT analysis.

## Barbara Porto

### Consultant

#### EDUCATION:

Institution	Hult International Business School
Date:	August 2014
Degree(s) or Diploma(s) obtained:	MBA - Master of Business Administration

Institution	COPPEAD/UFRJ (Brazil)
Date:	December 2010
Degree(s) or Diploma(s) obtained:	Finance Certificate

Institution	Universidade Estácio de Sá (Brazil)
Date:	June 2010
Degree(s) or Diploma(s) obtained:	Bachelor of International Relations

#### EMPLOYMENT RECORD:

Date:	January 2014 - Present
Location:	Boston, MA
Company:	London Economics International LLC
Position:	Consultant

Date:	July 2008 - August 2013
Location:	Rio de Janeiro, Brazil
Company:	ENEVA (subsidiary of E.ON AG)
Position:	Analyst (July 2010 - August 2013) Intern (July 2008 - June 2010)

#### SAMPLE PROJECT EXPERIENCE:

Date:	January 2015 to present
Location:	Mexico
Company:	LEI's Continuous Modeling Initiative (CMI)
Description:	As lead Mexico market modeler, Barbara tracks and evaluates the impact of on-going structural and regulatory changes in the electricity market to produce detailed price forecast and associated analyses on an ongoing semi-annual basis using LEI's in-house price forecast software, POOLMod.

Date:	August 2016 - on-going
Location:	USA

Company:	Private Client
Description:	LEI was retained by a transmission developer to serve as Independent Examiner for a proposed merchant transmission project open season process. The project entailed overseeing the entire process, including drafting announcements and press releases, preparing the Open Season documents and forms, conducting information sessions, creating the associated website, evaluating and ranking bids, and submitting a report to FERC as part of the developers' Section 205 filing.

Date:	July 2016 - on-going
Location:	USA
Company:	Private Client
Description:	LEI was retained by a transmission developer to serve as Independent Examiner for a proposed merchant transmission project open solicitation process. The project entailed designing the solicitation process, meeting with potential shippers on the line to garner early interest, drafting announcements and press releases, conducting information sessions, updating the solicitation website, evaluating and ranking bids, assisting both bilateral negotiations with shippers, and submitting a report to FERC as part of the developers' Section 205 filing.

Date:	June 2016
Location:	USA
Company:	Private Client
Description:	LEI was retained by a transmission utility to provide an overview of resources in the Chicago area and the Commonwealth Edison ("ComEd") zone and analyze the congestion of several nodes within the Chicago area and shorelines sites of Lake Michigan.

Date:	June 2016
Location:	Brazil
Company:	Private Client
Description:	For a Canadian electricity transmission company, LEI conducted theoretical and empirical analysis of the Brazilian Electricity Market Credit Crisis highlighting interesting lessons for the Alberta market. Topics explored include: credit/financing issues, system reliability, government interventions, power market risks, resources diversity.

Date:	April - May 2016
Location:	Multiple
Company:	TransAlta
Description:	LEI was retained to provide ongoing research, analytical and advisory support to TransAlta as the Alberta government implements its climate change policy, which will shut down coal plants early, ramp up renewable generation, and put in place a province wide carbon tax. Part of the engagement was to perform a case study-oriented comparative review of ancillary services in North America and abroad.

	Barbara was responsible for the Ireland case study.
Date:	March 2016
Location:	Canada
Company:	Alberta Balancing Pool
Description:	LEI was retained by the Alberta Balancing Pool to provide wholesale energy price forecasts and market revenue projections over the period 2017-2020 for various generating facilities operating in the Alberta. LEI ran multiple sensitivities accounting for changes in ownership and dispatch rights, facility decommission and carbon policy changes. LEI relied on its proprietary dispatch simulation model, POOLMod applying Conjecture theoretical approach.
Date:	December - February 2016
Location:	Canada
Company:	Ontario Power Generation ("OPG")
Description:	LEI prepared a report for OPG entitled "Empirical Analysis of Total Factor Productivity Trends in the North American Hydroelectric Generation Industry." The purpose of this report was to share findings from LEI's total factor productivity ("TFP") study, which estimated TFP trends for a select group of peers from the North American hydroelectric generation industry. Data for this study covered an eleven year period from 2002-2012. This study was further updated for newly available data (encompassing operating costs and other statistics for calendar years 2013 and 2014). LEI also examined the feasibility of such a study for OPG's nuclear generation assets.
Date:	October - November 2015
Location:	Multiple
Company:	Private Client
Description:	LEI was retained as part of a consortium to support an energy product manufacturing firm assess the market for solar thermal technologies, with a focus on an economic assessment of solar thermal technology, assessing the value contribution of the different components of the value chain creating a molten thermal solar plant. In addition the client asked LEI to provide support to developing business strategies for this market. LEI's conducted the analysis in 3 out of 5 high priority markets - Saudi Arabia, Morocco, and Chile. More specifically we assessed the economics for solar thermal in each market, commented on the general perception of the technology and provided a comprehensive brief on the rules governing the market access. Barbara was responsible for the Chilean market.
Date:	June - October 2015
Location:	USA
Company:	Private Client
Description:	LEI was retained by the largest electric utility company in Malaysia, to conduct a capacity building workshop on performance-based regulation ("PBR") and technical visits to utilities and regulators worldwide that are operating under PBR-like regimes.

	Barbara presented to TNB's traveling contingent on PBR Requirements standards across different jurisdictions and on fundamental of Tariff Design.
Date:	June 2015
Location:	USA
Company:	Private Client
Description:	LEI was retained to categorize the different plants in PJM into self-supply, merchant or under PPA.
Date:	May - June 2015
Location:	USA
Company:	Private Client
Description:	LEI was engaged by a private equity company to provide a briefing paper that compares "The Opportunities of the Buy versus Build Investment Decision." 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.
Date:	April 2015
Location:	Colombia
Company:	Private Client
Description:	LEI was hired by a financial investor to provide an understanding of the dynamics underpinning hydro-dominated power markets as opposed to thermal systems. As part of this project, LEI reviewed in details the dynamics and key drivers of energy markets in a sample of Latin America countries including Colombia, Panama, Brazil and Chile. Colombia was the point of focus of the report, in this respect LEI compared and contrast several aspects of the Colombian markets to other jurisdictions and created a scoring card to evaluate Colombia against similar jurisdictions.
Date:	March - April 2015
Location:	Colombia
Company:	Private Client
Description:	LEI was hired by an electric operator for the purposes of valuing a portfolio of generating assets in Colombia. LEI's scope of work consists of a comprehensive review of the Colombia energy market (including fuel and power market drivers), describe in details the functioning of both wholesale power market and firm energy market (capacity market), develop forecasts of spot prices in order to derive expected revenues for the portfolio. Colombia being a hydro dominated system, as part of its modeling exercise, LEI ran a Monte Carlo simulation to develop a series of probabilities associated with generation profiles of Colombia's hydro resources to reflect the impact of weather conditions and water inflows on hydropower plants' output. LEI summarized its research and modeling results in a final report that was presented to lenders and other interested parties.

Date:	January - February 2015
Location:	USA, Canada and Mexico
Company:	Private Client
Description:	LEI was retained by a private client to conduct a mini-workshop to discuss the market opportunities and risks on five proposed transmission projects in the US and Mexico. Barbara was involved in the analysis of the Mexican projects.

## Appendix B: LEI Brochure

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# LONDON ECONOMICS INTERNATIONAL LLC

## INTRODUCTION TO LONDON ECONOMICS INTERNATIONAL LLC ("LEI")

LEI is a global economic, financial, and strategic advisory professional services firm specializing in energy, water, and infrastructure. The firm combines detailed understanding of specific network and commodity industries, such as electricity generation and distribution, with sophisticated analysis and a suite of proprietary quantitative models to produce reliable and comprehensible results.

The firm also has in-depth expertise in economic and financial issues related to the electricity, gas, and water sectors, such as asset valuation, procurement, regulatory economics, and market design and analysis. LEI has worked extensively in North America, Europe, Asia, Latin America, Africa, and the Middle East, and has a comprehensive understanding of the issues faced by the utilities and regulators alike.

The following attributes make LEI unique:

- *clear, readable deliverables* grounded in substantial topical and quantitative evidence;
- *internally developed proprietary models* for electricity price forecasting incorporating game theory, real options valuation, Monte Carlo simulation, and sophisticated statistical techniques;
- *balance of private sector and governmental clients* enables LEI to effectively advise both regarding the impact of regulatory initiatives on private investment and the extent of possible regulatory responses to individual firm actions;
- *ability to estimate relative efficiency levels* and efficiency frontiers provides expertise to advise on network tariffs and design rates under performance-based ratemaking; and
- *worldwide experience* backed by multilingual and multicultural staff.

LEI has significant experience in several areas, including:

**ELECTRICITY:** London Economics International LLC has participated in the birth and development of competitive electricity markets worldwide. Our strategy practice has helped traditional IOUs in the creation of competitive gencos, assessment of the establishment of independent transcos, and valuation of synergies with associated businesses. Market design achievements include use of game theoretic techniques to assess bidding strategy and creation of sophisticated contracting structures to mitigate market power.

**WATER:** LEI's water and wastewater, and collection system sector services include advising on water utility management, tariff rate-setting and regulatory frameworks, PBR, water demand management programs, and freshwater supply, treatment and distribution systems. LEI has advised water and wastewater industry clients ranging from power and water utilities to government regulators and financial institutions in Europe, Africa and the Middle East.

**NATURAL GAS:** LEI's natural gas related activities include assessment of the synergies between the natural gas and electric power industries, examination of performance-based ratemaking and total factor productivity for natural gas distribution companies, and developing screening methodologies for potential investments in the natural gas industry.

**RENEWABLES:** LEI provides a range of services associated with the renewable energy industry. This includes working with developers to value potential revenue streams from renewable energy credits (RECs) and/or emissions offsets, advising private equity funds to craft investment plans targeted at "green" technologies, and counseling governments and regulators on creating policies which efficiently incentivize investment in renewable energy.

**TRANSPORTATION:** London Economics is at the forefront of analyzing key issues related to pricing and privatization of key transportation infrastructure. This includes analysis of the implications of road pricing, regulation and development of privatized ports, and lessons from the UK rail privatization process.

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PROCUREMENT

## PROCUREMENT

London Economics International LLC (LEI) has an extensive array of experience designing, administering, monitoring, and evaluating competitive procurement processes. As competitive solicitations for energy and energy related products quickly become the norm, regulators and utilities alike face increased pressure to ensure that economic principles and best practices are adhered to. At LEI, we have over twenty years of experience modeling and analyzing energy markets around the world. Our proprietary suite of analytical tools enables us to understand the impact of investment decisions and determine least-cost alternatives. Our leading team of economic, financial, and technical experts have a specialized knowledge of competitive procurement processes and have testified before local regulators, as well as the Federal Energy Regulatory Commission, on competitive procurement, market design fundamentals, and market power related issues.

### HOW WE CAN HELP

**PROCUREMENT PROCESS AND CONTRACT DESIGN:** LEI applies fundamental economic principles and an exhaustive knowledge of electricity markets to help regulators and utilities create effective, rational, and transparent procurement processes. LEI's support includes proposing selection criteria, drafting RFP documents and templates, publicizing the procurement, communicating with stakeholders, the creation of an analytic framework to evaluate bids, and development of supporting models to compare various options proposed.



**INDEPENDENT MONITORING AND EVALUATION:** As an independent monitor, LEI reviews and assesses the solicitation framework, documents, and modeling methodologies to ensure the process is designed to achieve a fair and unbiased result. LEI also monitors, audits, and validates the bid process and opines on the fairness of the ultimate result.

### RELEVANT ENGAGEMENTS

**RFP DESIGN AND IMPLEMENTATION:** LEI acted as advisor to the Connecticut Department of Public Utility Control (CT DPUC) during its all-source energy procurement. LEI developed a "Needs Assessment" to determine the quantity of capacity necessary to satisfy the State's Locational Forward Reserve Market requirements. LEI's procurement specialists designed the RFP framework and managed the day-to-day activities, including the collection of bids and the evaluation of submissions relative to anticipated market outcomes. LEI experts testified as to the merits of the selected projects that were awarded long-term contracts. LEI also recently performed a similar role, designing the RFP documents and evaluating bids, for the Maine Public Utilities Commission's 2009 procurement.

**CONTRACT DESIGN:** LEI has a longstanding history of expertise when it comes to the design and evaluation of energy related contracts. Recently, for the CT DPUC, LEI designed a power purchase agreement incorporating a hybrid physical and financial structure. For the Ontario Power Authority, LEI advised on the design of peaking incentive mechanisms in hydro-electric generation contracts.

**MONITORING AND EVALUATION:** LEI experts have served as independent monitors (IM) on a number of competitive procurement processes. Most recently, LEI was the IM for PacifiCorp's renewable energy procurement process. LEI reviewed the solicitation framework, documents, and modeling methodologies and monitored and audited the bid evaluation process. In Connecticut, LEI staff acted in a similar role, monitoring Connecticut Light & Power's transitional standard offer auction. LEI also actively monitors outcomes in default supply, standard offer, and provider of last resort bid processes for private investors.

**BEST PRACTICES IN GENERATION PROCUREMENT:** Having contributed to competitive procurements in multiple jurisdictions, LEI has a comprehensive understanding of best-practices. LEI staff have testified before the California Energy Commission on the benefits of competitive solicitations, and have led a number of stakeholder engagement sessions, including for the Ontario Power Authority, aimed at improving RFP design.

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PROCUREMENT

## REGULATORY ECONOMICS, PBR & MARKET DESIGN

Our regulatory economics practice examines the universe of economic and financial issues facing regulators, market institutions, and regulated companies. Using quantitative modeling techniques, exhaustive knowledge of innovative regulatory practice worldwide, and a sound grasp of underlying economic principles, London Economics International LLC (LEI) staff help to answer questions such as:

- ✓ *How should tariffs be designed to insure cost recovery while meeting standards for equity efficiency?*
- ✓ *What market structure best limits the exercise of strategic behavior among bidders?*
- ✓ *Can market rules be designed to address power concerns without eliminating the incentive to invest?*
- ✓ *What proportion of savings attributable to efficiency gains should go to shareholders v. ratepayers?*
- ✓ *Should capacity markets be established, and if so, how should they be formed?*
- ✓ *What conditions justify the imposition of explicit transmission congestion pricing regimes?*

Whether advising on regulatory strategy for a network, or tariff design or market reform for a regulator, our ability to balance the needs of various stakeholder groups helps us to propose durable, long term, least cost solutions to difficult regulatory conundrums.

### HOW WE CAN HELP

**PERFORMANCE-BASED RATEMAKING (PBR):** Our practice is anchored on our ability to quantify current and achievable efficiency levels for regulated industries, and to convert the findings into efficiency targets mutually acceptable to utilities and regulators. These abilities are supplemented by on-the-spot knowledge of how PBR regimes in the UK, Australia, Latin America, and elsewhere have evolved. For companies facing a PBR regime, we help to quantify the potential revenue at risk and the compensating possibility for upside. We also examine issues such as performance standards, cost of capital, and social protections.

**ELECTRICITY MARKET DESIGN:** We have extensive experience in coordinating input from stakeholder groups, and in developing the institutions necessary for day-to-day market operation. Our team has carefully studied “seams issues” between markets and developed potential solutions. From Chile to Australia, we are familiar with regulatory regimes, market design elements, and ways rules can be improved.

**MARKET POWER AND STRATEGIC BEHAVIOR:** LEI has exhaustively explored questions of market definition in wholesale and retail electricity and natural gas markets. We have created proprietary game theoretic models to show the extent to which players can influence prices.

### REPRESENTATIVE ENGAGEMENTS

**INDUSTRY STRUCTURE REVIEW:** Our work for a Canadian provincial government examined the appropriate interaction and evolution of institutions for price formation, transmission operation, market surveillance, and management of residual obligations. We explored questions of governance, market power, conflict of interest, and transparency, and recommended a more efficient institutional framework for market development.

**TRANSMISSION INVESTMENT MODELING:** To internalize social benefits from transmission investment into the regulatory approvals process, we developed a detailed model for the California ISO incorporating the impact on generation market power and the effects of NIMBYism in determining the relative social value of various proposed transmission projects. Examining 196 scenarios, the model is a flexible and reliable analytical tool.

**DESIGN OF SELF-FUNDING TARIFFS:** For ISOs in New England, Alberta, and Australia, we have designed self-funding tariffs and assisted in regulatory filings supporting them. Tasks have included creating detailed financial models of cost causation and tariff incidence, managing stakeholder input interactions, segmenting fixed and variable elements, attributing the tariff between generation and load, and explaining the tariff to relevant public bodies.

**PRODUCTIVITY ANALYSIS AND INCENTIVE DESIGN:** In Canada, Argentina, and the Caribbean, we have advised regulators on PBR design and on setting X-factors. Our comprehensive model of comparative network efficiency, including hundreds of international utilities, helps to benchmark efficiency levels for particular regions.

**TESTIMONY REGARDING RULES TO MINIMIZE STRATEGIC BEHAVIOR IN ELECTRICITY MARKETS:** Drawing upon detailed knowledge of economic theory, behavior or market participants, and experience in other markets, LEI was able to demonstrate that proposed rules would have a significant negative impact on new generation investment, ultimately increasing prices to final consumers.

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LITIGATION  
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PROCUREMENT

## EXPERT TESTIMONY & LITIGATION CONSULTING

London Economics International LLC (LEI) provided reliable testimony backed by strong empirical evidence. Our experts have been involved in market design, contract formulation, and asset valuation in power, water, natural gas, transportation, and other infrastructure sectors in countries around the world. This depth of knowledge makes them highly credible witnesses, as well as being able to provide complete and comprehensible briefings to counsel as they prepare their cases. LEI testimony and litigation consulting is supported by a suite of proprietary quantitative models and the firm's ability to construct intricate and accurate financial models quickly.

### HOW WE CAN HELP

**VALUATION QUESTIONS:** Valuation required an understanding of revenues, appropriate discount rates, alternative uses for assets, and accounting and taxation issues. LEI has the appropriate tools to perform both forecasting and backcasting, quickly providing revenue projections under a variety of scenarios. Experience in a wide range of valuation and acquisition exercises has provided us with in depth exposure to key accounting and tax issues.

**CONTRACT DISPUTES:** LEI staff have been asked to opine on the reasonableness of specific terms, whether specific terms are common industry practice, and whether or not force majeure or contract breakage clauses have been triggered appropriately.

**MARKET POWER AND STRATEGIC BEHAVIOR:** LEI has exhaustively examined questions of market definition in wholesale and retail electricity and natural gas markets. We have created proprietary game theoretic models to show the extent to which players can influence prices. In addition, we have analyzed short-run and long-run marginal costs in many industries to show when competitive market conditions can be said to exist, and have also delved into the question of linked product markets, such as capacity, ancillary services, and energy market in electricity.

**IMPLICATIONS OF MARKET DESIGN PROPOSALS:** We have participated in the design of electricity and natural gas markets across North and South America, the UK, and Australia. Our direct experience in market design enables us to testify and advise on market design flaws, market behavior during periods of system stress, market gaming, and governance and market surveillance issues.

### REPRESENTATIVE ENGAGEMENTS

**ESTIMATION OF DAMAGES IN DISPUTE OVER SALE OF ASIAN IPP:** In a case involving allegedly undisclosed contract modifications at the time of sale, LEI performed an independent investigation of possible damages. Testimony included detailed modeling of future offtake under the contracts, pricing regimes, the implications of electricity market restructuring, identification of an appropriate cost of capital, and examination of concession agreements.

**STATISTICAL SUPPORT FOR MATERIAL ADVERSE CHANGE EVENT:** For a client seeking contract termination over a material adverse change occurring due to an adjustment in the calculation of a related price index, LEI reviewed changes in the relevant market's rules; assembled a comprehensive set of data on fuel prices, plant outages, load patterns, and operation dynamics; and performed sophisticated statistical modeling including ARCH and GARCH models to demonstrate that an adverse change had occurred.

**TESTIMONY REGARDING RULES TO MINIMIZE STRATEGIC BEHAVIOR IN ELECTRICITY MARKETS:** Drawing upon detailed knowledge of economic theory, behavior of market participants, and experience in other markets, LEI was able to demonstrate that proposed rules would have a significant negative impact on new generation investment, ultimately increasing prices to final consumers.

**SUBMISSION OF TESTIMONY REGARDING SELF-FUNDING TARIFF:** LEI helped the northeastern ISO to design a self-funding tariff, and supported the client in preparing testimony regarding the tariff. We provided extensive financial modeling to show the impact on various stakeholders, how cost categories and billing determinants would change over time, and reflect, where possible, cost causation.

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## ASSET VALUATION, PRICE FORECASTING & MARKET ANALYSIS

London Economics International LLC (LEI) provides valuation, price forecasting, and market analysis in a broad range of energy and infrastructure industries, including electricity generation, transmission, and distribution, natural gas networks, water and wastewater treatment, mass transit, airports, and highways. By combining exhaustive sector specific knowledge and a suite of proprietary quantitative modeling tools, LEI provides reliable, independent, substantial, and comprehensible valuation-related deliverables.

LEI's modeling approach has been refined over a nearly twenty year period to incorporate state-of-the-art statistical and market dynamic examination techniques when analyzing competitive wholesale markets. Our strengths include an ability to interpret incentive-based rates, quantify potential efficiency gains, relate revenue growth to population, weather, and local economic trends, and identify regulatory and technological risks.

### TOOLS EMPLOYED

**WHOLESALE ELECTRICITY MARKET MODELS:** Using POOLMod, our proprietary pool simulation model; CUSTOMBid, a game theoretic framework which analyzes strategic bidding behavior; real options valuation techniques; and Monte Carlo scenario analysis, our team is able to develop a range of plausible wholesale electricity market outcomes, which we then employ to forecast revenues to generation stations.

**COMPARATIVE NETWORK EFFICIENCY CALCULATOR:** We employ techniques such as total factor productivity modeling and data envelopment analysis to determine the relative and potential efficiency of network industries. These techniques identify the magnitude of potential cost savings for particular networks, and thus the possible upside under incentive-based rates.

**COST OF CAPITAL DATABASE:** By maintaining an expansive database of industry-wide and company specific betas and capitalization ratios, an up-to-date understanding of market-risk premiums and their application in international settings, and a practical knowledge of hurdle rates employed in actual transactions, LEI is able to quickly and defensibly calculate the appropriate cost of capital for any specific investment.

**CONTRACT CONFIGURATION MATRICES:** Our detailed understanding of force majeure provisions, minimum credit standards, backstop arrangements, and other contract elements enables us to calculate the value of each element and incorporate it into consideration of the overall transaction, and to suggest more favorable configurations.

### REPRESENTATIVE ENGAGEMENTS

**CROSS-BORDER LEASING OF WATER AND WASTEWATER TREATMENT FACILITIES:** For a US investor leasing European wastewater assets, we analyzes revenue streams to the facilities, calculated and configured required subsidy arrangements, identifies required contractual elements, and stress-tested results against varying population and economic growth scenarios. LEI has advised over 20 such transactions in a number of infrastructure industries with a total value approaching \$30 billion USD.

**BID TO ACQUIRE INTEGRATED MIDWESTERN UTILITY:** We advised on all aspects of valuation and risk identification associates with the proposed acquisition of an integrated US electric and gas utility, including valuation of generation assets, distribution networks, provider of last resort obligations, and regulatory risks.

**PURCHASE OF ONTARIO HYDRO STATIONS:** LEI provided comprehensive revenue analysis for a successful bid for hydro stations in Ontario, including multiple hydrological scenarios, real options analysis, and identification of strategic benefits. We have advised on numerous successful hydro and fossil plant acquisitions internationally.

**REVENUE ANALYSIS FOR INDEPENDENT TRANSMISSION COMPANY:** For the first stand-alone transmission company in North America, LEI assessed the appropriate cost of capital, recommended a regulatory strategy for a transition to incentive based rates, examined the potential for cost gains, and opined on whether forecasts of future operating income were credible.

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## QUANTITATIVE MODELING TOOLS

London Economics International LLC (LEI) develops custom modeling approaches to capture the nuances of individual power markets, using as a foundation several key tools: production cost modeling using our proprietary POOLMod software; game theoretic modeling using CUSTOMBid, which is also proprietary; real options modeling using a modified Black-Scholes approach; and Monte Carlo simulation. We also model related markets such as those for capacity, ancillary services, or emissions credits.

**POOLMod** uses merit order stacks based on marginal cost calculations to schedule and dispatch plants, incorporating algorithms that consider issues such as maintenance scheduling, dynamic constraints, and daily reserve margins. POOLMod simulates dispatch of system resources on a half-hour basis for every day of the year, for up to 25 years, dispatching individual plants to meet projected regional load and reserve requirements.

**CUSTOMBid** helps market participants and regulators move beyond market share calculations as an indicator of market power to an approach which focuses on the composition of plant portfolios and the ability of the owners of those portfolios to sustain bidding above marginal cost.

**REAL OPTIONS** are an important tool in the financial valuation of generation assets, especially peaking plant and hydro-electric generators. Traditional valuation procedures, such as discounted cash flow analysis, ignore the value of managerial flexibility. These models do not capture the value embodied in the plant operator's ability to react to changing market conditions; the Real Options methodology measures the value inherent in such adaptability. Real Options, like financial options, have five components: value of asset, exercise or strike price, time to expiration, volatility, and risk-free rate. Our options pricing model for generation is based on the sparks-spread principle: a plant has the right, but not the obligation, to burn fuel and produce electricity, which it can then sell into the wholesale power market.

**MONTE CARLO** simulation is a useful technique for discovering the relationships of variables and outcomes under uncertainty. In a Monte Carlo simulation, key variables in a model are assigned probability distribution, and correlations may be established between variables.

POOLMod simulates least cost dispatch of power plants

**WHAT IT IS USED FOR:**

- wholesale power price forecasting
- competitive plant & contract valuation
- emission credit market analysis
- transmission congestion cost estimation

CUSTOMBid analyzes strategic behavior in wholesale power markets

**WHAT IT IS USED FOR:**

- power plant & contract valuation
- design of strategic portfolios
- detection of abuse of market power

Real Options quantify the costs/benefits of operational flexibility

**WHAT IT IS USED FOR:**

- valuation of peaking power plants
- developing turbine procurement inventory strategies
- assessment of site value

Monte Carlo identifies the impact of expected variation in input assumptions

**WHAT IT IS USED FOR:**

- modeling the impacts of hydrological price variation
- useful in markets with significant hydroelectric capacity
- modeling the sensitivity of financial results to uncertainty in input variables



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## RENEWABLE ENERGY

London Economics International LLC (LEI) has extensive experience related to renewable energy policy design and asset valuation. Below, we briefly describe our capabilities in five main areas: procurement, modeling, wind, biomass, and small hydro. This renewables capabilities briefing sheet is not intended to be exhaustive; LEI has worked on a range of renewables related topics, including but not limited to solar, demand response, energy efficiency, cogeneration, micro-grids, energy storage technologies, and emissions credit trading. LEI analysis has appeared in offering documents associated with renewable energy projects, and is supported by LEI's overall market modeling and regulatory expertise.

### HOW WE CAN HELP

**RENEWABLES PROCUREMENT AND POLICY:** LEI has experience both working with state and provincial authorities in the design of renewables procurement initiatives and with clients crafting their responses to solicitations. The firm has examined or helped design renewables procurement efforts in Connecticut, Kentucky, Maine, the Pacific Northwest, and several Canadian provinces, addressing such issues as contract length, eligibility requirements, and pricing. In Saudi Arabia, LEI has helped to draft the National Renewable Energy Policy. In Ontario, LEI assessed the costs of the Green Energy Act. Respondents to renewables procurement initiatives assisted by LEI include cogeneration, small hydro, and biomass producers.

**REC AND ERC MODELING:** As part of its suite of proprietary market modeling tools, LEI has created a model to provide forecasts of renewable energy credit (REC) pricing in various North American regions. The model marries an up-to-date understanding of current REC eligibility rules with current and projected renewable resource capacity by type to produce state specific projected REC pricing. With regards to emissions credits, whether for carbon dioxide under the Regional Greenhouse Gas Initiative, or existing sulfur dioxide and nitrous oxide regulations, LEI has created a module in its energy and capacity price forecasting models which considers emissions reduction credit (ERC) prices and their impact on both marginal production costs and capital expenditure decisions.

**WIND:** For investors and developers of wind projects, LEI has forecast revenues under a variety of market, REC pricing, and wind scenarios. LEI forecasts and market analysis have been incorporated into offering memoranda and used to underpin board level decision making processes. LEI is also familiar with the use of Monte Carlo and bootstrapped techniques to provide greater depth to modeled revenue outcomes associated with wind plants. The firm has also advised developers of energy storage devices intended to be paired with wind projects.

**BIOMASS:** LEI's biomass-related experience extends across the value chain, including fuel supply, PPA negotiation, assessment of operating contracts, and project valuation. LEI has provided asset management services for a private equity firm focused on biomass acquisitions, as well as expert testimony on behalf of a biomass project developer. Location of biomass projects assessed has included the Northeast, California, Hawaii, and Canada. LEI has compared numerous fuel contracts and fuel types, examined restart and retrofit programs, and managed biomass construction projects. The firm is knowledgeable about the impact of state and Federal incentive programs, such as production tax credits, on the underlying economics of biomass projects.

**SMALL HYDRO:** For small hydro projects, LEI has performed a range of economic assessment tasks. The firm has assisted in providing market analysis used to support financing. Such engagements have involved projecting market revenues from energy, capacity, and RECs under multiple market and production scenarios. LEI has also marketed RECs and output from small hydro projects on behalf of existing owners, obtaining bids and negotiating PPAs. Additional tasks have included examining and negotiating operating contracts, reviewing FERC compliance, and seeking project synergies. LEI has also assisted in examining and comparing the economic impact of differing financing proposals for small hydros.

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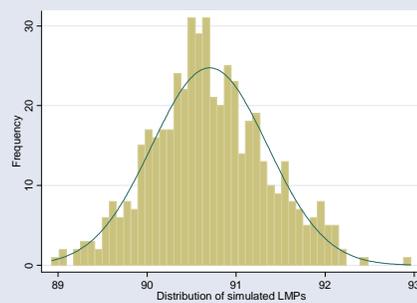
# TRANSMISSION

London Economics International LLC (LEI) has an extensive array of experience creating integrated wholesale electricity market simulations to identify beneficiaries and quantify the costs and benefits from proposed transmission lines. In addition to our array of proprietary quantitative models, LEI's staff has in depth industry experience across North America, with a strong focus on the United States and Canada. LEI's also has testified for state policymakers, regulators, and siting organizations on transmission rate-setting, and transmission policy design.

## HOW WE CAN HELP

**VALUING TRANSMISSION:** LEI combines fundamental economic and statistical analytical expertise with an exhaustive knowledge of electricity markets to create meaningful simulations of investment impact using a suite of proprietary integrated wholesale electricity models. Our Valuation of Transmission Augmentation Links (ViTAL) modeling framework was specifically designed for regulators and transmission system owners and operators. Other tools employed in our cost-benefit analysis include our network simulation model, PoolMOD which is used to forecast electricity prices and quantify benefits of new transmission capacity (see figure). In addition, LEI provides advice and analysis related to the valuation of congestion contracts across North America using real options coupled with PoolMOD.

Fig 1: Distribution of simulated energy prices



This figure demonstrates how our proprietary software PoolMOD is capable of creating a distribution of energy market prices based on slight changes in the availability of plants. Therefore our simulations provide robust results against many different system environments which is crucial to measuring the impact of transmission lines accurately. Furthermore it provides a range of potential benefits that also allow for the use of objective statistical methods.

**TRANSMISSION TARIFF DESIGN:** LEI has significant global experience in analyzing transmission market rules and developing new transmission tariffs, assessing demand elasticity, and undertaking comprehensive market analysis for transmission companies and regulators.

**PROCUREMENT PROCESS AND CONTRACT DESIGN:** LEI applies fundamental economic principles and an exhaustive knowledge of electricity markets to help governments, regulators, and private companies create effective, rational, and transparent procurement processes including competitive solicitations for transmission capacity. LEI's support for procurement processes includes proposing selection criteria, drafting contracts, publicizing the procurement, communicating with stakeholders, monitoring the opening and examination of bids, creation of an analytic and modeling framework to evaluate bids.

## RELEVANT ENGAGEMENTS

**COST BENEFIT ANALYSIS OF NEW REGIONAL TRANSMISSION PROJECT:** Developed wholesale market simulations in order to compare the potential benefits which would accrue to ratepayers between the investment in additional transmission or generation capacity within a constrained area of New England. In addition, we created a distribution of benefits to support the robustness of our findings.

**VALUING TRANSMISSION RIGHTS:** LEI conducted a first-stage of a proposed new transmission line between the Midwest and Canada and the value of transmission rights (TRs). Revenues associated with the sale of TRs were forecasted and compared against the estimated costs of the project to arrive at an estimate of the net present value of the project and return on investment.

**TRANSMISSION TARIFF DESIGN:** LEI advised a utility in tariff design, assessed allowed ROE, proposed strategy for cost-of-service incentive rates design and other cost of capital components project, built tariff models, as well as testified on tariff making principles for transmission.

**PROCUREMENT PROCESS AND CONTRACT DESIGN:** LEI worked on a transmission open season auction for a regulator. LEI designed and drafted the RFP process, RFP documentation, and contract template in order to best meet the needs of our clients. LEI also managed the procurement process, and evaluated project bids.

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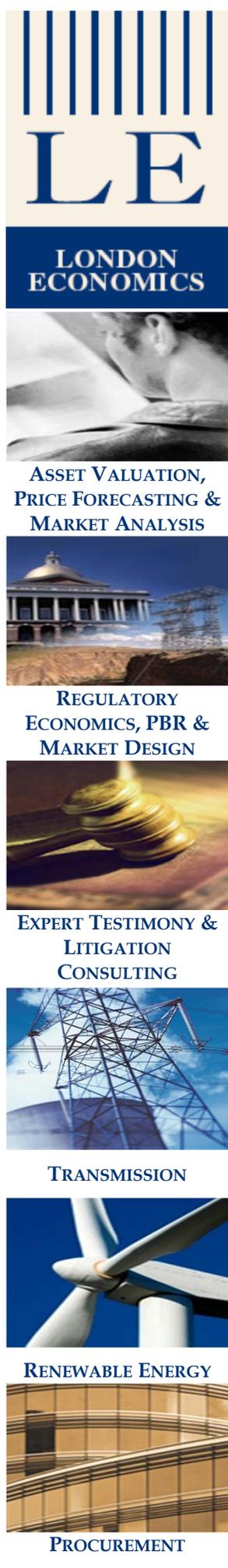


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# NORTH AMERICAN 10-YEAR WHOLESALE AND CAPACITY MARKET FORECASTS AND REGIONAL MARKET UPDATES



## Available markets:

- Alberta;
- California (CAISO);
- Midwest (MISO);
- New England (ISO-NE);
- New York (NYISO);
- Pennsylvania-New Jersey-Maryland Interconnection (PJM);
- Ontario;
- Southeast Reliability Council (SERC);
- Southwest Power Pool (SPP);
- Texas (ERCOT); and
- Western Electric Coordinating Council (WECC)

London Economics International (LEI) performs “multi-client” forecasts for eleven regional wholesale markets across North America. The energy, and where applicable, capacity market price outlooks are updated every six months.

These forecasts include an examination of recent market developments, key assumptions used in the modeling, and a 10-year wholesale electricity price and, where relevant, capacity price forecast.

These forecasts are available for individual purchase or as a subscription service. Other global markets are available on request, as are customized modeling services.

The modeling analysis- presented in the form of a 10-12 page report - is designed to provide clients with a concise update on trends, developments, key drivers, and price projections. It also provides a rigorous introduction to market conditions – ideal for policymakers, lenders, and investors. Each report consists of easy to understand charts, tables, and market descriptions.

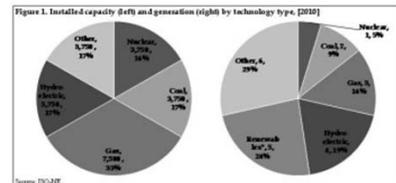
**An overview of the market and recent developments** - a discussion of the key market drivers, and developments in the previous six months, including any new entrants and retirements, new transmission lines, market rule changes, market auction outcomes, mergers and acquisitions, new state policies or initiatives, and environmental rules.

**Modeling assumptions in the LEI price forecast** - a detailing of assumptions used for each region, including market topography, future fuel prices, emission costs, the cost of generic new entry, import and export flows, demand levels, and the breakdown of supply. For regions with multiple zones, assumptions are broken down by zone.

### 1. Market overview and recent developments

The existing capacity in the New England plant database is calibrated primarily based on the latest official data from the ISO-NE, namely the 2007 Regional System Plan (RSP) and Capacity, Energy, Loads and Transmission (CELT) reports, and supplemented with Global Energy Decision's Energy Velocity Suite, generation resources data from utilities, surveys of independent power producers, and our own independent research.

Although different sub-regions have different resource profiles, most of the sub-regions in New England are dominated by gas-fired or oil-fired units. There is a large amount of nuclear capacity in Connecticut and hydroelectric capacity in parts of Northern New England. However, such baseload resources do not typically impact prices because their position on the supply stack is below minimum demand-levels or they are shadow-priced off higher priced resources. For example, in Maine, despite the abundance of hydro resources, prices are driven by the marginal cost of gas-fired units, because the hydro units typically shadow price off gas-fired units elsewhere in New England, subject to transmission constraints. Figure 19 illustrates the supply-demand balance by ZIP area in the 2009 modeled year.



Currently, the price-setting unit in the region is primarily gas-fired and it is expected to stay this way in the future. The shape of the short-run marginal cost-based supply curve, New England-wide, compared against the range of system-wide demand levels also confirms that, as seen in Figure 20, average demand levels currently fall on the relatively flat portion of the supply curve; therefore, substantial shifts in the supply curve will be necessary to impact the underlying price of energy, holding everything else constant (i.e., fuel price and transmission system ratings).

assumption in our modeling.

### 3. 10-year price forecast

#### 3.1. Energy market prices

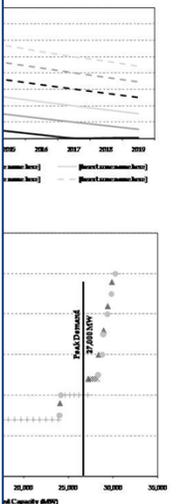
The 20-year modeling results for the New England market show that the time-weighted average annual energy prices at the Mass Hub start at \$80.3/MWh in 2009, and rise to \$127.7/MWh by 2029 (see Figure 53). In the first ten years of our forecast, the widening peak versus off-peak spread starts at \$15.5, which is congruent with historical data which have ranged approximately \$17.4/MWh in the past three years. Towards the end of our modeling horizon, peak prices grow faster than off-peak prices due to increasing gas prices, producing a greater spread in the long-run.

The modeled price trends are consistent with forward price trends, which start at \$88.2/MWh in 2009 (see Figure 54). Note that our modeling prices are not meant to necessarily mimic the actual values of the forwards, but rather follow the fundamentals that we are modeling. In some cases, we believe forward markets are not responding to all expected fundamentals. From 2012 onwards, the modeled price for Mass Hub diverges from the forwards, partly due to the tightening of the region's reserve margin (see Figure 57) and to the divergence of the natural gas prices from the NYMEX forwards.

Figure 53. 20-year price trends for the Base Case

Year	Annual Average Energy Price (\$/MWh)	ICAP Price (\$/MWh)	Capacity premium (\$/MWh)	Total Cost (\$/MWh)	Annual average Le Price (\$/MWh)	Implied Heat Rate (\$/MWh)	Capacity as % of Demand
2009	\$80.29	\$4.10	\$9.42	\$94.27	\$101.61	1.18	9.9%
2010	\$80.00	\$4.20	\$9.10	\$93.29	\$101.64	1.15	9.9%
2011	\$83.30	\$4.40	\$8.80	\$96.23	\$103.23	1.06	9.9%
2012	\$87.72	\$4.60	\$8.50	\$99.77	\$104.81	1.01	9.9%
2013	\$92.12	\$4.75	\$8.15	\$103.22	\$106.37	0.97	9.9%
2014	\$96.56	\$4.90	\$7.80	\$106.70	\$107.91	0.94	9.9%
2015	\$101.00	\$5.05	\$7.45	\$110.20	\$109.44	0.91	9.9%
2016	\$105.44	\$5.20	\$7.10	\$113.70	\$110.96	0.88	9.9%
2017	\$109.88	\$5.35	\$6.75	\$117.20	\$112.48	0.85	9.9%
2018	\$114.32	\$5.50	\$6.40	\$120.70	\$114.00	0.82	9.9%
2019	\$118.76	\$5.65	\$6.05	\$124.20	\$115.52	0.79	9.9%
2020	\$123.20	\$5.80	\$5.70	\$127.70	\$117.04	0.76	9.9%
2021	\$127.64	\$5.95	\$5.35	\$131.20	\$118.56	0.73	9.9%
2022	\$132.08	\$6.10	\$5.00	\$134.70	\$120.08	0.70	9.9%
2023	\$136.52	\$6.25	\$4.65	\$138.20	\$121.60	0.67	9.9%
2024	\$140.96	\$6.40	\$4.30	\$141.70	\$123.12	0.64	9.9%
2025	\$145.40	\$6.55	\$3.95	\$145.20	\$124.64	0.61	9.9%
2026	\$149.84	\$6.70	\$3.60	\$148.70	\$126.16	0.58	9.9%
2027	\$154.28	\$6.85	\$3.25	\$152.20	\$127.68	0.55	9.9%
2028	\$158.72	\$7.00	\$2.90	\$155.70	\$129.20	0.52	9.9%
2029	\$163.16	\$7.15	\$2.55	\$159.20	\$130.72	0.49	9.9%

Note that we performed hourly simulations only for the first ten years of the modeling timeframe. Energy prices over the timeframe follow closely gas price trends; energy prices decline from 2009 to 2012, and then continue rising until the end of the modeling horizon (see Figure 55).



**10-year price forecast** - a price forecast for wholesale electricity prices, and capacity market prices (for those regions where this is applicable). Where relevant, these price forecasts are broken down by zone.

For more information, visit our website at [www.londoneconomicpress.com](http://www.londoneconomicpress.com), call us at (617) 933-7200, or email us at [cherrylin@londoneconomics.com](mailto:cherrylin@londoneconomics.com).

# ECONOMIC ANALYSIS FOR LEVERAGED LEASE TRANSACTIONS

London Economics International LLC (LEI) has been extensively involved with leveraged leasing transactions. Working as part of an international consortia of leading economic, legal, and technical experts, we have provided valuation and contract design advisory in nearly thirty such transactions, with a total transaction value exceeding \$16 billion. The advisory work for leveraged lease transactions is supported by our consulting experience on issues related to regulatory economics, including wholesale market design, performance-based ratemaking and retail competition, and strategic advisory engagements for major infrastructure companies around the world.

## INDUSTRY EXPERTISE

- electricity transmission and distribution
- natural gas distribution
- power generation
- wastewater treatment and collection
- freshwater treatment and supply
- district heating
- rail infrastructure
- telecommunication equipment
- air traffic control equipment
- toll road facilities
- urban infrastructure assets

## TYPICAL ANALYSIS COMPONENTS

**EXAMINATION OF LOCAL MARKET:** Comprehensive survey of local market conditions; key players are identified, market structure and regulatory regime is discussed, and a prognosis for the future is provided.

**ANALYSIS OF BUSINESS RISKS AND VALUE DRIVERS:** In looking at the available options to investors after leases expiration, we have been asked to analyze the marketability of the swap arrangements and service contracts, through an analysis of the risk elements and examination of key profit drivers for the underlying business.

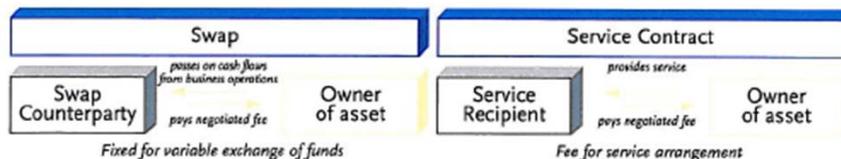
**ESTIMATION OF APPROPRIATE DISCOUNT RATE:** Our discount rate methodology analyzes the cost of capital for the asset in question, through the use of primary market data, comparable analysis, and industry standard methods, e.g. CAPM.

**PRIVATIZATION SUBSIDY DESIGN:** In many jurisdictions, public service enterprises operate under a regulatory regime that imposes restrictions on tariffs, commercial returns, and cost recovery. In such cases, we have assisted clients in the design of a compensating subsidy mechanism.

**IMPACT OF PERFORMANCE-BASED RATEMAKING:** Our expertise in designing PBR regimes for regulators and advising private clients on their application allows us to robustly analyze the impact of PBR reform on the asset in the transaction.

## REPRESENTATIVE ENGAGEMENTS

**SWAP/SERVICE CONTRACT ANALYSIS:** We utilize our extensive expertise in contract design to analyze swap service contract, which are a key element of the back end of the leveraged lease structure. We have provided expert support to the legal counsel in all aspects of the service/swap arrangement in over two dozen transaction. Our reports address contract design issues, valuation, and marketability of the arrangements.



**INTEREST RATE OPINION:** We opine on the reasonableness of interest rates on loan certificates in sale and leaseback transactions based on the analysis of market-derived interest rate outlooks, commercial terms available, nature of the transaction, collateral, and credit-ratings of the participating entities.

**BANKRUPTCY OPINION:** We have also written opinions on the likelihood of bankruptcy for the lessee based on the assessment of the servitude filing trigger conditions employed in the transaction.

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## CANADIAN MARKET EXPERIENCE

London Economics International LLC (LEI) has extensive experience analyzing Canadian energy markets. We have worked across Canada, from Vancouver to St. John's. Our clients include both private sector companies and regulatory institutions, and both Canadian and foreign companies. We have performed a number of engagements related to the dynamic market environments such as those found in the provinces of Alberta and Ontario, and are knowledgeable about developments in both electricity and natural gas trading.

### HOW WE CAN HELP

**MARKET DESIGN:** LEI has worked on a variety of issues related to market design and Independent System Operator (ISO) formation. In Ontario, we have advised clients on issues surrounding the Global Adjustment, Standard Service Supply Code, as well as reviewing the activities of the Market Design Committee. In Alberta, we were responsible for the initial proposed contractual structure which addresses market power without forcing divestiture. These Auctioned Biddable Contracts (ABCs) have since been used elsewhere to address similar situations. We also led the Industry Structure Review, in which we recommended revisions to the market design there. We have also worked extensively with both the Alberta Electric System Operator (AESO) and the Ontario Independent Electricity System Operator (IESO).

**WHOLESALE GENERATION MARKETS:** Extensive experience modeling wholesale generation markets across North America and around the world provides LEI with a detailed understanding of electricity price dynamics. Our long-term price forecasts for Ontario have been incorporated into analysis underpinning several asset purchases, including successful bids for the Bruce nuclear assets and for the Mississagi hydro-electric assets. In Alberta, our model of strategic bidding capabilities was used to determine the impact of the sale of Auction Biddable Contracts on an incumbent's portfolio. In depth experience with the dynamics of neighbouring US markets helps us to design highly relevant scenarios for modeling Canadian markets; use of our proprietary marginal cost based and strategic bidding models ensures that fundamental aspects of system dynamics are appropriately represented. Application of real options models assures that flexibility in peaking plants is also appropriately valued.

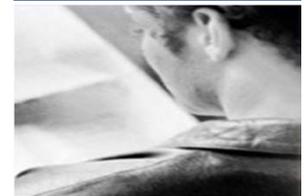
**DISTRIBUTION VALUATION:** Our comprehensive knowledge of performance based ratemaking (PBR) regimes around the world gives us unique capabilities in valuing natural gas and electricity network assets in evolving regulatory environments like those found in Alberta and Ontario. LEI advised the Ontario Energy Board on second generation PBR and the Coalition of Large Distributors on third generation PBR. Our valuation techniques are enhanced through our ability to recognize hidden assets such as telecommunication rights, and value them. In addition we have acquired in-depth knowledge of sophisticated leasing and swap transactions used in a number of European network financings which are relevant to Canada.

### REPRESENTATIVE CLIENTS

Alberta DOE  
AltaLink  
AMPCO  
Brookfield Renewable Power  
British Energy  
Coalition of Large Distributors  
ENMAX  
Hydro Quebec  
Ontario Energy Board  
Ontario IESO  
Ontario Power Authority  
Pension Funds  
Power Pool of Alberta  
Scotia Capital  
SNC-Lavalin  
Toronto Hydro  
TransAlta



LONDON  
ECONOMICS



ASSET VALUATION,  
PRICE FORECASTING &  
MARKET ANALYSIS



REGULATORY  
ECONOMICS, PBR &  
MARKET DESIGN



EXPERT TESTIMONY &  
LITIGATION  
CONSULTING



TRANSMISSION



RENEWABLE ENERGY



PROCUREMENT

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## LATIN AMERICAN/SOUTH AMERICAN MARKET EXPERIENCE

The Latin America/South America region offers significant potential for asset acquisitions, new project development and investment in a broad range of energy services. Since the first sector reforms in the 1980s, the Latin American/South American governments have increasingly been paving the way for private sector participation through deregulation and privatization.

London Economics International LLC (LEI) has extensive experience in analyzing Latin American/South American energy markets. We have worked in many countries across the region, including but not limited to: Argentina, Bolivia, Brazil, Chile, Colombia, Dominican Republic, El Salvador, Guatemala, Jamaica, Mexico, Nicaragua, Panama, Peru and Venezuela. Our clients include both private sector companies and regulatory institutions, as well as both Latin American/South American and foreign companies. We have performed a number of engagements related to wholesale market price forecasts, market modeling, asset valuation, regulatory review and market design, and strategic advisory. We are knowledgeable about developments in both electricity and natural gas markets. Lastly, with staff who speak Spanish and specialize in the Latin American/South American market, we provide profound understanding of the local markets as well as convenience in communication.

### HOW WE CAN HELP

**PRICE FORECASTING AND ASSET VALUATION:** LEI has modeled a variety of Latin American/South American markets using POOLMod, our proprietary pool simulation model. Our team is able to develop a range of plausible wholesale electricity market outcomes, which we then employ to forecast revenues to generation stations. In Panama, we advised a client on the acquisition and financing of a hydro facility. We performed a Monte Carlo simulation-based DCF analysis and supported our client in the road show. In El Salvador, for a US IPP, we conducted a number of spot market and dispatch forecasts for El Salvadoran and regional markets under various scenarios. For another US IPP, LEI has evaluated its Caribbean portfolio by analyzing regulatory, market and valuation issues associated with the assets. In Colombia, LEI assisted in valuation of Chivor and Betania power plants - the first privatization sale in this country - with support continuing through financing and closing. LEI has also modeled Central American markets. In addition to generation assets, LEI has evaluated distribution assets in the region.

**REGULATORY REVIEW AND MARKET DESIGN:** LEI has extensive knowledge in regulatory development in Latin America/South America and has worked with both regulators and regulated companies. For a private client in Chile, LEI performed a detailed review of the regulatory regimes of four restructured power markets (California, Colombia, Nord Pool, and Spain), as well as an analysis of the current Chilean regulatory regime and the changes to that regime the regulator has proposed. Engaged by the Argentine regulatory authority for the electricity sector (ENRE - Ente Nacional Regulador de la Electricidad), LEI led a consortium to conduct a review of Edenor, a large utility serving the northern portion of Buenos Aires. For a Caribbean-based regulator, LEI performed an intensive study of the types of PBR employed by regulators worldwide and the implications for key stakeholders, culminating in workshops for the regulator, the leading utility, and government representatives. LEI has also analyzed potential market power issues in Colombia in connection with a bid for generation assets by an existing market player.

**STRATEGIC ADVISORY:** LEI has assisted several clients in assessing market opportunities in Latin American/South American countries and provided strategic advisory. In Brazil, for a major US bank, LEI provided a market study and developed a screening methodology to allow quick appraisal of specific lending opportunities related to upcoming privatization activity. For a Japanese client, LEI provided strategic advisory on investment opportunities in Mexican electric and natural gas markets, and designed a strategic approach for the client. In another similar engagement, LEI reviewed activities of key players and analyzed market trends in thirteen Latin American countries, and identified potential investment opportunities in such markets.

### REPRESENTATIVE CLIENTS

- AES
- Bank of America Securities
- Colbun
- EEB
- ENRE
- Enron
- GE Capital Partners
- Harbinger Capital
- Houston Industries
- HSBC
- Inter-American Developmental Bank

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