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September 10, 2020

Kathryn H. Bowman  
Louisiana Public Service Commission  
Office of the Executive Counsel  
602 North Fifth Street (Galvez Building) (70802)  
P.O. Box 91154  
Baton Rouge, Louisiana 70821-9154

Re: RFP 20-14, Docket TBD – Southwest Louisiana Electric Membership Corporation, ex parte In re: Application for Approval to Acquire and Install an Advanced Metering System and Request for Cost Recovery and Related Relief

Dear Ms. Bowman:

Please find attached London Economics International's ("LEI") proposal to act as an outside consultant and assist the Louisiana Public Service Commission ("LPSC") with the above referenced docket.

LEI is uniquely qualified for this role. LEI has extensive knowledge of ratemaking and reasonableness reviews of cost recovery applications. We are familiar with the Midcontinent Independent System Operator ("MISO") region, having performed a broad range of services from asset valuation to price forecasts in the region over the last two decades. We have extensive experience working for regulators across the United States.

There are no actual or potential conflicts of interest for LEI in performing the contractual obligations contemplated in this RFP. LEI is currently working for LPSC, performing the Fuel Adjustment Clause ("FAC") audits of Cleco, Inc. (Docket No. X-35522) and Entergy Louisiana (Docket No. X-35523); LEI is also engaged by the LPSC in Docket No. R-35423 (Rulemaking to Study Renewable Energy Tariff Options). There are no other current engagements involving state entity, utility and/or investor in utilities operating in Louisiana, or any of their subsidiaries. To our knowledge, we are not advising, nor have a financial interest in, any potential bidders in a future competitive procurement for major resources in Louisiana.

If you have any follow-up requests or questions with respect to this submission, please do not hesitate to reach out to me at the contact information below.

Sincerely,

Marie N. Fagan, PhD  
Chief Economist  
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# Proposal responding to RFP 20-14 to serve as outside consultant to Commission’s review of SLEMCO’s request for approval to implement Advanced Metering System



prepared for the Louisiana Public Service Commission by London Economics International LLC

September 10, 2020

*London Economics International LLC (“LEI”) is pleased to submit this proposal to the Louisiana Public Service Commission (“LPSC” or “the Commission”) to serve as the outside consultant in the matter of request for approval to implement a permanent Advanced Metering System by Southwest Louisiana Electric Membership Corporation (“SLEMCO”).*

*LEI is a leading energy consulting firm that has advised regulators and utilities on tariffs, ratemaking, and renewable energy. The firm possesses over 20 years of experience advising regulators, electric and natural gas utilities, private firms, and specific customer classes across the United States and Canada as well as among international jurisdictions. LEI has worked with other regulators and has experience testifying on a variety of issues related to ratemaking, tariffs, and renewable energy.*

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## 1 Bidder information

London Economics International LLC (“LEI”) is a US-owned and operated 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, transmission and distribution, and retail markets with sophisticated analysis and a suite of proprietary quantitative models that together produce reliable and comprehensible results. LEI’s array of clients extends from the private sector to regulators and government institutions (see Figure 1).

Figure 1. Selected LEI clients throughout the world



The following attributes make LEI unique:

- *clear, readable deliverables that are grounded in substantial topical and quantitative evidence;*
- *internally developed proprietary models* for electricity price forecasting (energy, capacity, RECs, GHGs credits, etc.) that incorporate a detailed assessment of fundamentals, game theory, real options valuation, Monte Carlo simulation, and sophisticated statistical techniques;
- *a balance of private and public sector 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; and
- *worldwide experience* backed by a multilingual and multicultural staff.

## 1.1 Background and staffing

LEI is extremely well-qualified to serve as a technical consultant to the LPSC. As described in detail in Section 2, LEI has direct experience participating in regulatory proceedings related to cost recovery of infrastructure investments; the firm has broad experience in rate and tariff design, including analytical and audit capabilities. LEI understands the regional power market in the Midcontinent Independent System Operator (“MISO”) region, producing semi-annual market outlooks based on LEI’s detailed production simulation model of MISO. LEI understands the perspective and objectives of state regulators, having worked with many regulators. The firm has experience testifying on a variety of issues related to rate design, competitive markets, and long-term planning.

Based on the requirements of the engagement, LEI has gathered a select team of professionals with the required qualifications to assist the LPSC. The team possesses considerable independent assessment expertise, analytical and technical capabilities, and strong understanding of power markets, including MISO.

There will be three key personnel assigned to this project. Additional staff members and resources will be available on an as-needed basis. Key staff members assigned are as follows:

- **Marie Fagan**, Chief Economist
- Barbara Porto, Consultant
- **Himanshu Bhardwaj**, Research Associate

*Marie Fagan* will have overall responsibility for the project and will act as project manager and testifying expert. *Barbara Porto* and *Himanshu Bhardwaj* will serve as core team members. In addition, LEI staff in Toronto and Boston will provide additional support as needed.

Figure 2. Proposed LEI team organization chart



## **1.2 Brief bios of key staff assigned to the project**

**Marie Fagan**, Chief Economist at LEI, will serve as the **project manager** for this engagement. With over 30 years of experience in research and consulting for the energy sector, Marie's career has spanned international upstream and downstream oil and gas, global coal, North American gas markets, and North American power markets. She has advised C-suite industry clients, buy-side and sell-side financial clients, as well as legislators and regulators. For state agencies, she has served as an expert witness and managed lengthy, high profile projects.

**Barbara Porto** is a Consultant at LEI where she supports the firm's engagements with regulators, utilities, and private firms on issues regarding ratemaking, market design, project evaluation, and wholesale price analysis. She is experienced in performing utility management audits and has been a key team member on ratemaking engagements.

**Himanshu Bhardwaj** is a Research Associate at LEI where he supports the firm's technical engagements with regulators, utilities, and private equity firms on issues regarding market design, project evaluations, and wholesale price analysis. Himanshu has broad strategy consulting experience spanning multiple industries and countries, including advising government entities and investors on broad range of financial modeling and analysis topics.

Full CVs of the key team members are available in Section 6 (Appendix A).

## 2 Qualifications and experience

This section outlines LEI’s understanding of the engagement and selected relevant experience.

### 2.1 Understanding of the engagement

Commission Staff have been tasked to examine Southwest Louisiana Electric Membership Corporation’s request for approval to implement a permanent Advanced Metering System (“AMS”). As outlined below, LEI is familiar with the regulatory process and review criteria for approval of and recovery of costs associated with implementation and maintenance of advanced metering infrastructure (“AMI”) in jurisdictions across the United States, demand response (“DR”) programs and the role of AMS in implementing such programs. LEI is also familiar with relevant LPSC General Orders, including the General Order on AMS/DR.

#### 2.1.1 SLEMCO

Southwest Louisiana Electric Membership Corporation (“SLEMCO”) is a not-for-profit electric distribution cooperative, headquartered in Lafayette, LA. It began operations in 1937 and is owned by over 110,000 member-customers in the Acadiana region in the southwest of Louisiana.

Over the past decade SLEMCO’s retail sales have not grown significantly, having exhibited compound annual growth rate of 0.44% from 2010 to 2019 (see Figure 5).

As of the end of 2019, most of SLEMCO’s residential customers, 66% of commercial customers and 16% of industrial customers have a meter capable of automated meter reading. The total number of customer accounts is 110,243.

**Figure 3. SLEMCO service territory**



**Acadiana Region:** Acadia, Avoyelles, Cameron, Evangeline, Iberia, Lafayette, St. Landry, St. Martin and Vermilion parishes.

Source: SLEMCO Factsheet

**Figure 4. Statistics of automated meter reading-capable meters on SLEMCO system**

2019 data	AMR	non-AMR	AMR %	Total meters
Residential	101,191	505	99.5%	101,696
Commercial	5,630	2,880	66.2%	8,510
Industrial	6	31	16.2%	37
<b>Total meters</b>	<b>106,827</b>	<b>3,416</b>	<b>96.9%</b>	<b>110,243</b>

Source: Energy Information Administration Form-831

Figure 5. SLEMCO’s annual retail sales in MWh



Source: Energy Information Administration Form-831

### 2.1.2 Demand response is incentivized by tariffs and supported by technology

Smart meters (“AMI”) and smart appliances can support conservation and efficiency, because they facilitate demand-side management (“DR”) programs. DR programs are focused on incentivizing energy reductions at peak times. These can be incentivized by time-of-use tariffs, critical peak period tariffs, and real-time pricing. Other means of discouraging or shifting peak period demand include direct load control.

### 2.1.3 Demand response in the MISO context

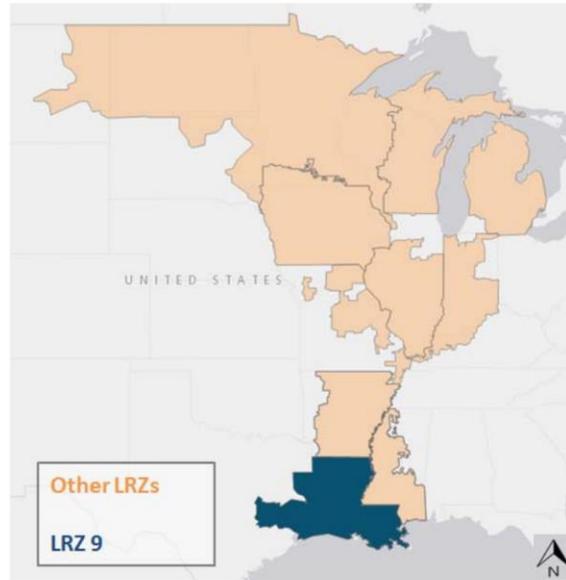
There are complexities in how DR is handled in competitive wholesale markets such as MISO. DR is a capacity resource, and system operators in competitive markets are becoming more reliant on demand response to shave system peak demand and maintain reliability. The challenge is for the system operator to be able to count on demand to respond when needed. Incentives as well as penalties for non-performance must be in place.

Louisiana is located in MISO Load Zone 9 (see Figure 6). In MISO, vertically integrated utilities are held responsible for resource adequacy but are not required to use the wholesale capacity market – the Planning Resource Auction (“PRA”) – for that purpose. In 2019, the Federal Energy Regulatory Commission (“FERC”) approved part of a MISO filing which sought to improve resource availability related to demand response (FERC case ER19-650). Load Modifying Resources (“LMRs”) must now make themselves available for as much of the year as possible (not just during summer peaks) and with the shortest-possible notification times.<sup>1</sup> This has helped expand the usefulness of DR in MISO’s resource portfolio. Before the FERC approval, in MISO’s

<sup>1</sup> MISO. [https://cdn.misoenergy.org/20190412\\_PRA\\_Results\\_Posting336165.pdf](https://cdn.misoenergy.org/20190412_PRA_Results_Posting336165.pdf)

2018/19 capacity auction only 6,964 MW of DR cleared.<sup>2</sup> In contrast, after the FERC approval, in the 2019/20 auction 7,371 MW of DR cleared.

**Figure 6. Louisiana is part of MISO Load Resource Zone 9**



Source: Entergy Louisiana LLC. [https://www.entergy-louisiana.com/userfiles/content/irp/2019/ELL\\_IRP\\_2019.pdf](https://www.entergy-louisiana.com/userfiles/content/irp/2019/ELL_IRP_2019.pdf)

Apart from different rules across RTO/ISOs, different RTO/ISOs have different price outcomes. An ISO with high capacity market clearing prices can attract DR resources more easily than one with low prices, all other things equal. High energy prices also incentivize DR more than low energy prices.

#### **2.1.4 LPSC General Order - Advanced Metering System / Demand Response**

The Commission's position and requirements for approval and allowing of cost recovery of advanced metering infrastructure are expressed in the General Order (September 22, 2009) regarding Dockets No. R-29213 and R-29213A: Advanced Metering Systems / Demand Response.

According to the General Order, an Advanced Metering System must meet the following definition:

- Measure and record consumption at regular intervals to enable the customers to obtain the direct benefits from demand response programs and/or incentive-based pricing;

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<sup>2</sup> Ibid.

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- At least daily transmission of data to the central collection point; and
- Permit communication between customers and utilities to facilitate offering of dynamic and incentive-based pricing programs and ancillary programs.

The review and approval of the cost to implement and operate the advanced metering systems must be based on cost effectiveness tests:

- California Energy Commission Standard Practice for Cost-Benefit Analysis of Conservation and Load Management Programs; and
- Other reasonably accepted methodologies for evaluating demand response and advanced metering systems.

The Commission must certify and review the proposed AMS based on:

- Benefits outweighing the costs;
- Clearly defined goals and evaluation criteria;
- Revenue cycle services (reduced billing inaccuracies, internet access to the usage data, reduced meter reading costs);
- Demand response management (improvement of data collection);
- Distribution asset optimization (asset life analysis, improved network design, remote tasks); and
- AMS and associated technology, hardware and software successfully tested and implemented with at least 500 advanced meters in North America, Australia, Asia, or Western Europe.

Prudently incurred costs for implementation of AMS and DR cover:

- Capital costs and return on investment at the utility's authorized rate of return;
- Implementation, operating and marketing costs;
- Depreciation of capital investments associated with meters and data transmission systems, and data management infrastructure and software; and
- Any additional costs associated with updating legacy systems, and other costs supporting any new program.

## **2.1.5 Familiarity with other relevant LPSC General Orders**

LEI is familiar with the following General Orders:

1) *The Commission's General Order No. 2 dated July 1, 1921 requiring all regulated public utilities to maintain tariffs on file with the Commission, as well as the "filed rate" doctrine.*

General Order No. 2 requires all companies providing utility and telecommunications services within the state of Louisiana and under the jurisdiction of the LPSC to file an annual report of its financial and operating conditions.<sup>3</sup> The filed rate doctrine forbids a utility to charge any rate other than the one on file with the Commission. To charge for services under a tariff, a utility must provide its services in exactly the way they are described in that tariff.

2) *The Commission's General Order dated March 12, 1974 prohibiting "promotional practices" by public utilities.*

The General Order prohibits a public utility from giving a preference to someone for the purpose of enticing them to deal with that utility in preference to other public utilities. It is LEI's understanding that this does not apply if the action is a part of a comprehensive service policy which is applied uniformly.<sup>4</sup>

3) *The Commission's General Order dated April 20, 2012 (Corrected) (Docket No. R-30021) regarding electric utilities filing Integrated Resource Plans.*

The General Order allows utilities to include DR programs in IRPs. DR programs “may include direct load control (such as air conditioners and water heaters), or incentive rates designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.”<sup>5</sup> The order establishes that industry standard screening tests such as the California Standard Practice Tests, a widely-used standard adopted by utility commissions in the United States, are to be used in screening DR programs.

## **2.2 Selected experience**

LEI has its roots in advising on the initial round of privatization of electricity, gas, and water companies in the United Kingdom. Since then, the firm has supported private sector clients, market institutions, and governments on privatization, asset valuation, deregulation, tariff design, market power, and strategy worldwide. This section provides a selection of projects relevant to the

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<sup>3</sup> Louisiana Public Service Commission. <http://www.lpsc.louisiana.gov/gasannualreports.aspx>

<sup>4</sup> <https://law.justia.com/cases/louisiana/supreme-court/1983/83-ca-1196-1.html>

<sup>5</sup> [https://www.energy-louisiana.com/userfiles/content/irp/LPSC\\_General\\_Order\\_R30021.pdf](https://www.energy-louisiana.com/userfiles/content/irp/LPSC_General_Order_R30021.pdf)

proposed engagement. The projects listed here are indicative of LEI's expertise and are not an exhaustive record of experience.

### **2.2.1 Recent engagements with LPSC**

LEI has recently acted as an outside technical consultant to LPSC on a number of recent regulatory cases.

- ***Technical consultant for renewable rulemaking:*** LEI was engaged by the Louisiana Public Service Commission to serve as the technical consultant for a renewable tariff option (also known as a green tariff) supporting the expansion of renewable energy in Louisiana (Docket No. R-35423).
- ***Regulatory audit of rate rider:*** LEI was engaged by the Louisiana Public Service Commission to audit the Fuel Adjustment Clause ("FAC") for Cleco (Docket No. X-35522).
- ***Regulatory audit of rate rider:*** LEI was engaged by the Louisiana Public Service Commission to audit the Fuel Adjustment Clause ("FAC") for Entergy Louisiana (Docket No. X-35523).

### **2.2.2 Demand response and AMI experience**

LEI has examined demand response issues and dynamics in many contexts:

- ***Commercial/industrial load response:*** LEI projected an Alberta newspaper publisher's energy load, given various energy and capacity market incentives. LEI reviewed how similar loads are compensated in other markets and identified ways in which market design can incentivize demand response in Alberta. LEI also developed a qualitative model to assess the implications penalties for non-performance, assuming various operational profiles.
- ***Demand response policies in Ontario:*** On behalf of a respected Canadian think tank, LEI provided an assessment of the ways in which the Ontario electricity sector could be improved to increase economic efficiency and reduce costs for consumers over the long run; LEI examined DR as a component of this analysis.
- ***Examination of DR as a potential non-transmission alternative ("NTA"):*** LEI examined NTAs to address reliability and performance issues in the Greater Boston area. LEI's scope of work consisted of determining the least cost combination of technologies that could be integrated to the New England transmission system and provide the same reliability benefits as proposed transmission lines. A combination of supply-side and demand-side resources were considered for the study, including energy efficiency and active demand response.
- ***Study of AMI implementation:*** On behalf of a Japanese utility, LEI conducted a study on smart metering implementation in the US. The study examined smart metering functions

and technologies, cost recovery, smart metering benefits, and issues encountered. Smart metering deployment and dynamic pricing programs of five utilities in California, Texas, Illinois, and Maine were studied and implications from the US experience were also provided.

- ***Review of remote telemetry infrastructure:*** LEI was engaged by a large Canadian distributor to perform a review of the growing responsibilities for distribution control centers ("DCC"), in particular due to the growth of Distributed Energy Resources ("DER"). LEI examined different jurisdictions with high DER penetration, performed research on utilities with backup DCCs, and conducted economic analysis on the justification for backup DCCs.
- ***Administrator to implement and deliver conservation and demand management programs on behalf of a utility:*** LEI oversaw receipt of bids, as well as the review and selection process. LEI provided a final report assessing the fairness of the overall process.
- ***Research into investment opportunities in AMI:*** For a private equity client, LEI reviewed all investable energy sectors in the US and Canada (except oil and gas exploration and production). The sectors included: electricity generation (natural gas, wind, solar, hydro), AMI, distributed Resources, demand response, retail and gentailers, gas LDCs, gas storage, gas pipeline transportation, LNG-related infrastructure, vertically-integrated utilities, electric distribution, and water utilities. LEI assessed the investment potential of each sector for the next five years, and proposed a methodology to screen and identify investment opportunities and execute on these opportunities.

### **2.2.3 Rate design, tariffs, and accounting standards**

LEI has experience in rate design and tariff design in the United States and globally. In addition, LEI's experience in utility management auditing provides LEI with hands-on familiarity with accounting standards and practices.

- ***Rate design for Kansas:*** LEI was selected by the Kansas Legislative Coordinating Council ("LCC") to perform a study of the retail rates of Kansas electric public utilities. The study aimed to inform electric sector policies and result in competitive electric rates and reliable electric service in Kansas. Part of the study focused on exploring options for retail electricity tariffs.
- ***Comparison of rates for retail consumers:*** LEI was retained by a power industry advocacy group to review rates charged to final consumers across Canada and identify distortions in rate design across provinces. LEI performed modeling to adjust for distortions and developed appropriate calculations to appropriately compare rates across jurisdictions.
- ***Rate impact study:*** LEI was engaged by an industry association to perform a study of the impact of electricity rates on Ontario's manufacturing sector. The scope of work consisted of review of Ontario industrial electricity rates and rate designs; assessment of

competitive electricity rate levels; development of options to change rates in a manner consistent with rate setting principles and beneficial to industrial consumers and the Province; quantification of economic benefits from appropriate rate adjustments; and consultation with industry and government officials and experts.

- **Management of rate case filing:** LEI was retained by the largest electric utility company in Malaysia to provide project management services for the client's performance-based regulation ("PBR") submission. LEI's scope of work consisted of several tasks: proposing the policy and governance framework for the PBR submission; providing a detailed project plan; assessing the regulatory requirement model; ensuring accurate and timely delivery of workshops; and reviewing the filing before submission.
- **Tariff review:** LEI's consortium was awarded a contract by the Argentine regulatory authority to conduct a tariff review of Edenor, a large utility. The LEI-led consortium advised the regulator on international best-practice design of tariffs, proposed a tariff setting methodology, provided technical assistance in the analysis of information presented by Edenor, proposed tariffs, and assisted the regulator during public hearings on the proposed tariffs.
- **Tariff design:** LEI was commissioned to support the Saudi power regulator in setting an electricity tariff. The work entailed data collection, assessment of costs of generation, transmission, and distribution, development of appropriate tariff setting methodologies, analysis of possible incentive mechanisms, drafting and creating regulatory tools, and helping to create the tariff review unit.
- **Alternative energy tariff rider:** LEI was engaged by the Public Utility Commission of Ohio ("PUCO") to perform a management/performance audit of the Alternative Energy Rider of the Ohio Power Company (AEP Ohio). LEI examined processes involved in procuring renewable energy credits ("RECs") and solar renewable energy credits ("SRECs"). LEI compared and benchmarked AEP Ohio RECs and SRECs costs and other operational results against data from public sources. LEI modeled the impact on ratepayers.
- **Management audit of a major utility in MISO:** LEI was engaged by the Mississippi Public Service Commission ("MPSC") to perform a two-year audit of the management activities of a major vertically integrated utility. LEI prepared a fuel inventory audit, where LEI assessed the utility's practices for economic purchase and use of fuel and electric energy, evaluated fuel and energy contract terms, investigated the operations of the utility's coal and nuclear generation units, and reviewed the prudence of coal inventory levels and inventory control procedures. Following the two-year audit, the MPSC engaged LEI for another two years to audit the other major vertically integrated utility in the state.

#### 2.2.4 MISO region experience

LEI closely monitors the MISO market for ongoing client work. LEI also produces a semi-annual regional market update and wholesale price forecast for eleven North American power markets,

including MISO. LEI's deep understanding of the MISO market serves as a solid foundation for this engagement.

- ***Due diligence for a potential asset acquisition in MISO:*** LEI was engaged to assist in due diligence for a gas-fired generation asset. LEI reviewed contracts and performed financial analysis, with a specific focus on the assumed market value of capacity in the long term, and locational marginal prices for energy. 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 an overview of the gas and electricity market in the region.
- ***Revenue opportunity for gas-fired cogeneration units in MISO:*** LEI was engaged to inform the client of potential risks upon the termination of power purchase agreements. LEI simulated MISO's energy and capacity markets and derived forecasts 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 eastern MISO to third parties in PJM.
- ***Costs/benefit analysis of Entergy joining a regional transmission organization ("RTO"):*** LEI was hired by the Public Utility Commission of Texas ("PUCT") to provide a cost-benefit analysis of the decision by Entergy to join MISO. LEI provided quantitative and qualitative analyses of specific costs/benefits attributable to Entergy Texas, Inc. ("ETI") and its customers following membership in MISO compared with membership in the Southwestern Power Pool ("SPP").
- ***Review of ETI's impact analysis of termination of a power purchase agreement ("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 the termination of specific 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.
- ***Estimating coal plants' energy and capacity revenues in MISO:*** For a large foreign utility, LEI performed the valuation of two power plants to determine their potential value upon expiration of an ongoing PPA. The plants revenues were calculated based on LEI's 25-year forecasts of electricity prices in their respective zones. Given the long-term horizon of the modeling exercise, LEI also simulated an organized capacity market based on the resource adequacy requirements of MISO to estimate potential capacity revenues for the plants.

## 2.2.5 Expert witness experience

LEI has performed dozens of engagements involving serving as an expert witness. The work listed below is a small sample.

- ***Independent expert related to Maine Energy Cost Reduction Act:*** LEI was engaged by the State of Maine Public Utilities Commission (“MPUC”) to assist in evaluating options for expansion of natural gas supply into Maine. LEI authored pre-filing reports; 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 served as an expert witness in the proceedings. [MPUC Docket No. 2014-071] URL: <https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2014-00071>
- ***ISO-NE tariff design:*** LEI submitted testimony on behalf of ISO New England to the FERC to help defend ISO New England’s self-funding tariff. LEI first defined the basic underlying economic principles for specifying the tariff, and then undertook to show how the tariff should be applied to various system users. The engagement involved intensive financial modeling and frequent interaction with stakeholders. (2000) [ER01-316-000]
- ***Triennial market power analysis (southeast region):*** In support of a client’s application to renew market-based rate authorization under the jurisdiction of FERC, LEI performed Pivotal Suppliers Analysis and Market Share Analysis for the Entergy balancing authority area. (2011) [ER97-4281 et al.]
- ***Testimony in support of transmission operating rules and curtailment protocols for interties into Alberta.*** Rules were promoted by Alberta Electricity System Operator (“AESO”) in order to support a fair, efficient and openly competitive power market. The LEI testimony was made in front of the Alberta Utilities Commission (“AUC”), on behalf of Morgan Stanley Capital Group (“MSCG”), a customer of the Montana-Alberta Transmission Line. LEI’s analysis considered commercial as well as operating protocols in deregulated power markets and how market rules incentivize new entry and produce dynamic efficiency gains. AUC Docket Number 1607958. URL: [http://www.auc.ab.ca/regulatory\\_documents/Pages/default.aspx](http://www.auc.ab.ca/regulatory_documents/Pages/default.aspx)
- ***Independent expert assessing role of Enbridge Line 3 for Minnesota:*** LEI was engaged as the independent market expert assisting the Minnesota Department of Commerce in evaluating the application of Enbridge Energy for a Certificate of Need for its Line 3 oil pipeline expansion project. LEI provided written testimony, responded to interrogatory requests, and provided written surrebuttal and oral testimony. [Docket No. PL-9/CN-14-916, OAH Docket No. 65-2500-32764]
- ***Section 203 and 205 analysis in support of NRG’s acquisition of certain Dynegy assets in CAISO and ISO-NE:*** LEI was engaged to provide testimony in support of a proposed acquisition. LEI performed a Delivered Price Test (“DPT”) for the California Independent

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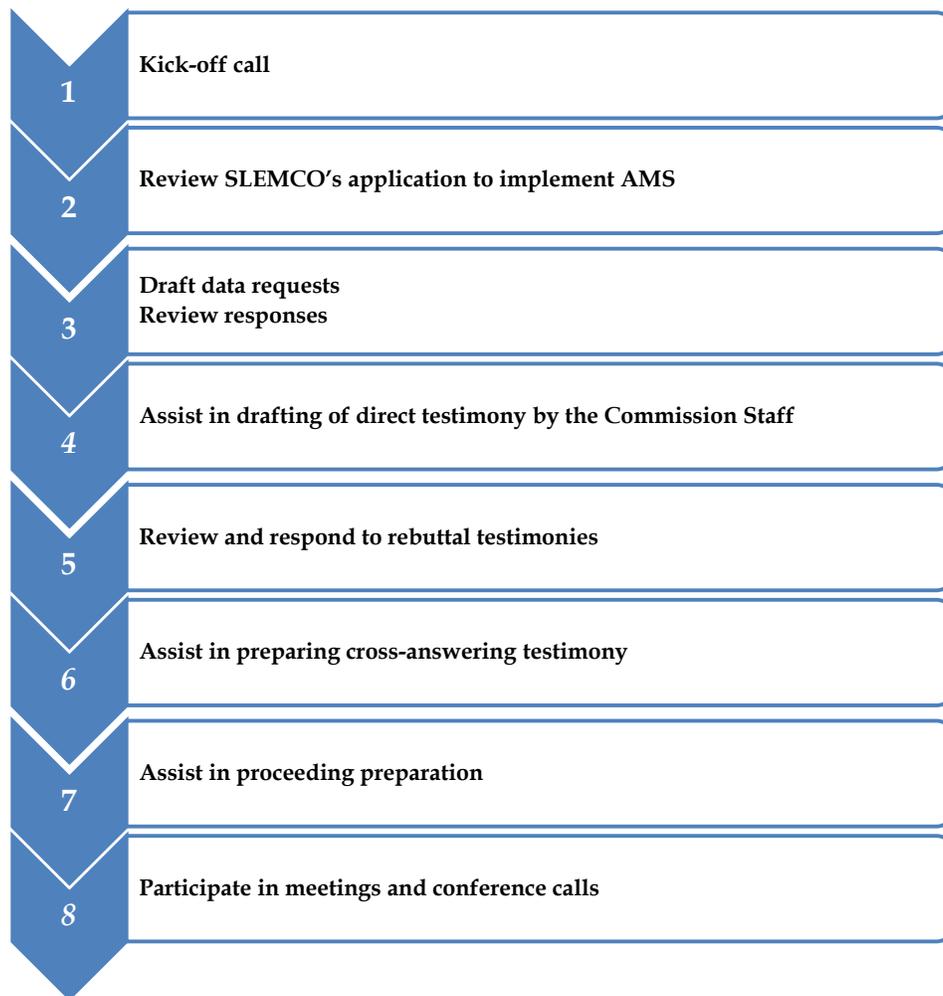
System Operator (“CAISO”) and ISO-NE energy markets as well as a standalone Herfindahl-Hirschman Index (“HHI”) analysis for the capacity markets. (2010) [EC10-88-000]

- ***Preparation of analysis of generation market power under FERC’s indicative screens for market-based rate authorization:*** In support of the acquisition of a 21-megawatt (“MW”) photovoltaic solar facility, LEI performed an updated market power analysis for acquirer’s affiliates in the California ISO which have been granted market-based rate authorization, and prepared the related Section 203 filing. (2010) [ER10-204-000]

### 3 Proposed plan of action

Throughout the SLEMCO's AMS Application review process, LEI will review all relevant applications, testimony, and supporting documentation filed by SLEMCO. In addition LEI will conduct and review data requests, assist in the preparation and review of direct and cross-answering testimony, assist LPSC staff in preparation of hearing briefs and filings, provide expert testimony in hearings, and participate in all relevant meetings and discussions with SLEMCO. In doing so, LEI plans to pursue the proposed plan of action summarized in Figure 7 below. In alignment with what LPSC noted in the RFP for this engagement, LEI understands that the LPSC and its staff will have the right to determine how these tasks will be carried out.

**Figure 7. LEI's proposed plan of action**



LEI's key findings will be summarized in the form of a report to the LPSC. Moreover, in the course of this engagement, LEI senior staff will confer with the LPSC staff in the form of periodic telephone and video calls and by e-mail.

### **3.1 Task 1: Kick-off meeting**

The purpose of the kick-off meeting is to establish and agree on the plan of actions, communication channels and protocols to manage the project.

### **3.2 Task 2: Review SLEMCO's AMS application**

LEI will study and review SLEMCO's AMS application, associated exhibits and testimonies, focusing on the compliance and adherence to the requirements of applicable General Orders by the Commission, including AMD/DR General Order dated September 22, 2009. As observed in Section 2.1.4 above, the Commission has established definition and criteria for AMS devices, as well as appropriate cost-effectiveness tests for their implementation and cost recovery. Consequently, LEI proposes to complete this task by considering a number of key main issues during the review process, as discussed below:

- ***Cost-benefit analysis of the metering system:*** to effectively assess the application, it is imperative that the benefits are clearly specified, and the application demonstrates that the meter technology would actually delivers on those benefits. Conversely, the costs should be clearly enumerated, and the application demonstrates precisely how customers will be impacted by the new investments on their bills. In addition, principles of cost causation and user-pays must be reflected, with any cross-subsidization avoided wherever possible. As established by the Commission, the application should demonstrate its consideration for commonly accepted cost-effectiveness tests for AMS, and any methodologies used should be clearly described in a transparent manner. These are among the issues that the LEI team will consider closely when evaluating the costs and benefits of the AMS system.
- ***Stranded costs analysis:*** in the case for AMS, stranded costs refers both to the existing mechanical meters to be retired and to the accelerated life cycle of automated meters which may need to be replaced much more frequently. As described in Section 2.1.1, while majority of SLEMCO's residential customers have a form of automated meter reading, this number drops to 66% for commercial customers. The transition to AMS would likely result in stranded costs for both mechanical meters, and automated meters that are not consistent with the AMS technology. The depreciation lifecycle of AMS technologies – likely accelerated relative to mechanical meters – will also need to be factored into the analysis.

The application should comprehensively describe how any stranded costs will be incurred and demonstrate these costs factor into other analyses of costs and benefits.

- ***Capability of new meters:*** as with any new technologies, it is imperative that the application demonstrates the capability of the new meters to deliver on their intended function ahead of deployment. While the Commission's General Order establishes criteria for defining an AMS system, the application should demonstrate the feasibility of implementation of the hardware and software, as well as integration with existing

systems i.e. asset optimization. A phased roll-out of the AMS technologies could be considered, whereby selected customers and communities are selected for a pilot program, and lessons learnt on customer behavior, technology integration and program awareness integrated into the rest of the program.

- ***Compliance with existing rate design framework:*** as noted by the Commission, the AMS technologies should enable customers to obtain direct benefits from “demand response programs and/or incentive-based pricing”. The application should demonstrate that these programs are consistent with existing Commission rate design principles and do not result in rates that are not fair and reasonable.

Each of these issues will be carefully considered, evaluated and LEI’s key findings review will be summarized in the form of a concise report to the LPSC Staff.

***Deliverable associated with Task 2***

The deliverable for Task 2 is the internal review report, which examines the compliance of the application with the relevant LPSC General Orders.

**3.3 Task 3: Data requests and review of responses**

Based on the review of the SLEMCO’s AMS application, LEI will provide support on any discovery and information requests (“IRs”). LEI’s discovery questions for SLEMCO and other intervenors would include requests for all data, computations, and analysis for LEI to examine in detail, as well as all assumptions which may have been implied but not made explicit in witnesses’ filings and reports. These may be propounded on intervenors, experts, and SLEMCO.

LEI will also support Staff in drafting replies to interrogatory requests from other parties. LEI will prepare any responses to interrogatories and IRs/data requests on behalf of LPSC Staff. These may be responses to intervenors, experts, and/or SLEMCO.

***Deliverable associated with Task 3***

The deliverables for Task 3 are data requests and briefing notes. responses.

**3.4 Task 4: Assist in drafting direct testimony by the Commission Staff**

LEI will assist, as directed, in the preparation of the direct testimony to be filed by the Commission Staff in the proceedings.

***Deliverable associated with Task 4***

The deliverable for Task 4 will be direct testimony co-written by LEI project team and the Commission Staff.

### **3.5 Task 5: Review and respond to the rebuttal testimonies**

LEI would work with Staff to review and respond to the rebuttal testimonies. The work will include both qualitative and quantitative review of the testimonies, checking for intellectual rigor, sound economic principles, mechanical accuracy and applicability of the materials submitted, and drafting of the responses.

**Deliverable associated with Task 5**

The deliverable for Task 5 will be responses to rebuttal testimonies, co-written by LEI project team and the Commission Staff.

### **3.6 Task 6: Assist in preparing cross-answering testimony**

LEI would work with Staff to prepare cross-answering testimony, as directed by the Commission Staff. The primary input by LEI will be in the form of briefing materials, addressing the topics of interest.

**Deliverable associated with Task 6**

The deliverable for Task 6 will be cross-examining testimony, co-written by the LEI project team and the Commission Staff.

### **3.7 Task 7: Assist in proceeding preparation**

LEI will assist the Commission Staff in preparation for cross-examination of witnesses, drafting pleadings and motions related to the proceedings. LEI anticipates reviewing different sections of the draft briefs that Staff would prepare, and/or drafting briefs.

**Deliverable associated with Task 7**

The deliverable for Task 6 will be briefing notes for the Commission Staff on topics of interest, drafts of pleadings and motions.

### **3.8 Task 8: Participate in meetings and conference calls**

LEI has broad experience in attending and presiding over technical conferences and meetings. LEI project leaders will be available to attend the meetings and conference calls, as permitted in the context of COVID-19 social distance protocols.

## 4 Timeline and budget

LEI expects to have a kick-off meeting a few weeks after the signing of the contract. LEI would take advantage of this time to gather data and information needed to begin Task 1.

### 4.1 Timeline

As indicated in the RFP, the time period required for the matter is estimated at 12 months. LEI expects that the schedule and the deadlines will be finalized during the kick-off meeting, or shortly before or after.

### 4.2 Professional fee budget

LEI offers a total professional fee budget not to exceed **\$76,070** (see Figure 8).

**Figure 8. Professional fee budget**

Tasks	Budget
1 Kick-off call	\$ 1,005
2 Review SMELCO's application to implement AMS	\$ 17,870
3 Draft data requests, Review responses	\$ 10,090
4 Assist in drafting of direct testimony by the Commission Staff	\$ 10,090
5 Review and respond to rebuttal testimonies	\$ 10,680
6 Assist in preparing cross-answering testimony	\$ 10,090
7 Assist in proceeding preparation	\$ 10,680
8 Participate in meetings and conference calls	\$ 5,565
<b>Total</b>	<b>\$ 76,070</b>

The proposed budget is based on LEI's professional fee rates (see Figure 9) and the estimated number of hours to be dedicated to each task.

**Figure 9. LEI's professional fee rates**

Staff	Project role	Company position	Hourly rate	Daily rate
Marie Fagan	Project Director	Chief Economist	\$ 495	\$ 3,960
Barbara Porto	Project Researcher	Consultant	\$ 295	\$ 2,360
Himanshu Bhardwaj	Project Researcher	Research Associate	\$ 215	\$ 1,720

### 4.3 Expense budget

LEI estimates that the additional cost for reasonable and customary reimbursable expenses, such as (but not limited to) printing, courier, and data acquisition fees, if any, will not exceed **\$600**. In addition, travel costs are estimated in Figure 10 below, assuming face-to-face meetings and technical conferences are conducted. LEI will comply with all expense caps as outlined in the

State of Louisiana Division of Administration Travel Policies and Procedures Memorandum. Accordingly, the travel expense budget will be approximately **\$2,882**.

**Figure 10. Indicative travel costs**

Travel	# trips	# people	# nights	Total cost
Meetings with Commission and/or Staff	2	1	1	\$1,052
Preside over technical conference	1	1	1	\$526
Meetings with parties	2	1	2	\$1,304
<b>Total estimated costs</b>				<b>\$2,882</b>

**Indicative**

#### **4.4 Total budget**

The total indicative budget including professional fees, travel, and other expenses therefore amounts to **\$78,952**.

## **5 Conflict of interest**

LEI currently has no interest, direct or indirect, which would conflict with the performance of services under this contract and shall not employ, in the performance of this contract, any person having a conflict.

## **6 Resumes of key staff assigned to the project**

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**Marie N. Fagan, PhD**

*Chief Economist*



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**KEY QUALIFICATIONS:**

Marie Fagan is the Chief Economist at London Economics International, LLC, based in Boston, Massachusetts. With over 30 years of experience in research and consulting for the energy sector, Marie's career has spanned international upstream and downstream oil and gas, global coal, North American gas markets, and North American power markets. She has advised industry clients, financial clients, regulators, and public interest organizations. She serves as an expert witness in oil, gas, and electric power litigation and regulatory matters.

At LEI, Marie's expertise across electricity markets and fuels provides integrated perspectives and supports sound strategic advice for clients. She has experience as a project manager for complex, multi-year engagements, including a two-year project for the Maine Public Utilities Commission in 2014-2016, and a two-year project for the Mississippi Public Service Commission in 2017-2019. She has deep experience in econometric analysis.

Marie leads LEI's engagements related to oil and natural gas market analysis. She directs gas pipeline modeling efforts based on a sophisticated network model, supporting outlooks for natural gas prices and basis, and analysis of flows on North American interstate pipelines. She provides in-depth expert testimony on issues such as basis differentials, pipeline capacity and utilization in key regions, and LNG import and export supply and demand. Projects have included serving as independent market expert for the Maine Public Utilities Commission, in the evaluation of the costs and benefits of new natural gas pipelines into New England, and independent market expert for the Minnesota Department of Commerce in the matter of the CN application of Enbridge Energy for the Enbridge Line 3 expansion.

From 1996-2014, she was with Cambridge Energy Research Associates ("CERA," now part of IHS Markit). She served as an Associate, then Associate Director for CERA's Global Oil research practice, as Director for the North American Gas research practice; she founded the CERAVIEW Institutional Investor Service and co-founded CERA's Global Steam Coal service; she served as Senior Director for CERA's North American Electric Power service and of IHS CERA's Upstream Strategy service. Before joining CERA, Marie served as an economist with the United States Energy Information Administration ("EIA"), conducting analysis and modeling supporting the Annual Energy Outlook ("AEO"), and conducting analysis of energy company financial performance.

Marie is the author of original research with publications in academic and industry journals. She holds a PhD in Economics from the American University in Washington, DC. She is a member of the Energy Bar Association, the American Economic Association, International Association for

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Energy Economics, New England Women in Energy and Environment, and the Boston Economic Club. She is Vice President of Business for the US Association for Energy Economics. She serves as a referee for the *Energy Journal*, the flagship academic publication of the International Association for Energy Economics.

**EDUCATION:**

Institution	American University, Washington DC
Date:	1995
Degree(s) or Diploma(s) obtained:	PhD in Economics. Dissertation: "Measuring Cost and Efficiency in US Crude Oil Resource Development, 1977-1990: A Frontier Translog Cost Function Approach"

Institution	University of Connecticut
Date:	1984
Degree(s) or Diploma(s) obtained:	Bachelor of Science, Business Administration (Finance)

**EMPLOYMENT RECORD:**

Date:	2014-present
Location:	Boston, MA
Company:	<b>London Economics International LLC ("LEI")</b>
Position:	Chief Economist (2020-present) Managing Consultant and Lead Economist (2016-2019) Managing Consultant (2014-2015)

Date:	2003-2014
Location:	Cambridge, MA
Company:	<b>IHS Markit (formerly Cambridge Energy Research Associates ("CERA"))</b>

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Position:	<p>Senior director, Upstream Strategy Advisory service (2012-2014).</p> <ul style="list-style-type: none"> <li>Responsible for the re-vamp of research services and development of new research services focused on the needs of oil and gas exploration and production companies. Defined product architecture, defined deliverables, and generated research, as well as managed the delivery of research. Responsible for marketing plans and focus, conducting presentations to Board of Directors meetings and other C-suite client groups. Keynote speaker at IHS CERA events such as CERAWeek and other industry events and conferences</li> </ul> <p>Senior director, North American Gas, Power, and Renewables group (2007-2011).</p> <ul style="list-style-type: none"> <li>Responsible for thought leadership, development, and delivery of research for IHS CERA's North American Electric Power Advisory Service and North American Gas and Power Scenarios Service. Led client engagements, as well as wrote and published research. Provided oversight and direction of the launch of a new research service, the IHS CERA Global Steam Coal Advisory Service</li> </ul> <p>Director/Senior director, CERAVIEW Institutional Investor Service (2004-2007)</p> <ul style="list-style-type: none"> <li>Created, launched, and directed IHS CERA's first research service encompassing the oil, gas, and power sectors to serve a targeted client community. Developed a new IHS CERA research publication, <i>Investors' Energy Monthly</i>, and served as publication's executive editor. In this role, won the IHS Circle of Excellence Award in 2005</li> </ul> <p>Director, North American Gas Advisory service (2003-2004)</p> <ul style="list-style-type: none"> <li>Responsible for rapid re-construction and turnaround of one of CERA's largest research advisory services. Contributed to and helped define the research agenda and was responsible for the editorial content and publication of major research and analytical reports related to gas infrastructure and markets in North America. Advised senior executive clients, including leading discussions of sensitive client-related issues.</li> </ul>
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Date:	2001-2002
Location:	Boston, MA
Company:	<b>International Human Resources Development Corporation ("IHRDC")</b>
Position:	<p>Director, International Gas Program</p> <ul style="list-style-type: none"> <li>Developed and implemented management training programs for middle and senior energy company managers, designed interactive presentations and teaching materials, and served as instructor. Taught principles of project development and financial analysis of energy company operations.</li> </ul>

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Date:	1996-2001
Location:	Cambridge, MA
Company:	<b>CERA</b>
Position:	<p>Associate director, Global Oil advisory service (1999-2001)</p> <ul style="list-style-type: none"> <li>• Authored original research reports, responsible for client presentations and the management, execution, and delivery of consulting projects.</li> </ul> <p>Associate, Global Oil advisory service (1996-1998)</p> <ul style="list-style-type: none"> <li>• Developed and maintained IHS CERA's expertise in exploration and production costs, technology, and financial factors affecting the upstream oil and gas industry.</li> </ul>

Date:	1994-1996
Location:	Washington, DC
Company:	<b>US Department of Energy, Energy Information Administration</b>
Position:	<p>Economist</p> <ul style="list-style-type: none"> <li>• Conducted financial analysis of upstream and integrated oil and gas companies; evaluated and implemented conceptual approaches to analysis of energy markets and market incentives and wrote and published original research reports.</li> </ul>

Date:	1989-1994
Location:	Vienna, Virginia
Company:	Decision Analysis Corporation of Virginia (DAC)
Position:	<p>Research associate/ Associate</p> <ul style="list-style-type: none"> <li>• Performed economic and econometric analysis, modeling, and forecasting to support the Energy Information Administration energy end-use models. Designed the National Energy Modeling System's Commercial Energy Demand Model; conducted financial analysis of energy companies.</li> </ul>

Date:	1988
Location:	Washington DC
Company:	US Department of Energy, Office of Policy, Planning and Analysis
Position:	<p>Intern</p> <ul style="list-style-type: none"> <li>• Researched waste-to-energy potential in the United States; constructed a database, developed econometric models, analyzed results, and produced written reports.</li> </ul>

**RECENT PROJECT EXPERIENCE:**

<i>Date:</i>	August 2020 - present
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	<b>Audit of fuel adjustment clause for Entergy Louisiana</b> LEI was engaged by Louisiana Public Service Commission, Docket No. X-35523, to perform an audit of the Fuel Adjustment Clause filings of Entergy Louisiana. Marie supervised and directed the audit.

<i>Date:</i>	July 2020 - present
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	<b>Audit of fuel adjustment clause for Cleco Power</b> LEI was engaged by Louisiana Public Service Commission, Docket No. X-35522, to perform an audit of the Fuel Adjustment Clause filings of Cleco Power. Marie supervised and directed the audit.

<i>Date:</i>	June 2020 - present
<i>Location:</i>	Ohio
<i>Organization:</i>	Public Utility Commission of Ohio
<i>Description:</i>	<b>Audit of PPA Rider of Duke Energy</b> LEI was engaged by the Public Utility Commission of Ohio, to perform an audit of the PPA Rider of Duke Energy. Aspects of the audit included assessing the reasonableness and produce of the disposition of energy and capacity in the PJM market of the energy provide by two coal plants, as well as plant performance, compliance with environmental requirements, and the prudence of fuel purchases. LEI also audited charges and true ups related to the company's quarterly PPA filings. Marie supervised and directed the audit.

<i>Date:</i>	May 2020 - present
<i>Location:</i>	Ohio
<i>Organization:</i>	Public Utility Commission of Ohio
<i>Description:</i>	<b>Audit of PPA of AEP Ohio</b> LEI was engaged by the Public Utility Commission of Ohio, to perform an audit of the PPA Rider of AEP Ohio. Aspects of the audit included assessing the reasonableness and produce of the disposition of energy and capacity in the PJM market of the energy provide by two coal plants, as well as plant performance, compliance with environmental requirements, and the prudence of fuel purchases. LEI also audited charges and true ups related to the company's quarterly PPA filings. Marie supervised and directed the audit.

<i>Date:</i>	April 2020 - May 2020
<i>Location:</i>	North Dakota
<i>Organization:</i>	Law firm
<i>Description:</i>	<b>Impacts of the potential shutdown of the Dakota Access pipeline ("DAPL")</b>

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	LEI was engaged by a law firm representing the plaintiff tribes to provide a Declaration in the matter of US District Court Case No. 1:16-cv-1534-JEB. Marie directed and led the research and prepared the Declaration as well as an in-depth report. The report covered issues including the long-term and near-term drivers of oil production in North Dakota, the drivers of global oil demand, the costs to transport oil by rail versus pipeline, and analysis of rail transport trends in the United States. She provided independent analysis as well as critiques of Declarations filed by other witnesses. Her declaration is available at: <a href="https://earthjustice.org/sites/default/files/files/3154-525_declarations-in-support-of-standing-rock.pdf">https://earthjustice.org/sites/default/files/files/3154-525_declarations-in-support-of-standing-rock.pdf</a>
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<i>Date:</i>	February 2020 - present
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	<b>Rulemaking to study renewable energy tariff, aka "green tariff" options</b> Marie's team supported the Louisiana Public Service Commission in Docket No. R-35423. LEI provided framing questions for stakeholder feedback on green tariff options, evaluated stakeholder responses, provided in-depth case studies of green tariffs in other US jurisdictions, and provided other consultatory services for the Commission.

<i>Date:</i>	January 2020 - June 2020
<i>Location:</i>	Massachusetts
<i>Company:</i>	Massachusetts Office of the Attorney General
<i>Description:</i>	<b>Application for firm transportation on a gas pipeline</b> The MA Attorney General's Office of Ratepayer Advocacy ("AGO") engaged LEI to examine the application of National Grid d/b/a Boston Gas for approval to execute a contract with Algonquin, for firm transportation ("FT") on the Atlantic Bridge Project (DPU 19-132). Marie led the project which included examining National Grid's projections of gas demand and its assumed resources to meet demand; examining the Assigned Precedent agreement for the FT as well as other documents; and providing a critique of the assumptions driving National Grid's cost-benefit analysis. Marie reviewed briefs, developed interrogatory requests, and evaluated the responses to such requests.

<i>Date:</i>	November 2019
<i>Location:</i>	Japan
<i>Organization:</i>	Private equity investor
<i>Description:</i>	<b>Long-term outlook for Japan electricity sector</b> LEI was engaged to prepare a brief, fact-based report that would help support a view of wholesale electricity prices in Japan after 2040. Marie authored the report, which covered i) the structure of Japanese electric power industry, and ii) the status of de-regulation and environmental policy. Based on this, Marie developed two reasonable scenarios for wholesale prices based on two different paths for energy supply to 2040 and beyond.

<i>Date:</i>	October 2019 - November 2019
<i>Location:</i>	ERCOT

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<i>Organization:</i>	European investor-owned utility
<i>Description:</i>	<b>Investment environment for transmission in ERCOT</b> LEI was engaged by a European utility to examine the investment environment for transmission in ERCOT. Marie’s team provided a detailed report covering agents and institutions, the regulatory and legal framework, remuneration of investment, and transmission planning.

<i>Date:</i>	July 2019 - August 2019
<i>Location:</i>	Alberta, British Columbia
<i>Organization:</i>	Counsel for natural gas producer
<i>Description:</i>	<b>Analysis of Western Canadian natural gas costs and production</b> LEI was retained by counsel to provide support in the matter of NOVA Gas Transmission Limited (“NGTL”)’s application to the National Energy Board (“NEB”). LEI reviewed evidence and prepared testimony. Marie led analysis of the natural gas and natural gas liquids (“NGLs”) market in Alberta and British Columbia, and the impact of a pipeline surcharge on producers of natural gas.

<i>Date:</i>	May 2019 – August 2020
<i>Location:</i>	Massachusetts
<i>Organization:</i>	Investor-owned gas distribution utility
<i>Description:</i>	<b>Econometric benchmarking analysis of gas utility performance</b> LEI was engaged by an investor-owned local gas distribution company to support its rate filing for performance-based ratemaking. Marie led an econometric benchmarking analysis of utility performance and served as a testifying witness. The econometric analysis used a transcendental logarithmic cost function (a tried-and-tested methodology for providing empirical evidence in utility benchmarking cases) to help set expectations for further efficiency improvement and appropriate stretch factor. The benchmarking report was used by counsel to develop the company’s strategy for the rate filing. Marie served as a testifying witness.

<i>Date:</i>	June 2019- December 2019
<i>Location:</i>	Ontario
<i>Organization:</i>	Generating company
<i>Description:</i>	<b>Benchmarking generation utility performance</b> LEI was engaged to support a hydropower generating company in relation to its second-generation hydroelectric payment amounts price-cap application before the regulator. The project involved performing independent benchmarking analysis of OPG’s regulated hydroelectric facilities. This project involved selecting an appropriate peer group, selection of appropriate metrics to be benchmarked, and model development. Marie created an econometric model to develop recommendations as to the appropriate stretch factor to apply. LEI also aided the company in public consultations and the regulatory process.

<i>Date:</i>	October 2018 – April 2018
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<i>Location:</i>	United States, ISO-NE
<i>Company:</i>	Massachusetts Office of the Attorney General
<i>Description:</i>	<p><b>Winter fuel reliability/electric power market design</b></p> <p>The MA Attorney General's Office of Ratepayer Advocacy ("AGO") engaged LEI to examine ISO-New England's proposals to address potential winter fuel security issues facing the electric power sector. Marie led the project, including developing an independent definition of the problem to be solved; developing solutions, identifying potential allies in the NEPOOL stakeholder community; analyzing other stakeholders' proposals; and working with the AGO in the stakeholder process. LEI developed an alternative proposal, a forward auction for stored energy reserves based on the financial concept of an American call option with a two-dimensional bid (the option premium and strike price).</p>

<i>Date:</i>	February 2018 – December 2018
<i>Location:</i>	Global
<i>Company:</i>	Columbia University School of International and Public Affairs, Center on Global Energy Policy
<i>Description:</i>	<p><b>Econometric analysis of crude oil price and income elasticities of demand</b></p> <p>LEI was engaged by the Columbia University, Center for Global Energy Policy ("CGEP") to conduct econometric analysis of global oil demand. Marie directed and managed the project, the foundation of which was a detailed econometric analysis of price and income elasticities of oil demand. Marie employed a variety of specifications of econometric models (including static and dynamic models, and symmetric and asymmetric models) and estimated separate models for crude oil, gasoline, and diesel demand. She used country-level data covering 40 years (1977-2016), aggregated into panel (pooled cross-section and time series) data sets for OECD, non-OECD, and oil-producing countries. Marie examined and reported the results of econometric tests covering time-series properties of the data (tests for integration and cointegration), performance of the log linear model specification as compared to an intrinsically non-linear specification, and the pool-ability of cross-sectional data. LEI's results were provided in a comprehensive report titled "Oil demand: Up the down staircase," which underwent academic review outside of CGEP. The report will be published by CGEP.</p>

<i>Date:</i>	September 2018-December 2018
<i>Location:</i>	United States, ISO-NE
<i>Company:</i>	Maine Public Utilities Commission
<i>Description:</i>	<p><b>Avoided energy supply costs</b></p> <p>LEI was engaged to perform a critical review of the methodology and assumptions which underpinned other consultants' analysis of avoided energy supply costs ("AESc"). Marie led the gas market forecast, and the critical review of the other consultants' gas price forecast. She also led a careful examination of the economic theory and econometric techniques used by the other consultants to estimate demand-induced price reduction effects ("DRIPE"). Owing to miss-specified models and/or unwarranted assumptions (such as a perfectly inelastic demand curve for natural gas in the long term) the other consultants' DRIPE estimates were generally too high.</p>

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<i>Date:</i>	June 2018-December 2018
<i>Location:</i>	United States, PJM
<i>Company:</i>	Ohio Public Utilities Commission
<i>Description:</i>	<p><b>Management performance and financial audit of large utility</b></p> <p>LEI was engaged to perform a management performance and financial audit of AEP Ohio's Alternative Energy Rider ("AER"). Marie led the project which required examining the terms of power purchase agreements ("PPAs") for wind and solar power, the cost of renewable energy credits ("RECs"); energy and capacity market prices; inventory strategies, and the accuracy of AEP Ohio's load forecasts. Marie recruited a local Ohio accounting firm to perform the financial portion of the audit; she provided guidance (as the firm had not previously audited a utility) and oversight of their work as well as the work of the LEI in-house team.</p>

<i>Date:</i>	March 2018 - September 2018
<i>Location:</i>	United States, MISO, Michigan
<i>Company:</i>	NGO
<i>Description:</i>	<p><b>The role of Enbridge Line 5 in NGLs and crude oil transport in Michigan</b></p> <p>For a non-governmental organization ("NGO") Marie produced three white papers examining the current and future role of Enbridge Line 5 in Michigan related to three issues: propane supply in Michigan, transportation for crude oil producers in Michigan, and supply of crude oil to Michigan-area refineries. Marie's analysis of the propane market included a comparative static econometric analysis of the supply and demand from propane in Michigan, explained in non-technical language. The white papers were used by the client in discussions with the Governor of Michigan and other stakeholders</p>

<i>Date:</i>	July 2017-June 2018
<i>Location:</i>	United States, MISO, Minnesota
<i>Company:</i>	Minnesota Department of Commerce
<i>Description:</i>	<p><b>Role of Enbridge Line 3 in heavy and light crude oil supplies</b></p> <p>Marie served as independent market expert assisting the Minnesota Department of Commerce in evaluating the application of Enbridge Energy for a Certificate of Need for its Line 3 oil pipeline expansion project (Docket No. PL-9/CN-14-916, OAH Docket No. 65-2500-32764). Marie's analysis covered global and local trends in refined product demand and crude oil supply, refinery utilization rates and utilization of high-conversion refinery capacity in Petroleum Administration for Defense District ("PADD") 2 and in the local Minnesota region. Her analysis required detailed examination of the assumptions and methodology of an oil pipeline linear programming-based model, in order to assess another witness's testimony which relied on the model. Marie provided written testimony; responded to interrogatory requests, provided written surrebuttal, and oral testimony.</p>

<i>Date:</i>	June 2017-December 2018
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<i>Location:</i>	United States, MISO, Mississippi
<i>Company:</i>	Mississippi Public Service Commission
<i>Description:</i>	<b>Management audit of large vertically integrated utility</b> Marie led a management audit of the fuel (gas, coal, and nuclear) and energy procurement activities of Entergy Mississippi. Marie’s team assessed fuel and energy contract terms, and reviewed the prudence of coal and nuclear fuel procurement and inventory practices. Marie’s team also assessed management, organization, controls, strategies, and outcomes for the company’s hourly MISO offers. The team investigated the operations of a nuclear power plant, and the financial implications of the utility’s power purchase agreement for nuclear power. Marie appeared before the Commission to present and defend findings.

<i>Date:</i>	November 2018 – February 2018
<i>Location:</i>	WECC
<i>Company:</i>	PacifiCorp
<i>Description:</i>	<b>Independent evaluator (“IE”) for energy procurement</b> LEI was retained as an IE by PacifiCorp for its system-wide 2017 Solar RFP. Marie led the project, which included a review of PacifiCorp’s Solar RFP, the facilitation and monitoring of communications between PacifiCorp and bidders, performing a review of the initial shortlist evaluation and scoring, and the filing of status reports and the final IE closing report.

<i>Date:</i>	April, May 2017
<i>Location:</i>	United States and Canada
<i>Company:</i>	Private client
<i>Description:</i>	<b>Review of investable energy sectors</b> For a private equity client, Marie led an extensive project reviewing a wide range of investable energy sectors in the United States and Canada. The sectors included: electricity generation (natural gas, wind, solar, hydro), AMI, distributed resources, demand response, retail energy, gas LDCs, gas storage, gas pipeline transportation, LNG-related infrastructure, vertically-integrated utilities, electric distribution utilities, and water utilities. LEI assessed the investment potential of each sector for the next five years, and proposed a methodology to screen and identify investment opportunities and execute on these opportunities.

<i>Date:</i>	March 2017
<i>Location:</i>	Alberta, Canada
<i>Company:</i>	Private client
<i>Description:</i>	<b>Analysis of capacity markets</b> LEI was engaged to provide global perspectives on the detailed mechanisms that make up capacity markets, so that eventual capacity market design in Alberta will be workable and efficient, with minimal unintended consequences. Marie led research and delivered a detailed report on market power mitigation mechanisms and their potential impacts on capacity market performance.

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<i>Date:</i>	February 2017
<i>Location:</i>	North America
<i>Company:</i>	Provider of services to vehicle fleet industry
<i>Description:</i>	<b>Outlook for electrification of transportation</b> Marie developed scenario outlooks for electric vehicle (“EV”) market penetration in the United States; examined the role of electric utilities (and their emerging EV-related business models) as potential partners versus competitors to the downstream transportation industry; identified activities and strategic positioning of upstream and downstream industry participants; led discussion of implications of “electrification of transportation” for fleet service companies, convenience stores, and other downstream industry participants. Presented material to company’s partner advisory board.

<i>Date:</i>	December 2016
<i>Location:</i>	Alberta, Canada
<i>Company:</i>	Private client
<i>Description:</i>	<b>Analysis of capacity markets</b> To support Board-level understanding of the implications of potential capacity market designs in Alberta, Marie prepared a detailed review and comparison of capacity markets across international and North American jurisdictions. Report concluded “the devil is in the details” of capacity market design. Market design details with potentially large impacts on the client were resource eligibility definitions, price setting mechanism, demand curve design, performance requirements, and market power mitigation rules.

<i>Date:</i>	September 2016
<i>Location:</i>	Northeast United States
<i>Company:</i>	Private client
<i>Description:</i>	<b>Examination of solar business models</b> For a client performing due diligence related to a potential investment in business-to-business behind-the-meter solar in the Northeast United States, Marie led a project examining US federal and state incentives for solar adoption, and assessing business models used for targeting commercial, institutional, and industrial sectors. For each business model, LEI assessed the competitive environment—who is operating in the sector, what is their go-to-market strategy, and in general how these models have been performing. Marie’s team also provided a 10-year outlook for solar renewable energy credits (“SRECs”) for certain jurisdictions. Finally, LEI developed key questions the client should ask as part of its evaluation of potential transactions in the behind-the-meter solar sector.

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<i>Date:</i>	October 2016-November 2016
<i>Location:</i>	California, Kansas
<i>Company:</i>	Law firm
<i>Description:</i>	<p><b>Support for counsel in contested matter</b></p> <p>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 accurate methodology for valuing the green attributes of LFG, based on market fundamentals driven by the California RPS requirements.</p>

<i>Date:</i>	August 2016-October 2016
<i>Location:</i>	Maine
<i>Company:</i>	Maine Public Utilities Commission
<i>Description:</i>	<p><b>Macroeconomic impact of biomass generation</b></p> <p>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.</p>

<i>Date:</i>	May 2016
<i>Location:</i>	ERCOT/Texas
<i>Company:</i>	Private client
<i>Description:</i>	<p><b>Examination of ancillary services</b></p> <p>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. 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 did not include SIR in its FAS-NPRR.</p>

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<i>Date:</i>	April 2016-May 2016
<i>Location:</i>	ERCOT/Texas
<i>Company:</i>	Renewable power investor
<i>Description:</i>	<p><b>Due diligence in ERCOT</b></p> <p>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).</p>

<i>Date:</i>	June 2014-April 2016
<i>Location:</i>	Maine
<i>Company:</i>	Maine Public Utilities Commission
<i>Description:</i>	<p><b>Project manager and testifying expert</b></p> <p>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.</p>

<i>Date:</i>	November 2015-December 2015
<i>Location:</i>	US Northeast
<i>Company:</i>	Renewable power developer
<i>Description:</i>	<p><b>Due diligence for assets in ISO-NE (Maine)</b></p> <p>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</p>

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	limits for the plants in question. LEI also provided an assessment of risk of outages based on NERC outage data for NPCC. Marie led the project
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<i>Date:</i>	October 2015-November 2015
<i>Location:</i>	ERCOT/ Texas
<i>Company:</i>	Private equity company
<i>Description:</i>	<b>Due diligence for assets in ERCOT</b> 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.

<i>Date:</i>	July 2015
<i>Location:</i>	North America/United Kingdom
<i>Company:</i>	UK Department of Energy and Climate Change
<i>Description:</i>	<b>Examination of design of auctions</b> Marie participated in a review of auction design for the UK DECC. The UK market regulator 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. Marie examined whether and for how long a "lock-in" option for the first year capacity price is offered to new generation assets bidding into the auctions. She 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.

<i>Date:</i>	May 2015
<i>Location:</i>	Connecticut; Virginia
<i>Company:</i>	Private equity company
<i>Description:</i>	<b>Review of gas transportation contracts</b> Marie evaluated contracts for firm gas transportation capacity for gas-fired plants in Virginia and Connecticut.

<i>Date:</i>	April 2015
<i>Location:</i>	Connecticut; New Jersey
<i>Company:</i>	Private equity company
<i>Description:</i>	<b>Outlook for natural gas prices</b> 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 led the gas market analysis.

<i>Date:</i>	August 2014 - January 2015
<i>Location:</i>	North America
<i>Company:</i>	Private client

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<i>Description:</i>	<b>Monthly energy market reports</b> LEI was engaged to support an energy company’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 CO <sub>2</sub> . 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 activities.
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<i>Date:</i>	October 2014
<i>Location:</i>	New England
<i>Company:</i>	Private equity company
<i>Description:</i>	<b>Assessment of ancillary service market</b> To support potential acquisition of hydropower assets, Marie provided analysis of ISO-New England’s Locational Forward Reserves Market (“LFRM”).

<i>Date:</i>	April-June 2014
<i>Location:</i>	US Midwest
<i>Company:</i>	Private equity company
<i>Description:</i>	<b>Due diligence for asset in PJM</b> For 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.

<i>Date:</i>	June 2014
<i>Location:</i>	North America
<i>Company:</i>	Law firm
<i>Description:</i>	<b>Examination of FERC policies and practices</b> LEI was engaged by a law firm on behalf of a Canadian energy company to provide market advisory for an investigation related to the timing of outage scheduling under PPAs. Marie provided research and expertise covering FERC practices related to monitoring, enforcement, and definition and prosecution of alleged market manipulation.

<i>Date:</i>	April-May 2014
<i>Location:</i>	Nova Scotia
<i>Company:</i>	Government of Nova Scotia
<i>Description:</i>	<b>Organization of energy system</b> 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.

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## **SPEAKING ENGAGEMENTS:**

### **Selected recent webinars and conferences**

Boston Bar Association, 2020 Virtual Energy Conference. Session title: *Performance-based Ratemaking*. Presentation title: *Performance-based ratemaking: Understanding the basics, and the role of performance incentives*. July 15, 2020. <http://energyconference.bbablogs.org/>

Morgan Stanley Webcast Series | *Regulatory Outlook for Key Pipeline Projects with Experts Bloomberg and London Economics International*. Presentation title: *Impacts of a potential shutdown of Enbridge Line 5*. July 10, 2020.

US Association for Energy Economics, Webinar. Presentation title: *Taking a look ahead: The long-term impacts of a crisis on oil demand*. June 29, 2020. <https://www.usaee.org/webinars/webinar-kleinberg.aspx>

US Energy Association, Webinar. Presentation title: *Taking a look ahead: The long-term impacts of a crisis on oil demand*. May 27, 2020. <https://usea.org/event/taking-look-ahead-long-term-impacts-oil-demand-after-crisis>

USAEE/IAEE 37th Annual North American Conference. Denver, CO. Session chairman/moderator, concurrent session title: *Regulation*. November 6, 2019.

ASSA/IAEE. Atlanta, GA. Session title: *Single and bi-directional economic dependencies in energy systems*. Presentation title: *Business and innovation cycles in the US Upstream: Surviving the ups and downs*. January 2019.

MIT/SPE/YPE. Cambridge, MA. Session chairman/moderator, session title: *Meeting the changing demand for US natural gas: Do markets alone suffice or are regulatory changes necessary?* April 26, 2018.

ERCOT Market Summit. Austin, TX. Session chairman/moderator, session title: *Perspectives on ERCOT Market Reforms*. February 28, 2018.

ASSA/IAEE. Philadelphia, PA. Session title: *Energy Economics, Regime Changes, and Sustainability* Discussant for paper "What's killing nuclear power in US electricity markets?" January 6, 2018.

## **PUBLICATIONS:**

### **Technical/Academic**

Fagan, Marie. "Up the Down Staircase: What History Teaches Us about Oil Demand after a Crisis" (May 4, 2020). USAEE Working Paper No. 20-440. Available at SSRN: <https://ssrn.com/abstract=3592443>

Kleinberg, Robert and Fagan, Marie, "Business Cycles and Innovation Cycles in the U.S. Upstream Oil & Gas Industry." (December 1, 2019). USAEE Working Paper No. 19-423. Available at SSRN: <https://ssrn.com/abstract=3508466> or <http://dx.doi.org/10.2139/ssrn.3508466>

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“The Disappearing Middle Class: Economies of Scale in Exploration and Development,” presented at the International Association for Energy Economics, 26th annual conference, Aberdeen, June 2002.

“The Key Role of Technology in Reducing Offshore Finding and Development Costs,” *Fundamentals of the Global Offshore Industry*, The Petroleum Economist Ltd., London, September 2001.

“The US Oil and Gas Supply Situation: How Did We Get Here?” guest lecture, Clark University, Worcester, MA, October 2000.

“The Technology Revolution and Upstream Costs,” *The Leading Edge* (Journal of the Society of Exploration Geophysicists), June 2000.

Review of *Exploration, Development, and Production – Texas Oil and Gas 1970-1995*, for the *Journal of Economic Literature*, 1999.

“Resource Depletion and Technical Change: Effects on US Crude Oil Finding Costs from 1977 to 1994,” *The Energy Journal*, 1997.

“Inter-jurisdictional Competition, Resource Rents, Tax Exporting, and Oil and Gas Severance Taxes,” *The Journal of Energy Finance and Development*, 1997, with Kevin Forbes.

“Fiscal Illusion and Fiscal Sclerosis: The Case of Oil and Gas Severance Taxes,” presented at the US Association for Energy Economics/International Association for Energy Economics conference, Boston, MA October 1996.

“Prices, Depletion, and Technical Change 1977-1990: The Declining Cost of Crude Oil,” presented at the Allied Social Science Association Annual Meeting, American Economic Association/International Association for Energy Economics session, San Francisco, CA, January 1996.

“Technical Change and Scale Economies in US Onshore Oil and Gas Exploration 1977-1990,” presented at the Southern Economic Association meeting, New Orleans, LA, November 1993.

### **US Department of Energy**

*State Energy Severance Taxes*, DOE/EIA-TR/0599, Washington, DC, 1995.

*Oil and Gas Development in the United States in the Early 1990s: An Expanded Role for Independent Producers*, DOE/EIA-0600, Washington, DC, 1995, with Jon Rasmussen.

“Trash to Energy: A Burning Issue,” *1988 Selected Papers and Presentations by DOE’s Policy Integration Staff*, US Department of Energy, Office of Policy, Planning and Analysis, Office of Policy Integration, Washington, DC, December 1988, with Peggy Podolak.

### **IHS/CERA Publications**

*Global Prospects for Shale Gas: Assessing Above-ground Risks and Enablers* IHS CERA Private Report 2013

*The Impact of Technology on US Offshore Finding and Development Costs* IHS CERA Private Report 2013

*The Next E&P Hotspots: What are the Leading Indicators?* IHS CERA Decision Brief 2012

*Taking the Shale Gale International: Lessons from North America* IHS CERA Decision Brief 2012

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*Prospects for Shale Gas in Europe: Insights from CERAWeek* IHS CERA Insight 2012  
*Envisioning a Long-term Future for Coal* IHS CERA Insight 2011  
*North American Power Industry Landscape 2011* IHS CERA Decision Brief 2011  
*Common Ground? CERAWeek Perspectives on US Electric Power Transmission* IHS CERA Insight 2010  
*North American Power Industry Landscape 2010* IHS CERA Decision Brief 2010  
*Mexico's Road to Renewable Power: The Cost of a Range of Targets and Options* IHS CERA Decision Brief 2009  
*Competitive Bidding: A Key Tool for Capital Formation in the US Power Sector* IHS CERA Decision Brief 2009  
*Financing the Global Power Business: Insights from CERAWeek* IHS CERA Insight 2009  
*Concentrating Solar Power: US Demand Heats Up* IHS CERA Decision Brief 2008  
*US CO2 Policy Quandary: Near-term Reductions Imply a High Carbon Price* IHS CERA Private Report 2008  
*The US Energy Act of 2007: Addressing the Demand Side of Electric Power* IHS CERA Insight 2008  
*Investors' Energy Monthly* December 2004 – November 2007  
*Some Sail, Some Fail: Utility M&A after PUHCA* IHS CERA Decision Brief 2006  
*Another Decade of Rising Upstream Costs?* IHS CERA Decision Brief 2006  
*Merchant Power's Recovery: Four Dimensions of Value* IHS CERA Private Report 2006  
*PUHCA Repeal and Utility M&A: One Big Obstacle Down, Many Remain* IHS CERA Decision Brief 2005  
*North American Gas Monthly Briefing* January 2003 - June 2004  
*Costs are Up for North American Natural Gas* IHS CERA Decision Brief 2004  
*Bottom Line: A New Long-term Floor for North American Gas Prices* IHS CERA Private Report 2004  
*Upstream Gas Costs and North American E&P Strategy: Avoiding the Edge* IHS CERA Decision Brief 2004  
*Can We Drill Our Way Out of the (Natural Gas) Supply Shortage?* IHS CERA Decision Brief 2003  
*Cost-effective Deepwater Development: Seeing the Forest from the "Trees"* IHS CERA Private Report 2001  
*Optimization and the Role of R&D* IHS CERA Decision Brief 2001  
*Upstream Spending Plans: Inflation in the Pipeline* IHS CERA Alert 2001  
*Upstream Technology on the Horizon* IHS CERA Decision Brief 2000  
*Upstream Costs--Why the Gap will widen* IHS CERA Decision Brief 1999  
*The Impact of Falling Oil Prices on Upstream Operations* IHS CERA Decision Brief 1998  
*The Technology Revolution and Upstream Costs* IHS CERA Private Report 1998  
*Managing the Rig Shortage* IHS CERA Decision Brief 1997

## **News Media**

"Economists wonder: Did COVID-19 accelerate timeline for peak oil demand?" (excerpts from USAE webinar *Taking a look ahead: The long-term impacts of a crisis on oil demand*, May 27, 2020). S&P Global Market Intelligence. June 8, 2020.

[https://platform.mi.spglobal/SNL.Services.Export.Service/v2/Export/Retrieve?filename=Html\\_2bdf6b05-697e-4a2b-8768-579bf532b596.html](https://platform.mi.spglobal/SNL.Services.Export.Service/v2/Export/Retrieve?filename=Html_2bdf6b05-697e-4a2b-8768-579bf532b596.html).

"Upstream oil costs on the rise" (excerpts from *Another Decade of Rising Upstream Costs?* IHS CERA Decision Brief 2006), *The Wall Street Journal Morning Brief*, June 28, 2006.

"Unnatural Gas Prices," live television interview for CNN-FN, December 23, 2003.

## **IHS/CERA CERAWeek Roles**

Chairman, Coal Plenary *Envisioning a Long-term Role for Coal*, March 10, 2011

Chairman, Strategy Session *Financing the Power Future*, March 10, 2011

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Chairman, Expert Dialog *North American Gas and Power Scenarios Wildcards*, March 9, 2011  
Chairman, Strategy Session *Financing a North American Power Sector in Transition*, March 12, 2010  
Panelist, CERA Insights *Global Power Outlook*, March 12, 2010  
Chairman, Strategy Session *US Electric Power Transmission: the Battle of the Jurisdictions*, March 11, 2010  
Chairman, Critical Issue Forum, *Financing the Power Sector in a Turbulent Economy*, February 12, 2009  
Chairman, Critical Issue Forum *Power Sector Investment: Global Capital, Local Strategies* February 15, 2008  
Panelist, Leadership Circle *Global Power Outlook* February 14, 2008  
Chairman, Critical Issue Forum *Rising Costs and the Outlook for North American Gas*, February 14, 2007  
Host and Commentator, *Reception for Institutional Investors* February 13, 2007  
Panelist, Critical Issue Forum *Oil Sector Finance: The Cliff behind the Clouds?* February 13, 2007  
Host and Commentator, *Reception for Institutional Investors* February 7, 2006  
Chairman, Critical Issue Forum *Financing the Oil Future: A Three-Trillion Dollar Dilemma* February 7, 2006  
Host and Commentator, *Reception for Institutional Investors* February 15, 2005  
Chairman, Critical Issue Forum *North American Natural Gas: E&P in a Mature Region* February 11, 2004  
Chairman, Expert Briefing *North American Gas E&P Strategy: Getting off the Treadmill?* February 12, 2003  
Panelist, Expert Briefing *Bracing for a Wild Ride: North American Gas Market Outlook* February 11, 2003

## Barbara Porto

### Consultant



#### KEY QUALIFICATIONS:

Barbara is a Consultant at London Economics International LLC (“LEI”), where she supports the firm’s technical engagements with regulators, utilities and private equity firms on issues regarding market design, project evaluations, and wholesale price analysis. Barbara is LEI’s lead expert and modeler for the Mexico and Latin America markets and provides advisory services on a variety of topics touching upon all aspects of the power sector value chain. Barbara also serves as a key modeler for LEI’s gas pricing model. She is a key team member for LEI’s management audit engagements.

Prior to LEI, Barbara was an Analyst at ENEVA, the largest private thermal power generation company in Brazil, where she was responsible for market intelligence reports and procurement strategic planning.

#### 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 2015 - 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)

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Position:	Analyst (July 2010 – August 2013) Intern (July 2008 – June 2010)
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**RECENT PROJECT EXPERIENCE:**

<i>Date:</i>	January 2015 to present
<i>Location:</i>	Mexico
<i>Company:</i>	LEI's Continuous Modeling Initiative (CMI)
<i>Description:</i>	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.

<i>Date:</i>	January 2018 – January 2019
<i>Location:</i>	USA
<i>Company:</i>	Public Utility Commission of Ohio
<i>Description:</i>	LEI was engaged in 2018 by the Public Utility Commission of Ohio to perform a management/performance audit of the Alternative Energy Rider of the Ohio Power Company (AEP Ohio). LEI examined processes involved in procuring RECs and SRECs. LEI compared and benchmarked AEP Ohio RECs and SRECs costs and other operational results against data from public sources. LEI created a working model of the true-up process and provided quantitative results comparing the impact of quarterly versus semi-annual true-up periods on the utility and on ratepayers. Barbara performed analysis on RECs benchmarking, inventory, and compliance, as well as the cost of compliance and the approach used by AEP Ohio to calculate the cost of RPS compliance.

<i>Date:</i>	July – December 2018
<i>Location:</i>	New England, USA
<i>Company:</i>	Private Client
<i>Description:</i>	LEI was retained to assist in the review of the avoided energy supply costs as reported in the Avoided Energy Supply Cost ("AESC") 2015 - Update of December 16, 2016 and provide independently developed forecasts of energy supply costs and/or wholesale electricity and natural gas prices in New England. As part of the required services, the LEI undertook a review of the AESC and provided expert analysis of the AESC assumptions, methodology and results. LEI also advised the Commission and its staff with respect to the application of the AESC in the context of evaluating the cost effectiveness of energy efficiency measures. In addition, LEI provided independently developed energy supply costs and/or wholesale electricity and natural gas prices for the region that reflect current market conditions and outlooks. Barbara was responsible for the natural gas and other fuels price outlook review and performing natural gas forecast.

<i>Date:</i>	June – December 2017; July – November 2018
<i>Location:</i>	MISO
<i>Company:</i>	Mississippi Public Service Commission

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<i>Description:</i>	LEI was engaged by a public service commission to audit management activities of a major vertically-integrated utility in the MISO region. LEI assessed the utility's practices for economical purchase and use of fuel and electric energy, assessed relevant fuel and energy contract terms, investigated the operations of the utility's coal and nuclear generation units, and reviewed the prudence of coal inventory levels and inventory control procedures. Barbara worked on the procurement and inventory management sections of the audit related to natural gas, oil, and coal.
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<i>Date:</i>	July - August 2018
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<i>Location:</i>	New York, USA
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<i>Company:</i>	Private Client
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<i>Description:</i>	For an international client, LEI prepared a memo reviewing the performance of a generation asset in the NYISO wholesale markets. The memo included a review of the plant's competitive advantages and disadvantages from the point of view of its technology, operational characteristics, fuel procurement options, location with respect to transmission constraints. LEI's analysis also included a view on likely short and medium market conditions, together with potential market developments, that could affect the plant's revenues. Barbara was responsible for the fuels and plant performance sections of the report.
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<i>Date:</i>	March - August 2018
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<i>Location:</i>	USA
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<i>Company:</i>	Private Client
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<i>Description:</i>	For a non-governmental organization ("NGO") LEI examined the current and future role of Enbridge Line 5 on oil consumers and producers in the State of Michigan. LEI's analysis covered a) the extent to which refineries which serve Michigan consumers require Enbridge Line 5 to provide crude oil; b) the extent to which consumers of propane in Michigan's Upper Peninsula rely on Enbridge Line 5; and c) the extent to which producers of crude oil in Michigan's Lower Peninsula rely on Enbridge Line 5. Barbara assisted with research tasks and coauthored the report.
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<i>Date:</i>	May - July 2018
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<i>Location:</i>	Maine, USA
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<i>Company:</i>	Private Client
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<i>Description:</i>	LEI was retained to assess the financial viability of select biomass power plants in the next few years and confirm the plant's assertion that a discount on certain transmission costs was required in order to avoid plant closures. Barbara led the engagement, creating an estimated pro forma income statement to assess whether the select biomass plants are expecting to make positive (or negative) gross profit margin in the next few years, 2018-2021. The financial model presented a range of market revenues that the power plants can earn from the sale of energy, capacity, and RECs in ISO-NE's control area, relative to an estimate of going forward operating costs for two power plants. The model included five scenarios.
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<i>Date:</i>	January - July 2018
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<i>Location:</i>	USA
<i>Company:</i>	Maine PUC
<i>Description:</i>	LEI was retained by the Maine PUC to review and critique the analysis filed by Central Maine Power ("CMP") regarding the benefits to Maine resulting from the New England Clean Energy Connect ("NECEC"), which is a 1,200 MW HVDC Transmission Line from the Quebec-Maine border to Lewiston. The analysis includes work related to the regional energy markets, including the effect of the NECEC on a) wholesale energy, capacity, and ancillary service costs for Maine ratepayers b) impact on price volatility during natural gas price spike events; and c) greenhouse gas (GHG) reduction benefits. In addition, the analysis will also include work related to economic benefits to Maine from the NECEC including a) job creation, both direct and indirect; b) employment impacts from electricity price reductions and associated cost savings; c) economic development benefits and d) municipal tax revenues. Barbara was responsible for the natural gas price outlook review and performing natural gas forecast.

<i>Date:</i>	February - April 2018
<i>Location:</i>	USA
<i>Company:</i>	Columbia University Center for Global Energy Policy
<i>Description:</i>	LEI was engaged by the Columbia University School of International and Public Administration's Center on Global Energy Policy ("CGEP") to conduct econometric analysis of global oil (crude oil and key refined products) demand and its income and price drivers. Barbara conducted a portion of the econometric analysis using STATA and coauthored the report.

<i>Date:</i>	November 2017 - March 2018
<i>Location:</i>	USA
<i>Company:</i>	PacifiCorp
<i>Description:</i>	LEI was retained as an independent evaluator ("IE") by PacifiCorp for its system-wide 2017 Solar RFP. LEI reviewed PacifiCorp's Solar RFP, facilitated and monitored communications between PacifiCorp and bidders, performed a review of the initial shortlist evaluation and scoring, and filed status reports and the IE closing report. Barbara coauthored the status and IE report, and managed the information-gathering and summarizing process, which involved information from over 100 bids, and multiple documents from each bidder.

<i>Date:</i>	August 2017
<i>Location:</i>	Canada
<i>Company:</i>	Private Client
<i>Description:</i>	For a large utility, LEI performed a detailed bottom-up analysis of the range of costs for building a utility-scale solar farm in a Canadian province. LEI researched potential costs for multiple solar module technologies, interconnection options, and land types. The cost analysis customized the hardware, labor, and other costs into the province's business landscape so as to create an accurate representation of the costs for building a solar generation resource. Barbara assisted on the research, composition of the cost model and final report.

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<i>Date:</i>	May 2017 – August 2017
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	LEI was retained to provide a research paper highlighting the opportunity to evolve system planning practices to a more resilient transmission system in the longer term, one that promotes efficient electricity production and consumption decisions and efficient infrastructure investment. Barbara assisted on the research tasks.

<i>Date:</i>	May 2017
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	For a private equity client, LEI reviewed all investable energy sectors in the US and Canada (except oil and gas exploration and production). The sectors included: electricity generation (natural gas, wind, solar, hydro), AMI, distributed Resources, demand response, retail and gentailers, gas LDCs, gas storage, gas pipeline transportation, LNG-related infrastructure, vertically-integrated utilities, electric distribution, and water utilities. LEI assessed the investment potential of each sector for the next five years and proposed a methodology to screen and identify investment opportunities and execute on these opportunities. Barbara was responsible for the electric generation sector and the Alaska regional study.

<i>Date:</i>	April 2017
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	For a private developer, LEI reviewed the eligibility of small (less than 25 MW) run-of-river hydroelectric electric generation facilities to provide ancillary services in the ISO-NE, MISO, NYISO, and PJM jurisdictions. Barbara assisted with research tasks.

<i>Date:</i>	December 2015 – April 2017
<i>Location:</i>	Canada
<i>Company:</i>	Ontario Power Generation (“OPG”)
<i>Description:</i>	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 supported OPG through 2017 in recommending an appropriate X factor and I factor to use in a I-X regime for hydroelectric generation. Barbara coauthored the report and assisted on information-gathering.

<i>Date:</i>	December 2016
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<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	In 2014, LEI assessed the impact of the construction of the 1000 MW Pacifico HVDC transmission interline between Southern Peru and Northern Chile. LEI also provided due diligence support and market analysis for the Peruvian and Chilean electricity markets to the team of investors backing the project. In 2016, the model was updated to the current market condition. Barbara assisted with research tasks.

<i>Date:</i>	July – December 2016
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	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. Barbara coauthored the IE report and managed the information-gathering.

<i>Date:</i>	June 2016
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	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. Barbara assisted with research tasks.

<i>Date:</i>	June 2016
<i>Location:</i>	Brazil
<i>Company:</i>	Private Client
<i>Description:</i>	For a Canadian electricity transmission company, Barbara 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.

<i>Date:</i>	April – May 2016
<i>Location:</i>	Multiple
<i>Company:</i>	TransAlta
<i>Description:</i>	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

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	comparative review of ancillary services in North America and abroad. Barbara was responsible for the Ireland case study.
<i>Date:</i>	March 2016
<i>Location:</i>	Canada
<i>Company:</i>	Alberta Balancing Pool
<i>Description:</i>	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. Barbara assisted with research tasks.
<i>Date:</i>	October - November 2015
<i>Location:</i>	Multiple
<i>Company:</i>	Private Client
<i>Description:</i>	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.
<i>Date:</i>	June - October 2015
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	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.
<i>Date:</i>	June 2015
<i>Location:</i>	USA
<i>Company:</i>	Private Client
<i>Description:</i>	LEI was retained to categorize the different plants in PJM into self-supply, merchant or under PPA. Barbara assisted with research tasks.
<i>Date:</i>	May - June 2015
<i>Location:</i>	USA

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<i>Company:</i>	Private Client
<i>Description:</i>	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. Barbara assisted with research tasks.

<i>Date:</i>	April 2015
<i>Location:</i>	Colombia
<i>Company:</i>	Private Client
<i>Description:</i>	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 detail 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. Barbara assisted with research tasks and coauthored the report.

<i>Date:</i>	March - April 2015
<i>Location:</i>	Colombia
<i>Company:</i>	Private Client
<i>Description:</i>	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 detail 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. Barbara created the fuels forecast, assisted with research tasks for the modeling activities, and coauthored the report.

<i>Date:</i>	January - February 2015
<i>Location:</i>	USA, Canada and Mexico
<i>Company:</i>	Private Client
<i>Description:</i>	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.



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Engagement Manager, Global Strategy Group

**From:** 2010

**Employer:**

**To:** 2012

*Deloitte & Touche (Deloitte Consulting & Monitor Deloitte)*  
Senior Associate, Strategy

**From:** 2008

**Employer:**

**To:** 2009

*Frost & Sullivan*  
Consultant, Strategy

**From:** 2005

**Employer:**

**To:** 2007

*Standard & Poor's*  
Senior Associate, Fixed Income and M&A

**RECENT PROJECT EXPERIENCE:**

The projects briefly described below are typical of the work Himanshu Bhardwaj has performed.

**Energy related studies**

- *Drafted 8 MOUs resulting in over US\$250MN in investment through an improved market access and investor relations strategy, economic impact assessment, and privatization for a major downstream (oil & gas) industrial city.* Himanshu led the investor participation strategy for a leading national oil company's downstream activity in an industrial city in Middle East.
- *Advised a leading public sector utilities company on tariff mechanism review for commercial and residential sector.* The study involved various scenario assessments across demand – supply gaps in peak loads and non-peak loads seasons. Further, digitization of meters and billing processes was included as a part of the strategy implementation.
- *Yielded a multimillion-dollar cost optimization strategy for a major oil company by drafting a 10-year business plan.* Himanshu co-managed the study during the 2014-2015 oil crisis, by optimizing multiple variable cost drivers (such as opex, margins, taxes, and forex), translating into a 1.25% overall cost savings.
- *Supported a leading oil and gas exploration company in increasing revenues 10x by drafting a successful growth strategy.* Identified offshore exploration projects in Asia Pacific alongside supply chain and logistics requirements and introduction with various refineries and downstream players along the value chain.

**Various public sector & infrastructure studies**

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- *Identified revenue growth opportunities of appx. 500% for a leading civil aviation authority by reorganizing through a privatization strategy after decades of sustainable losses.*
- *Orchestrated and presented a multi-billion private sector participation plan to a government healthcare authority, covering national healthcare infrastructure and healthcare insurance, impacting over 30 million citizens.*
- *Implemented a digital strategy for a leading telecommunication and infocom authority with an estimated economic impact of US\$100MN through a 'data monetization' opportunity covering ownership, privacy, and open data.*
- *Devised and launched a local content strategy and economic impact assessment for a major commerce and trade authority through opportunities worth US\$2BN by calculated expansions of their infrastructure, energy, and transportation sectors.*
- *Developed a multibillion-dollar portfolio strategy for a leading sovereign wealth fund covering a comprehensive social portfolio, including education, hospitals, social infrastructure, and low-to-mid-income housing assets.*
- *Remodeled the business plan of a tourism authority through private sector investment in tourism assets (national parks, attractions), positively impacting over 2 million citizens in the province and generating over US\$50MN in fiscal revenues.*
- *Overhauled the non-core postal delivery operations of a national postal agency through a US\$100MN privatization strategy that included establishing fulfillment center and banking operations, and transforming last mile delivery.*
- *Earned US\$500K in success fees on a PPP deal by delivering a privatization strategy for a Shanghai port authority.*
- *Achieved a 5% reduction in costs through reorganization and transformation of the healthcare regulator in Singapore.*
- *Partnered with a leading telecom regulator on a 3G rollout strategy and auction plan impacting over 200 million citizens.*