BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of:

DIRECT TESTIMONY

OF

KURT G. STRUNK

ON BEHALF OF

NORTH CAROLINA SUSTAINABLE ENERGY ASSOCIATION
Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.
A. My name is Kurt G. Strunk. My business address is 1166 Avenue of the Americas, New York, New York 10036.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?
A. I am employed as a Director of National Economic Research Associates, Inc. (“NERA”). NERA is a firm of consulting economists with its principal offices in a number of major U.S. and European cities. NERA’s experts have advised on power sector development since the firm’s founding in 1961. We have been influential in major initiatives such as marginal cost pricing for electric utilities, sector restructuring and the competitive procurement of power supply.

Q. PLEASE DISCUSS YOUR PROFESSIONAL BACKGROUND.
A. I have over twenty years of professional experience working as an economist in the power sector. My practice at NERA focuses on financial matters of energy firms. I frequently serve as an expert on the requirements of investors with regard to committing capital to energy sector investments. My work in matters relating to power generation is extensive and includes resource planning, asset and contract valuation, and competitive bidding. I have worked on dozens of assignments related to power contracting and generation development.
My current curriculum vitae, which more fully details my educational, consulting and testifying experience, is provided in Exhibit 1 to this testimony.

Q. **HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH CAROLINA UTILITIES COMMISSION?**

A. No, I have not.

Q. **HAVE YOU PREVIOUSLY TESTIFIED BEFORE REGULATORY COMMISSIONS IN OTHER JURISDICTIONS?**

A. Yes. I frequently serve as an expert in matters before state and federal regulatory commissions. I have presented expert evidence in matters before the Hawai‘i Public Utilities Commission, the Maryland Public Service Commission, the Massachusetts Energy Facilities Siting Board, the Nevada Public Utilities Commission, the Ohio Public Utilities Commission, the Regulatory Commission of Alaska, the Washington Utilities and Transportation Commission, as well as the Federal Energy Regulatory Commission and the National Energy Board of Canada.

Q. **WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

A. The purpose of my testimony is to evaluate whether reduction in term from fifteen years to ten years and proposed two-year energy pricing resets for the
Commission-approved standard power purchase agreement ("PPA") rates and contract terms available to qualifying facilities (the "Standard Offer") proposed by Duke Energy Carolinas, LLC, Duke Energy Progress, LLC (collectively, "Duke") and Dominion North Carolina Power ("Dominion"), (collectively, the "Utilities") will compromise the ability of new Qualifying Facilities ("QFs")\(^1\) to secure reasonable terms for the long-term financing necessary to enable construction of those facilities.

Q. WHAT DATA AND INFORMATION HAVE YOU RELIED UPON FOR THE DEVELOPMENT OF YOUR TESTIMONY?

A. Exhibit 2 identifies the documents I relied upon in forming the opinions presented in my testimony. These opinions are also based on my experience working on matters related to the development of new power generation facilities in various jurisdictions.

Q. WHAT HAVE THE UTILITIES PROPOSED SPECIFICALLY RELATED TO THE STANDARD OFFER?

A. Ms. Bowman, witness for Duke, explains that Duke is proposing significant changes to the Standard Offer available to QFs. Specifically, Ms. Bowman’s direct testimony identifies the following changes, among others:

\[^1\] By Qualifying Facilities, I mean new power generation facilities that meet the requirements of the Public Utility Regulatory Policies Act ("PURPA"), as implemented by the Federal Energy Regulatory Commission.
• Reducing the eligibility limit for the Standard Offer from 5 megawatts ("MW") to 1 MW for non-hydroelectric generators;
• Transitioning to a single, 10-year PPA with fixed, levelized capacity rates and energy rates that are adjusted every two (2) years;
• Amending Duke’s Terms and Conditions to include circumstance that requires action by the Companies to comply with NERC and SERC regulations as an “an emergency condition;”
• Amending the Companies’ standard PPAs to ensure that the Commission’s eligibility threshold for the Standard Offer is not evaded by subsequent transfers of standard PPAs to a partner or affiliate of a developer of another QF of the same energy resource located within one-half mile.

Similarly, Mr. Gaskill, witness for Dominion, has proposed the following:

• Reducing the eligibility limit for the Standard Offer from five MW to one MW; and
• Reducing the term of the PPA from 15 years to 10 years.

Q. DOES YOUR TESTIMONY ADDRESS ALL OF DUKE’S AND DOMINION’S PROPOSED CHANGES?
A. No. My testimony addresses the proposed changes that are likely to have the greatest effect on the ability of QFs to have a reasonable opportunity to attract capital from potential investors. These are: 1) the reduction of the
PPA term to ten years; and 2) the adjustment of avoided energy rates every two (2) years.

Q. **WHAT DO YOU CONCLUDE?**

A. I conclude that these proposed changes will not provide QFs with a reasonable opportunity to attract capital from potential investors. As I explain below, these changes will compress the recovery of capital investment in long-lived generation assets into too short a period to allow QFs to attract capital on reasonable terms.

Q. **QUALIFYING FACILITIES ARE A TYPE OF INDEPENDENT POWER PRODUCER. PLEASE PROVIDE BACKGROUND ON THE BUSINESS MODEL FOR INDEPENDENT POWER PRODUCERS.**

A. In states like North Carolina that have not elected to open their markets to retail competition and where wholesale competition is in most locations not facilitated by an organized wholesale market, the business model for independent power production facilities relies on forward contracting. Independent power producers derive revenue and cash flow from the sale of energy and capacity to integrated utilities, which then sell bundled electricity service to final customers. These independent power producers typically

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2 Policy makers in the United States have pursued two types of market opening: 1) the introduction of retail competition; and 2) the enabling of greater wholesale competition through the implementation of organized competitive wholesale markets. In this case, I am referring both to the lack of a competitive retail market and to the lack of an organized and easily accessible wholesale market in much of the state of North Carolina.
must obtain long-term contracts to secure financing and to ensure that the
independent power producers are not subject to “holdup”\(^3\) of these highly
relationship-specific investments. The holdup problem occurs when large
capital investments are made to support a specific trading relationship, and
then one party to that relationship acts opportunistically to usurp the other
party’s trading value.

Under long-term contracts used by independent power producers, the
local utility typically is the purchaser of the electrical output. Holdup, in this
context, would be opportunistic behavior by the purchasing utility (for
example, to lower the price or to impose other unfavorable terms) after the
investment has been made and the independent power producer no longer
has negotiating leverage because there are no practical alternative buyers of
its output. While QFs are entitled to avoided cost pricing, the pricing to
which the QF will be entitled subsequent to the term of the PPA is not
knowable at the time a QF makes its initial investment decision. The
viability of new QFs, therefore, depends on the price and non-price terms of
the PPAs that govern sales of output from those facilities and are entered
into before investors commit capital to the business. Fixed pricing\(^4\)
committed for long contract durations – sufficient to provide a reasonable


\(^4\) By fixed pricing, I am referring to prices that are fixed in nominal terms or prices that are fixed in real terms with period adjustments for inflation.
amortization of sunk investment costs for a long-lived asset – has traditionally underpinned the financing of new independent power production facilities.

Q. **WHAT FEATURES DISTINGUISH A FINANCEABLE PROJECT FROM A NON-FINANCEABLE ONE?**

A. There is no bright line differentiating a financeable project from a non-financeable one. Getting a new power project financed with reasonable quantities of debt tends to hinge on factors such as the amount of equity committed, the interest rates paid, payback periods and other terms required by lenders, as well as the lenders’ perceptions of risk in extending credit to the project.

Q. **WHAT TRADE-OFFS EXIST AMONG THE VARIOUS PARAMETERS AFFECTING QF DEVELOPMENT?**

A. The most important trade-off among the parameters affecting QF development is between the PPA duration and the price at which a QF will have a reasonable opportunity to attract capital from potential investors. Reducing the PPA duration will increase the price at which a QF must sell in order to be able to attract financing, all else equal. If the price at which a QF must sell is in excess of the rate that reflects the utility’s then avoided cost, then the QF will not be developed.
Q. CAN QFS SET THE PRICE AT WHICH THEY MAKE SALES TO THE UTILITIES?

A. No. QFs are price takers. They receive avoided cost pricing from utilities. They cannot choose the price at which they sell. However, they can choose whether they develop new facilities, and they will do that based on the price they require in order to be viable (i.e., have a reasonable opportunity to attract capital from potential investors). This price is in turn based upon their costs.

Reducing the PPA term and including 2-year energy price resets raises the $/kWh price that a QF requires to be viable for two reasons: 1) the QF’s cost of capital will increase as its investors bear more risk; and 2) as a practical matter, investors will seek shorter amortization periods for capital investments, which in turn translate to higher short-term cash flow requirements.

Hence, reducing the term of the PPA increases the near-term costs for the QF, decreases the possibility that those costs could be recovered under avoided cost pricing, and reduces the likelihood that the QF will be developed.

This could easily be the case not because a QF is more expensive relative to alternative resource options when compared on an apples-to-apples basis.
(e.g., levelized $/kWh cost over the facilities’ useful life), but rather because
the institutional and market framework for QFs operating in North Carolina
includes PPA terms that are too short to allow reasonable access to capital.

Q. WHY DOES REDUCING THE TERM OF THE PPA MEAN THAT
QFS WILL NEED TO RECEIVE HIGHER PER KWH PRICES?

A. The shorter PPA gives the QF less time to recover its capital investment.
The compression of the capital repayment schedule, in turn, pushes up the
price that the QFs must be paid in order to be solvent in the years over which
the PPA applies and debt would typically be serviced.

Q. BUT THE INVESTORS IN QUALIFYING FACILITIES MUST
RECOGNIZE THE RESIDUAL VALUE OF THE FACILITY
BEYOND THE PPA TERM. DO THEY NOT?

A. Equity investors may count on a certain amount of residual value after the
PPA term. But that does not mean that they will be willing to accept a large
share of unrecovered capital at the end of the PPA. Forcing too much of the
capital recovery into an uncertain post-PPA term will undermine the
attractiveness of the investment opportunity to equity investors.

Q. HOW WILL LENDERS VIEW PPA ENERGY PRICING THAT
RESETS EVERY TWO YEARS?
A. Lenders typically rely upon fixed pricing for assurance that the project will be in a position to service its debt. Lenders evaluate various credit metrics that depend on the projected cash flows, which in turn are driven by revenue, based upon the projected output of the generating facility and the fixed prices for the electrical output. The proposed reduction of the time period over which fixed rates apply will lead to lenders to view the effective PPA coverage period as only two years, even though Duke is proposing a ten-year PPA term. Lenders will significantly discount the revenues available beyond that two-year period. Because of the discounting of revenues beyond the second year, it is unlikely that project debt could be obtained in reasonable quantities for terms longer than two (2) years. In contrast, if the energy pricing were fixed for the entire period of the PPA term, that level of discounting would not occur and higher debt levels could be used to finance the project.

Q. CAN THE QF DEVELOPER SOLVE SOME OF THESE PROBLEMS BY CONTRIBUTING MORE EQUITY?

A. In principle, the developer could contribute more equity. At the extreme end of the spectrum, the developer could contribute the entirety of funds needed to construct the facility. In practice, however, it is unlikely that the project sponsor or other equity investors would be willing to provide equity in such large quantities required to make the project viable in such a context. Equity investors in power projects are often capital constrained and seek to employ
debt leverage as part of attractive financial structures and to be able to offer lower prices. From their perspective, the equity investors will be taking on all of the risks of the project but the return available to do so would be lower than the expected return on the traditional structure with long-term debt. While the unleveraged equity investment carries less financial risk, all else equal, it may not offer a return high enough to make the project attractive to an equity provider. This is accentuated by the fact that an equity investor would require higher returns, all things equal, with two-year PPA energy price resets as compared to energy prices fixed for the term of a PPA. Equity investors, like lenders as discussed above, would view the two-year resets as adding significant risk to the cash flows from the investment. This in turn would drive up the cost of financing.

Q. YOU MENTIONED COMPRESSION OF THE CAPITAL REPAYMENT PERIOD FOR QFS WITH SHORTER-TERM PPAS. FOR COMPARISON PURPOSES, WHAT CAPITAL REPAYMENT SCHEDULES DOES DUKE USE FOR ITS REGULATED GENERATION ASSETS?

A. For several out-of-state solar projects, Duke has relied upon a useful life of 30 years with a corresponding depreciation rate of 3.33 percent. For a

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recent combined heat and power project in North Carolina, Duke sought approval of a useful life of 35 years.\(^6\) For coal facilities subject to regulation by this Commission, I understand Duke uses a 60-year useful life, and a 40-year useful life for natural gas facilities subject to regulation by the Commission.\(^7\)

The point here is that Duke itself uses relatively long capital recovery periods for its long-lived generation assets, yet is proposing changes that reduce capital recovery periods for QFs to unreasonably short periods given the useful lives of such generating assets.

**Q. WHAT DO YOU MAKE OF THE UTILITIES’ PROPOSAL TO LOWER THE PROJECT SIZE TO WHICH THE STANDARD OFFER PPA WILL BE AVAILABLE?**

**A.** My expectation is that the smaller facilities are those that naturally have more difficulties in obtaining financing. This is why, for example, one sometimes observes pools of small projects being financed together as a group. The reduction in eligibility threshold for the Standard Offer should be expected to further challenge the financing prospects for QFs.

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\(^7\) Christopher J. Ayers, Executive Director, NCUC Public Staff, Ratemaking Presentation, available at: http://epic.uncc.edu/sites/epic.uncc.edu/files/media/Ratemaking%20presentation%20EPIC.pdf.
Q. **IS YOUR ANALYSIS LIMITED TO SOLAR QFS?**

A. No. My analysis is not limited to solar QFs. While each technology has its own economics, the principles I have outlined above are general and not specific to a given type of generating technology.

Q. **HAVE YOU PREPARED EXHIBITS SHOWING THE EFFECTS OF THE PROPOSED PPA CHANGES?**

A. Yes, I prepared Exhibit 3 and Exhibit 4 to illustrate my analysis. Exhibit 3 depicts how the Utilities’ proposals will shift more risk to QFs and shorten the time period during which they can expect a stable revenue stream, thereby compromising their ability to obtain financing on reasonable terms. Exhibit 4 provides an illustration of how the Utilities’ proposals will change the economics of a QF investment relative to a forecasted avoided cost rate. Together, these exhibits show how the proposed changes to the terms and conditions of the Standard Offer will unreasonably limit QFs’ access to capital.

Q. **PLEASE EXPLAIN EXHIBIT 3 IN MORE DETAIL.**

A. Exhibit 3 visually depicts two of the proposed changes to the Standard Offer that are before this Commission. For a hypothetical facility with a 30-year useful life, Exhibit 3 shows the revenue streams that would be available to QFs under several PPA constructs. For the existing Standard Offer PPA
construct, investors can count on contracted revenues for 15 years to support investments in new facilities. Reducing the PPA term from 15 years to 10 years reduces by one third the period during which investors can count on stable revenues. Grafting onto a 10-year PPA the proposed two-year energy price reset leads to a situation where lenders and equity investors will only be able to count on two (2) years of known energy revenues during the facility’s 30-year useful life. All energy revenues after the second year will be regarded by lenders and equity sponsors as risky and will be discounted accordingly.

Q. **WHAT DOES EXHIBIT 4 ILLUSTRATE?**

A. Exhibit 4 extends the concepts advanced in my testimony and highlighted in Exhibit 3. Using hypothetical assumptions for a new QF—including the unit size, construction cost, debt and equity ratios, tax depreciation schedule, applicable tax rates, inflation, and costs of capital—I estimate the annual revenue requirement that would be necessary for a QF to cover its fixed capital investment costs. Using the unit’s capacity factor, I then calculate the levelized cost of energy over the term of the Standard Offer PPA necessary to recover fixed capital investment costs. First, I make the levelized cost calculation assuming the existing 15-year term available to QFs. Second, I make the levelized cost calculation using the 10-year term proposed by the Utilities. Third, I calculate the levelized cost with both the 10-year term and two-year energy price resets. As these figures are
illustrative, and not intended to represent actual QF costs, I present them on a relative basis as compared to the per kWh revenue requirement under the status quo Standard Offer. This analysis shows that decreasing the Standard Offer PPA term and implementing two-year energy price resets will increase the revenue requirement of QFs, all else equal. The higher revenue requirement calculated for the shorter PPA term reflects compressed recovery of capital investment, while the higher revenue requirement calculated for the PPA with two-year energy price resets reflects increased price uncertainty and greater discounting of expected revenues.

Q. WHAT IS THE DIFFERENCE BETWEEN THE FIRST AND SECOND CHART IN EXHIBIT 4?

A. Exhibit 4 contains two charts because I illustrate the QF economics using two scenarios: in the first, no residual value is attributed to the post-PPA term (first chart); in the second, a residual value equal to 30 percent of the initial facility investment is attributed to the post-PPA term (second chart). While many QF investors will be unwilling to count on 30 percent of the capital recovery occurring after the term of the initial PPA, I present this scenario to illustrate that the Utilities’ proposals could also render infeasible QFs that are willing to accept high levels of equity investment risk.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.
Mr. Strunk is an expert in applied finance and energy matters with over 20 years of experience in complex commercial litigation, arbitration and regulatory proceedings. He has been retained as an expert to testify before arbitrators, the Federal Energy Regulatory Commission, US Tax Court, US Federal Court, and US Bankruptcy Court, the National Energy Board in Canada, as well as before state and provincial public utilities boards in the US and Canada. His testimonies have addressed the estimation of damages in breach of contract claims, asset and contract valuation, cost of capital, trading and risk management, the application of the just and reasonable rate standard, prudence, cost of service, regulatory reform, pipeline access and retail market issues. He has served as an advisor in over fifty public utility tariff reviews.

In the oil and gas sectors, Mr. Strunk has consulted on rate matters, mergers and acquisitions, restructurings, contract disputes, and product pricing. He has conducted numerous analyses of the procurement of fuels by electric generators. He served as an expert in regulatory hearings relating to pipeline tariffs in Canada and the United States. He has valued oil and gas assets and swaps in litigated disputes on behalf of major firms in the petroleum sector. He has also carried out studies of the reasonableness of gas supply agreements in various jurisdictions and assessed damages in connection with the early termination of such agreements.

In electric power, Mr. Strunk has advised governments, regulators, and energy companies on industry structure, regulation, and sector reform in North America, South America, Europe, Australia, Asia and Africa. He has worked extensively on matters related to all aspects of the electric power sector in the US and across the globe. In generation, Mr. Strunk recently co-authored a fairness opinion addressing a 6,300 MW nuclear power transaction in Ontario, Canada. He has advised a number of clients on the development of independent power contracts, fuel supply arrangements and competitive solicitations. With regard to transmission, he has advised on the design of transmission tariffs and on the design of electricity markets to encourage efficient transmission investment. He has advised on the electric sector reform program in Mexico, power market design and clean energy auctions, while also advising on capacity market design in US markets.

Mr. Strunk’s assignments often require that he determines the appropriate return on equity capital for energy firms. He has calculated and supported required rates of return for power generators, gas distribution utilities, electric distribution and transmission companies, and other energy firms in the context of traditional tariff reviews for regulated entities, litigation and advisory work. Mr. Strunk frequently collaborates with NERA's Securities and Finance Practice. He has addressed liability and damages in broker-dealer disputes, and in securities class actions.
Kurt G. Strunk

Education

1997  INSEAD (The European Institute of Business Administration), Fontainebleau, France
      MBA, with Distinction, 1997

1993  VASSAR COLLEGE,
      New York, USA
      B.A., Economics, General and Departmental Honors

Career Details

2017-present  NERA ECONOMIC CONSULTING
               Director, New York

2012–2016  NERA ECONOMIC CONSULTING
           Vice President, New York

2005–2012  NERA ECONOMIC CONSULTING
           Senior Consultant, New York

2003–2004  NERA ECONOMIC CONSULTING
           Outside Consultant, New York

2000–2002  NERA ECONOMIC CONSULTING
           Senior Consultant, New York

1998–1999  NERA ECONOMIC CONSULTING
           Senior Analyst, New York

1996  NERA ECONOMIC CONSULTING
      Associate Analyst, New York

1994–1995  NERA ECONOMIC CONSULTING
           Research Associate, New York

1993–1994  NERA ECONOMIC CONSULTING
           Research Assistant, New York

1992  GÉNÉRALE DE BANQUE
      Research Assistant, Brussels

Languages

English:  mother tongue
French:   fluent
Spanish:  fluent
Project Experience
EXPERT TESTIMONY

2017
NV Energy
Cost of Gas / Prudence
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the prudence of the Company’s gas purchases, March 1, 2017.

2016
NV Energy
Cost of Capital
Rebuttal Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company’s electric and gas divisions, September 23, 2016.

2016
Hawai‘i Electric Light
Incentive Ratemaking, Fuel Adjustment Clauses
Direct Testimony before the Hawai‘i Public Utilities Commission, on behalf of Hawai‘i Electric Light, addressing alternative incentive mechanisms for the Company’s power generation fleet and the reasonableness of the Company’s proposed ECAC. September 19, 2016.

2016
NV Energy
Cost of Capital
Certification Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company’s electric and gas divisions, August 2, 2016.

2016
NV Energy
Cost of Capital
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company’s electric and gas divisions, June 6, 2016.

2016
PacifiCorp
Cost of Capital
Oral Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company’s expedited rate filing (Docket UE-152253), May 2, 2016.
2016  Confidential Client
Damages under Wind Power Purchase Agreement

2016  Municipality of Anchorage (ML&P), Chugach Electric Association
Valuation of Gas Field and Reasonableness of Acquisition Price
Oral Testimony before the Regulatory Commission of Alaska on the reasonableness of the proposed acquisition of ConocoPhillips’ working interest in the Beluga River Unit, April 19, 2016.

2016  PacifiCorp
Cost of capital
Rebuttal Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's expedited rate filing (Docket UE-152253), April 7, 2016.

2016  NV Energy
Cost of Gas / Prudence
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2016.
2016  Alliance to Protect Nantucket Sound
Financial of off-shore wind farm
Oral Testimony before the Energy Facilities Siting Board of the Commonwealth of Massachusetts on the financeability of the Cape Wind project, January 25, 2016.

2015  PacifiCorp
Cost of capital
Direct Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital, November 24, 2015.

2015  Chugach Electric Association, Inc.
Regulatory principles for attributing found natural gas
Oral testimony before the Regulatory Commission of Alaska, addressing the regulatory treatment of gas found by the Cook Inlet Natural Gas Storage Alaska LLC, August 31, 2015.

2015  Baltimore Gas & Electric Company
Risks and rate of return for retail electricity business

2015  Baltimore Gas & Electric Company
Risks and rate of return for retail electricity business

2015  Chugach Electric Association, Inc.
Regulatory principles for attributing found natural gas
Pre-filed testimony before the Regulatory Commission of Alaska, addressing the regulatory treatment of gas found by the Cook Inlet Natural Gas Storage Alaska LLC, June 5, 2015.

2015  ATX Southwest, LLC.
Cost of Capital
Direct Testimony before the Federal Energy Regulatory Commission, on behalf of ATX Southwest, addressing return on equity, May 28, 2015.
2015  Chugach Electric Association, Inc.
Cost of Capital

2015  Baltimore Gas & Electric Company
Risks and rate of return for retail electricity business

2015  NV Energy
Cost of Gas / Prudence
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2015.

2014  PacifiCorp
Cost of capital
Oral Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, December 16, 2014.

2014  PacifiCorp
Cost of capital
Rebuttal Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, November 21, 2014.

2014  PacifiCorp
Cost of capital
Direct Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, including the effects of transitioning away from coal, April 30, 2014.

2014  Nevada Power Company
Cost of capital
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Nevada Power Company, on the cost of capital in the Company's general rate case, April 30, 2014.
2015  
NV Energy  
Cost of Gas / Prudence  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2014.

2013  
Sierra Pacific Power Company  
Cost of capital  
Oral testimony, before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, October 7, 2013.

2013  
Sierra Pacific Power Company  
Cost of capital  
Rebuttal Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, September 25, 2013.

2013  
Market Area Shippers  
(Gaz Métro, Union Gas and Enbridge Gas Distribution)  
Contract Renewal Alternatives for Regulated Pipeline Service  

2013  
Sierra Pacific Power Company  
Cost of capital  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, June 4, 2013.

2013  
NV Energy Operating Companies  
Cost of capital  
Direct Testimony before the Federal Energy Regulatory Commission, on behalf of NV Energy Operating Companies, on the appropriate rate of return for the consolidated transmission system, May 31, 2013.

2013  
Public Intervenor  
Wholesale Margins for Regulated Motor Fuels and Heating Oil  
Oral testimony before the New Brunswick Energy and Utilities Board, In the Matter of an Application by Irving Oil Marketing GP and Irving Oil Commercial GP requesting an increase in the wholesale margins for motor fuels and heating oil, January 29, 2013.
2013
Public Intervenor
Power sector modelling, deferral account policy, financial analysis

2012
Baltimore Gas & Electric Company
Potomac Electric Power Company
Power Purchase Agreements, Retail electric competition

2012
Public Intervenor
Modelling of coal and oil plants, deferral account, financial analysis
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board *In the Matter of the Point Lepreau Nuclear Generating Station Deferral Account and Section 143.1 of the Electricity Act*, November 26, 2012.

2012
Nevada Power Company
Cost of capital

2012
Public Intervenor
Wholesale margins for regulated motor fuels and heating oil

2012
Nevada Power Company
Prudence of gas costs for 2012

2012
Sierra Pacific Power Company
Prudence of gas costs for 2012
2011  
**Public Intervenor**

**Power system loss factors, OATT, transmission regulatory policy**  

2011  
**John Hancock**

**Risk analysis of European power plant leveraged lease**  
Oral Testimony before the U.S. Tax Court, on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, October 24, 2011.

2011  
**John Hancock**

**Risk analysis of European power plant leveraged lease**  

2011  
**John Hancock**

**Risk analysis of European power plant leveraged lease**  
Pre-filed Expert Report before the U.S. Tax Court on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, July 8, 2011.

2011  
**Public Intervenor**

**OATT, transmission regulatory policy**  

2011  
**Public Intervenor**

**Power system loss factor, OATT, transmission regulatory policy**  

2011  
**Baltimore Gas & Electric Company**

**Risks and rate of return for retail electricity business**  
2010 Baltimore Gas & Electric Company
Risks and rate of return for retail electricity business

2010 Public Intervenor
Greenfield gas distributor, cost of service, just and reasonable rates

2010 Public Intervenor
Greenfield gas distributor, cost of service, just and reasonable rates

2009 Public Intervenor
Greenfield gas distributor, cost of service, just and reasonable rates

2009 Public Intervenor
Greenfield gas distributor, cost of service, just and reasonable rates

2009 Public Intervenor
Greenfield gas distributor, cost of service, just and reasonable rates

2009 Public Intervenor
Greenfield gas distributor, cost of service, just and reasonable rates

2009 The City of New York
Cost of service, incentives and taxi lease rates

2009  
The City of New York  
Cost of service, incentives and taxi lease rates  

2009  
Public Intervenor  
Greenfield gas distributor, cost of service, just and reasonable rates  

2009  
Public Intervenor  
Greenfield gas distributor, cost of service, just and reasonable rates  

2009  
Public Intervenor  
Cost of service, ISO management, OATT transmission policy  

2009  
Public Intervenor  
Cost of service, ISO management, OATT transmission policy  

2008  
Allegheny Power, Baltimore Gas & Electric  
Integrated resource planning, competitive retail electric markets  
2008

**Allegheny Power, Baltimore Gas & Electric**

**Integrated resource planning, competitive retail electric markets**


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2008

**Public Intervenor**

**Ratemaking for greenfield gas distributor**

Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by Enbridge Gas New Brunswick for changes to its Charges, Rates and Tolls*, March 27, 2008.

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2008

**Public Intervenor**

**Ratemaking for greenfield gas distributor**


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2007

**Public Intervenor**

**Prudence, just and reasonable standard, affiliate transactions**


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2007

**Public Intervenor**

**Nuclear power plant Cost of Service**

Pre-filed Report before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls*, December 7, 2007.

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2007

**Public Intervenor**

**Prudence of power generation costs**

Pre-filed Report before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls*, November 5, 2007.

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2007

**Public Intervenor**

**Prudence of power generation costs**

Kurt G. Strunk

Corporation (Disco) for changes to its Charges, Rates and Tolls, June 21, 2007.

2007

Public Intervenor

Prudence of power generation costs
Pre-filed Report before the New Brunswick Energy and Utilities Board, In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls, June 14, 2007.

2006

Brookfield Energy Marketing Inc.

Valuation of power purchase agreement and power plant

2006

Brookfield Energy Marketing Inc.

Valuation of power purchase agreement and power plant

2006

Brookfield Energy Marketing Inc.

Valuation of power purchase agreement and power plant

2006

Public Intervenor

Application of the prudence standard to affiliate transactions
Oral testimony before the New Brunswick Board of Commissioners of Public Utilities, In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls, March 14, 2006.

2006

Public Intervenor

Application of the prudence standard to affiliate transactions
Pre-filed Report with Eugene Meehan before the New Brunswick Board of Commissioners of Public Utilities, In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls, January 31, 2006.
2005  Dayton Power & Light Company  Retail pricing for default service customers and option valuation  Oral testimony at hearings in Ohio Public Utilities Commission Case No. 05-276-EL-AIR, November 8 and 14 2005.

2005  Dayton Power & Light Company  Retail pricing for default service customers and option valuation  Deposition testimony in Ohio Public Utilities Commission Case No. 05-276-EL-AIR, November 8, 2005.

2005  Dayton Power & Light Company  Retail pricing for default service customers and option valuation  Testimony in Ohio Public Utilities Commission, in Support of Stipulation filed in support of Dayton’s proposed settlement Case No. 05-276-EL-AIR, November 4, 2005.

2005  Dayton Power & Light Company  Retail pricing for default service customers and option valuation  Rebuttal testimony in Ohio Public Utilities Commission, application of financial options pricing techniques to assess the reasonableness of Dayton's proposed provider-of-last-resort charges, Case No. 05-276-EL-AIR, October 31, 2005.

2004  Board of Public Utilities  Cost of capital  Pre-filed testimony with Cindy Ma before the Board of Public Utilities, Newfoundland and Labrador, Canada, on “The Cost of Capital for Automobile Insurance Firms,” October 13, 2004.
CONSULTING EXPERT EXPERIENCE

2016
Confidential Client
Valuation of Solar Generation Facilities
Advisor to counsel in dispute related to the valuation of solar facilities.

2014-Present
Confidential Client
Offshore Exploration and Production Permit Arbitration
Advised on dispute related to an agreement between two firms to develop an offshore gas field in New Zealand in arbitration at the ICC International Court of Arbitration.

2013-Present
Gaz Métro
Cost Recovery of Gas Distribution System Upgrade
Advised client on regulatory merits of ratemaking for distribution system upgrade. Performed survey of ratemaking policies for similar upgrades in other jurisdictions in connection with proceeding before Provincial regulator.

2014-Present
Confidential Client
Gas Supply Agreement Negotiation
Advise on cost of service and LNG contract price issues in Australia.

2014-Present
Alliance Pipeline
Restructuring of services and tolls
Advised on Alliance’s restructuring proposal in a matter before the National Energy Board. Supervised modelling of pipeline tolls and assessment of natural gas pipeline market power.

2014-2015
Gazprom OAO
Civil dispute involving gas field development and LNG importation
Supervised modelling of LNG netback prices and damage calculations in preparation for a jury trial before a Tarrant County, Texas District Court. Consulted with respect to a dispute between a U.S oil company and Russian oil company regarding ownership of a Russian gas field, tortious interference, and trade secret misappropriation with regards to a plan to import LNG into the United States in the mid-2000s.

2014
FortisBC Energy Inc
Tolling for pipeline in Canada
Analyzed toll methodology and advised on regulatory issues related to a tolling proposal of NGTL’s North Montney Mainline, an extension of the existing NGTL Alberta System.

2014
Royal Bank of Canada
**Gas Supply Agreement Dispute**
Served as consulting expert in a gas supply agreement dispute between RBC and three municipal gas distributors in Nevada and Iowa. Case involved analysis of Basel III regulations, capital requirements, commodity swaps and interest rate swaps.

2013  
Confidential client  
Valuation and pricing analysis  
Performed valuation and pricing analysis for oil pipeline dispute in Texas. Provided advice to outside counsel throughout litigation.

2012–2014  
ATCO Gas & ATCO Electric  
Cost of Service / Capital Trackers  
Provided expert review of ATCO Gas and ATCO Electric’s capital tracker proposals, including a survey of capital trackers in other jurisdictions.

2012–2013  
Confidential client  
Valuation of oil pipeline company and its hedging positions  
Performed valuation of oil pipeline company and its hedging positions in litigation involving an alleged breach of fiduciary duty. Provided advice to outside counsel throughout litigation.

2012–2013  
Confidential client  
Approaches to regulatory accounting and cost-of-service regulation  
Contributed to study assessing benefits of various approaches to regulatory accounting and cost-of-service regulation for pipelines.

2011–2013  
Confidential client  
Possible outcomes of power contract disputes  
Analyzed potential litigation and settlement outcomes in a series of power contract disputes. Provided advice to outside counsel.

2011–2012  
Confidential client  
Oil pipeline cost of service and depreciation policies  
Advised counsel to a shipper in an intrastate oil pipeline company rate case before the Kansas Corporation Commission.

2011  
Confidential client  
Antitrust aspects of a proposed pipeline merger  
Analyzed antitrust aspects of oil pipeline combinations in connection with a proposed merger. Provided advise to outside counsel.

2010–2011  
Confidential client  
Valuation of generation assets  
Performed valuation of power plant in context of alleged expropriation.
2010  Hydro Québec, Canada
    Grid connection and upgrade cost policy
    Analyzed grid connection and upgrade cost policy. Evaluated existing policy to allocate costs of grid upgrades to generation developers and system users. Suggested modifications to policy. Prepared benchmarking analysis comparing the company’s practices to those of over a dozen other entities in North America.

2008  Confidential client
    Allegations of energy market manipulation
    Advised on the evaluation of allegations of energy market manipulation in the context of physical electricity trades in RTO-managed markets.

2007  Confidential client
    Valuation of valuation of long-dated oil warrants
    Performed valuation of long-dated oil warrants priced off Venezuelan crude oil in context of damages calculation.

2006  Confidential client
    Damages valuation in securities class action
    Valued damages in a securities class action related to the bankruptcy of an energy retailer.

2003-2004  Confidential client
    Bid process advantages: generation pricing and transmission costs
    Contributed to testimony on behalf of a large electric utility regarding an affiliate transaction that resulted from a competitive solicitation. Testimony before FERC focused on whether the affiliate was advantaged during the bid process, both with respect to generation pricing and electric transmission cost.

2003  Confidential client
    Valuation, economic, accounting, and hedging analysis
    Performed valuation, economic, accounting, and hedging analysis of a gas-fired power plant in an international arbitration matter.

2002  Confidential client
    Prudence of forward power purchases
    Contributed to testimony on behalf of an electric utility regarding the prudence of forward power purchases during the Western power crisis.

2002–2003  Pacific Gas & Electric
    Valuation of Damages Due to Gas Pipeline Capacity Withholding
Performed analyses of damages from withheld pipeline capacity into California. Analyses led to $1 billion settlement.

2002–2003

Confidential client
**Prudence of forward power purchases**
Contributed to testimony regarding the prudence of Department of Water Resources’s forward power purchases during the Western power crisis.

2002

Confidential client
**Electric and gas hedging strategies for its generation assets**
Contributed to testimony on behalf of an energy marketing and trading firm regarding electric and gas hedging strategies for its generation assets, including an examination of the nature of competition among energy marketing and trading firms and strategies.

2001–2002

Pacific Gas & Electric Company
**FERC refund and other related proceedings**
Analysis and support to a California utility in the context of the FERC refund and other related proceedings, 2001-2002.

2001–2002

Pacific Gas & Electric Company
**Value of a long-term affiliate power sales agreement**
Contributed to testimony before FERC relating to the value of a long-term affiliate power sales agreement. Involved analysis and valuation of over 100 long-term power contracts in the context of this benchmarking analysis.

2001

Confidential client
**Valuation of a passive equity interest**
Contributed to testimony on behalf of a leading US energy company regarding the valuation of a passive equity interest in an IPP project in El Salvador.

2001

Baltimore Gas & Electric Company
**Business separation of Constellation Energy Group**
Contributed to testimony submitted to the Public Service Commission of Maryland on the business separation of Constellation Energy Group.

1998

Baltimore Gas & Electric Company
**Valuation of generation assets**

**1995–1996**

Confidential client

**Analysis of market concentration**

Performed HHI analyses to support testimony presenting a competitive assessment of the Western electric generation market in the US, 1995-1996.

**1994–1995**

Confidential client

**Damages valuation in securities class action**

Estimated losses and alleged damages for several mutual funds that invested in derivative securities.

**1994–1995**

Confidential client

**Damages valuation in securities class action**

Estimated losses and alleged damages for several mutual funds that invested in derivative securities.

**1994**

Goldman Sachs

**Default risk studies on fixed income instruments**

Prepared default risk studies on fixed income instruments for counsel to Goldman Sachs in a broker/dealer arbitration.

**1994**

Confidential client

**Damages valuation in securities class action**

Consulted to counsel for an infomercial company on materiality, liability, and damages in a shareholder class action suit.

**1993**

Confidential client

**Damages valuation in securities class action**

Assessed materiality and damages in a 10b-5 class action against a major pharmaceutical company.
ADVISORY PROJECTS

2016  Utility Merger
      Due Diligence for Prospective Acquirer
Retained by a confidential acquirer to evaluate a target utility and prospective merger benefits. Provided strategic advice and due diligence relating to the financial and regulatory implications of the acquisition.

2016  Wind Power Transaction
      Due Diligence for Prospective PPA Offtaker
Retained by a confidential offtaker to evaluate the costs, benefits and risks associated with a prospective long-term power purchase transaction backed by a wind farm.

2016  Electric Utility Acquisition
      Due Diligence for Prospective Acquirer
Retained by a confidential equity investor to evaluate load risk associated with the prospective acquisition of an interest in a regulated electric utility. Focused on risks around load forecast.

2015  Southern Star Central Gas Pipeline
      Due Diligence for Prospective Acquirer
Retained by a confidential equity investor to evaluate regulatory and investment risk associated with the prospective acquisition of an interest in Southern Star. Analyzed likely outcomes in the pipeline’s upcoming rate case.

2015  Independent Electricity System Operator (IESO)
      Reasonableness of 6,300 MW Power Transaction
Retained by IESO in Ontario, Canada, to prepare, together with a team of NERA experts, an Opinion as to the Fairness of the Amended and Restated Bruce Power Refurbishment Implementation Agreement.

2015  ESKOM, South Africa
      Regulatory Strategy for Cost Recovery
Retained by ESKOM to advise on regulatory strategy, treatment of coal-plant operation and associated fuel costs, delays in unit online dates and other regulatory issues.

2014  Hawaiian Electric Company
      Fuel Adjustment Clause and Oil Hedging
Retained by Hawaiian Electric Company to provide analysis regarding the efficiency incentives embedded in the company’s fuel adjustment clause (ECAC). Analyzed the possibility of hedging oil price volatility through commercially-available contracts.
2014  Confidential Client  
**Pricing Principles for Domestic Gas Reservation Policy**
Formulated a methodology to determine a schedule of reasonable prices using a cost of service approach for gas that the company is obligated to market under the domestic gas supply policy.

2012/2013  Atlantic Path 15  
**Due Diligence Study for Confidential Potential Buyer**
Performed regulatory due diligence in connection with the potential acquisition of Atlantic Path 15 transmission assets. Evaluated the regulatory climate at FERC and analyzed FERC decisions from prior rate cases, with a focus on allowed rate of return. Used NERA rate-of-return models to replicate the FERC methodology and to predict the rate-of-return to be allowed by FERC in the next rate case.

2013  Energy trading entity  
**Price risks and electricity transmission development**
Retained by energy trading entity to perform an independent study of price risks and electricity transmission development in the ERCOT market.

2013  Electric industry client  
**Reactive power compensation**
Retained by electric industry client to analyze electricity transmission tariffs and reactive power compensation in competitive electric markets.

2012/2013  New Mexico Natural Gas Company  
**Due Diligence Study for Confidential Potential Buyer**
Performed regulatory due diligence in connection with the potential acquisition of New Mexico Natural Gas. Assessed hurdles to getting the transaction approved by regulatory authorities. Analyzed recent rate actions by the state commission and the likely outcomes of future cases.

2012  Oil industry client  
**Regulation benchmarking in downstream oil sector**
Retained by oil industry client to advise on margins and to perform an international benchmarking of the regulation of the downstream oil sector.

2012  Hawaiian Electric Company  
**Hedging and rate stabilization**
Retained by Hawaiian Electric Company to provide analysis regarding hedging of fuel oil and diesel fuel purchases in order to stabilize customer rates.

2011  Confidential client  
**Implications of CFTC proposed definition of swap dealer**
Advised on margin, capital and reporting implications of CFTC proposed definition of swap dealer under Dodd Frank.

2010
Confidential client
Leveraged lease transaction
Provided litigation support services with respect to a dispute over a leveraged lease transaction.

2010
Confidential client
Valuation, risk assessment and analysis of offtake contract options
Performed detailed valuation, risk assessment and analysis of offtake contract options for a hydroelectric power plant.

2009
Potomac Edison Company
Capital investment planning
Performed least-cost capital investment planning on behalf of the Potomac Edison Company.

2009
Government of New Brunswick, Canada
Advised on asset valuation
Advised on inputs into the valuation of NB Power’s generation fleet, including the Point Lepreau Nuclear Generation Station in connection with the potential sale of NB Power to Hydro Québec. Coordinated assumptions with financial advisor for fairness opinion.

2009
Energy East
Cost of capital
Advised on rate-of-return issues for electricity distributors in New York State.

2008
Confidential client
Contract design
Advised on design of structured contract for new wind power plant, new electricity transmission lines and associated RFPs.

2008
Commission for Energy Regulation
Review of SOLR tariffs
Advise the Commission for Energy Regulation on the review of SOLR tariffs in the Republic of Ireland.

2008
Comisión Nacional de Energía
Market mechanisms for distributions to serve default customers
Advised on design and implementation of market mechanisms by which Spanish distribution utilities buy energy to serve default customers.
2006–2009  Hawaiian Electric Company  
**Hedging options for fuel**  
Performed economic and accounting analysis of hedging options for low sulfur fuel oil, diesel and fuel oil on behalf of Hawaiian Electric Company.

2004–2010  Commonwealth Edison and Ameren’s Illinois utilities  
**Competitive procurement for power supply**  
Advised Commonwealth Edison and Ameren’s Illinois utilities on the design of a competitive procurement for short- and long-term power supply, including the contractual framework for energy purchases, 2004 to 2010.

2004–Present  New Jersey and Maryland distribution utilities  
**Mark-to-market issues and credit policies**  
Advised several utilities in the Eastern Interconnection on mark-to-market issues and credit policies.

1999–2008  New Jersey distribution utilities  
**Contract design and implementation**  
Worked with credit representatives of New Jersey distribution utilities on contract design and implementation of the contract credit terms. Coordinated the utilities’ responses to changes to the forms of letters of credit proposed by bidders; oversaw bidder credit qualification process; managed approval process for alternate guaranty instruments, and served as advisor to utilities when contract interpretation issues arose, 1999 to 2008.

1999–2008  FirstEnergy Companies  
**Competitive procurement for power supply**  
Advised the FirstEnergy Companies on the design of a competitive procurement for intermediate term power supply, including the contractual framework for energy purchases, 2004-2005.

2003  Commission for Energy Regulation  
**Hedging agreement and a power plant construction agreement**  
Advised the Commission for Energy Regulation in Ireland on the structure of a long-term hedging agreement and a power plant construction agreement; assisted with the development of the hedging contract and the tender documentation; performed bid evaluation.

2002  Sierra Pacific Resources  
**Risk management strategies**  
Advised a major west coast utility in the US on the development of its risk management policy and procedures; reviewed past trading and risk
management strategies; and performed an assessment of its risk measurement and reporting techniques, including credit risk management policy.

2000

Ministry of Energy, México
Mexican IPP solicitation program
Advised on the development of the Mexican IPP solicitation program, including transaction structure (IPP v. BLT v. BOT), credit risk management, model contracts, and bid evaluation (the Comisión Federal de Electricidad has procured as much as 2000 MW per year of long-term power supply from IPPs).

2000

Comisión Federal de Electricidad, Mexico
Credit and collateral requirements for a power purchase agreement
Advised the Comisión Federal de Electricidad in Mexico on credit and collateral requirements for an asset backed power purchase agreement with an IPP based in Mexico, including advice on the development of comparable credit and collateral requirements for an import transaction that was to be made on a firm basis with liquidated damages.

1998–2000

Ministry of Energy, Mexico
Restructuring and privatization of the Mexican electricity sector
Consulted to the Mexican Ministry of Energy on the restructuring and privatization of the Mexican electricity sector, the design of a competitive spot market, and the policy of IPP solicitations, electricity transmission pricing, upstream gas pricing and the development of a regulatory framework for the sector.

1998–1999

Ministry of Energy, Mexico
Assessing competition in restructured Mexican electric generation
Contributed to study assessing competition in restructured electric generation market in Mexico.

1999

Swiss Re
Novel insurance packages to hedge electric price and operations risk
Assisted Swiss Re in the development of the modeling for the creation of novel insurance packages to hedge electric price and operations risk, 1999.

1998

Iberdrola S.A., Spain
Seminars on the deregulated markets for gas and electricity in the US
Designed and conducted a series of three training courses for representatives of Iberdrola S.A. (Spain’s principal private utility), which consisted of seminars on the deregulated markets for gas and electricity in the US, followed by a series of interviews with large utilities, IPPs, and energy marketers. Courses were designed to provide the European traders with an understanding of best practices employed by energy traders in the
1998

C.E.L.P.E, Brazil
Risk management and energy trading
Assisted in training senior management of Iberdrola’s Brazilian subsidiary C.E.L.P.E. in the area of risk management and energy trading.

1998–2000

Baltimore Gas & Electric Company
Sector restructuring
Consultant to Baltimore Gas & Electric Company on sector restructuring.

1998–1999

Baltimore Gas & Electric Company
Market value estimates of generation fleet
Assisted in developing market value estimates of Baltimore Gas & Electric Company’s generation fleet, including Calvert Cliffs Nuclear Power Plant.

1998

Confidential Client
Generation and fuel strategy
Participated in the development of a generation and fuel strategy for a large merchant generator and energy trader.

1996

Iberdrola, S.A, Spain
Restructuring of the electricity sector
Consultant to Iberdrola, S.A. on issues relating to the restructuring of the electricity sector in Spain.

1996

Confidential client
Investment strategy
Consultant to a major southeastern electric utility on investment strategy in the US.

1996

Confidential client
Competitive analysis of electric generation
Performed competitive analysis of electric generation market for utilities in eastern US.

1996

New York State Electric and Gas Company
Restructuring of the electricity market in New York State
Consultant to the New York State Electric and Gas Company on issues relating to the restructuring of the electricity market in New York State.

1995–1996

New York Power Authority
Sector restructuring
Consultant to senior management of the New York Power Authority on issues relating to the New York Competitive Opportunities Docket.

1995 Southern California Edison Company
Proposed restructuring of California’s electric services industry
Consultant to Southern California Edison Company on issues relating to the California Public Utilities Commission’s Proposed Policies Governing Restructuring California’s Electric Services Industry and Reforming Regulation.

Publications and Presentations

2016 Perusahaan Gas Negara
Provided in-depth training on regulatory practice and tariff design for gas pipelines and distribution companies.
December 2016.

2016 Electricity Journal
Low interest rates and unprecedented stock market volatility: What they mean for your next rate case.
January-February 2016.


Policy Options to Address Cross Subsidies from Self Generation, March 14, 2016

2016 International Arbitration Group of International Law Firm
Applications of Economic Analysis in International Arbitration (with a focus on the Energy Sector)
New York, January 12, 2016

2015 The Electricity Journal
Low interest rates and unprecedented stock market volatility: What they mean for your next rate case
December, 2015
2015  Utility Regulation Conference: Rate Case, ROE, and Reliability
Brave New World for Return on Equity
Washington DC, December 10-11, 2015

2015  Law Seminars International, Energy in the Northeast
Energy Sector Developments and the Cost of Capital
Boston, September 29, 2015

2015  Law Seminars International, Rate Case Conference
A Brave New World for Return on Equity
Las Vegas, March 5, 2014

2014  Law Seminars International, Rate Case Conference
Current Challenges in Determining Appropriate Rates of Return for Public Utilities
Las Vegas, February 28, 2014

2014  National Energy Agency (China) and representatives of the State Grid
Regulatory Accounting and the FERC Uniform System of Accounts
Beijing, January 16, 2014

2012  Agencia Nacional de Petroleo, Gas Natural e Combustiveis (Brazil)
Natural Gas Pipeline Regulation in the United States (training course)
Rio de Janeiro, September 18-19, 2012

2012  Center for Research in Regulated Industries Eastern Conference
Optimal Capital Structures for Regulated Public Utilities: When Does an Imputed Debt Ratio Make Sense for Ratemaking Purposes?
Eastern Conference, Delaware May 18, 2012

2012  Energy Policy Briefing Note
The Real Costs of Eliminating Unsecured Credit Lines and Requiring Cash Collateral in OTC Swaps Markets

2012  Law Seminars International, Electric Utility Rate Case Conference
Marginal Cost Pricing for Rate Design
Las Vegas, February 2, 2012

2012  Center for Research in Regulated Industries
Advanced Workshop in Regulation and Competition
Gas Pipeline Overearning Investigations
Newark, New Jersey, January 13, 2012
2011  Working Group of Commercial Energy Firms  
Cost-Benefit Analysis of the CFTC's Proposed Swap Dealer Definition  
December 20, 2011.

Abundant Low-Cost Natural Gas? A Driver of Market Activity  
August 4, 2011.

2011  Public Utilities Fortnightly  
Zone of Reasonableness: Coping with Rising Profitability a Decade after Restructuring  
July 2011.

2011  Law Seminars International, Electric Utility Rate Case Conference  
Rate Design Issues Among Customer Classes  
Las Vegas, February 10, 2011.

2011  Advanced Workshop in Regulation and Competition, Center for Research in Regulated Industries  
Decoupling and the Cost of Equity  
Newark, New Jersey, January 14, 2011.

2010  New York State Bar Association, Business Law Section Committee on Public Utility Law  
Getting Renewables to Market: The Importance of Transmission Ratemaking Policy  

2009  Law Seminars International Conference, Renewable Energy in New England  
Getting Renewable Power to Market  
Boston, June 25, 2009.

2008  Report for Baltimore Gas & Electric and Allegheny Power  
Evaluation of Longer-Term Procurement Plans  
October 1, 2008.

2008  Electricity Journal  
The Continuing Rationale for Full and Timely Recovery of Fuel Price Levels in Fuel Adjustment Clauses  
July 2008.
2008  Energy in the Southwest Conference  
Natural Gas as a Fuel: Will There Be Enough? At What Prices?  
July 22, 2008.

2007  NERA Economic Consulting  
The Line in the Sand: The Shifting Boundary Between Markets and Regulation in Network Industries.  
Coauthor.

2007  Electric Utility and Natural Gas Interdependency  
Managing Risk in Interdependent Gas and Power Markets  
Houston, March 6, 2007.

2004  Electricity Journal  
FERC Imposes New Constraints on Utility Procurement  

2003  Northeast Gas Storage and Supply Strategies  
Can Your Capital Structure Handle Today’s Market, Credit and Liquidity Risks?  
Boston, June 17, 2003.

1996  World Bank  
Regulatory and institutional reforms in the Chinese power sector  
Contributor, 1996.

1993  World Development  
Political Economy, Convergence and Growth in Less Developed Countries  
Contributor, 1996.

December 2016
Documents Relied Upon in NERA Testimony

1. Documents filed in the instant docket


h) DNCP Avoided Cost Information, November 15, 2016.

2. Other documents


m) Christopher J. Ayers, Executive Director, NCUC Staff, Ratemaking Presentation, available at: http://epic.uncc.edu/sites/epic.uncc.edu/files/media/Ratemaking%20presentation%20EPICT.pdf.


Price Risk under Alternative PPA Constructs

1. 15-Year Fixed Price PPA

- Investors will have the most confidence in the revenues during a 15-year fixed price PPA term
- Revenues during the post-PPA term are highly uncertain

2. 10-Year Fixed Price PPA

- A 10-year fixed price PPA reduces the period during which investors can count on stable revenues

3. 10-Year PPA with Price Reset

- Lenders and equity investors will heavily discount the riskier revenues provided in years 3 through 30
- Heavy discounting means it will be more difficult to obtain financing on reasonable terms
North Carolina QF Standard Offer

Zero Residual Value
Levelized QF Revenue Requirement

Notes:
• Designed to illustrate directional effect of proposed policy changes.
• Illustrative based on hypothetical capital cost and unit operating profile.
• Does not incorporate benefits of bonus depreciation, ITC, or PTC.
North Carolina QF Standard Offer

30% Residual Value

Levelized QF Revenue Requirement

Notes:
• Designed to illustrate directional effect of proposed policy changes.
• Illustrative based on hypothetical capital cost and unit operating profile.
• Does not incorporate benefits of bonus depreciation, ITC, or PTC.