

April 4, 2023

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Re: RFP 23-11,

Docket No. X-36660, Louisiana Public Service Commission, ex parte. In re: Formula Rate Plan Annual Report based upon the test year ending December 31, 2022; and

Docket TBDs, 1803 Electric Cooperative, Inc., ex parte. In re: Formula Rate Plan Annual Reports

Dear Kimberly and Kathryn:

Please find attached London Economics International's ("LEI") proposal to act as an outside independent technical consultant and assist the Louisiana Public Service Commission ("LPSC") with Docket No. X-36660 and TBDs referenced above. LEI offers a total indicative budget of to \$39,849 per Test Year (for a 3-year total of \$119,547) including professional fees, travel, and other expenses.

LEI is uniquely qualified for this role. LEI has extensive experience advising electric utilities and regulators on their ratemaking plans' design and components. LEI's experiences in select US states and Canada are complemented by similar work performed worldwide; for example, LEI staff has worked on performance-based ratemaking ("PBR") related projects in Barbados, Canada, Jordan, and Malaysia. Moreover, LEI has also investigated PBR mechanisms in Argentina, Australia, Europe (Austria, Germany, the Netherlands, Romania, and the UK), and Asia (the Philippines). This international experience enhances LEI's knowledge of ratemaking best practices and the latest regulatory innovations. In addition, we have extensive experience working for regulators across the United States, as well as providing follow-up testimony support to defend its findings.

There are no actual or potential conflicts of interest for LEI in performing the contractual obligations contemplated in this RFP. LEI is not currently working for a 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,

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Chief Economist
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Proposal responding to RFP 23-11 to serve as an independent technical consultant to Commission’s review and analysis of 1803 Electric Cooperative, Inc’s Formula Rate Plan Annual Report (Dockets No. X-36660 and TBDs)



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

April 4, 2023

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 independent technical consultant in the matter of Dockets No. X-36660 and TBDs, “Formula Rate Plan Annual Report based upon the test year ending December 31, 2022.” LEI is a leading energy consulting firm with 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 on tariffs, ratemaking, and renewable energy. LEI has worked with regulators, including the LPSC Staff, on many occasions and has experience testifying on a variety of issues.

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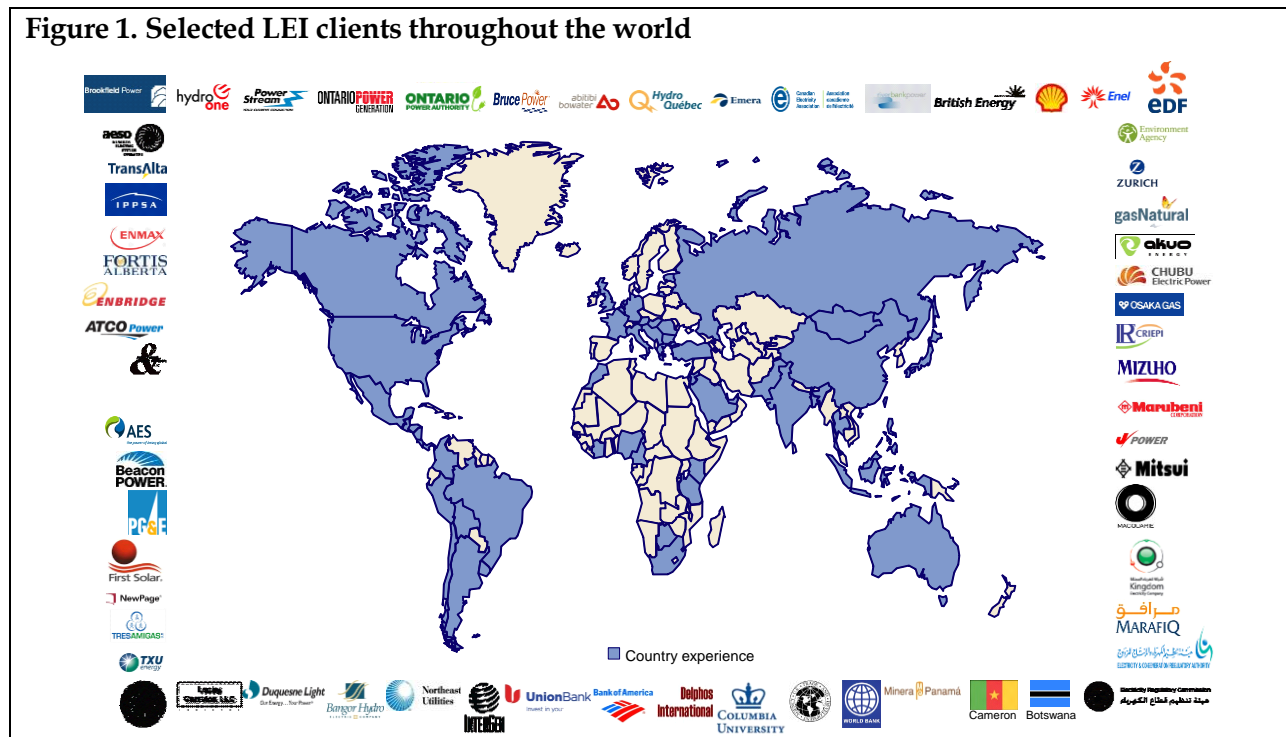
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1 Bidder information

LEI is a global economic, financial, and strategic advisory professional services firm specializing in energy and infrastructure. The firm combines a detailed understanding of specific network and commodity industries, such as electricity generation and distribution, with sophisticated analysis and a suite of proprietary quantitative models to produce reliable and comprehensible results. The firm had its start in the initial round of privatization of electricity, gas, and water companies in the United Kingdom. Since then, LEI has advised private sector clients, market institutions, regulators, and governments on policy initiatives, market and tariff design, asset valuation, market power, and policy, and strategy in virtually all deregulated markets worldwide (see Figure 1).



The following attributes make LEI unique:

- *clear, readable deliverables* grounded in substantial topical and quantitative evidence;
- *extensive experience with regulatory regimes, including formula rate plans (“FRPs”)*, enables LEI to provide benchmarking and comparison to industry best practices;
- *wealth of knowledge of energy and infrastructure regulation* worldwide enables LEI to provide expert testimony services on regulatory best practices and innovation;
- *balance of private sector and governmental clients* enables LEI to advise both regarding the impact of regulatory initiatives on private investment and the extent of possible regulatory responses to individual firm actions; and
- *US-wide and worldwide experience* backed by multilingual and multicultural staff.

LEI is well qualified to assist LPSC in the review and analysis of 1803 Electric Cooperative's 3-year FRP Annual Reports. FRP is a form of alternative ratemaking, aka performance-based ratemaking ("PBR"), and is an area that LEI has specialized in:

- *LEI has extensively studied regulatory regimes involving PBR and advised utilities, regulators, and investors on best practices with respect to the design of PBR formulas and implementation.* In some of LEI's work, we have advised on how PBR implementation may affect consumers, while in other engagements, we have focused on implications for regulated utilities and regulators. That work has exposed LEI to various forms of PBR and the technical studies that regulators and utilities use to calibrate the trajectory of future rates, consider investment needs and align the incentives of customers, the regulated utility, and the regulator.
- LEI is active across *North America's utility sector and has a comprehensive understanding of issues faced by utilities and regulators alike.* LEI's areas of expertise include regulatory economics, PBR, and market design; expert testimony and litigation consulting; electric and gas distribution advisory; and asset valuation and price forecasting.
- LEI has *advised utilities on the appropriate inflation factor and the reasonableness of stretch factors/consumer dividends as well as other features of PBR such as earnings sharing mechanisms, efficiency carryover schemes, and capital trackers.* LEI has advised on the formulaic "I-X" approach and has studied the building-blocks approach historically applied in the United Kingdom ("UK") and Australia, as well as the "RIIO" model currently adopted in the UK.
- LEI team members have *testified before several regulators in various aspects of rate design, and PBR specifically.* LEI team members have served as expert witnesses in a number of jurisdictions that have applied PBR to regulated electric and gas utilities. These include the Massachusetts Department of Public Utilities ("DPU") on behalf of Eversource Energy, the Ontario Energy Board (on behalf of the Coalition of Large Distributors, Ontario Power Generation, Enbridge Gas, and Union Gas), the Alberta Utilities Commission (on behalf of FortisAlberta and ENMAX), and the Malaysian Energy Commission (on behalf of Tenaga Nasional Berhad).

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 with PBR and has broad experience in regulatory economics and cost allocation. 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 also understands the perspective and objectives of state regulators, having worked with many regulators. The firm has experience providing testimony to state commissions on issues, including ratemaking, regulatory economics, cost allocation, utility audits, market power, retail competition, and other issues.

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

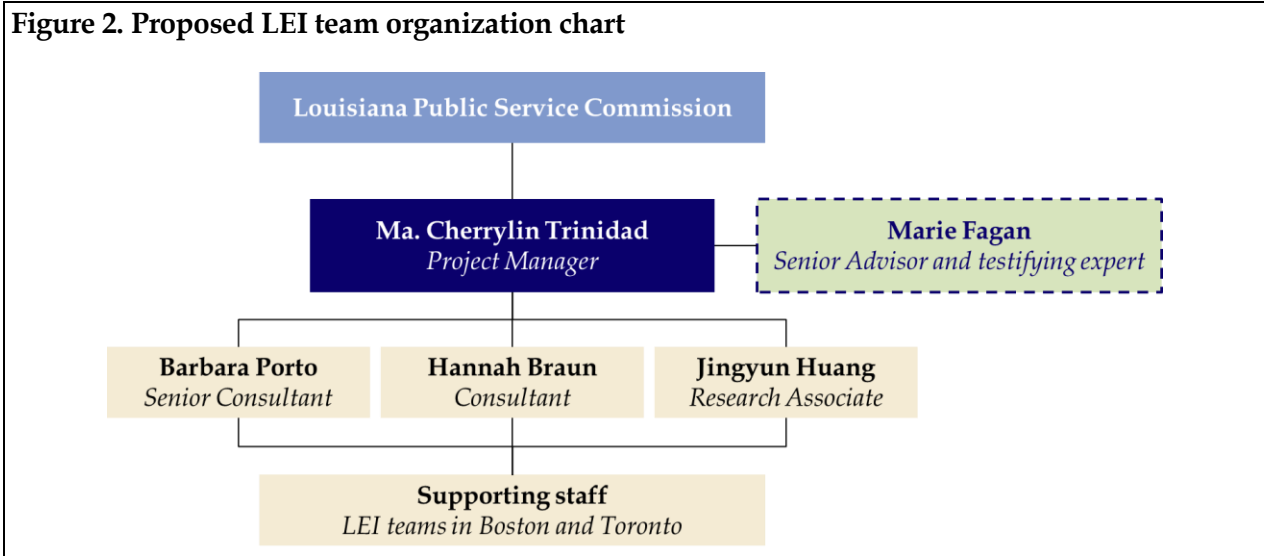
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assessment expertise, analytical and technical capabilities, experience with PBRs, and expertise in competitive power markets, including MISO.

There will be four 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*
- *Ma. Cherrylin Trinidad, Director*
- *Barbara Porto, Senior Consultant*
- *Hannah Braun, Consultant*
- *Jingyun (“Angela”) Huang, Research Associate*

Ma. Cherrylin Trinidad will have overall responsibility for the project and will act as Project Manager. *Marie Fagan* will serve as Senior Advisor and testifying expert. *Barbara Porto* will serve as Senior Consultant. *Hannah Braun* and *Jingyun Huang* will serve as core team members. In addition, LEI staff will provide additional support as needed.



1.2 Brief bios of key staff assigned to the project

Marie Fagan, Chief Economist at LEI, will serve as a **Senior Advisor** for this engagement, and **expert witness**. 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, as well as North American gas and 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. She also served as the Project Manager and lead expert in the ELL FAC audit for 2016 to 2019 (Docket No. X-35523), the Cleco FAC audit for 2018 and 2019 (Docket No. X-35522), the Audit of Cleco’s Storm Cost (Docket No. X-35990), and several other projects for the Commission.

Ma. Cherrylin Trinidad, Director at LEI, will serve as the **Project Manager** for this engagement, and **expert witness**. She has managed numerous PBR-related projects. She was LEI's project manager for the PBR filing of Tenaga Nasional Berhad ("TNB"), Southeast Asia's largest electric utility, NSTAR Gas (Docket 19-120), FortisAlberta, and Enbridge Gas. She assisted LEI Principal, Julia Frayer in her expert testimony for these clients. She has served as the Project Manager assisting Eversource Connecticut Power and Light ("CL&P") as it navigated the first generation PBR process in the State of Connecticut.

Barbara Porto is a Senior Consultant at LEI where she lends her knowledge and skills to the firm's technical engagements with regulators, utilities and private equity firms in the US and abroad on issues regarding project evaluation, tariff design, investment strategic consulting, litigation support, as well as power price forecasting and market analysis. Recent work includes working and presenting on a PBR workshops for a major electric utility on topics such as PBR requirement standards, and on the fundamentals of tariff design and a TFP study for a Canadian power producer. Barbara also has experience working with the Commission, including the ELL FAC audit for 2016 to 2019 (Docket No. X-35523) and the Cleco FAC audit for 2018 and 2019 (Docket No. X-35522).

Hannah Braun is a Consultant at LEI where she participates in the firm's technical engagement with regulators, utilities, and private equity firms on market design, project evaluations, and utility management/ performance and efficiency analysis. Recent relevant projects, include a case study analysis of PBR and performance incentive mechanisms in two New England states in support of the utility's future PBR/PIMs filing to its state regulator. Similarly, for a New England regulator, she has analyzed best practices in the development of PBRs and alternative rate structures that incentivize improved utility performance.

Jingyun ("Angela") Huang is a Research Associate at LEI. Jingyun's experience and subject matter focus includes utility rate cases, power market design, tariff design, renewable energy project evaluation, power market modeling, and market analysis.

Full CVs of the key team members are available in Section 6.

2 Qualifications and experience

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

2.1 Understanding of the engagement

LPSC is seeking an outside consultant to assist in the review and analysis of 1803 Electric Cooperative’s 3-year FRP Annual Reports beginning with Test Year 2023. As outlined below, LEI is very familiar with ratemaking standards and practices including FRP. LEI is also familiar with relevant LPSC Orders, in particular Order No. U-36268 for the approval of 1803’s Wholesale Formula Rate, as described below.

2.1.1 Overview of the 1803 Electric Cooperative

1803 Electric Cooperative, Inc. (“1803 Cooperative”) was incorporated on April 1, 2019, as a Louisiana electric cooperative organized pursuant to La. R.S. 12:401 et seq. It serves as an electric power supply cooperative to purchase and supply electric power to five Louisiana electric distribution cooperatives, including Beauregard Electric Cooperative, Inc. (“Beauregard”), Claiborne Electric Cooperative, Inc. (“Claiborne”), Northeast Louisiana Power Cooperative, Inc. (“NELPCO”), South Louisiana Electric Cooperative Association (“SLECA”) and Washington-St. Tammany Electric Cooperative, Inc. (“WST”) (see Figure 3).¹

Figure 3. Member cooperatives



Source: 1803 Cooperative <<https://www.1803electric.coop/our-members>>

¹ 1803 Cooperative. “Home.” <<https://www.1803electric.coop/>>

1803 Cooperative serves around 140,000 Louisiana customers, mostly rural. 1803 Cooperative does not provide retail electric service, it only provides wholesale power and related services to its Member Cooperatives, which include: serving as a market participant in MISO, providing ancillary services, handling MISO market charges, energy management, MISO settlement, and related services.

2.1.2 Recent LPSC dockets regarding 1803 Cooperative

2.1.2.1 LPSC Order No. S-35709

LPSC Order No. S-35709, decided on June 16, 2021, authorizes 1803 Cooperative to operate as a regulated public utility within Louisiana, subject to the LPSC's regulations and jurisdiction by being subject to the LPSC's rules, regulations, and orders.

This Order was in response to a filing on September 1, 2020, by 1803 Cooperative seeking recognition as a regulated public utility. Notice of the application was published in the Commission's Official Bulletin, dated September 4, 2020, and no requests for intervention were filed.

1803 Cooperative's application stated that the primary goal of the Company is to "assist the Member Cooperatives by combining load, efforts, and resources to achieve economies of scale, efficiencies, and savings through sharing of costs, efforts and resources."²

2.1.2.2 LPSC Order No. U-35927

In the Business and Executive Session held on January 25, 2022, LPSC approved Order U-35927 regarding a portfolio of six Power Purchasing agreements ("PPAs") selected as the result of 1803 Cooperative's 2019 Long-Term Request for Proposals ("RFP") process to replace the Louisiana Generating, LLC PPAs ("La Gen PPAs"), along with the associated cost recovery.³ The following contracts make up the 1803 Cooperative portfolio with five providers:

- 1) 20-year PPA for 409 MW of Combined Cycle Gas Turbine ("CCGT") capacity (Capacity Sale and Tolling Agreement) with Magnolia Power LLC;
- 2) 20-year PPA for 98.1 MW AC solar photovoltaic aggregate nameplate capacity with Bayou Galion Solar Project, LLC;
- 3) 20-year PPA for 150 MW AC solar photovoltaic aggregate nameplate capacity with Bayou Chicot Solar, LLC;

² LPSC Order No. U-35709.

³ LPSC Docket No. X-35283, "1803 Electric Cooperative, Inc. ("1803"), ex parte. In re: Notice of Intent to Conduct 2019 Request for Proposals for Long-Term Power Purchase Contracts and/or Generating Capacity Pursuant to the LPSC's Market Based Mechanism General Order."

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- 4) 20-year PPA for 95 MW AC solar photovoltaic aggregate nameplate capacity, with Bayou Teche Solar, LLC;
- 5) five-year PPA for the purchase of firm electric energy, capacity and ancillary services for 27% of the 1803 Cooperative's real-time total load with Exelon Generation Company, LLC; and
- 6) five-year PPA for 185 MW energy (EEI Master Purchase and Sale Agreement) with Calpine Energy Services, L.P.

The portfolio serves the 1803 Cooperative's power supply needs upon the expiration of the La Gen PPAs. The La Gen PPA with NELPCO will expire on December 31, 2024; the La Gen PPAs with BECi and SLECA will expire on March 27, 2025; and the La Gen PPAs with Claiborne and WST will expire on March 31, 2025.

2.1.2.3 LPSC Order No. U-36268

The Commission's Order, dated July 27, 2022 (Docket No. U-36268), accepted the stipulated settlement among the 1803 Cooperative and the Commission Staff regarding:⁴

- Wholesale Rate Tariff set to go into effect on August 1, 2022; and
- FRP that will be effective for the test years ending 2023, 2024 and 2025 and the annual redetermination procedures that will occur as part of the annual reviews in the years 2024, 2025 and 2026.

The approved Wholesale Rate Tariff ("WRT") allows for cost recovery through monthly rates reflected in various components, including: Power Cost Adjustment Clause ("PCA"), Fuel Cost Adjustment Clause ("FCA"), and FRP Rider Schedule.⁵ The WRT also includes provision for the recovery of Capital Contribution Charges in a pre-determined monthly amount through December 2024.

The FRP Rider Schedule ("Rider FRP") defines the procedure by which the rates may be periodically adjusted. On or before January 31 of each year, 1803 Cooperative shall file a report (referred to as the "FRP Annual Report") with the Commission containing a calculation of the Cooperative's revenue requirement based on the 12 months ending December 31 of the previous year. Staff has until April 15th of the filing year to review the FRP Annual Report to ensure that it complies with the Order requirements. The 1803 Cooperative then have 15 days to review any proposed corrections and/or adjustments, to work with the Staff to resolve any differences, and to file a revised FRP rate change. After the 15-day period, unsolved disputed issues may be submitted to the Commission for resolution.

⁴ LPSC Order No. U-36268.

⁵ LPSC Order No. U-36268 Attachment.

Provisions of the annual redetermination of rate adjustments should include:

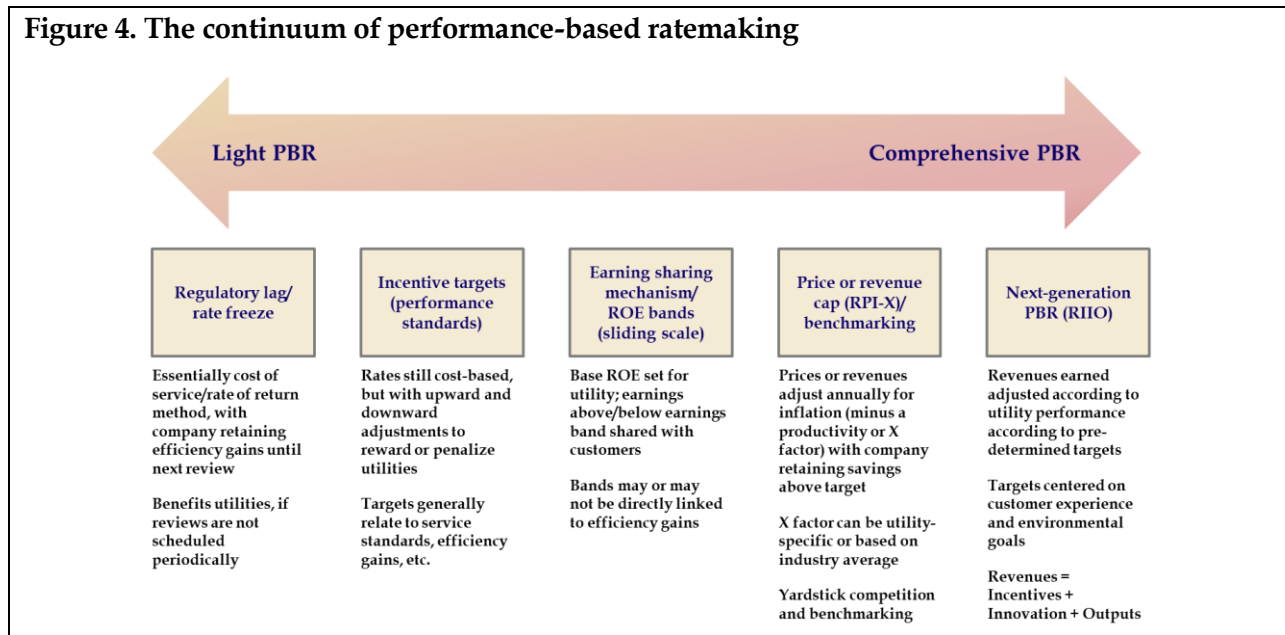
1. **Calculated margin as a percentage of revenue (“MPR”)**: For each test year based on the actual results recorded in the 12-month period ending December 31 of the calendar year immediately preceding the filing of an FRP Annual Report
2. **Bandwidth for debt service coverage ratio**: Lower band equal to 0.25 and upper band equal to 0.35.
3. **Rider FRP revenue level**:
 - a. No rider FRP change if MPR change is within the bandwidth range
 - b. Ride FRP increase if MPR change is less than the Lower Band (100% of the difference between the MPR and the Lower Band)
 - c. Ride FRP refund if MPR change is more than the Upper Band (100% of the difference between the MPR and the Upper Band)
4. **Rider FRP Revenue allocation for increase**: developed by dividing the Total Rider FRP Revenue by the total applicable base revenue
5. **Rider FRP Rate change by tariff**: adjusted by equal percentage of the base rate revenue of all bills.

The Order requires each of the 1803 Member Cooperatives to submit a full rate review within three calendar years of an order in this proceeding. Further, the Settlement provides for biennial fuel audits once 1803 Cooperative begins supplying power to the 1803 Member Cooperatives.

2.1.3 Familiarity with ratemaking and traditional cost-of-service

FRP is a form of alternative ratemaking, aka performance-based ratemaking (“PBR”). PBR is not a single approach, rather, the term reflects a continuum from light, simple mechanisms to comprehensive mechanisms (see Figure 4).

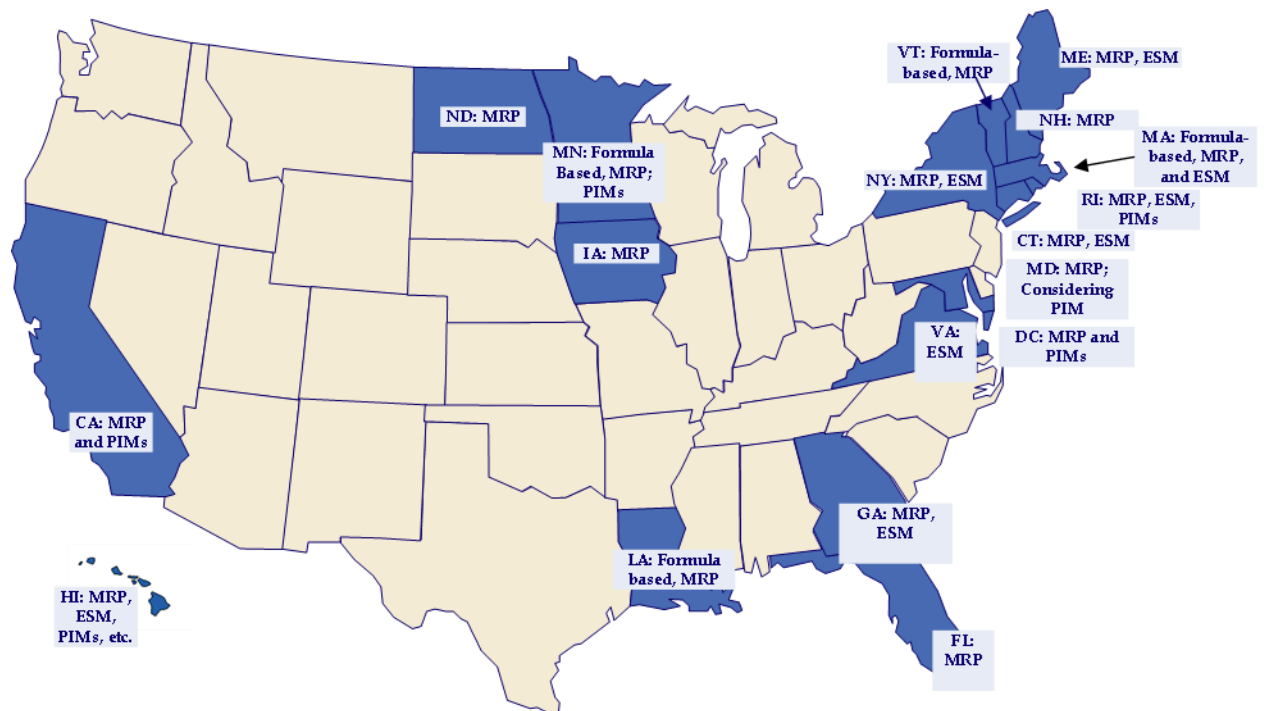
Figure 4. The continuum of performance-based ratemaking



The goal of a PBR regime is to mimic competition by incentivizing productivity gains. It therefore can decouple utility profitability from sales growth; and it changes the regulatory focus from line-item scrutiny to reaching financial and other goals. PBR designs are focused on making the utility more cost-effective, i.e., increasing productivity (total factor productivity); however, it must be used in conjunction with performance metrics and incentives, otherwise the built-in incentives to under-invest and cut costs will lead to poor non-financial performance.

Across the United States, regulators (including in Louisiana) have implemented a variety of forms of PBR, including FRP (see Figure 5).

Figure 5. Forms of PBR across the United States



Source: Public utilities commissions and utility websites, S&P Global Market Intelligence

2.2 Selected experience

In this section, LEI hand-picked a sample of projects highlighting the project team’s experience relevant to the present engagement. LEI has performed a broad range of regulatory services for various utilities around the world, including providing regulatory support pertaining to rate cases, total-factor productivity (“TFP”) studies, and benchmarking over the last two decades. Below are some of our relevant qualifications.

This section provides projects relevant to the proposed engagement and attest to LEI’s experience and ability to meet the minimum requirements listed in the 23-11 RFP. The projects listed here are indicative of LEI’s expertise and are not an exhaustive record of experience.

2.2.1 Ratemaking plan and rate case strategy

- ***Advisor on the first generation PBR development process in Connecticut:*** LEI was retained to support Eversource Energy d/b/a Connecticut Light & Power, an electric distribution company in New England, in navigating Connecticut's PBR proceeding. This specifically entails evaluating the PBR design components proposed by the regulator and public stakeholders engaged in the process, assessing gaps in proposed regulatory design, and determining what PBR elements are suitable (or unsuitable) in the context of the state's regulatory and market structures. As part of its scope of work, LEI assisted the client in choosing and designing performance incentive mechanisms ("PIMs") included in the company's rate filing. As part of this engagement, LEI performed in-depth research of PBR/PIMs across select jurisdictions, provided advisory support in the PBR/PIMs development process, drafted various proposals or other reports for public filing, and defended its analysis in both written work and oral stakeholder meetings.
- ***Formula-based regulation ("FBR") transmission tariff re-opener filing support for an Alberta network service provider:*** LEI prepared a paper to support to the ENMAX Power Corporation's transmission FBR reopener application. In particular, the client wanted LEI to support their argument (i) to amend the G factor calculation to eliminate the G-factor lag effective January 1, 2011, and (ii) to reduce EPC's current X-factor of 1.2% to 0.0%. LEI provided support throughout the litigation proceeding by responding to information requests which involved additional research and analysis, including synthesis of publications on recent technological advances in electricity transmission sector, and updating the Ontario LDC's TFP model.
- ***Review of utility performance incentives:*** LEI assisted the Maine Public Utility Commission ("MPUC") in its investigation of Central Maine Power Company management issues and related ratemaking and performance incentive mechanisms. Ultimately, the Commission's goal was to determine whether the rate plan proposed by CMP would be more suitable than the cost-of-service rate plan under which CMP operated, given Avangrid/Iberdrola's incentives to invest in CMP. LEI performed a literature review of utility investment incentives and of multi-national entities' incentives to invest in subsidiaries. LEI also developed detailed case studies of performance-based ratemaking elements in place in other North American and international jurisdictions, and the role and effectiveness of performance incentives in the regimes. [Docket No. 2022-00038]
- ***Preparation of expert testimony related to performance-based ratemaking ("PBR"):*** LEI was engaged to provide expert evidence and assist in the Alberta Utilities Commission ("AUC") proceeding to establish parameters for the third PBR term in the province. LEI provided recommendations related to the timing of PBR rate adjustments, merits of the price cap versus revenue-per-customer cap approaches, I factor, X factor, capital funding provisions, earnings sharing mechanisms, and quantifying and tracking efficiencies. LEI based its recommendations on industry best practices as well as analysis of Alberta-specific data.
- ***Support to gas utility in PBR plan development:*** LEI was hired to be the advisor of a gas utility in Massachusetts during their performance-based distribution ratemaking plan. LEI

performed a TFP study and a benchmarking study to support NSTAR Gas' PBR plan. In addition, Ms. Julia Frayer and Dr. Marie Fagan provided expert testimony on PBR and benchmarking, respectively.

- ***Testimony on PBR:*** LEI provided a supporting testimony for FortisAlberta Inc., a Canadian electricity utility, in its filing for a PBR plan. The testimony provided detailed data analysis (including inflation and TFP trends), underpinning PBR economic theory, and reviews of best practices in various North American and international jurisdictions. The testimony provided back up elements for each of the various components of the PBR plan that was being proposed by the client. [Alberta Utilities Commission, Proceeding: 566]
- ***Applicability of PBR to Ontario Power Generation ("OPG"):*** LEI was engaged by OPG to support senior management through regulatory processes related to performance-based rates. LEI prepared a discussion paper on incentive regulation mechanisms ("IRM") in place in Ontario for electricity and natural gas distribution utilities and presented it at a technical workshop at the OEB. LEI also provided expert testimony regarding the cost of capital and risk factors associated with OPG's prescribed assets, as well as creating a risk-return continuum on which power sector assets could be placed.
- ***Enbridge Gas Distribution Inc*** LEI performed a review and analysis of ratemaking approaches applied to the client's capital expenditure profile including a demonstration of the potential negative impact of "I-X" ratemaking approaches on a utility's ability to earn a fair return. The objective of this engagement was to demonstrate to stakeholders and the Ontario Energy Board the reasonableness of the revenue cap per customer model that the client had previously relied upon and planned to propose in its next ratemaking review. A secondary objective was to conceptualize the insufficiency of the "I-X" regime, even with a revenue cap per customer model, in consideration of the fair return standard and given the an environment where substantial capital expenditure needs were projected over the next Incentive Regulation Plan ("IRP") period. Docket Number EB 2012-0459
- ***Incentive ratemaking ("IR") case study:*** For the Nova Scotia Department of Energy, LEI prepared a comprehensive literature review report covering four key areas: (i) Global experience related to the electricity sector restructuring and liberalization, (ii) PBR – including discussion of various structures of PBR implemented globally and associated challenges, (iii) Performance and Accountability discussing performance monitoring and performance standard measures used in the generation, transmission, and distribution sectors, and (iv) Customer and Service Provider Risks discussing various risks and how these may be impacted or mitigated through the energy market and regulatory structures.
- ***Advising on IBR filing and review of the Malaysian electricity regulatory framework:*** LEI was engaged by TNB, the largest electric utility in Malaysia to work as the project manager of its Incentive-Based Regulation ("IBR") submission for the 2nd regulatory term. LEI's role in this project includes two phases. In phase 1, LEI's role includes advising on the policy and governance framework for the implementation of IBR, providing strategic advice to IBR Council and TNB management regarding the IBR submission, managing and monitoring the submission process, coordinating with business entities and attending IBR Council meetings,

progress meetings, and challenge workshops. LEI reviewed the current Regulatory Implementation Guidelines (“RIGs”) set by the Energy Commission and proposed enhancements to the RIGs. LEI negotiated with the Energy Commission regarding proposed changes to the RIGs. LEI was also responsible for reviewing and providing enhancement to the Revenue Requirement Model (“RRM”) which sets the IBR tariff for each business entity. LEI co-drafted the IBR submission report with TNB and reviewed the final IBR report before the submission. Finally, LEI assisted TNB in the negotiation of the IBR framework and tariff with Energy Commission.

- ***Prepared a white paper for Canadian electricity regulators and utilities on the comparative advantages and drawbacks of various tariff-setting regimes, from performance-based regimes to cost-of-service.*** This project involved a general overview of tariff-setting practices across Canadian provinces as well as highly detailed Canadian and international case studies and an examination of the key lessons to be learned from each case. Detailed case studies covered the tariff-setting regimes in place in the UK, the Australian National Electricity Market, and the Netherlands. As part of its deliverables, two workshops were conducted with a variety of regulators and utilities.
- ***Provided support on best practices pertaining to multi-year rate plan structures:*** For the Maine Public Utilities Commission (“MPUC”), LEI prepared a technical report covering best practices in multi-year rate plan development. LEI reviewed rate case filings submitted by one of the state’s electric distribution utilities and discussed the MPUC’s desired outcomes for this rate case. Using this information, LEI drafted its report covering various elements of multi-year rate plans and PBR design that are used across jurisdictions in both the US and internationally, as well as the advantages and disadvantages of their adoption in the regulatory framework. This technical information was supplemented with case studies. Hannah provided support in the form of meeting with the client regulatory, reviewing the utility’s filings, conducting research, and drafting and editing the report.
- ***Malaysia PBR workshops:*** LEI was retained by TNB to conduct a workshop on PBR. The topics for the workshop include theoretical conceptual overview of PBR regulatory framework, key elements of comprehensive PBR regimes, best practices of PBR in various jurisdictions, timing and framework in other jurisdictions, how to convince regulators and stakeholders, identifying barriers to successful implementation of the PBR, and moving from first to second generation PBR, to name a few.
- ***Case study on capital expenditure recovery mechanisms:*** For a Canadian client, Cherrylin led the team in drafting a report that investigated the different capital expenditure recovery mechanisms utilized in four markets namely Australia, New Zealand, Ontario, and the UK for electric network utilities. The report also provided different options that the client can propose for its performance-based ratemaking filing.
- ***Advised on Hong Kong electricity regulatory regime:*** LEI was retained by the Hong Kong Special Administrative Region government to assess certain aspects of the Hong Kong regulatory regime for electricity, such as cost of capital, rate base calculations, efficiency

incentives, and fuel cost pass through mechanisms, in order to help prepare the Government for negotiations with the utilities to change the regime after contracts' expiration.

- ***Reviewed Manitoba cost of service methodology:*** LEI was retained by a law firm to provide independent evidence to assist the Manitoba Public Utilities Board in understanding the views and positions of the general service small and general service medium (“GSS/GSM”) customers in Manitoba Hydro’s 2017/18 & 2018/19 general rate application (“GRA”) proceeding. Later, the scope of LEI’s role was expanded to include key issues for the Keystone Agricultural Producers. LEI’s analysis included the impact of the proposed rate increases of GSS, GSM and agricultural ratepayers, Manitoba Hydro’s capital plan, and a review of the utility’s operating efficiencies and service quality.

2.2.2 Expert witness experience

- ***Provided expert witness services to Eversource Energy (NSTAR Gas) in its 2019 application to move to PBR:*** LEI’s testimony provided expert technical analysis for NSTAR Gas performance-based ratemaking plan. More specifically, LEI presented a total factor productivity study as the basis for the X factor that NSTAR Gas used for its “I-X” rate escalation mechanism, and the results of a total cost benchmarking study, which estimated the Company’s efficiency level relative to its peers. LEI also responded to the information requests by interveners and advised the client on issues raised by these interveners.
- ***Assisted a PBR filing for a Canadian Utility:*** LEI assisted a large Alberta utility with its third-generation PBR filing, including advising on incentives, effectiveness of inflation factors, potential for special capital expenditure provisions responsive to government electrification policies, productivity factors, length of regulatory period, and other matters associated with PBR.
- ***Supported testimony for a Canadian electric utility in its filing for a PBR plan:*** LEI’s testimony provided detailed data analysis (including inflation and TFP trends), underpinning PBR economic theory, and reviews of best practices in various North American and International jurisdictions. The testimony offered backup elements for each of the various components of the PBR plan proposed by FortisAlberta, Inc. LEI also responded to the information requests by interveners and advised the client on issues raised by these interveners.
- ***Provided expert testimony in support of a Canadian power utility's filing for a formula-based tariff-setting scheme:*** LEI developed a formula for ENMAX for periodic adjustments to an average tariff metric based on an inflation factor, efficiency factor, the impact of capital investments, operational performance relative to defined metrics. The work defined mechanisms for additional adjustments based on force majeure and financial performance outside a defined range. LEI also provided strategic advice to the CEO and other senior managers on presenting the firm’s proposal to the regulator and other stakeholders and provided expert testimony in support of the firm's filing to its regulator.

- **Testimony in support of transmission operating rules and curtailment protocols:** LEI Managing Director Julia Frayer provided testimony in support of transmission operating rules and curtailment protocols for interties into Alberta, as proposed by the Alberta Electricity System Operator, to support a fair, efficient and openly competitive power market. The testimony was made in front of the AUC, on behalf of Morgan Stanley Capital Group (“MSCG”), a customer of the Montana-Alberta Transmission Line. Julia’s analysis considered commercial as well as operating protocols in deregulated power markets and considers how market rules incentivize new entry and produce dynamic efficiency gains related to more intense competition. The AUC issued a favorable decision to MSCG in early 2013.
- **White paper and market analysis on proposed market power tests in Alberta:** In response to government-proposed policies on what defined a “fair, efficient, and openly competitive” market, LEI prepared for the Alberta provincial government a detailed white paper and market analysis on the proposed market power tests to be added to regulation, and specifically demonstrating the adverse effects of the 20% hard cap market share limit proposed by the province's Department of Energy (“DOE”). The white paper was filed as testimony with the DOE in their consultation on Section 6 of the Electric Utilities Act.
- **Testimony on using building blocks approach in IR frameworks:** LEI was engaged by Enbridge Gas Distribution to provide an analysis of building block incentive ratemaking approaches used in Australia and the UK, and how they would apply to Enbridge’s circumstances in Ontario. LEI’s report supported Enbridge’s distribution tariff proposal submission to the Ontario Energy Board for a second-generation Customized IR plan for five years (2014-2018). The testimony set out the theory behind as well as the practical experience of using the building blocks approach in incentive regulation regimes. (*Julia Frayer, Ma. Cherrylin Trinidad*)
- **Cost of capital for regulated generating assets:** LEI provided expert testimony on behalf of the Ontario Energy Board regarding the cost of capital and risk factors associated with OPG’s prescribed assets, as well as creating a risk-return continuum on which power sector assets could be placed. (*Julia Frayer*)

2.2.3 LPSC and MISO region experience

- **Louisiana PSC Entergy 2016-2019 FAC audit and CLECO 2018 and 2019 FAC audit:** LEI was engaged by the Louisiana Public Service Commission to audit the Fuel Adjustment Clause (“FAC”) for Entergy Louisiana and Cleco Power. The audits involved detailed examination of monthly true-ups of incurred costs with billed costs; the appropriateness of interest rates as applied to over-recovered or under-recovered costs; examination of the impact of deferred costs; reconciliation of expenses recorded in FERC Form 1 account categories (“as booked”) with expenses included in monthly fuel adjustment clause filings; the prudence and reasonableness of costs incurred for oil, gas, coal, and nuclear fuel and transportation, and an assessment of operating performance of utility generating assets.
- **Louisiana PSC Cleco Winter Storm 2021 Audit:** LEI was engaged to audit and review the actions taken and decisions made by Cleco Power which impacted fuel costs incurred during

the February 2021 winter storm. LEI's review and analysis included lessons learned and best practices in order to mitigate such impacts in the future.

- ***Asset evaluation:*** LEI was engaged by an investment firm in association with asset valuation, due diligence support and market analysis. Work involved reviewing documents in a virtual data room, and analysis related to drivers of gross margin for the asset: macroeconomics, weather fluctuations, fuel and electricity cost projections, and overview of gas and electricity market in the MISO region where the asset was located.
- ***Long-term market outlook for MISO:*** LEI was hired by a private utility to perform an independent market analysis for a number of assets located in NYISO, MISO, CAISO, and ERCOT. LEI conducted a 20-year price forecasting horizon and provided forecasts of plants' output, load factor, and realized prices.
- ***Congestion analysis for parts of MISO:*** LEI was retained by a private client to analyze the congestion within the Chicago area and MISO zones surrounding Lake Michigan.
- ***Due diligence analysis:*** LEI was engaged by a private client to provide analytical support on their due diligence process. The supporting tasks entailed: providing an updated outlook on energy prices and intelligence on recent developments in PJM and MISO; conducting REC price forecasts; and reviewing requirements and risk exposure for hydropower facilities in capacity markets.
- ***Revenue opportunity for gas-fired cogeneration units in MISO:*** The purpose of the assignment was to inform the client of potential revenue risks associated with the plants upon termination of their 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 East MISO to third parties in PJM.
- ***Costs/benefits analysis of Entergy joining MISO or SPP:*** LEI was hired by the Public Utility Commission of Texas ("PUCT") to provide a cost benefit analysis pertaining to an announced 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 versus SPP.
- ***Review of ETI's impact analysis of termination of PPA on consumers:*** LEI was hired by the PUCT to conduct a due diligence review of the analyses performed by ETI on the impact of termination of certain PPAs while a member of MISO. LEI's scope of work included a review of ETI's inputs and 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 located in the Midwest region of the US to determine their potential value upon expiration of an ongoing PPA. The plants' revenues

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were calculated based on the 25-year forecasts of electricity prices in their respective zones. Given the long-term horizon of the modeling exercise, we also simulated an organized capacity market based on the Resource Adequacy requirements of MISO to estimate potential capacity revenues for the plants.

3 Proposed plan of action

The scope of work encompasses the review of each of the three upcoming Test Years to be filed, beginning with the 2023 Test Year, as well as assistance with a limited review of 1803 Cooperative's filing docketed as Docket No. U-36660. LEI's scope of representation for each Test Year, as outlined in RFP 23-11, will include:

- Review the annual report filing and accompanying workpapers;
- Assist Commission Staff in drafting and responding to discovery;
- Participate in formal status conferences, pre-trial conferences, depositions, and hearings;
- Prepare for filing recommendations and direct testimony on each year's annual review and cross-answering testimony, if necessary, together with exhibits supporting the same;
- Assist in the review and analysis of stipulation terms;
- Testify before an administrative law judge, whether in a contested or stipulated hearing, and;
- Assist in the preparation of briefing materials for Staff and the Commissioners.

Based on LEI's previous experience working on ratemaking cases and the RFP's scope of representation, LEI proposes for each Test Year a two-phase structure to this engagement, with a number of tasks for each phase. LEI's plan of action is discussed in detail below. Collectively, the tasks address all the items enumerated in the RFP's scope of work. Figure 6 below shows the list of the deliverables that, in LEI's view, are aligned with the RFP. This plan can be viewed as a starting point, as LEI understands that the LPSC and its Staff will have the right to determine how the tasks will be carried out.

Throughout the course of this engagement, LEI senior team members will confer with LPSC Staff in the form of periodic calls and e-mails and will be available to attend meetings in Baton Rouge as needed and/or permitted. LEI senior staff will be available to participate in or lead technical conferences and conduct informal meetings with parties as needed and/or permitted.

LEI will work with the Commission Staff to ensure that LEI has access to the necessary resources (contact persons, documents, records, and so on) that will enable the conduct of the scope of work. If appropriate, LEI will utilize LPSC's data request procedures for issuing information requests and recoding responses, which will assist in gathering information and organizing materials.

Figure 6. Key tasks under this engagement (proposed)

Phase 1: Review and examine FRP filing and the related supporting documentation
Sub-tasks/activity
Systematically review the Company's FRP filing
Define data needs, issue DRs, conduct meetings, conference calls
Assist in the preparation of the Staff's Report and Recommendation
Phase 2: Provide testifying expert
Sub-tasks/activity
Discovery response assistance
Attend meetings/hearings and testify where applicable
Assist in the review and analysis of stipulation terms
Assist in preparation of applicable motions
Assist in the preparation of briefing materials for Staff and the Commissioners

3.1 Phase 1: Review the Company's FRP filings and related supporting documentation

LEI will thoroughly review the FRP filing and supporting documentation, draft data requests, and review responses thereto to assess whether the proposed expenses and rate base are reasonable.

LEI will then (i) discuss its findings with the Commission Staff, whether it recommends the approval or disallowance of the proposed expenses and rate base, and (ii) support the Commission Staff in the preparation of the Staff's Report and Recommendation.

3.2 Phase 2: Provide testifying expert

Dr. Marie Fagan will serve as the testifying expert for this engagement. LEI will assist the Commission Staff in responding to discovery on the Staff's Report and Recommendation, as well as participate in related meetings and conferences. LEI expects to present expert testimony during a hearing(s) involving the FRP filing docket and assist in preparation of applicable motions and other pleadings in support of Staff's Report and Recommendation.

The testifying expert will also be available appear before the Commission at the Commission's Business and Executive Sessions where this matter will be discussed.

3.3 Deliverables and schedule

The team expects that the engagement will start with a **kick-off meeting** that will be held over the phone, with the Commission Staff. During this meeting, the team expects that the engagement's timetable, milestones, overall expectations and format and timing of deliverables will be discussed and finalized. Given the timeline the RFP outlines, LEI understands that the selection of consultants is anticipated to take place at an upcoming April 2023 "Business and Executive Session." As such, LEI proposes the kick-off meeting be held around May 1, 2023.

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LEI understands that the timeline for scope of representation for this engagement is approximately 4 months per annual review. However, if the Commission Staff wishes LEI to complete the work in a shorter time scale, LEI can do so.

Assuming for the present the 4-month scope of representation for the 2023 Test Year, and given a start date of May 1, 2023, LEI proposes submitting LEI’s recommendations on the FRP Report around **June 9, 2023**. Testimony support deliverables and target dates will be defined with the Commission Staff. For the upcoming annual reviews, LEI will agree on a timeline with the Commission Staff.

During the 4-month engagement for each annual review, LEI will also provide **weekly** updates to the Commission staff. As noted previously, LEI will summarize progress made on tasks and preliminary findings. LEI expects constant engagement with the Commission staff in all stages of the project.

For the 2023 Test Year, LEI commits to having the appropriate experts available throughout the project from May 2023 through August 2023. LEI’s team will have a Project Manager for this engagement, Ma. Cherrylin Trinidad, who will liaise with the Commission Staff throughout the project.

Figure 7. Indicative work schedule and timing of deliverables, for 2023 Test Year, assuming May 1, 2023 start date

Tasks and Deliverables	Month 1				Month 2				Month 3				Month 4			
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
<i>Kickoff call</i>	█															
Phase 1: Review and examine FRP filing and the related supporting documentation																
Sub-tasks/activity																
Systematically review the Company's FRP filing																
<i>Define data needs, issue DRs, conduct meetings, conference calls</i>			█			█										
Assist in the preparation of the Staff's Report and Recommendation								█								
Phase 2: Provide testifying expert																
Sub-tasks/activity																
Discovery response assistance																
<i>Attend meetings/hearings and testify where applicable</i>									█							
Assist in the review and analysis of stipulation terms														█		
Assist in preparation of applicable motions																
Assist in the preparation of briefing materials for Staff and the Commissioners																

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 Phase 1. For the 2023 Test Year, LEI will start reviewing the 2022 FRP Annual Report and associated documents filed under Docket No. U-36660. In subsequent years, LEI will start reviewing the FRP Annual Reports as soon as they are filed.

4.1 Timeline

As indicated in the RFP, the time period allowed for the matter is 4 months for each Test Year. LEI expects that the schedule and the deadlines will be finalized during the kick-off meeting, or shortly before or after, as noted in Section 3.3. LEI commits to having the key staff members noted in Section 1.2 available for the entire period of the project.

4.2 Professional fee budget

LEI offers a total professional fee budget not to exceed **\$37,145** per annual review (see Figure 8), based on the scope discussed in Section 3. Any additional tasks not discussed in this scope would need an update of the professional fee budget.

Figure 8. Professional fee budget (indicative)

Task	Total LEI staff hours	Professional fee budget
Kickoff meeting	5	\$ 1,585
Phase 1: Review and examine FRP filing and the related supporting documentation	84	\$ 21,760
Phase 2: Provide testifying expert	60	\$ 13,800
Total	149	\$ 37,145

For Phase 2, LEI Chief Economist Marie Fagan, would provide all the expert testimony support regarding this engagement. This would be billed at an hourly rate of \$350/hour. LEI is offering this at a substantial discount to LEI's current rates, as well as its discounted rates (see Figure 9). LEI will bill only for the actual costs associated with providing testimony support and serving as an expert witness before the Commission during the applicable hearing.

Figure 9. LEI hourly rates

Title	Standard hourly rate	Discounted hourly rate
President	\$750	\$480
Managing Director	\$740	\$475
Director / Chief Economist	\$575	\$370
Managing Consultant	\$525	\$335
Senior Consultant	\$450	\$290
Consultant	\$325	\$210
Research Associate	\$210	\$135
Admin	\$100	\$65

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. If travel is required, LEI will comply with all-expense caps as outlined in the State of Louisiana Division of Administration Travel Policies and Procedures Memorandum. Accordingly, the indicative travel expense budget is **\$2,104**.

Figure 10. Indicative travel costs (indicative)

Travel	# trips	# people	# nights	Total cost
Meetings with Commission and/or Staff	1	2	1	\$1,052
Meetings with parties	1	2	1	\$1,052
Total estimated costs				\$2,104

Indicative

4.4 Total budget

The total indicative budget, including professional fees, travel, and other expenses, therefore, amounts to **\$39,849** per annual review, and **\$119,547** for the 3 years.

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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A.1 Marie N. Fagan, PhD

Chief Economist, London Economics International LLC



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. Marie is experienced in the use of scenario analysis, an approach which helps clients identify potential turning points and arrive at decisions that are robust given the uncertainties inherent in any future set of market conditions.

At LEI, Marie leads LEI's utility management performance audit engagements and has been involved in performance-based ratemaking cases. She has experience as a project manager for complex, multi-year engagements, including a two-year project for the Maine Public Utilities Commission, and a two-year audit project for the Mississippi Public Service Commission. She has deep experience in econometric analysis.

Projects have included serving as independent expert witness for the Maine Public Utilities Commission, in the evaluation of the costs and benefits of new natural gas pipelines into New England, and independent expert witness for the Minnesota Department of Commerce in the matter of the CN application of Enbridge Energy for the Enbridge Line 3 oil pipeline 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 Energy Economics, and the Boston Economic Club. She is former Vice President of Business for the US Association for Energy Economics ("USAEE") and is a former member of the USAEE

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Strategic Planning Committee. 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:	London Economics International LLC ("LEI")
Position:	Chief Economist (2020-present) Managing Consultant and Lead Economist (2016-2019) Managing Consultant (2014-2015)

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

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Position:	<p>Senior director, Upstream Strategy Advisory service (2012-2014).</p> <ul style="list-style-type: none"> 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 <p>Senior director, North American Gas, Power, and Renewables group (2007-2011).</p> <ul style="list-style-type: none"> 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 <p>Director/Senior director, CERAVIEW Institutional Investor Service (2004-2007)</p> <ul style="list-style-type: none"> 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 <p>Director, North American Gas Advisory service (2003-2004)</p> <ul style="list-style-type: none"> 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.
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Date:	2001-2002
Location:	Boston, MA
Company:	International Human Resources Development Corporation ("IHRDC")
Position:	<p>Director, International Gas Program</p> <ul style="list-style-type: none"> 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.

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

Date:	1994-1996
Location:	Washington, DC
Company:	US Department of Energy, Energy Information Administration
Position:	<p>Economist</p> <ul style="list-style-type: none"> • 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.

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"> • 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 Building Energy Demand Model; conducted financial analysis of energy companies.

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"> • Researched waste-to-energy potential in the United States; constructed a database, developed econometric models, analyzed results, and produced written reports.

PROJECT EXPERIENCE:

<i>Date:</i>	October 2022 - present
<i>Location:</i>	North Dakota
<i>Organization:</i>	North Dakota Public Service Commission
<i>Description:</i>	Montana-Dakota Utilities (“MDU”) rate case LEI was engaged by the North Dakota Public Service Commission as the outside independent technical consultant supporting the Commission's ratepayer advocacy staff in a rate case involving MDU. LEI examined key components of the rate case, which included the depreciation study, tax rates, environmental upgrades, transmission investment, the ROE/common equity ratio, the impact of amortization of early retirement of coal plants. LEI prepared data requests and provided written reports and oral testimony. Marie served as project manager and expert witness. [Case No. PU-22-194].

<i>Date:</i>	July 2022 - December 2022
<i>Location:</i>	Maine
<i>Organization:</i>	Maine Public Utilities Commission
<i>Description:</i>	Investment incentives for electric distribution utility Marie served as independent expert for the Maine PUC in its investigation of Central Maine Power Company (“CMP”) management issues and related ratemaking and performance incentive mechanisms. Ultimately, the Commission’s goal was to determine whether the rate plan to be proposed by CMP in a concurrent docket would be more suitable than the current cost-of-service rate plan under which CMP operates, given the parent company’s incentives to invest in CMP. Marie led the project, which included a literature review of utility investment incentives and of multi-national entities' ("MNE") incentives to invest in subsidiaries. The project also included detailed case studies of performance-based ratemaking regimes in other US jurisdictions, and the role and effectiveness of performance incentives in the regimes. [Docket No. 2022-00038, and Docket No. 2022-00152].

<i>Date:</i>	May 2022 - October 2022
<i>Location:</i>	ERCOT
<i>Organization:</i>	Private client (law firm)
<i>Description:</i>	Analysis of fair market prices for natural gas LEI provided economic analysis and independent expert advice related to natural gas market activities in Texas during and around February 2021 in conjunction with Brazos Electric Power Cooperative, Inc. bankruptcy case in Texas. LEI provided an expert testimony report [Cause No. 21-03863]. Marie served as the project manager, natural gas expert, and a key witness.

<i>Date:</i>	April 2022
<i>Location:</i>	ERCOT/PJM/SPP
<i>Organization:</i>	Confidential client
<i>Description:</i>	Regulatory and commercialization pathways for a renewable developer platform

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	LEI was engaged by a multinational energy company to support its due diligence of an acquisition of a 3000 MW+ portfolio of solar and wind development assets across PJM, ERCOT, and SPP. LEI performed a review of the state regulations and RTO markets for each asset, to evaluate the opportunities and risks around the commercialization paths for each asset. Marie led the analysis related to the ERCOT and SPP regions.
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<i>Date:</i>	February 2022 - present
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	Review of integrated resource planning (“IRP”) process for three Louisiana utilities LEI was engaged by Louisiana Public Service Commission, Docket No. I-36175 (Cleco Power), Docket No. I-36181 (Entergy Louisiana), and Docket No. I-36242 (SWEPCO), to assist to serve as the outside technical independent consultant in the process related to the IRP process for the three utilities. LEI reviewed and examined filings and pre-filed testimony; drafted, reviewed, and responded to discovery, and prepared direct and cross-answering testimony. LEI appeared at technical conferences and hearings and assisted with trial preparations. Marie directed the three engagements and served as independent expert witness.

<i>Date:</i>	March 2022
<i>Location:</i>	Texas/ERCOT
<i>Organization:</i>	UT Austin Bureau of Economic Geology
<i>Description:</i>	Expert contributor to study of gas distribution industry for Texas Railroad Commission Following Storm Uri of February 2021, the Texas Railroad Commission was asked by the State of Texas to deliver an investigation of the value of underground storage for local gas distribution companies (“LDCs”), especially for coping with extreme weather conditions. The Bureau of Economic Geology at the University of Texas at Austin led the project. Marie provided insight into essential elements of the LDC gas supply procurement process, as well as best practices for winter supply security.

<i>Date:</i>	March 2022
<i>Location:</i>	Maine
<i>Organization:</i>	New England Aqua Ventus/Pine Tree Offshore Wind
<i>Description:</i>	Economic impact of development of offshore wind in Maine LEI was engaged by New England Aqua Ventus/Pine Tree Offshore Wind to evaluate the potential economic benefits to Maine of two scenarios for offshore wind project construction and operations based on floating offshore structures: NEAV’s 144-MW Research Array, and a commercial-scale buildout of 5,000 MW over a number of years. LEI utilized the IMPLAN economic model to estimate the economic impacts. Marie directed and led the project.

<i>Date:</i>	September 2021 - March 2022
<i>Location:</i>	ERCOT
<i>Organization:</i>	Private client
<i>Description:</i>	February 2021 winter storm impacts on ERCOT natural gas production and prices

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	LEI developed and examined data for natural gas production at the basin level in Texas, flows on intra-state and inter-state pipelines, prices at supply and market hubs, and use of gas by electric power plants and other customers in the state. Marie served as senior advisor to the project team.
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<i>Date:</i>	July 2021 - present
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	Audit of fuel costs of Cleco Power associated with the February 2021 Winter Storm Event LEI was engaged by Louisiana Public Service Commission, Docket No. X-35990, to perform an audit of the Fuel Adjustment Clause ("FAC") filings of Cleco Power related to costs incurred during the February 2021 Winter Storm Event. Marie supervised and directed the audit. In addition to the scope of services typically provided in an FAC audit, LEI also examined actions and decisions of Cleco Power leading up to and during the Winter Storm Event.

<i>Date:</i>	May 2021 - March 2022
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	Evaluation of utility green pricing option LEI was engaged by Louisiana Public Service Commission, Docket No. U-35916, to serve as the technical consultant evaluating Entergy Louisiana LLC's application for authorization to implement a green pricing option, to be paid for by a Green Pricing Option ("GPO") or Large Volume Green Pricing Option ("LVGPO") rider, and related rate relief. LEI reviewed and examined filings and pre-filed testimony, assisted in drafting, reviewing, and responding to discovery, prepared testimony, and conducted other activities related to the matter.

<i>Date:</i>	April 2021 - June 2021
<i>Location:</i>	ERCOT
<i>Organization:</i>	Private client
<i>Description:</i>	February 2021 winter storm impacts on ERCOT energy prices For a law firm representing an ERCOT market participant, LEI conducted an analysis of the impact on hourly real time energy prices in ERCOT for the week of February 14, 2021. Marie served as co-author of report, filed in PUCT Project 51812, Item No. 207. https://interchange.puc.texas.gov/search/documents/?controlNumber=51812&itemNumber=207

<i>Date:</i>	July 2021 - December 2021
<i>Location:</i>	Ohio
<i>Organization:</i>	Public Utilities Commission of Ohio
<i>Description:</i>	Audit of Legacy Generation Resource ("LGR") Riders of Duke Energy, AEP Ohio, and AES Ohio

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	LEI was engaged by the Public Utility Commission of Ohio, to perform audits of the LGR Riders for three major Ohio electric distribution utilities. The LGR Riders are the mechanisms for passing to customers the costs of a power purchase contract with the Ohio Valley Electric Corporation (“OVEC”). Aspects of the audit included assessing the reasonableness and prudence of the disposition of energy and capacity in the PJM market of the energy provide by two coal plants owned by OVEC, 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 companies’ filings. Marie supervised and directed the audits.
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<i>Date:</i>	February 2021 - February 2022
<i>Location:</i>	New Jersey
<i>Organization:</i>	New Jersey Board of Public Utilities
<i>Description:</i>	Natural gas capacity and non-pipeline alternatives LEI was engaged by the New Jersey Board of Public Utilities to examine current and future natural gas transmission capacity to serve demand from New Jersey’s local gas distribution utilities (Docket No. GO19070846). The purpose of the engagement was to determine if capacity on pipelines and from non-pipeline sources would be sufficient to meet demand from firm customers through 2030. LEI examined the capacity and contracting status of pipelines serving New Jersey. LEI examined design day demand projections from the LDCs and estimated impacts of New Jersey’s energy efficiency targets in the context of its Energy Master Plan and de-carbonization goals. LEI also looked at the role of third-party suppliers. LEI provided recommendations for addressing capacity issues. LEI also developed a playbook for identifying possible alternatives, including non-pipeline alternatives and new tariff mechanisms, for avoiding and/or responding to potential disruptions. Marie led the project.

<i>Date:</i>	August 2020 – August 2021
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	Audit of fuel adjustment clause of Entergy Louisiana 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. The audit involved detailed examination of monthly true-ups of incurred costs with billed costs; the appropriate of interest rates as applied to over-recovered or under-recovered costs; examination of the impact of deferred costs; reconciliation of expenses recorded in FERC Form 1 account categories (“as booked”) with expenses included in monthly fuel adjustment clause filings; the prudence and reasonableness of costs incurred for oil, gas, coal, and nuclear fuel and transportation, and an assessment operating performance of utility generating assets.

<i>Date:</i>	July 2020 - present
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	Audit of fuel adjustment clause of Cleco Power

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	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. The audit involved detailed examination of monthly true-ups of incurred costs with billed costs; the appropriateness of interest rates as applied to over-recovered or under-recovered costs; examination of the impact of deferred costs; reconciliation of expenses recorded in FERC Form 1 account categories (“as booked”) with expenses included in monthly fuel adjustment clause filings; the prudence and reasonableness of costs incurred for oil, gas, coal, and lignite; and transportation; and an assessment operating performance of utility generating assets.
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<i>Date:</i>	June 2020 – October 2020
<i>Location:</i>	Ohio
<i>Organization:</i>	Public Utilities Commission of Ohio
<i>Description:</i>	Audit of PSR of Duke Energy LEI was engaged by the Public Utility Commission of Ohio, to perform an audit of the Price Stabilization Rider (“PSR”) of Duke Energy Ohio related to Duke’s purchase of energy from the Ohio Valley Electric Corporation (“OVEC”) (PUCO Case No. 20-167-EL-RDR). Aspects of the audit included assessing the reasonableness and prudence of the disposition of energy and capacity in the PJM market of the energy provided 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 PSR filings. Marie supervised and directed the audit.

<i>Date:</i>	May 2020 – September 2020
<i>Location:</i>	Ohio
<i>Organization:</i>	Public Utilities Commission of Ohio
<i>Description:</i>	Audit of PPA Rider of AEP Ohio LEI was engaged by the Public Utility Commission of Ohio, to perform an audit of the PPA Rider of AEP Ohio related to AEP’s purchase of energy from the Ohio Valley Electric Corporation (“OVEC”) (PUCO Case No. 18-1004-EL-RDR). Aspects of the audit included assessing the reasonableness and prudence of the disposition of energy and capacity in the PJM market of the energy provided 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>	Public interest law firm
<i>Description:</i>	Impacts of the potential shutdown of the Dakota Access pipeline (“DAPL”) 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

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	at: https://earthjustice.org/sites/default/files/files/3154-525_declarations-in-support-of-standing-rock.pdf
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<i>Date:</i>	February 2020 – February 2022
<i>Location:</i>	Louisiana
<i>Organization:</i>	Louisiana Public Service Commission
<i>Description:</i>	Rulemaking to study renewable energy tariff, aka “green tariff” options 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>	Application for firm transportation on a gas pipeline 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>	Long-term outlook for Japan electricity sector 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
<i>Organization:</i>	European investor-owned utility
<i>Description:</i>	Investment environment for transmission in ERCOT 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.

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<i>Date:</i>	July 2019 - August 2019
<i>Location:</i>	Alberta, British Columbia
<i>Organization:</i>	Counsel for natural gas producer
<i>Description:</i>	Analysis of Western Canadian natural gas costs and production 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>	Econometric benchmarking analysis of gas utility performance for PBR LEI was hired to be the advisor of a gas utility company in Massachusetts for their performance-based distribution ratemaking plan. Eversource hired LEI in relation to its NStar Gas distribution company, to support NStar Gas’s 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 an appropriate stretch factor. The benchmarking report was used by counsel to develop the company’s strategy for the rate filing. Marie prepared direct written testimony, delivered oral testimony, developed interrogatory requests, responded to interrogatories by opposing counsel, and prepared rebuttal testimony. DPU Docket No. 19-120.

<i>Date:</i>	June 2019- December 2019
<i>Location:</i>	Ontario
<i>Organization:</i>	Generating company
<i>Description:</i>	Benchmarking generation utility performance 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
<i>Location:</i>	United States, ISO-NE
<i>Company:</i>	Massachusetts Office of the Attorney General
<i>Description:</i>	Winter fuel reliability/electric power market design 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

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	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).
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<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>Econometric analysis of crude oil price and income elasticities of demand</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.</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>Avoided energy supply costs</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. [Docket No. 2018-00321]</p>

<i>Date:</i>	June 2018-December 2018
<i>Location:</i>	United States, PJM
<i>Company:</i>	Public Utilities Commission of Ohio
<i>Description:</i>	<p>Management performance and financial audit of large utility</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</p>

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	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. [Docket No. 18-80-EL-RDR]
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<i>Date:</i>	March 2018 - September 2018
<i>Location:</i>	United States, MISO, Michigan
<i>Company:</i>	NGO
<i>Description:</i>	The role of Enbridge Line 5 in NGLs and crude oil transport in Michigan 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

<i>Date:</i>	July 2017-June 2018
<i>Location:</i>	United States, MISO, Minnesota
<i>Company:</i>	Minnesota Department of Commerce
<i>Description:</i>	Role of Enbridge Line 3 in heavy and light crude oil supplies 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.

<i>Date:</i>	June 2017-December 2018
<i>Location:</i>	United States, MISO, Mississippi
<i>Company:</i>	Mississippi Public Service Commission
<i>Description:</i>	Management audit of large vertically integrated utility 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

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	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.
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<i>Date:</i>	November 2018 – February 2019
<i>Location:</i>	WECC
<i>Company:</i>	PacifiCorp
<i>Description:</i>	Independent evaluator (“IE”) for energy procurement 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 independent 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>	Review of investable energy sectors 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>	Analysis of capacity markets 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.

<i>Date:</i>	February 2017
<i>Location:</i>	North America
<i>Company:</i>	Provider of services to vehicle fleet industry
<i>Description:</i>	Outlook for electrification of transportation 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

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	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.
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<i>Date:</i>	December 2016
<i>Location:</i>	Alberta, Canada
<i>Company:</i>	Private client
<i>Description:</i>	Analysis of capacity markets 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>	Examination of solar business models 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.

<i>Date:</i>	October 2016-November 2016
<i>Location:</i>	California, Kansas
<i>Company:</i>	Law firm
<i>Description:</i>	Support for counsel in renewable natural gas matter 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 methodology relied upon by the opposing counsel’s expert witness. Marie proposed an alternative, more accurate methodology for valuing the green attributes of LFG, based on market fundamentals driven by the California RPS requirements.

<i>Date:</i>	August 2016-October 2016
<i>Location:</i>	Maine

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<i>Company:</i>	Maine Public Utilities Commission
<i>Description:</i>	Macroeconomic impact of biomass generation 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.

<i>Date:</i>	May 2016
<i>Location:</i>	ERCOT/Texas
<i>Company:</i>	Private client
<i>Description:</i>	Examination of ancillary services 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.

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

<i>Date:</i>	June 2014-April 2016
<i>Location:</i>	Maine
<i>Company:</i>	Maine Public Utilities Commission
<i>Description:</i>	Project manager and testifying expert 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 #2014-00071). 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

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	<p>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>
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<i>Date:</i>	November 2015-December 2015
<i>Location:</i>	US Northeast
<i>Company:</i>	Renewable power developer
<i>Description:</i>	<p>Due diligence for assets in ISO-NE (Maine) LEI was hired by a wind developer to provide a quantitative assessment, based on an economic dispatch model, of congestion/curtailment risk for a wind asset in Maine. LEI used its proprietary dispatch model, PoolMod, to provide an outlook from 2016 through 2020 of hourly LMPs, as well as the components of LMP (energy, losses, and congestion). We incorporated information from the interconnection impact study to examine system limits for the plants in question. LEI also provided an assessment of risk of outages based on NERC outage data for NPCC. Marie led the project</p>

<i>Date:</i>	October 2015-November 2015
<i>Location:</i>	ERCOT/ Texas
<i>Company:</i>	Private equity company
<i>Description:</i>	<p>Due diligence for assets in ERCOT 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.</p>

<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>	<p>Examination of design of auctions 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</p>

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	rules, and international auctions for toll roads to examine whether and how duration or length of contract is incorporated into bidding.
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<i>Date:</i>	May 2015
<i>Location:</i>	Connecticut; Virginia
<i>Company:</i>	Private equity company
<i>Description:</i>	Review of gas transportation contracts 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>	Outlook for natural gas prices 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
<i>Description:</i>	Monthly energy market reports 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 ₂ . 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.

<i>Date:</i>	October 2014
<i>Location:</i>	New England
<i>Company:</i>	Private equity company
<i>Description:</i>	Assessment of ancillary service market 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>	Due diligence for asset in PJM 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.

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	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.
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<i>Date:</i>	June 2014
<i>Location:</i>	North America
<i>Company:</i>	Law firm
<i>Description:</i>	<p>Examination of FERC policies and practices</p> <p>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.</p>

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

SPEAKING ENGAGEMENTS:

Selected recent webinars and conferences

Energy Bar Association Mid-year Meeting and Conference 2021 (virtual). Session chair: *Securitization of utility costs: Panacea or poison pill?* October 13, 2021.

International Association for Energy Economics (“IAEE”) 2021 Conference (virtual). Presentation title: *Liberalization, de-carbonization, and nuclear recovery in Japan: Outlook for long-term energy prices.* June 7, 2021.

Expert participant (virtual) in University of California Davis, Institute of Transportation Studies: *Future Scenarios of Passenger Mobility in the US: Year 2030*, October 2020.

Energy Bar Association Mid-year Meeting and Conference 2020 (virtual). Presentation title: *Performance-based ratemaking for local gas distribution companies: Lessons learned from a recent rate case.* October 13, 2020.

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.

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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

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>

"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.

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“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
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 USEA 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.

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“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

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

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A.2 Ma. Cherrylin Trinidad

Director, London Economics International LLC



KEY QUALIFICATIONS:

Cherrylin, a Managing Consultant at London Economics International LLC, has significant experience in the areas of regulatory economics, electricity market design, and mergers and acquisitions. She has extensive experience in performance-based rate advising clients on the various components of the PBR as well as assisting them in their PBR submission. She is also very familiar with the regulatory environment and market rules in PJM, the largest wholesale electricity market in the world, having worked on various projects in this jurisdiction spanning from assessing the investment opportunities in this market to modeling and forecasting the energy and capacity prices. Finally, Cherrylin has managed several multi-million projects not only in North America but internationally as well.

EDUCATION:

Columbia University, New York, New York, M.A. International Affairs (International Energy Management and Policy)

Asian Institute of Management, Manila, Philippines, master's in business administration

University of the Philippines, Manila, Philippines, B.A. in Public Administration

EMPLOYMENT RECORD:

From: 2020 **To:** present
Employer: *London Economics International LLC, United States*
Director

From: 2012 **To:** 2019
Employer: *London Economics International LLC, United States*
Managing Consultant

From: 2008 **To:** 2011
Employer: *London Economics International LLC, United States*
Senior Consultant

From: 2007 **To:** 2008
Employer: *London Economics International LLC, United States*
Consultant

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From: 2005
Employer: USAID projects such as Philippines Climate Change Mitigation Program, Energy Environment Training Program, Energy Clean Air Program, Philippines
Contractor/Consultant

From: 2001
Employer: Philippines Climate Change Mitigation Program, Philippines
Project Manager

From: 1997
Employer: Department of Energy, Philippines
Executive Assistant IV to the Undersecretary

SAMPLE PROJECT EXPERIENCE:

The projects briefly described below are typical of the work Ma. Cherrylin has performed throughout her career. This list is not exhaustive.

PBR

- ***Design of a PBR framework in Connecticut:*** LEI was retained by Eversource Energy to provide independent expert advice on the design of a PBR framework for regulating electric distribution companies in Connecticut. LEI participated in the stakeholder engagement process. LEI also advised Eversource Energy on the fundamental concept of PBR and best practices in development of revenue adjustment mechanisms and performance incentives. ***strategic support to local electric distribution utility with local regulator:*** LEI is advising a Northeast-based electricity distribution utility with its regulatory strategy.
- ***Performed total factor productivity and advised a gas utility on its rate case application:*** Cherrylin is part of the team that is supporting a gas utility in Massachusetts in its PBR filing for 2021-2025. She is worked with the team on putting together the total factor productivity and input pricing study. She also assisted the team's expert witness in putting together the direct testimony, rebuttal testimony, and responses to the IRs. In addition, she advised on topics related to PBR and GSEP.
- ***Co-authored report on capital expenditure recovery mechanisms:*** For a Canadian client, Cherrylin led the team in drafting a report that investigated the different capital expenditure recovery mechanisms utilized in four markets namely Australia, New Zealand, Ontario, and the UK for electric network utilities. The report also provided different options that the client can propose for its performance-based ratemaking filing.
- ***Authored a report on PBR:*** For the Nova Scotia Department of Energy, Cherrylin wrote the following sections of the comprehensive literature review (i) Performance-based regulation ("PBR") - including discussion of various structures of PBR implemented globally and

associated challenges, and (ii) Performance and Accountability discussing performance monitoring and performance standard measures used in the generation, transmission, and distribution sectors. This report was posted on the Department's website.

- ***Provided support to expert testimony in support of FortisAlberta Inc. ("FAI") in its filing for a performance-based ratemaking ("PBR") plan with the Alberta Utilities Commission ("AUC"):*** The testimony provided detailed data analysis (including inflation and TFP trends), underpinning PBR economic theory, and reviews of best practices in various North American and International jurisdictions. The testimony offers backup elements for each of the various components of the PBR plan that is being proposed by FAI. Ma. Cherrylin provided support to the expert in her testimony at the AUC in the Spring of 2012.
- ***Engaged by Ontario Power Generation ("OPG") to support senior management through regulatory processes related to performance-based rates.*** Cherrylin was part of a team that prepared a discussion paper on incentive regulation mechanisms ("IRM") currently in place in Ontario for electricity and natural gas distribution utilities and presented it at a technical workshop at the Ontario Energy Board ("OEB").
- ***Prepared a white paper for Canadian electricity regulators and utilities on the comparative advantages and drawbacks of various tariff-setting regimes, from performance-based regimes to cost-of-service.*** This project involved a general overview of tariff-setting practices across Canadian provinces as well as highly detailed Canadian and international case studies and an examination of the key lessons to be learned from each case. Detailed case studies covered the tariff-setting regimes in place in the UK, the Australian National Electricity Market, and the Netherlands. As part of its deliverables, two workshops were conducted with a variety of regulators and utilities.
- ***Provided case studies on performance incentive metrics:*** LEI was engaged by an electric distribution company in New England to provide a presentation on the various performance incentive metrics used by other electric utilities in the US. In addition, LEI looked at the customer surveys on PBR as well as other jurisdictions that impose financial penalties to utilities for slow response to services.
- ***Performed a 4-day workshop on Incentive-Based Ratemaking ("IBR") and accompanied the TNB delegation on a study tour.*** The team went to several Canadian utilities as well as utility commissions to learn about their experiences in implementing the IBR.
- ***Analyzed the building block incentive ratemaking approaches used in Australia and the UK, and how they would apply to the client's circumstances in Ontario:*** LEI's report supported the client's distribution tariff proposal submission to the Ontario Energy Board for a second-generation Customized Incentive Regulation ("IR") plan for the period of five years (2014-2018). The testimony set out the theory behind as well as the practical experience of using the building blocks approach in incentive regulation regimes. Julia will provide the testimony for this project.
- ***Prepared an expert report on different incentive rate-making frameworks for submission as part of a gas distribution company ratemaking proposal.*** The report set out: the theory behind price and revenue cap frameworks, including their strengths and weaknesses; included case study analysis on approaches in ten jurisdictions across Canada, the US, and

the UK; and quantitatively analyzed the impacts of different rate-making frameworks on the client's revenue streams. LEI's analysis' was filed with the Ontario Energy Board in July 2013.

- ***Led a team to assist the largest electricity utility company in Malaysia in its amendments to the electricity tariff regulatory implementation guidelines ("RIGs")***. The Team proposed enhancements to the RIGs and presented these proposals to the IBR Council, composed of the utility's management team. The Team also presented its recommendations to the Commissioner on multiple occasions. Lastly, the Team amended the RIGs, and this was submitted to the Commission for approval.
- ***Headed a team to assist the largest electricity utility company in Malaysia in its 2nd regulatory period performance-based regulation submission (2018-2020)***. The Team provided strategic advisory and reviewed the draft of the submission. The Team attended several meetings with the IBR Council and provided briefing sessions on various issues such as earning-sharing mechanisms, ring-fencing, funding for innovation, etc.
- ***Case studies on regulatory framework and experience in restructuring***: For the Nova Scotia Department of Energy, Cherrylin led a team that prepared a comprehensive case studies report covering seven jurisdictions and two utilities with varying regulatory framework and experience in restructuring: Alberta, California, FortisBC (utility), Georgia Power Company (utility), New Brunswick, New England, New South Wales, Ontario, and the UK. Jurisdictions were selected to gain a holistic perspective - as such, experience reviewed varies from well-known successes in restructuring (e.g., the United Kingdom) to previous failures (e.g. California) - and includes jurisdictions that have similarities with Nova Scotia in terms of size and initial structure (e.g. New Brunswick). The case studies provide various contextual aspects including an overview of the electricity market (or utility), the current institutional and legal framework, history of restructuring along with recent developments, transitional challenges encountered, and remedies adopted. Case studies further exemplify discussion in the Literature Review and illustrate the importance of policy makers' decisions with respect to implementation of specific goals (both in the short and long terms), which includes establishing appropriate policy environment, designing the market based on unmet needs and best practices, involving stakeholders, and allowing for gradual transition.
- ***Conducted a workshop on incentive-based ratemaking ("IBR") for the largest utility in Southeast Asia***. Cherrylin led the group in preparing the presentations for the workshop. The topics for the workshop include a theoretical conceptual overview of the IBR regulatory framework, key elements of comprehensive IBR regimes, best practices of IBR in various jurisdictions, timing and framework in other jurisdictions, how to convince regulators and stakeholders, identifying barriers to the successful implementation of the IBR, and moving from first to second generation IBR, to name a few.
- ***Reopener application***: LEI prepared a paper to support the ENMAX Power Corporation's transmission FBR reopener application. In particular, the client wanted LEI to provide an independent opinion on their argument (i) to amend the G factor calculation to eliminate the G-factor lag effective January 1, 2011 and (ii) to reduce EPC's current X factor of 1.2% to 0.0%. Cherrylin provided support throughout the whole litigation proceeding by responding to information requests which involved additional research and analysis, including synthesis of

publications on recent technological advances in electricity transmission sector, and updating the Ontario LDCs TFP model to ten years.

- ***Led the team that analyzed the emerging trends in utility governance, organization, performance, and accountability.*** Cherrylin wrote sections of the literature review on performance-based ratemaking. Cherrylin also managed the team that prepared the Comparator Industry Design and Regulation Report, which consists of some case studies on the power market and governance structures. This report constitutes an analysis of global best practices and lessons learned based on both success and failures of some jurisdictions in restructuring and liberalization.
- ***Led the conduct of a study on the utility ownership and regulatory models (including PBR) that apply to the utilities in Hawaii, and that would meet the state's energy goals.*** The Team looked at the technical, financial, and legal feasibility of these models in detail and conducted multiple stakeholder outreaches in all the Hawaii islands to solicit the inputs of the different stakeholders. One of the regulatory models being studied is the incentive-based regulation. The team proposed three PBR options for Hawaii. The final deliverable will be submitted to the legislature in early 2019.

New England market

- ***led a team in reviewing House Bill 3968 (or An Act Relative to Clean Energy Resources)*** and providing insights as to the impact of the Bill on the client's long-term contracts
- ***Conducted New England price simulation:*** New England wholesale electricity markets were simulated in order to determine whether the Greater Springfield Reliability Project ("GSRP") would produce economic benefits to the New England region. In order to ensure that economic benefits were not subject to the forced outage and availability schedule of the simulated energy markets, LEI simulated the energy market with 30 different random forced outage and availability schedules. Using these simulations, a distribution of results was used to calculate confidence intervals and hypothesis tests run on the results, hence increasing the robustness of our findings. The study results were used to produce written testimony to the CSC and oral testimony was provided in late August and early September 2009.
- ***Provided energy and capacity price forecasts*** for the client's assets in New England and PJM.

Regulatory design

- ***energy study for Indiana:*** LEI was retained by the Indiana Chamber of Commerce Foundation ("ICF") to provide an Indiana energy policy study and report covering the following topics: (1) an overview of Indiana's energy resources and electricity industry; (2) a discussion of the state's regulatory framework; (3) a summary of Indiana's national ranking in terms of costs, affordability and reliability; (4) an exploration of the factors that have driven cost changes; (5) goals for policy going forward; and (6) a discussion of what can be done through the legislative process to impact energy costs for consumers. The paper was used by ICF for informational purposes ahead of the state's legislative session.
- ***retail rate study 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,

which involved two main sections, aimed to inform electric sector policies and result in competitive electric rates and reliable electric service in Kansas. Section 1 of the study evaluated the effectiveness of current Kansas ratemaking practices and their ability to attract required capital investments and balance utility profits with public interest objectives and reliable service. Section 2 focused on exploring options available to the State Corporation Commission and the Kansas Legislature to affect Kansas retail electricity prices to become regionally competitive while providing the best practicable combination of price, quality and service.

- ***Analyzed the financial transmission rights (“FTR”) and auction revenue rights (“ARR”) mechanisms of PJM:*** For PJM, Cherrylin managed the team that determined whether the current ARR/FTR processed employed by PJM, including the ARR allocation and FTR auctions, constitute the appropriate mechanism by which to ensure that load receives the optimum value of the transmission system for which it is paying through the transmission access charges. Included in this study are the identifying of the objective functions of the ARR/FTR, defining measurable criteria for evaluation, evaluating the current issues in the ARR/FTR, conducting case studies on other markets with ARR/FTR, and proposing enhancements to the current ARR/FTR. The Team also conducted four stakeholders focus group discussions to gather inputs from the stakeholders. The Team presented its findings to the PJM Board of Director and the PJM stakeholders.
- ***Part of a team that reviewed the different market design alternatives for Alberta,*** the client’s portfolio by 2020, and the client’s competitors relative to the changes in the market by 2020. The paper also provided market strategies for the client given the likely market changes by 2020.
- ***Analyzed the ancillary services products, trading arrangements, and procurement processes of several North American markets such as New York, New England, and Texas (ERCOT) as well as international markets such as UK, Australia, and Ontario.*** The ancillary services in Alberta were also studied as a background for comparison with the other markets. Cherrylin also identified the best practices in these markets that Alberta can explore. The results of this analysis were used to support the client in the stakeholder process to redesign a system operator’s procurement process.
- ***Prepared a report on energy storage technologies.*** The report includes a discussion on (i) the different energy storage technologies such as pumped hydro storage, flywheels, compressed air energy storage, and batteries, (ii) applications of these technologies, (iii) the economics of energy storage technologies, (iv) regulatory and legal issues, and (v) significance of energy storage to Saudi Arabia.
- ***Drafted the Term Sheet and the RFP for long-term contracting of supply resources for Maine.*** The RFP consists of the description of products being procured, the RFP process, requirements, and evaluation criteria.

Due diligence (market analysis, price forecasts, etc.)

- ***Produced energy and capacity price forecasts for six U.S. markets.*** Cherrylin was the primary modeler for the PJM Interconnection region, providing an analysis of market dynamics and potential revenues to value electric generation assets.
- ***Prepared the LEI's Renewable Energy Credit ("REC") model for New England*** and forecasted the REC prices for class I resources for the next ten years (2010-2019), which was used to evaluate bids to the Maine PUC energy procurement.
- ***retained by I-Squared Capital to present a market overview of the markets where it owns generation assets:*** These markets include PJM, New York, New England, ERCOT, and SERC. In addition to this, LEI presented an investment opportunity presentation from the ISQ Investment Opportunities slide deck that LEI submitted in March 2017.
- ***Reviewed the production, demand, storage, transportation, distribution, and marketing of natural gas in Canada.*** Recommended possible investment areas in the Canadian gas market for a client who was interested in investing in these sectors.
- ***Led a team that prepared a regulatory checklist for a client that was interested in making investments in the US.*** Cherrylin looked into the obligations of a power plant owner as well as filing requirements for FERC, NERC, and the Balancing Authorities. The checklist will be used for the client's future acquisitions.
- ***Evaluated the electricity and gas markets of Singapore*** in relation to a client's bid for a generating facility. The analysis included a review of the coal market, liquefied natural gas market, and the carbon market in Asia. She also reviewed the retail market and the ancillary services in Singapore. In addition, she conducted due diligence on the current assets of the target company as well as evaluated its coal vs. gas repowering plans. Furthermore, she prepared a market primer on the Singapore electricity and gas markets for the client.
- ***Conducted gas price forecasting:*** For a private equity client, LEI forecasted the energy and capacity revenues of various gas-fired plants in PJM for 20 years. More specifically, LEI projected the energy and capacity prices, plants' annual generation, load factor, and operating costs. LEI's analysis influenced the client's going forward investment decisions.
- ***Provided 20-year monthly energy and capacity prices and operating metrics results for two new CCGT plants in PJM and one in SERC in connection with the client's proposed acquisitions.*** LEI reviewed plant parameters, financial models, and market consultant reports provided by the seller and delivered price forecast and dispatch results to the client.
- ***Directed a team to analyze the PJM capacity market.*** The final deliverable was a PowerPoint presentation containing a comparison of LEI's forecast and the recent 2018/2019 Base Residual Auction results, as well as potential changes in the market that will impact future capacity prices.
- ***Prepared a 20-year energy and capacity price forecast for PJM.*** This is related to the firm's potential target to acquire a portfolio of hydro assets in SERC which looks to sell into PJM West.
- ***Provided analytical support to a private equity firm's due diligence process.*** Cherrylin provided an updated outlook on energy prices, as well as intelligence on recent developments

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in selected US power markets (PJM). She also assisted in forecasting the REC prices for the next ten years and reviewing the requirements and risk exposure to hydropower facilities in PJM.

- ***Evaluated the project financing of an offshore wind project off the Dutch continental shelf.*** The team also assessed the Dutch electricity markets, the impact of the government's subsidies not only on the specific project but to other future renewable projects as well.
- ***Appraised the Alberta electricity markets*** and part of the team that prepared an outlook on the wholesale Alberta electricity prices for the next fifteen years and implications for the company's three wind projects.
- ***Reviewed and analyzed an investment portfolio for a client.*** The investments include assets in the power generation, power distribution, retail fuel, natural gas transportation, and natural gas distribution in emerging markets in Latin America and Asia. In-charge of conducting the market analysis of the electricity market in the Philippines and Jamaica and made recommendations on the viability of the assets.
- ***Analyzed current and future dynamics in the British Columbia power markets.*** Topics examined included costs of independent power producers ("IPPs") relative to BC Hydro, uncertainty around future demand levels in BC, implications of moving away from use of Critical Water Year analysis in planning, risks, and uncertainties regarding import availability, and the overall macroeconomic contributions of IPPs. LEI also analyzed the provincial government's Review of BC Hydro and provided an assessment.
- ***Managed the team that forecasted the energy and capacity prices for the next 20 years of the relevant zone for the target asset in PJM.*** LEI modeled both energy and capacity markets on an integrated basis, as well as used the Real Options Model to simulate the target unit's operational decision in arbitraging the peak versus off-peak hours in the energy market. The client was interested in acquiring a pumped storage hydro generation facility owned by LS Power in the PJM region.
- ***Led a team in performing a 20-year energy and capacity price forecast in support of a potential acquisition of a planned gas-fired plant in Pennsylvania.*** The results were used to update the firm's valuation of its other plant in Ohio.
- ***Guided a team in putting together the projected revenues of a solar plant in New Jersey for potential acquisition.*** The Team forecasted the potential energy, capacity, and solar renewable revenues for a solar plant in New Jersey using the firm's proprietary dispatch model.
- ***Managed a team in forecasting the revenues in PJM.*** The forecasts include energy and capacity payments for a gas-fired plant for the next 30 years.
- ***Updated the PJM and NY energy and capacity forecast*** to facilitate private client financing.
- ***Assessed the price and macroeconomic impact of closing some nuclear plants in PJM.*** The project involved evaluating the continued operations of the nuclear plants on the energy market, assuming that some form of subsidies will be provided by the state. Through the use of its simulation model, POOLMod, LEI simulated the costs of power for consumers based on future market prices for energy and capacity (with the nuclear continuing to operate) under

“baseline” or “business as usual” market conditions. LEI also looked at another scenario where the nuclear plants were prematurely shut down. LEI analyzed how the closure of these nuclear plants affected the wholesale electricity and capacity prices in the state, and evolution of replacement resources, and the implications thereof on consumers’ electricity rates.

- ***Managed a team in forecasting the energy and capacity price forecasts in PJM*** as well as the potential revenues of a proposed gas-fired plant in PJM. The client was looking into acquiring the proposed plant located in Maryland. The client purchased the proposed plant.
- ***Led a team that projected the energy and capacity revenues of a proposed gas-fired plant in Ohio.*** Cherrylin specifically led the modeling of the PJM energy and capacity markets. In addition, a market overview of PJM as well as Ohio, was prepared and presented to the management.
- ***Managed a team that performed due diligence for a hydro plant in PJM.*** Cherrylin performed an energy and capacity price forecasts for 20 years. Cherrylin also assisted the team in putting together a renewable energy credit (“REC”) model to determine the long-term REC prices.
- ***Headed a team that prepared the long-term energy and capacity price forecast for the New York power market and annual revenue forecast for a hydro plant located in upstate New York.*** The report was used as part of the Confidential Information Memorandum for the sale of the hydro plant.
- ***Led the team in forecasting the energy and capacity price forecasts in PJM*** as well as the potential revenues of a portfolio of pumped storage and conventional hydro generation facilities, over a 20-year horizon. LEI was hired to review regulatory and market drivers of energy and capacity prices in PJM.
- ***Performed 20-year of energy price forecasts for the Luzon island in the Philippines*** were developed based on assumptions of macroeconomics, demands, fuel prices, and new entry and retirements. The energy price modeling was customized to take into the difference between dependable capacity and installed capacity. The modeling results served as direct inputs to financial valuation models of the bidder’s agent investment bank in support of the bidder’s potential purchase of the company.
- ***Conducted an energy price forecasting for PJM as well as the client’s power plant in PJM.*** Aside from the base case, the report also included a scenario with the Regional Greenhouse Gas Initiative (“RGGI”) program. Cherrylin was responsible for making the assumptions to the price forecasting, running the POOLMod simulation, and interpreting the results of the simulation.
- ***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.

- *Managed the team in putting together a slide deck that includes a market overview, key drivers of the market, and recent developments* of the following markets: PJM, New York, New England, ERCOT, and SERC for an infrastructure fund looking for investment opportunities in the US.
- *Led a team in doing a market power analysis for a potential acquisition of a portfolio of assets*
- *Prepared an independent market report on the client's portfolio of hydro assets in PJM.* Included in the market report was a price forecasts for the energy and capacity markets.
- *Provided valuation services for a waste coal facility located in the Pennsylvania-New Jersey-Maryland ("PJM") regional market:* Specific tasks consist of i) due diligence review of documents such as past financial statements, operational statistics report, fuel agreements and power purchase agreements ("PPA"); ii) forecasts energy and capacity prices in the PJM regional market; iii) create a pro forma financial model to evaluate the market value of the plant as of expiration of its PPA; iv) writing a final report documenting assumptions, methodologies used and modeling results.

Transmission

- *Managed a team that is assessing the economics of the proposed Lake Erie HVDC transmission project* and determining the additional revenue streams or value adders of the Lake Erie HVDC transmission project ("LEP") from the perspective of third-party shippers. The LEP is a 100-km long 1,000 MW bi-directional HVDC transmission line that will connect the Ontario energy market with the PJM market. LEI prepared a comprehensive report that includes a review of the Ontario and PJM markets, a 20-year (2017 to 2036) market outlook and prices for electricity, capacity and renewable energy credits in Ontario and the relevant zone/s in PJM; the total gross arbitrage value for the energy congestion rents, the capacity revenue potentials for PJM, and the renewable energy credits revenue potential in PJM.
- *Authored a paper on California ISO's transmission economic planning process ("TEPP") and transmission economic assessment methodology ("TEAM").* Cherrylin was part of the team that reviewed the CAISO's regulations related to transmission planning and economic studies to evaluate transmission projects and co-wrote the paper describing CAISO's TEPP and TEAM with illustrative and quantitative examples.
- *Analyzed the viability of potential investment of a client in a proposed electricity transmission line in California connecting the South California Edison and San Diego Gas & Electric utility service areas* in light of the state's electric transmission approval process, the relative feasibility of the project compared to proposed alternatives, and the increased need for electricity reliability in the LA Basin and San Diego region in the aftermath of the shutdown of the San Onofre Nuclear Generating Station.
- *Conducted an independent modeling exercise to determine the potential revenues for a proposed transmission project wheeling power from western MISO to eastern MISO and eventually to PJM.* The team evaluated both the revenue opportunities to the investors as well as the societal benefits to the MISO system. The team also assessed the incremental value of the business strategy of selling the energy (and capacity) out of East MISO to third parties

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who will serve customers in PJM. LEI's modeling exercise entailed evaluating intrinsic revenues, extrinsic revenues, as well as the green value of the project.

- ***Evaluated the detailed cost-benefit analysis and macroeconomic impact analysis in support of the Champlain Hudson Power Express ("CHPE")*** application for siting approval at the New York Department of Public Service ("DPS"). LEI's analysis of economic effects was the cornerstone of the settlement agreement reached between TDI and some New York agencies. Results of the modeling were filed with the Commission. The study is available on the client's website at <http://www.chpexpress.com/docs/Analysis-of-the-Macroeconomic-Impacts-of-the-Proposed-CHPE-Project.pdf>.
- ***Analyzed Chicago congestion issues:*** LEI was retained to do a resource analysis in the Chicago area and to analyze the congestion within the Chicago area and MISO zones surrounding Lake Michigan.
- ***Performed macroeconomic analysis of HVDC project:*** Cherrylin part of a team of economists that performed a macroeconomic analysis to estimate the local economic benefits accruing to taxpayers, residents, and businesses along the 800+mile route during construction of the Zephyr HVDC project, which runs from Wyoming to Colorado, Utah, and Nevada. LEI performed the analysis using the REMI P1+ model.

A.3 Barbara Porto

Senior Consultant, London Economics International LLC



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, wholesale price analysis, and utility management/performance auditing. Barbara is LEI’s lead expert and modeler for the California ISO’s energy and capacity markets, responsible for analyzing changes in market rules and system dynamics. Barbara also serves as a key modeler for LEI’s gas pricing model.

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:

Hult International Business School, Cambridge, MA, United States, MBA - Master of Business Administration, 2014.

COPPEAD/UFRJ, RJ, Brazil, Finance Certificate, 2010.

UNESA, RJ, Brazil, Bachelor of International Relations, 2010.

EMPLOYMENT RECORD:

From: 2015 **To:** present
Employer: London Economics International LLC, Boston, MA, United States
Consultant

From: 2008 **To:** 2013
Employer: ENEVA (subsidiary of E.ON AG), Rio de Janeiro, Brazil
Analyst

RECENT PROJECT EXPERIENCE:

- **OPG TFP study 2019:** LEI was engaged to support Ontario Power Generation in relation to its second-generation hydroelectric payment amounts price-cap application before the Ontario Energy Board (“OEB”). The project involved performing an updated TFP study reflecting the OEB’s 2017 Decision on the first-generation price-cap index. Other key tasks were the preparation of analysis and written evidence assessing whether the inflation factor and treatment of the Capacity Refurbishment Variance Account remain appropriate. Barbara worked on the inflation factor, physical TFP, coauthored the report and assisted on information-gathering.

- ***Total Factor Productivity study:*** 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.
- ***Workshop on Incentive-Based Ratemaking (“IBR”):*** LEI was retained by the largest electric utility company in Malaysia, to conduct a capacity building workshop on IBR and technical visits to utilities and regulators worldwide that are operating under IBR-like regimes. Barbara presented to TNB’s traveling contingent on PBR Requirements standards across different jurisdictions and on fundamental of Tariff Design. Barbara presented to TNB’s traveling contingent on PBR Requirements standards across different jurisdictions and on fundamental of Tariff Design.
- ***Montana-Dakota Utilities rate case:*** LEI was engaged by the North Dakota Public Service Commission as the outside independent technical consultant supporting the Commission's ratepayer advocacy staff in a rate case involving Montana-Dakota Utilities. LEI examined key components of the rate case, which included the depreciation study, tax rates, environmental upgrades, transmission investment, the ROE/common equity ratio, amortization for early retirement of coal plants, and impacts on residential rates versus impacts on other classes of service. LEI prepared data requests, and provided written and oral testimony. Barbara worked on the sections of the audit related to depreciation and environmental upgrades.
- ***LEI's Continuous Modeling Initiative (CMI):*** As lead California market, 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.
- ***Consulting Services and Forecasts Related to Avoided Energy Supply Costs:*** 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.
- ***Management audit of Entergy Mississippi:*** LEI was engaged to conduct the annual fuel procurement and management audit of Entergy Mississippi. The LEI team assessed a complex

array of issues including the Company's organization and staffing, risk management and company controls, coal procurement and inventory management, coal transportation, natural gas procurement and trading, plant operations and generation portfolio management, energy procurement and trading, and costs associated with the Grand Gulf nuclear plant. LEI prepared a comprehensive report detailing its analysis, findings, and recommendations, and appeared before the Mississippi Public Service Commission to present its findings and recommendations.

- ***Ancillary service revenue streams for long-duration storage in California:*** LEI was engaged by a developer to evaluate potential revenue stream of its battery storage technology that is capable in providing very long-duration storage. Specifically, LEI is helping the client understand the value of regulation, spinning reserve, frequency regulation, voltage support and other revenue streams that its battery can earn in the California market under current market structure and under future potential market designs.
- ***Financial Transmission Rights ("FTRs") and Auction Revenue Rights ("ARRs") Market Review:*** LEI has been engaged by a Regional Transmission Operator ("RTO") to conduct a holistic assessment of its FTR markets and ARR to determine whether the current ARR/FTR processes constitute appropriate mechanism to ensure that load receives the optimal value of the transmission system for which it is paying through its transmission access charges. Barbara was responsible for analyzing the FTR/ARR metrics and target allocation process, as well as comparing it to similar mechanisms in other jurisdictions.
- ***Audit of Legacy Generation Resource Rider for Ohio Valley Energy Company:*** LEI was engaged by the Public Utility Commission of Ohio to perform an audit of the prudence and performance of the generation purchase riders of Duke Energy Ohio, AEP Ohio, and AES Ohio for the output of two coal plants operated by Ohio Valley Energy Company ("OVEC"). Barbara was responsible for examining OVEC's participation in the PJM market and the fuel and variable cost expenditures to determine whether they were prudently incurred.
- ***Due diligence on a potential wind portfolio acquisition:*** LEI was engaged by an infrastructure investment fund to provide consulting and advisory services in support of due diligence efforts on a potential wind portfolio acquisition in ISO-NE and California. The scope of the project included reviewing data room materials, critically reviewing a market report prepared by the sell-side consultant, preparing independent long-term 20-year energy and capacity price forecast for the target assets under two different scenarios, one reflecting a base case scenario with nation-wide carbon tax implemented by 2028, and another reflecting decarbonization goal achieved through non-carbon tax policies. Barbara was responsible for the California portion of the project, conducting extensive and detailed review of the materials provided, additional research on various topics, and performing the California modeling activities.
- ***Management audit of fuel adjustment clause for Entergy:*** LEI was engaged by Louisiana Public Service Commission ("LPSC"), Docket No. X-35523, to perform an audit of the Fuel Adjustment Clause filings of Entergy Louisiana, LLC. Barbara assisted with developing and analyzing data requests to evaluate if fuel costs were prudent and in compliance with LPSC orders.

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- ***Audit of fuel adjustment clause for Cleco Power:*** LEI was engaged by Louisiana Public Service Commission ("LPSC"), Docket No. X-35522, to perform an audit of the Fuel Adjustment Clause filings of Cleco Power. Barbara assisted with developing and analyzing data requests to evaluate if fuel costs were prudent and in compliance with LPSC orders.
- ***Application for firm transportation on a gas pipeline:*** 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). The project 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. Barbara assisted with reviewing briefs, developing interrogatory requests, and evaluating the responses to such requests.
- ***Stranded cost assessment:*** LEI was retained by a Midwest cooperative seeking to cease purchasing supply from the incumbent and rather opt for an alternate supply provider. As part of the engagement, LEI prepared a critique of the stranded cost estimate provided by the incumbent provider and calculated its own estimate of the stranded cost payment based on FERC's policy guidelines in Order 888. LEI's calculation of market value for the released energy and capacity from the incumbent t provided was based on its own forecast of energy and capacity prices in the MISO markets. LEI's report was filed with FERC as part of the litigation procedures. Barbara was responsible for the capacity market analysis, reviewing thousands of capacity transactions in the MISO region.
- ***2019 Transmission + storage:*** For a transmission developer in the in Northeast, LEI modeled various portfolios of renewable generation assets (including wind, solar, and hydro resources) together with various quantities and technologies of storage resource to analyze, and optimize, the capacity factor and delivered price for energy on the proposed HVDC transmission line. LEI also modeled customer load at the withdrawal end of the line together with additional storage to analyze the benefits of these storage resources to provide load-following service. Barbara assisted with research on the costs and technical specifications of various storage technologies.
- ***Economic development benefits of the CAES:*** LEI was engaged by Range EES to analyze the local economic development benefits associated with the construction and operations of a Compressed Air Energy Storage ("CAES") project at the site of the soon-to-be-retired Intermountain Power Project plant in Millard County, Utah (the "Project") using the REMI PI+ model. Barbara assisted the REMI modeller with research, conducting model runs and in the composition of the final report.
- ***Fuel Audit of Mississippi Power Company:*** LEI was engaged for a two-year term to conduct the annual management audits of the oil, gas, coal, nuclear fuel, and energy procurement activities of Mississippi Power Company. The LEI team assessed a complex array of issues including fuel and energy contract terms and the prudence of fuel procurement and inventory practices. LEI appeared before the Commission to present and defend findings. Barbara worked on the procurement and inventory management sections of the audit related to natural gas and coal.

- ***Consultancy Study on Effective Carbon Prices:*** As part of a consortium, LEI was hired by the NCCS to undertake a study on effective carbon prices faced by energy-intensive manufacturing sub-sectors in jurisdictions across Asia, Middle East, Europe, and North America. Specifically, LEI was tasked with studying carbon policies in China, Middle East, Taiwan, USA, and Canada. The deliverables, consisting of a report and a dashboard tool, allowed the NCCS to compare effective carbon prices across competitor jurisdictions in these key manufacturing sectors and thus inform current and future policy decisions regarding the level of Singapore's carbon price and wider climate change policy. Barbara was responsible for the Panama study.
- ***Fuel Audit of Entergy Mississippi:*** 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.
- ***Audit of AEP Ohio Alternative Energy Rider:*** 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.
- ***Market and Economic Impact Consulting:*** 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.
- ***Natural gas generation asset performance review:*** 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.

- ***Biomass power plants economics:*** 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.
- ***Enbridge Line 5:*** 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.
- ***Cost of Utility-Scale Solar:*** 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.
- ***Econometric study of oil demand elasticities:*** 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.
- ***IE for PacifiCorp 2017S RFP:*** 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.
- ***White paper for debunking myths surrounding transmission investment:*** 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.

- ***Investment Opportunities in the US and Canada:*** 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.
- ***Hydro Ancillary Services:*** 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.
- ***Pacifico Chile-Peru interconnection assessment:*** 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.
- ***Transmission open solicitation:*** 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.
- ***ComEd congestion analysis:*** 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.
- ***Brazilian electricity market credit crisis review:*** 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.
- ***TransAlta Climate Change 2016:*** LEI was retained to provide ongoing research, analytical and advisory support to TransAlta as the Alberta government implements its climate change policy, which will shut down coal plants early, ramp up renewable generation, and put in place a province wide carbon tax. Part of the engagement was to perform a case study-oriented comparative review of ancillary services in North America and abroad. Barbara was responsible for the Ireland case study.

- ***Alberta Market Modeling:*** 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.
- ***Assessment of solar thermal technologies:*** 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.
- ***Analysis of buy versus build investment decision:*** 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.
- ***Overview of hydro-dominated market:*** 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.
- ***Colombia market overview and revenue forecasts for target assets:*** 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. LEI was hired later to update the market fundamentals and energy prices outlook in order to evaluate the impact of evolving market conditions on a portfolio of assets acquired by the client. Barbara created the fuels forecast, assisted with research tasks for the modeling activities, and coauthored the report.

- *Transmission project workshop:* 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.

A.4 Hannah Braun

Consultant, London Economics International LLC



KEY QUALIFICATIONS:

Based in Warsaw, Poland, Hannah joined London Economics International LLC (“LEI”) in August 2021. As consultant, she applies her analytical, research, and writing skillsets.

Hannah has over seven years of professional experience. She began her career at the PGNiG Capital Group (Polskie Górnictwo Naftowe i Gazownictwo S.A.), the youngest of five core team members who comprised the company’s Warsaw-based LNG Department. There, she helped negotiate several long-term LNG supply contracts with major international sellers. These cargoes are currently being delivered to the Świnoujście LNG terminal in northern Poland. A skilled researcher and writer, Hannah has also contributed to academic works focusing on natural gas market dynamics. More recently, she has worked on sustainable and equitable energy project development, climate finance, and energy subsidy reform.

Hannah received her Bachelor of Arts with Honors in International Relations from Brown University in 2014. She graduated from Columbia University’s School of International and Public Affairs in 2020 with a Master of International Affairs in Energy and Environment, specializing in both Management and East Central Europe. She is a dual citizen of the US and Poland.

EDUCATION:

Brown University, Providence, Rhode Island, B.A. in International Relations, 2014. Magna Cum Laude, Honors, Phi Beta Kappa. Watson Undergraduate Fellow. Winner of the Mark and Betty Garrison Prize for best thesis in international relations and foreign policy analysis and the Dean of the College’s Distinguished Senior Thesis Award.

Columbia University, New York, New York, M.I.A. in Energy & Environment, 2020. Recipient of the Harriman and Davis Fellowships, Fellow at the University Consortium (St. Anthony’s College, University of Oxford).

EMPLOYMENT RECORD:

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From: August 2021
Employer: *London Economics International LLC; Boston, MA*
Consultant (November 2021 – present), Research Associate (August 2021 – November 2021)

From: July 2021
Employer: *Regenerative Crisis Response Committee*
Research Fellow

From: June 2020
Employer: *EnergyPolicyTracker.org*
Curator – Poland and European Institutions

From: March 2020
Employer: *The World Bank*
Short Term Consultant

From: October 2020
Employer: *Moerenhout Consulting*
Independent Consultant

From: January 2020
Employer: *Ministry of Mines and Energy of Colombia; New York, NY*
Graduate Consultant

From: June 2019
Employer: *European Bank for Reconstruction and Development; Warsaw, PL*
Intern, Banking

From: November 2018
Employer: *Center on Global Energy Policy, Columbia University; New York, NY*
Student Research Assistant

From: 2015
Employer: *Agnia Grigas, Inc. for The New Geopolitics of Natural Gas*
Research Assistant (April 2015 - December 2016)

From: 2014
Employer: *PGNiG Capital Group; Warsaw, PL and Munich, DE*
Specialist (October 2016 - June 2018), Junior Specialist (October 2015 - September 2016), Trainee in LNG Business Development (April 2015 - September 2015), LNG Analyst-in-Training (January 2015 - March 2015), Intern (September 2014 - December 2014)

PROJECT EXPERIENCE:

The projects below briefly describe work that Hannah has conducted over the course of her career.

Performance metric design

- ***advised on best practices in performance-based regulation:*** LEI was engaged by an electric distribution company in New England as its advisor during the state's proceeding on performance-based regulation ("PBR"). LEI's task was to evaluate the state's PBR proposals against best practices in PBR-based regulatory design and given the context of the state's regulatory and power sector structures. One of LEI's tasks includes designing performance incentive mechanisms ("PIMs"), which will be included in the company's rate filing. In this engagement, Hannah prepared case study presentations that examined the PIMs of other markets, participated in stakeholder workshops held by the state regulator, drafted briefing memos on these meetings, and co-wrote a PBR technical report that was filed in the state's docket.
- ***provided support on best practices pertaining to multi-year rate plan structures:*** For the Maine Public Utilities Commission ("MPUC"), LEI prepared a technical report covering best practices in multi-year rate plan development. LEI reviewed rate case filings submitted by one of the state's electric distribution utilities and discussed the MPUC's desired outcomes for this rate case. Using this information, LEI drafted its report covering various elements of multi-year rate plans and PBR design that are used across jurisdictions in both the US and internationally, as well as the advantages and disadvantages of their adoption in the regulatory framework. This technical information was supplemented with case studies. Hannah provided support in the form of meeting with the client regulator, reviewing the utility's filings, conducting research, and drafting and editing the report.

Litigation support or support in regulatory proceedings

- ***economic impact analysis for an outage resulting from the impairment of critical transmission infrastructure:*** LEI was hired by a New England utility to carry out an independent expert analysis regarding the potential economic losses (and other associated costs) to electricity consumers affected by a highly critical transmission system component forced out of service. LEI relied on the concept of Value of Lost Load ("VoLL") and understanding of the scope of impact to estimate the economic impact of the outage. The purpose of this analysis was to determine whether the investment in infrastructure (ballistic physical barrier) proposed by the utility to limit the probability of occurrence (or the intensity) of a high-impact outage could be economically justified at the proposed cost. Hannah worked on both the quantitative task in this assignment, as well as drafted and edited the final report.
- ***provided market research used in a legal proceeding:*** LEI was retained as an independent expert in a legal proceeding on a renewable energy case in North America. LEI was responsible for preparing an expert report consisting of research on the types and costs of services typically provided by development service companies to renewable energy projects.

Hannah provided supporting materials from sources including the US Securities and Exchange Commission (“SEC”), publicly available legal and bankruptcy proceedings, and other US-agency websites, among other sources.

Business models and investment support

- *valuing pre-customer discount bill credits in a New England state:* LEI was retained to provide a private investor with a forecast of a New England state’s residential kWh credit and non-residential tariff rate net energy billing programs for three different electric distribution utilities. Hannah provided research, data, and analysis on the state’s standard offer, transmission and distribution, and tariff prices, as well as a sensitivity analysis of LEI’s price forecast for the two net energy billing programs under the three utilities of interest.
- *support in understanding the US northeast offshore wind market:* For a European investor, LEI assembled technical information on the regulatory, market, and policy conditions relevant to offshore wind development in the US northeast. As part of this assignment, Hannah provided an explanation of the offshore wind development process in two New England states, including context on the states’ procurement processes, contract and pricing structures, regulatory considerations, and local content requirements.
- *HVDC interconnection business and operation models:* On behalf of a large utility, LEI performed an assessment of the current use of HVDC interconnectors across the US. LEI’s discussion included a review of existing interconnectors, their use, and business models. LEI further discussed current market rules pertaining to inter-jurisdictional HVDC transmission links, rule changes contemplated by various ISOs to enable increased market participation from these resources, together with potential business models identifying revenue streams and beneficiaries for future HVDC transmission assets. Hannah conducted extensive research on this project on these topics.

Sustainable and renewable project development

- *evaluated the true cost of renewable energy integration with the grid:* LEI was retained by a Southeast Asian entity responsible for electricity planning and management to provide an in-depth analysis of the costs associated with the integration of solar PV technology into the grid system. As part of this engagement, LEI was tasked with formulating a true integration cost of solar PV and subsequently developing a tariff framework that fairly allocates and distributes these costs to applicable entities (ratepayers, solar developers, traditional generators, etc.). LEI then determined the socioeconomic impacts of increased solar penetration. In addition to other tasks, Hannah primarily engaged in numerous stakeholder meetings and conducted literature reviews on how renewable integration costs are calculated and mitigated in other international jurisdictions, with a special focus on the UK.
- *strategized new project development and investment standards:* The Ministry of Mines and Energy of Colombia envisions that the northern-most region of La Guajira will become a core development spot for renewable energy projects. This will first require consensus from local and indigenous communities that have been negatively impacted by coal production from the Cerrejón open-pit mine. Hannah was a core team member who conceptualized and authored a guidebook and ESG- and SDG-based compliance checklist for the private sector explaining its obligations under the novel Community Partnership Agreement, a legally

binding contract that holds companies accountable for developing resources and projects sustainably and equitably. The final report championed stringent investment standards via cumulative environmental impact assessments (“EIAs”), the creation of a Social Wealth Trust Fund, and the introduction of cross-default.

Fuel procurement

- ***supported diversification of natural gas supply:*** The strategy of both the Polish Oil & Gas Company (“PGNiG S.A.”) and the Polish government was to develop the country’s counterparty portfolio and diversify natural gas supplies in order to replace Gazprom imports by 2022. The LNG Department was tasked with achieving these goals. Hannah critiqued and negotiated commercial terms of NDAs, term sheets, and MSPAs. This led to the signing of LNG supply agreements including a 5-year contract for 9 U.S. cargoes with Centrica LNG Co. Ltd. (November 2017), 20-year SPAs with Venture Global LNG (October 2018) and Port Arthur LNG (December 2018), and a 24-year contract with Cheniere Marketing International LLP (November 2018). Additionally, Hannah facilitated the application for a UK Gas Shipper License and the purchase of two spot LNG cargoes. Furthermore, she built a dynamic, interactive Excel shipping calculator that computed final LNG landing price at various global ports.

Climate finance and economic relief packages

- ***review of energy- and climate-focus of COVID-19 economic relief packages:*** The Energy Policy Tracker is an initiative consisting of six core organizations: International Institute for Sustainable Development (“IISD”), Institute for Global Environmental Strategies (“IGES”), Oil Change International (“OCI”), Overseas Development Institute (“ODI”), Stockholm Environment Institute (“SEI”), and Columbia University Center on Global Energy Policy. This core group is joined by numerous contributing partners located in Latin America, Europe, and Asia. The purpose of this initiative is to track public money allocation for energy in COVID-19 recovery packages. There are currently 31 major economies and 8 multilateral development banks that are being tracked. Hannah was the Curator for both Poland and European Institutions, updating the Tracker with energy- and climate-related spending on a weekly basis.
- ***draft whitepapers with suggestions for the U.S. financial system in light of climate change:*** The Regenerative Crisis Response Committee (“RCRC”) is a group of ten leading experts in economics, law, and public policy working to guide US monetary and financial policy post-COVID-19 in a greener, more sustainable direction. The objective is to mitigate the effects of climate change on the US economy with new policies and incentives. Following COP26, the RCRC published three major whitepapers on the following subjects: green mortgages, green federal procurement, and carbon offsets. Hannah conducted research and drafted these whitepapers.

Subsidy reform support

- ***recommended improvements in reform support to underdeveloped and developing nations:*** The World Bank’s Energy Sector Management Assistance Program (“ESMAP”) supports governments across Latin America, Europe, Africa, and Asia in implementing subsidy reform programs. This includes both technical assistance as well as in stakeholder management (i.e.,

performing political economy analyses and providing support to relevant ministries building consensus for tariff increases). Hannah took stock of the World Bank's design and conduct of 60+ global fossil fuel subsidy and tariff reform programs. She then drew lessons that will help improve the Bank's support to governments.

- ***recommended negotiation strategy for World Trade Organization ("WTO") subsidy negotiations:*** Generous subsidies to the fishery industry have led to overfishing and, subsequently, an unhealthy drop in fishery stocks. IISD was hired to provide advisory support to countries scheduled to take part in fishery subsidy negotiations at the WTO-level. These countries are eligible for differential treatment due to their status as least-developed countries. For this project, Hannah produced a confidential scoping study for the Government of Myanmar on pathways to fishery subsidy reform and suggestions for the country's negotiation strategy.

Market and policy research and analysis

- ***reviewed policies and incentives for electric vehicle uptake:*** The Organization for Economic Cooperation and Development ("OECD") and IISD were chosen to provide support to policymakers seeking to increase electric vehicle ("EV") uptake. Hannah was subcontracted to provide research support. She compiled a literature review of over 100 sources on lithium-ion battery and raw material recycling, focusing on EV recycling state-of-play, regulatory and trade barriers, and technological developments. She then compiled a checklist of 85 policies, regulations, and incentives that attracted public and private investment in the EV and battery value chains of major global markets.
- ***studied National Energy and Climate Plans in Central and Eastern Europe:*** The European Bank for Reconstruction and Development's ("EBRD") Green Economy Transition ("GET") program helps countries transition into green, low-carbon, and resilient economies. It is important to understand national energy contexts when strategizing and plugging-in GET programs. As such, Hannah assessed and deciphered the National Energy and Climate Plans of Estonia, Hungary, Latvia, Lithuania, Slovakia, and Slovenia to inform EBRD Warsaw's upcoming GET investments.
- ***investigated the status of European Projects of Common Interest ("PCIs"):*** PCIs are priority projects for connecting the European Union's ("EU") energy networks. Despite their importance at the EU-level, many projects have been significantly delayed. Hannah investigated the dormant status of gas infrastructure PCIs in Central and Eastern Europe. She also studied the reluctance to establishing an Energy Union stemming from a perceived challenge to national sovereignty.
- ***analyzed U.S. gas market viability:*** As a research assistant for *The New Geopolitics of Natural Gas*, published by Harvard University Press in 2017, Hannah drafted and edited book content on the history of the natural gas industry; natural gas pipeline/ LNG market and infrastructural developments in North America, Europe, Africa, and Asia; shifts in gas pricing schemes; discourse on global climate change; as well as on the implications of the US shale revolution on both the global gas market and on European energy security.

A.5 Jingyun Huang (Angela)

*Research Associate, London Economics International
LLC*



KEY QUALIFICATIONS:

Jingyun is a Research Associate at London Economics International LLC (“LEI”) Boston Office, where she applies her knowledge and analytical skills in energy markets and brings experience in energy transitions to the firm’s engagements with government bodies, regulators, utilities and private equity firms on issues regarding market and tariff design, project evaluations, wholesale price analysis, and utility management/performance auditing. Jingyun is LEI’s electricity market modeler for NYISO, responsible for analyzing changes in market rules and system dynamics.

Jingyun received her Master of Arts in International Relations from Johns Hopkins University, School of Advanced International Studies in 2022, concentrating in Energy, Resources, and Environment, and holds a Bachelor of Laws in Political Science from Peking University. Prior to LEI, she worked at International Energy Agency, focusing on energy transition issues in China and was responsible for the agency’s stakeholder engagement in Asia Pacific. She has also worked as a Graduate Consultant for World Bank Group investigating Kazakhstan’s oil and gas sector. Jingyun is fluent in English and Mandarin Chinese.

EDUCATION:

Institution	Johns Hopkins University – School of Advanced Studies
Date:	May 2022
Degree(s) or Diploma(s) obtained:	M.A. - Master of Arts in International Economics and Relations
Institution	Peking University
Date:	July 2020
Degree(s) or Diploma(s) obtained:	L.L.B. – Bachelor of Laws in Political Science
Institution	Columbia University
Date:	May 2019
Degree(s) or Diploma(s) obtained:	Semester Exchange

EMPLOYMENT RECORD:

Date:	August – Present
Location:	Boston, MA
Company:	London Economics International LLC

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Position:	Research Associate
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Date:	February 2022 - May 2022
Location:	Bonn, Germany (Remote)
Company:	United Nations Climate Change (UNFCCC)
Position:	Capacity-building and Negotiations Intern

Date:	January 2022 - May 2022
Location:	Washington DC, United States
Company:	World Bank Group
Position:	Graduate Consultant

Date:	July 2021 - January 2022
Location:	Paris, France
Company:	International Energy Agency
Position:	Policy Analyst

RECENT PROJECT EXPERIENCE:

<i>Date:</i>	September 2022 - present
<i>Location:</i>	New York
<i>Company:</i>	LEI's Continuous Modeling Initiative (CMI)
<i>Description:</i>	As lead New York market modeler, Jingyun 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>	November 2022 - January 2023
<i>Location:</i>	New York
<i>Company:</i>	Confidential client (electric utility)
<i>Description:</i>	<p>Modeling of ELCC Accreditation Curve for Battery Storage</p> <p>LEI was retained by a large electric utility to provide due diligence support on their renegotiation of long-term contracts. The utility aimed to commercialize a battery storage project in NYISO by 2026. Jingyun analyzed the key aspects of NYISO's accreditation proposal and how it would affect battery energy storage, and used ELCC approach to estimate the potential Capacity Accreditation Factor of the project in multiple capacity zones, in turn to derive the project's UCAP for the considered years.</p>

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<i>Date:</i>	October 2022 – January 2023
<i>Location:</i>	North Dakota
<i>Company:</i>	North Dakota Public Service Commission
<i>Description:</i>	<p>Montana-Dakota Utilities Rate Case</p> <p>LEI was engaged with the North Dakota Public Service Commission as an independent technical consultant, supporting the Commission's rate case involving Montana-Dakota Utilities. LEI examined key components of the rate case, which included the depreciation study, tax rates, environmental upgrades, transmission investment, the ROE/common equity ratio, amortization for early retirement of coal plants, and impacts on residential rates versus impacts on other classes of service. LEI prepared data requests, and provided written and oral testimony. Jingyun worked on the sections related to transmission investments and riders, as well as taking charge of the tracking system of data requests. [Case No. PU-22-194]</p>

<i>Date:</i>	August 2022 – ongoing
<i>Location:</i>	Mississippi
<i>Company:</i>	Mississippi Public Service Commission
<i>Description:</i>	<p>Management Audit of Entergy Mississippi</p> <p>LEI was engaged to conduct the annual fuel procurement and management audit of Entergy Mississippi. The LEI team assessed a complex array of issues including the Company's organization and staffing, risk management and company controls, coal procurement and inventory management, coal transportation, natural gas procurement and trading, plant operations and generation portfolio management, energy procurement and trading, and costs associated with the Grand Gulf nuclear plant. LEI prepared a comprehensive report detailing its analysis, findings, and recommendations, and appeared before the Mississippi Public Service Commission to present its findings and recommendations. Jingyun investigated in the nuclear plant and power purchase agreement, analyzing their nuclear fuel cycle, purchasing process, responds to the market changes, and nuclear fuel costs and efficiency as well as the cost and revenues under the power purchase agreement for Grand Gulf.</p>

<i>Date:</i>	August 2022 – ongoing
<i>Location:</i>	Maine
<i>Company:</i>	Maine Public Utilities Commission
<i>Description:</i>	<p>CMP Investment Incentives</p> <p>LEI assisted the Maine PUC in its investigation of Central Maine Power Company management issues and related ratemaking and performance incentive mechanisms. Ultimately, the Commission's goal was to determine whether the rate plan proposed by CMP would be more suitable than the current cost-of-service rate plan under which CMP operates, given Avangrid/Iberdrola's incentives to invest in CMP. Jingyun developed detailed case studies of performance-based ratemaking regimes in New York and other US jurisdictions, and the role and effectiveness of performance incentives such as storm response mechanism in the regimes.</p>

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