PREPA Ex. 6.0

COMMONWEALTH OF PUERTO RICO

PUERTO RICO ENERGY COMMISSION

IN RE: REVIEW OF RATES OF THE PUERTO RICO ELECTRIC POWER AUTHORITY, Petitioner.	No.: CEPR-AP-2015-0001 **SUBJECT:** DIRECT TESTIMONY IN SUPPORT OF VERIFIED PETITION

Direct Testimony of

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On behalf of the

Puerto Rico Electric Power Authority

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I. INTRODUCTION

A. Witness Identification

Q. **Please state your name, title, employer, and business address.**

A. My name is Larry Kaufmann. I am the President of Kaufmann Consulting Inc. and a Senior Advisor to Navigant Consulting, Inc. ("Navigant"). My business address is 12520 Central Park Drive, Austin, Texas 78732.

Q. **On whose behalf are you testifying?**

A. I am testifying as a witness on behalf of the Puerto Rico Electric Power Authority ("PREPA").

B. Summary of Direct Testimony and Attachments

Q. **On what issues does your direct testimony focus?**

A. The primary purpose of my testimony is to present benchmarking evidence on PREPA's cost performance relative to a number of peer utilities. This evidence suggests that PREPA's internal cost management is not the primary factor in PREPA's financial difficulties.

Q. **How is your testimony organized?**

A. My testimony is organized in the following sections:

I. Introduction

II. Benchmarking Analysis

A. Definition of Benchmarking Metrics and Peer Groups

B. Comparing PREPA to Mainland U.S. Electric Utilities

C. Comparing PREPA to Caribbean and Pacific Island Electric Utilities

D. Comparing PREPA and U.S. Electric Utility Industry Wages

III. Conclusion

Q. **Are there any exhibits to your testimony?**

A. Yes. My testimony includes the following Exhibits:

- PREPA Ex. 6.01, which is a copy of my resume; and
- PREPA Ex. 6.02, which lists the 74 mainland U.S. utilities used in one portion of the benchmarking analysis.

C. Qualifications and Professional Background

Q. **What are your duties and responsibilities as a senior advisor to Navigant?**

A. As a Senior Advisor to Navigant, I am responsible for assisting Navigant in advising its clients and related parties, particularly energy utilities and regulators, on various regulatory and industry issues. My duties include consulting on utility ratemaking approaches, benchmarking utility cost, analyzing appropriate code of conduct policies for competitive markets, and related public policy issues. Outside of my work with Navigant, I have supervised dozens of large empirical projects that address these and other regulatory topics using sophisticated quantitative techniques. I often prepare written reports and provide expert witness testimony on energy regulation issues.

Q. **What other professional positions have you held?**

A. I have held a number of positions during my 23-year career consulting on energy and regulatory issues. I was a Senior Economist at Christensen Associates in Madison,

Wisconsin, from 1993 until 1998. In 1998, I co-founded the Madison office of Pacific Economics Group. I became a Vice President at Pacific Economics Group in 1998 and a Partner in 2000. In 2008, I became the President of Kaufmann Consulting and a Senior Advisor to both Pacific Economics Group and Navigant Consulting.

Q. **What is your educational background?**

A. I received a Ph.D. in Economics from the University of Wisconsin-Madison in 1993. Before that, I obtained a Bachelor of Arts degree in Economics in 1983, and a Masters of Arts degree in Economics in 1984, both from the University of Missouri-Columbia.

Q. **Have you prepared a resume presenting your background and experience in greater detail?**

A. Yes. My resume is attached as PREPA Ex. 6.01.

Q. **Have you appeared as a witness in other regulatory or legal proceedings?**

A. Yes. I have appeared many times as an expert witness in regulatory and legal proceedings. I have testified before public utility commissions in Massachusetts, Wisconsin, Michigan, Rhode Island, Kansas, Hawaii, Oklahoma, and Kentucky. I have testified on several occasions before the Ontario Energy Board in the Canadian province of Ontario. I have also testified in Australia and New Zealand.

II. BENCHMARKING ANALYSIS

A. Definition of Benchmarking Metrics and Peer Groups

Q. **What general approach did you use to benchmark PREPA's costs?**

A. I employed a high level benchmarking methodology in which I compared PREPA's measured performance on selected performance metrics to norms for the electric utility industry on those same metrics. By high-level, I mean that I benchmarked accounting-based measures of PREPA's unit costs, revenues, and wages against similar metrics for other utilities and did not analyze utility processes at a more detailed or "granular" level.

Q. **What metrics did you use to benchmark PREPA's relative cost performance?**

A. I benchmarked PREPA's relative cost performance using seven metrics, all measured on a calendar-year basis:

1. Operating revenue per customer served;
2. Operating revenue per kWh sold;
3. Operating revenue excluding fuel and purchased power costs per customer served;
4. Operating revenue excluding fuel and purchased power costs per kWh sold;
5. Operating expenses (excluding fuel and purchased power costs) per customer served;
6. Operating expenses (excluding fuel and purchased power costs) per kWh sold; and
7. Annual wages and salaries per employee.

Q. **Are these metrics appropriate for benchmarking PREPA's cost performance relative to the range of performance in the industry?**

A. Yes. These metrics are useful in this instance because they focus on distinct, but complementary, objectives and facets of PREPA's operations. Taken as a whole, I

believe evidence developed from these metrics provides a reasonable basis for assessing PREPA's relative cost performance against that of its peers.

The operating revenue metrics (measures one and two above) are comprehensive measures of PREPA's overall operations.

At the same time, it should be recognized that PREPA's operating revenues include the recovery of fuel and purchased power costs. PREPA managers have little ability to control these costs because they are determined either by international market conditions or previously negotiated contracts. The revenue and cost metrics that exclude fuel and purchased power costs (measures three, four, five and six above) therefore provide better measures of costs that managers can actually control. Accordingly, these metrics better reflect PREPA's actual performance in managing its cost pressures.

The wage measures directly benchmark the prices PREPA pays for labor relative to electric utility norms. These metrics therefore focus on specific managerial choices that impact a wide range of PREPA's operating and capital costs.

In addition, these seven metrics are all relatively simple to calculate and understand. These measures do not require complex statistical methods to compute. While advanced statistical methods can be useful for some benchmarking applications, they are also far less transparent and can be difficult for parties to interpret. The simplicity of these seven metrics facilitates transparent and easily understood benchmarking comparisons between PREPA and other electric utilities.

Q. **What was PREPA's measured performance on these metrics compared against?**

A. On the revenue and cost metrics, PREPA's measured performance was compared against the following sets of peers:

1. A broad group of 74 vertically-integrated electric utilities in the mainland United States;
2. A more narrowly-tailored peer group of 10 vertically-integrated electric utilities in the mainland United States that are more similar to PREPA; and
3. Four island utilities:
   a) One U.S. island utility operating in the Pacific: Hawaiian Electric Industries ("HEI"); and
   b) Three Caribbean island utilities: the Bermuda Electric Light Company ("BELCO"); the Virgin Islands Water and Power Authority ("VIWAPA"); and Jamaica Public Service Company ("JPS").

On the wage and salaries metric, I compared PREPA against three measures of electric utility wages and salaries:

1. Wages and salaries for U.S. electric utilities as measured biannually by the Occupational Employment Survey ("OES").
2. Annual earnings for U.S. electric utilities as measured by the Quarterly Census on Employment and Wages ("QCEW").
3. The Institute of Electrical and Electronics Engineers ("IEEE") 2013 Salary Survey Special Report for the Energy & Power Industry ("IEEE Salary Survey").

Q. **What do you mean by a "peer" utility?**

A. I am using the term "peers" in a general sense to mean the members of a collection of utilities that, overall, represent a sample against which PREPA can be benchmarked. Not every individual utility in this peer group is, or need be, similarly situated with PREPA in every material respect.

Q. **How was the broad peer group of mainland U.S. vertically-integrated electric utilities chosen?**

A. A utility was deemed to be vertically-integrated if it reported electricity generation assets in each year from 2008 through 2014. I identified a group of 74 mainland U.S. utilities that satisfied this criterion and which reported all the other variables necessary to construct the six revenue and cost performance metrics in each year from 2008 through 2014. This is what I mean by referring to this group in a general sense as peers of PREPA. PREPA Ex. 6.02 provides a listing of these utilities.

Q. **How was the more focused peer group of 10 U.S. utilities that are more similar to PREPA selected?**

A. The 10 utilities in the more focused peer group were specifically chosen to be more similar to PREPA in terms of the "drivers" of electric utility cost. I considered three different cost drivers when selecting peers for PREPA. The first was the size of the utility, as measured by the total number of customers served. Overall utility size (and hence utility output) impacts utility cost since electric utility technologies exhibit economies of scale (*i.e.,* the unit cost of production declines as the scale of production increases, at least up to a certain output level). Other than fuel, most costs for vertically-integrated electric utilities depend more on the number of customers a utility serves rather

than the total kWh delivered to those customers. The reasons are that, for a given generation capacity and infrastructure needed to deliver energy to customers, the incremental cost associated with generating an additional kWh tends to be very small (again, excluding fuel costs). Because most electric utility costs depend more strongly on customers served rather than kWh sold, I focused on customer numbers rather than kWh sales as the more relevant indicator of scale economies.

I also considered two other cost drivers when selecting peers. The first was energy usage (sometimes also called "energy density"), or kWh sold per customer. Because many electric utility costs do not vary with kWh sold, utilities serving a customer base with relatively higher energy usage tend to enjoy relatively lower unit costs.

The second cost driver was customer density, or the number of customers per mile of transmission and distribution line. All other things being equal, more customers along a given mile of line indicates a more densely populated service territory. Utility cost generally increases as service territories become more spatially dispersed, *i.e.* as customer density declines. Energy usage and customer density are therefore relevant cost drivers that can be used to select peer utilities in benchmarking studies.

In the current analysis, however, using energy usage and customer density to select peers proved problematic. The miles of transmission and distribution lines data were spotty and incomplete for many mainland U.S. utilities. This made it difficult to examine differences in customer density between PREPA and the broader mainland U.S. electric utility sample.

Energy usage levels were also almost uniformly greater for mainland U.S. utilities than for PREPA. PREPA's annual energy usage per customer averaged 12.55 MWh between 2008 and 2014, as measured on a calendar-year basis. Over the same period, annual energy usage for the broad 74 mainland U.S. utility group averaged 25.15 MWh per customer. It is perhaps not surprising that U.S. customers' energy usage is about double the energy usage for Puerto Rico customers given the differences in income between the U.S. and Puerto Rico, but the almost uniformly higher energy use in the U.S. makes it difficult to select peers based on this criterion.

Because of the practical difficulties in using energy usage or customer density to select peers, I selected peers for PREPA entirely on the basis of number of customers served. PREPA served an average of 1,468,329 customers over the 2008-2014 time period. There were ten utilities in the broad U.S. utility group that served between one million and 1.7 million customers. The average number of customers served by these ten US utilities was 1,444,218 over the 2008-2014 time period, which is virtually indistinguishable from the number of PREPA customers. These ten utilities are therefore collectively an appropriate peer group for PREPA in terms of the scale of output and the degree of economies of scale realized.

Q. **What are the 10 U.S. mainland utilities in this peer group?**

A. The 10 U.S. mainland utilities in the more focused peer group are:

1. Alabama Power;
2. Consumers Energy;
3. Duke Energy – Florida;

4. Duke Energy – Progress;
5. Northern States Minnesota;
6. PacifiCorp;
7. Public Service of Colorado;
8. Puget Energy;
9. San Diego Gas and Electric; and
10. Wisconsin Electric Power Company.

Q. **Apart from the comparability of the group as an aggregate, is there one individual utility within this group that is an especially appropriate peer for PREPA for purposes of this analysis?**

A. Yes. One utility within the selected peer group stands out and is especially comparable to PREPA for purposes of this analysis. San Diego Gas and Electric ("SDG&E") has customer densities and, more importantly, energy usage levels that are quite similar to PREPA's. For example, in 2014 SDG&E customers consumed 11.7 MWh per customer, compared with a comparable value of 11.9 MWh for PREPA. Energy consumption for SDG&E and other California utilities tends to be lower than most other U.S. utilities because of the extent of California's demand side management and conservation programs. Combined with the fact that SDG&E and PREPA serve a comparable number of customers, the similarities in energy usage and customer density make SDG&E the single best "peer" utility for PREPA within the mainland U.S. sample. I will therefore highlight the SDG&E benchmarking results when presenting benchmarking metrics for the broad U.S. utility sample and the 10 utility peer group.

B. Comparing PREPA to Mainland U.S. Electric Utilities

Q. **Please present a summary of PREPA's relative cost performance compared to mainland U.S. electric utilities.**

A. Table 1 provides data on PREPA, the broad group of 74 mainland U.S. electric utilities, and the more focused 10 utility peer group of U.S. mainland utilities on the six revenue and cost metrics. As used in this table, "Operating Revenue" is equal to revenue from sales of electricity to ultimate consumers. "Net Operating Revenue" is computed as operating revenue minus fuel and purchased power expenses. Data are presented for the average values of each metric over the 2008-2014 period. All six metrics were calculated on a calendar year basis, and all data used to construct the U.S. metrics were drawn from utilities' annual Federal Energy Regulatory Commission ("FERC") Form 1 filings.

Before proceeding further, I should make clear that "cost performance," as that term is used in this analysis, is a comparative measure quantified by the specific metrics that I have defined earlier in my testimony. This analysis should not be understood to mean that PREPA's measured levels of spending do not reflect downward pressures due to its financial difficulties or that the spending levels are sufficient and sound from an operating perspective. PREPA's spending levels likely reflect those pressures. Further, as I noted earlier, I did not analyze utility processes at a more detailed or granular level.

Table 1. Comparision of PREPA and Mainland Electric Utilities

Item	U.S. Peer Group	74 Utility Sample	PREPA
Operating Revenue per Customer	$2,734.53	$2,931.71	$3,082.15
Operating Revenue per kWh	$0.12273	$ 0.10911	$0.24620
Net Oper. Revenue per Customer	$1,631.45	$ 1,705.97	$1,001.71
Net Oper. Revenue per kWh	$0.07170	$0.06440	$0.0799
O & M excl Fuel and PP per customer	$709.43	$762.76	$515.14
O & M excl Fuel and PP per kWh	$0.03307	$0.02916	$0.04121

Data Source: PREPA data and FERC Form 1 filings

Q. **How does PREPA compare to mainland U.S. utilities on operating revenues per customer and operating revenues per kWh?**

A. PREPA has slightly higher values of operating revenues per customer and per kWh than the mainland U.S. utility groups. PREPA's operating revenues per customer averaged $3,082 between 2008 and 2014, compared with comparable values of $2,932 for the broad U.S. utility aggregate and $2,735 for the 10 utility peer group. The discrepancies are somewhat higher when examining operating revenues per kWh. These values are $0.2462 for PREPA compared with $0.1091 for the broad U.S. industry aggregate and $0.1227 for the peer group. However, two points should be kept in mind when interpreting PREPA's operating revenue data relative to U.S. utilities.

First, the operating revenues metrics include the recovery of fuel costs. PREPA's fuel costs will almost certainly be relatively greater than those of the U.S. utilities because PREPA (unlike almost all mainland U.S. electric utilities) relies heavily on oil-fired generation, which has especially high fuel costs. PREPA can do relatively little to mitigate these costs until infrastructure is developed that facilitates greater fuel diversity in electricity generation. PREPA's fuel costs are therefore largely beyond its control.

As a result, I believe the more relevant measures of PREPA's underlying cost performance are operating expenses and revenues net of fuel and purchased power costs.

Second, lower energy usage tends to have a negative impact on a utility's measured performance. As discussed, other than fuel, there are few incremental costs associated with generating and delivering an additional kWh using the utility's existing power generation and delivery infrastructure. All else being equal, utilities with greater energy usage therefore tend to look better on performance metrics expressed on a per kWh basis, simply because selling more kWh directly increases the denominator of a cost or revenue per kWh metric but has little impact on the numerator. The fact that the U.S. mainland utilities have energy usage levels that are approximately double those of PREPA's is therefore translated into lower operating revenue per kWh measures for most mainland U.S. utilities than for PREPA.

Q. **Are there any U.S. utilities that have similar energy usage per customer as PREPA?**

A. Yes. As previously discussed, SDG&E has energy usage per customer that is quite low by U.S. standards but very similar to PREPA's energy usage per customer. This is why SDG&E is the single best peer mainland U.S. utility for PREPA for purposes of this analysis. Over the 2008 – 2014 period, SDG&E's operating revenues per kWh averaged $0.2431 per kWh compared with $0.2664 for PREPA. PREPA's operating revenues are only somewhat higher on a per kWh basis than SDGE's, even though PREPA's operating revenues include the recovery of relatively larger fuel costs.

Q. **How does PREPA compare to mainland U.S. utilities on "net" operating revenues per customer and operating revenues per kWh, which exclude fuel and purchased power costs?**

A. PREPA's relative performance is more favorable when fuel and purchased power costs, which are largely beyond PREPA's control, are netted out of its operating revenues. Excluding fuel and purchased power costs, the 74 utility U.S. aggregate had average net operating revenues of $1,706 per customer and $0.0644 per kWh over the 2008-2014 period. The same measures for PREPA's U.S. utility peer group are $1,631 per customer and $0.0717 per kWh. PREPA's operating revenues net of fuel and purchased power costs were $1,002 per customer and $0.0799 per kWh. PREPA's "net" operating revenue per customer was therefore about 40% below comparable operating revenue measures for the U.S. groups, although it remained somewhat higher on a per kWh basis because of lower energy usage levels in Puerto Rico.

Q. **How does PREPA compare to mainland U.S. utilities on operating expenses per customer and operating expenses per kWh?**

A. PREPA's performance on net operating expenses is similar to its performance on net operating revenue. The broad U.S. utility group had average operating expenses (excluding fuel and purchased power costs) of $762.76 per customer and $0.0292 per kWh for the relevant period. The smaller U.S. utility peer group had net operating expense of $709.43 per customer and $0.0331 per kWh. PREPA's net operating expenses of $515.14 per customer are about 30% below those of the mainland U.S. utility groups. Although PREPA's operating expense of $0.0412 per kWh was somewhat

higher than the mainland U.S. utility groups, this was likely due to lower energy usage in Puerto Rico. I also will note again that in this comparison and in the later comparisons in my testimony, the PREPA figures likely reflect downward pressures on spending due to its financial difficulties.

Q. **How does PREPA's performance on the net operating revenue and operating expense metrics compare specifically to SDG&E, which has similar energy usage?**

A. SDG&E's average net operating revenue was $1,514 per customer and $0.1507 per kWh over the 2008-2014 period. PREPA's values on these metrics are 34% and 47% below SDG&E's values, respectively. On net operating expenses, SDGE registered average values of $742.50 per customer and $0.0740 per kWh. PREPA's performance on these same metrics are 31% and 44% below SDG&E's, respectively.

Q. **What do you conclude are the most appropriate choices for metrics when benchmarking PREPA against mainland U.S. electric utilities?**

A. I believe mainland U.S.-PREPA benchmarking can be distorted by differences in fuel costs and energy usage between PREPA and U.S. electric utilities. PREPA's measured performance will be negatively impacted by higher fuel costs and lower energy usage relative to the U.S. electric utility industry. Both factors are almost entirely beyond PREPA's control and thus not indicative of management's ability to manage or control costs.

I therefore find that the most relevant metrics for mainland U.S.-PREPA benchmarking are operating expenses per customer and operating revenues per customer, in each case net of fuel and purchased power. These two metrics are more appropriate

than the other four metrics considered (operating revenue per customer, operating revenue per kWh, net operating revenue per kWh, and operating expenses per kWh) because each of the preferred metrics: 1) nets out fuel and purchased power costs that are largely beyond the control of PREPA management; and 2) 'normalizes' cost only by customers served rather than by energy (i.e., kWh) usage.

Q. **How does PREPA perform on the preferred net operating revenue per customer and operating expense per customer metrics relative to mainland U.S. electric utilities?**

A. PREPA's net operating expenses per customer are about 30% below those of the overall U.S. electric utility industry and the selected 10 utility peer group. PREPA's net revenue per customer is about 40% below those of the overall U.S. electric utility industry and the selected 10 utility peer group. Based on these benchmarking comparisons, I would conclude that PREPA is at least an average cost performer, and perhaps a good cost performer, relative to comparable mainland U.S. electric utilities, subject to my earlier remarks regarding PREPA's financial circumstances and pressures.

C. Comparing PREPA to Caribbean and Pacific Island Electric Utilities

Q. **Why did you compare PREPA against island utilities as well as mainland U.S. utilities?**

A. There will generally be fewer operational differences between PREPA and other island utilities. Island utilities typically use oil-fired generation and therefore have similar fuel costs. Energy usage levels can still vary across islands depending on income and other factors, but island economies are generally more comparable to Puerto Rico than the U.S.

336 economy. All these factors potentially make island utilities natural and appropriate
337 comparators for PREPA in benchmarking analyses. However, while island utilities may
338 be natural comparators for PREPA, far less data are available for island utilities than for
339 U.S. electric utilities.

340 Q. **What island utilities were used as peers for PREPA?**

341 A. While little data is available on island utilities, I was able to supplement the U.S. dataset
342 with data from four relatively prominent island utilities. Three of these utilities are based
343 in the Caribbean: the Virgin Islands Water and Power Authority (VIWAPA); the
344 Bermuda Electric Light Company (BELCO); and Jamaica Public Service (JPS). Data for
345 all three companies were drawn from the firms' financial reports. I also added Hawaiian
346 Electric Industries (HEI), a U.S. electric utility operating on several islands in the Pacific
347 Ocean. HEI data were drawn from reports filed with its state Public Service
348 Commission.

349 Q. **Please describe your process for benchmarking PREPA against selected island**
350 **utilities.**

351 A. I benchmarked PREPA against island electric utilities using the same six metrics
352 described above that were used in the mainland U.S. benchmarking analysis.

353 Q. **Please present a summary of PREPA's relative cost performance compared to these**
354 **island electric utilities.**

355 A. Table 2 provides data on PREPA, VIAWAPA, BELCO, JPS, and HEI on the six revenue
356 and cost metrics. In this table, "Operating Revenue" is equal to revenue from sales of

electricity to ultimate consumers. "Net Operating Revenue" is computed as operating revenue minus fuel and purchased power expenses. Data are presented for the average values of each metric over the 2008-2014 period, and all six metrics are calculated on a calendar year basis.

Table 2. Comparison of PREPA and Other Island Utilities

Utility Name	(U.S.) Virgin Islands Water and Power Authority	Bermuda Electric Light Company	Jamaica Public Service	Hawaii	PREPA
MWh/Customer	13.215	16.521	5.395	21.840	12.55
Bundled Total Sales MWh	721,017	633,020	3,165,015	8,245,224	18,4189,900
Bundled Total Customers	54,560	38,940	587,060	377,601	1,468,329
Operating Revenue per Customer	$ 5,405	$ 6,392	$ 1,736	$ 4,494	$ 3,082.15
Operating Revenue per kWh	$ 0.41251	$ 0.38952	$ 0.32255	$ 0.27975	$ 0.24720
Net Oper. Revenue per Customer	$ 1,534	$ 2,635	$ 610	$ 1,586	$ 1,001.71
Net Oper. Revenue per kWh	$ 0.11704	$ 0.15847	$ 0.11307	$ 0.07282	$ 0.08027
O & M excl. Fuel and PP per Customer	$ 1,165	N/A	$ 259	$ 1,010	$ 515.23
O & M excl. Fuel and PP per kWh	$ 0.08912	N/A	$ 0.04792	$ 0.04633	$ 0.04121

Data Source: PREPA data, self-published annual utility financial reports

VIWAPA and BELCO each had energy usage a bit higher than PREPA's, although JPS's energy usage is much lower. Energy usage for HEI is greater than for any of the other island utilities but somewhat below the U.S. average.

Q. **How does PREPA compare to the island utilities on the operating revenue metrics?**

A. PREPA's operating revenues per customer are well below those of most of the island utilities. VIWAPA's operating revenues per customer are $5,405, which is about 80%

above PREPA's. BELCO's operating revenues per customer are more than 100% above PREPA's, while HEI's are almost 50% higher. On the other hand, JPS has operating revenues per customer that are lower than PREPA's.

However, all four island utilities have higher operating revenue per kWh than PREPA. PREPA's operating revenue per kWh of $0.2472 compares with $0.2798 for HEI, $0.3225 for JPS, $0.3895 for BELCO, and $0.4125 for VIWAPA. HEI, BELCO, and VIWAPA enjoy higher energy usage per customer than PREPA which, as discussed, will tend to make those utilities look better on this metric compared with PREPA. In spite of this operating advantage, PREPA has lower operating revenues per kWh than any of these three utilities.

Q. **How does PREPA compare to the island utilities on the net operating revenue metrics?**

A. A similar but somewhat less pronounced pattern is seen for the "net" operating revenue metrics. Net operating revenues per customer are lower than those of all of the island utilities except JPS. PREPA also exhibits lower net revenues per kWh than VIWAPA, BELCO and JPS, although HEI's measured net operating revenues per kWh is a bit lower than PREPA's.

Q. **How does PREPA compare to the island utilities on the operating expense metrics?**

A. Operating expense data are not available for BELCO, but PREPA's net operating expense per customer is about half the comparable measures for HEI and VIWAPA, although above that for JPS. On a per kWh basis, though, PREPA again displays better

performance than all other island utilities, subject to my earlier remarks regarding PREPA's financial circumstances and pressures.

Q. **What do you conclude about PREPA's cost performance relative to the island utilities?**

A. Overall, the results of benchmarking PREPA against island utilities support my conclusions from the mainland U.S. benchmarking analysis. PREPA shows better performance on all six metrics than the other island utilities, other than JPS on some metrics, subject to the qualifications I noted above. However, this may be at least partly because wages in Jamaica are generally below market wages in Puerto Rico (or the Virgin Islands, Bermuda, or Hawaii). Data constraints did not allow me to investigate this issue, although I did examine the relationship between PREPA wages and those paid by the U.S. electric utility industry.

D. Comparing PREPA and U.S. Electric Utility Industry Wages

Q. **PREPA's relative cost may be impacted by the wages paid to PREPA employees. What were PREPA's wage levels in recent years?**

A. I calculated PREPA wages using data on PREPA's total salary and wage payments and total employment. PREPA provided monthly data on total salary and wage payments excluding overtime and total salaries and wages including overtime. I aggregated these monthly data to produce annual measures for each variable. I then divided these annual values by the number of employees in each year to produce two average wage and salary metrics for PREPA: average wages that exclude overtime, and average wages that

include overtime. Table 3 summarizes PREPA's average wage levels paid for the 2008 through 2014 calendar years.

Table 3. PREPA Annual Salaries and Wages 2008-14

Year	No Overtime	Including Overtime
2008	$55,237	$61,608
2009	$50,049	$54,737
2010	$53,471	$62,170
2011	$55,997	$63,160
2012	$58,543	$67,089
2013	$58,028	$64,527
2014	$55,558	$61,285
Average	$55,269	$62,082

Q. **When assessing the appropriateness of PREPA's wage levels, what wage measures should PREPA wages be benchmarked against?**

A. In general terms, I believe PREPA wages should be benchmarked against wages paid in the U.S. electric utility industry. Citizens of Puerto Rico employed by PREPA have the right to move to the mainland U.S. in pursuit of better employment opportunities that may exist at U.S. electric utilities. This means PREPA workers essentially compete in the same labor markets as the rest of the U.S. electric utility industry. Appropriately benchmarking PREPA's salaries and wages therefore means comparing them to salaries and wages paid by U.S. electric utilities.

Q. **What wage measures are computed and generally available for U.S. electric utilities?**

A. There are several sources of data on U.S. electric utility wages, but I selected three prominent and authoritative measures:

1. The Quarterly Census on Employment and Wages (QCEW) conducted by the U.S. Bureau of Labor Statistics (BLS), a part of the U.S. federal government's Department of Labor;
2. The Occupational Employment Statistics (OES) Survey, also conducted by the BLS; and
3. The Institute of Electrical and Electronics Engineers ("IEEE") 2013 Salary Survey Special Report for the Energy & Power Industry ("IEEE Salary Survey)."

Q. **Please describe the QCEW wage measure.**

A. The QCEW measure in most States reports total compensation paid during the calendar year, regardless of when services were performed. Under most State laws, the QCEW measure of "wages" include bonuses, stock options, severance pay, the cash value of meals and lodging, tips and other gratuities, and in some States employer contributions to certain deferred compensation plans, including 401(k) plans.

Q. **Please describe the OES wage measure.**

A. The OES wage measure is less comprehensive than the QCEW. It includes only the base rate of pay, tips, cost-of-living allowances, guaranteed, hazardous-duty, and on-call pay. OES wages exclude back pay, overtime, severance, jury duty, bonuses, non-production bonuses, and adjustments for shift differentials.

Q. **Are any elements of employee compensation excluded from both the QCEW and the OES?**

A. Yes. Both wage measures exclude employer contributions for health insurance, old-age, survivors, and disability insurance, unemployment insurance, workers' compensation, and private pensions not reported as wages.

Q. **How do the computed PREPA wage measures compare to the QCEW and the OES?**

A. Recall that the OES measure of wages excludes overtime, while the QCEW includes it. The PREPA salary and wage measure without overtime is therefore more similar to the OES wage and salary estimate for the U.S. electric utility industry. The PREPA salaries and wage metric that includes overtime pay is more similar to the QCEW estimate, although the QCEW measure also includes elements of compensation (like stock options) that are not reflected in PREPA's reported wages.

Q. **How do the values of PREPA wages compare with the quantitative values of the QCEW and OES?**

The most recent OES was completed in May 2014. It provides estimates of annual wages and salaries for both the electric power industry specifically (North American Industrial Classification System, or "NAICS," number 2211) and more broadly for the "utilities" sector (NAICS 22). The May 2014 OES reports that the average annual wage/salary for a U.S. electric utility employee (NAICS 2211) is $72,800. The comparable figure for an average utilities sector (NAICS 22) employee is $70,900.

The most recent QCEW has annual data for 2013. The QCEW average wage for a U.S. electric utility employee is $99,918. The comparable figure for a utilities sector employee is $95,157.

PREPA's 2013 wage without overtime of $58,028 compares with the comparable OES wage excluding overtime of $72,800 for the U.S. electric utility industry. PREPA's wage is about 20% below the U.S. electric utility wage benchmark.

PREPA's 2013 wage including overtime of $64,527 compares with a QCEW wage including overtime (and other compensation) of $99,818 for the U.S. electric utility industry. PREPA's wage including overtime pay is about 35% below the U.S. electric utility wage benchmark.

Q. **What do you conclude by comparing PREPA's wage measures against the OES and QCEW wage metrics for the U.S. electric utility industry?**

I believe the most "apples to apples" wage comparison between PREPA and the U.S. electric utility industry overall is obtained by comparing PREPA's annual wages without overtime to the OES measure of wages and salaries for U.S. electric utilities. While the comparison of PREPA wages including overtime and the QCEW wage measure is interesting, the latter metric contains aspects of employee compensation (such as stock options) that are not reflected in PREPA's annual salaries and wages. PREPA's wages without overtime are about 20% lower than comparable wages for U.S. electric utilities, as reported in the OES. This analysis therefore supports the conclusion that PREPA's expenses are not being artificially inflated because of excessive wage payments to PREPA employees.

Q. **Please describe the IEEE Salary Survey.**

A. The IEEE 2013 Salary Survey provides an independent assessment of the compensation of U.S. members of the IEEE. IEEE members can reasonably be expected to be either engineers or other professionals with technical education. According to the IEEE, 98.1% of the respondents hold a bachelors or advanced education degree.

Q. **What data does the IEEE Salary Survey provide?**

A. The IEEE Salary Survey classifies responses into various lines of business. The most relevant category for my analysis is the Utilities line of business, which contained 1,053 respondents. The Utilities line of business provided compensation data for "Primary Sources ("Base Salary") and "Total Compensation," which includes overtime and other non-salary components of compensation. This information is shown in Table 4 below.

Table 4. IEEE Salary Survey U.S. Utilities

	Average	Lower Quartile	Median	Upper Quartile
Primary Sources (Base Compensation)	$105,700	82,000	$102,000	122,500
Total Compensation	$122,400	$88,700	$114,000	$140,000

The IEEE Salary Survey shows that, in 2013, U.S. utility engineers and other professionals received an average base salary of $105,700 and average total compensation of $122,400. Professionals reporting annual salaries in the lowest quartile of respondents had an average base compensation of $82,000 and average total compensation of $88,700. Those in the upper quartile had average base salary of $122,500 and average total compensation of $140,000.

Q. **How do PREPA salaries for engineers and other professionals compare to compensation levels reported in the IEEE Salary Survey?**

A. I obtained detailed 2015 data on PREPA's base salary and total compensation for all classes of engineers employed by PREPA. These data show that PREPA's average base salary for engineers in 2015 was $63,214. This is 40% below the average base wage for utility employees in the IEEE Salary Survey. Average total compensation for PREPA engineers in 2015 was $102,045. This is 17% below the average total compensation for utility employees in the IEEE Salary Survey.

Q. **What do you conclude by comparing PREPA's wages for engineers to wages for comparable utility employees in the U.S.?**

A. I conclude that salaries and total compensation for PREPA engineers are well below the levels these employees could earn at U.S. electric utilities. This analysis supports the conclusion that PREPA's expenses are not being artificially inflated because of excessive wage payments to PREPA engineers.

III. OVERALL FINDINGS AND CONCLUSION

Q. **What are the overall findings of your benchmarking analysis?**

A. I find that PREPA's operating revenues and operating expenses (net of fuel and purchased power expenses) are 30% to 40% below those of mainland U.S. electric utilities. This finding applies to both the 74 utilities in the overall, mainland U.S. sample and the more focused group of 10 "peer" U.S. mainland utilities. PREPA's wages are about 20% below those of U.S. electric utilities, and PREPA's wages for engineers are 17% to 40% below wages for comparable employees at US electric utilities. PREPA's

operating revenues and expenses are also generally well below those of the four island utilities that were examined. While I was not able to compare PREPA wages to those of other island utilities, I do not believe this is a relevant benchmarking examination because PREPA workers essentially compete in the same labor markets as the rest of the U.S. electric utility industry.

Overall, these findings lead me to conclude that PREPA's expenses are not being artificially inflated because of inefficient operations or excessive wage payments to PREPA employees. The evidence suggests that PREPA's internal cost management is not the primary factor in PREPA's financial difficulties. The PREPA figures, however, likely reflect downward pressures on spending due to its financial difficulties.

Q. **Does this complete your testimony?**

A. Yes.

Lawrence Kaufmann

Resume

April 2016

Address: 12520 Central Park Drive
Austin, Texas 78732
(608) 443-9813 (cell)

Education:

Ph.D.:	Economics, University of Wisconsin-Madison, 1993
BA & MA:	Economics, University of Missouri-Columbia, 1984
High School:	St. Louis University High, St. Louis, MO, 1980

Relevant Work Experience, Primary Positions:

December 2008 – present: President, Kaufmann Consulting
Senior Advisor, Pacific Economics Group and Navigant Consulting
Fellow, Canadian Energy Research Institute (since April 2015)

Advise companies and public agencies, particularly energy utilities and regulators, on various regulatory and industry restructuring issues. Duties include consultation on performance-based regulation (PBR), developing service quality incentive plans, analyzing appropriate code of conduct policies for competitive markets, and providing supporting empirical research. Duties involve preparing public testimony and written reports, overseeing empirical research, client contact and briefings, and public presentations.

January 2001 – December 2008: Partner, Pacific Economics Group, Madison, WI
November 1998 – December 2000: Vice President, Pacific Economics Group, Madison, WI

Advise energy utilities and regulators on various industry restructuring issues. Duties include consultation on performance-based regulation (PBR), developing service quality incentive plans, analyzing appropriate code of conduct policies for competitive markets, and providing supporting empirical research. Duties involve preparing public testimony and written reports, overseeing empirical research, client contact and briefings, and public presentations.

August 1993 – October 1998: Senior Economist, Christensen Associates, Madison, WI

Assisted in the development and evaluation of PBR plans for energy utilities and other regulated enterprises. Duties included theoretical and empirical research (including the estimation of total factor productivity trends), written reports, client contact and briefings, public presentations, and monitoring regulatory trends in the United States and overseas.

January 1993 - July 1993: Research Assistant to Dr. Robert Baldwin, Department of Economics, University of Wisconsin-Madison

Project investigated whether dumping penalties imposed by the United States have led to a diversion of imports from the nations on which the duties were assessed to other exporters.

January 1991 - May 1993: Dissertation research on the impact of foreign investment on Mexican firms.

Dissertation examined whether there has been any spillover of advanced multinational technologies to competing Mexican firms. Research included development of a theoretical model of spillovers through Mexican recruitment of multinational personnel, interviews and data collection in Mexico, and empirical tests of theoretical conclusions. Dissertation research was funded through a fellowship from the Mellon Foundation.

June 1989 - December 1990: Research Associate, Credit Union National Association, Madison, WI

Initiated and assisted on several long-term research projects, including the assessment of capital positions at Corporate credit unions, comparing the asset portfolios of credit unions and banks, and analysis concerning the development of credit union industries in Poland and Costa Rica.

January 1988 - August 1988: Investment Banking Officer and Associate Economist, Centerre Bank, St. Louis, MO

April 1985 - December 1987: Assistant Economist, Centerre Bank, St. Louis, MO

As Assistant Economist, the primary duty was to prepare country risk reports on nations to which the bank was lending. As Associate Economist and Investment Banking Officer, duties expanded to include writing a twice-weekly column on interest rate trends and preparing special reports on regional, national and international economic trends for senior management.

August 1983 - December 1984 and four semesters during the period September 1988 - May 1993:

Teaching assistant for classes in introductory microeconomics, introductory macroeconomics, international economics and the history of economic thought.

Professional Memberships: American Economic Association
National Association of Business Economists

Foreign Language Proficiency: Spanish

Major Consulting Projects:

1. Testimony on cost and wage benchmarking. Puerto Rico Electric Power Authority, 2016.
2. Recommend updated inflation escalators in performance-based regulation plan. Epcor Water, 2015-2016.
3. Recommend productivity factor for updated performance-based regulation plan. Epcor Water, 2015-2016.
4. Testimony on benefits of expanding bidding process for expansion of Alliant Riverside Energy Center facility. Associated Builders and Contractors of Wisconsin, 2015.
5. Cost benchmarking study. Puerto Rico Electric Power Authority, 2015.

6. Multi-client "Utility of the Future" and PBR study. Clients wish to remain confidential at this time, 2015.

7. Advise on benchmarking methods for electricity distribution. ANEEL, Brazilian Electricity Regulatory Agency, 2014.

8. The impact of gas extension tariffs on the development of the CNG market in Wisconsin. Reinhart Boerner Van Deuren on behalf of Kwik Trip, 2014.

9. TFP study and review of price controls in New Zealand. New Zealand Electricity Network Association, 2014.

10. Advise on benchmarking and regulatory issues in Toronto Hydro Custom IR application. Ontario Energy Board, 2014-15.

11. Advise on interrogatory responses. Consumer Energy Coalition of British Columbia, 2014.

12. Survey and analysis of implementation issues associated with customer-specific reliability metrics. Ontario Energy Board, 2013-15.

13. Empirical analysis and recommendation of appropriate reliability benchmarks. Ontario Energy Board, 2013-15.

14. Cost of service review (transmission and distribution operations) and cost benchmarking for Israel Electric Corporation. Public Utility Authority of Israel, 2013-15.

15. Value of reliability improvements from undergrounding power lines. Wisconsin Public Service, 2013.

16. Advise on and assess gas distribution incentive regulation plans. Ontario Energy Board, 2013-14.

17. Advise on price control application. UK Power Networks, 2013.

18. Advise on electricity distribution incentive regulation plans and other aspects of renewed regulatory framework for electricity. Ontario Energy Board, 2012-13.

19. Response to Productivity Commission Report on Energy Network Regulatory Frameworks. Energy Safe Victoria, 2012.

20. Statement on appropriate opt-out policies for smart meters to Wisconsin Public Service Commission. SMART Water, 2012.

21. Submission to Australia's Productivity Commission on the role of benchmarking in utility regulation. Energy Safe Victoria, 2012.

22. Assist Staff on review of cost of service applications for Enbridge Gas Distribution and Union Gas. Ontario Energy Board, 2012.

23. Assist with responses on data requests in testimony on alternative regulation plan. Potomac Electric Power, 2011-12.

24. Assess incentive regulation plans for Union Gas and Enbridge Gas Distribution in Ontario. Ontario Energy Board, 2011.

25. Advise on demand-side management and decoupling plans, and utility involvement in conservation and renewable energy businesses. ATCO Gas, 2011.

26. Advise on defining and measuring utility performance and the use of performance measures and standards in electric utility regulation. Ontario Energy Board, 2011-12.

27. Advise on rate mitigation strategies. Ontario Energy Board, 2011.

28. Advise on PBR strategy in Alberta. EDTI, 2011-12.

29. Estimate total factor productivity trend for gas distributors in New Zealand. Powerco, on behalf of industry, 2011.

30. Evaluation of reliability standards and alternative regulatory approaches for maintaining the reliability of electricity supplies. Ontario Energy Board, 2010-12

31. Prepare submission on rule change application and respond to consultant reports on TFP spreadsheet simulations and the impact of the regulatory framework on energy safety. Energy Safe Victoria, 2010.

32. Research on operating productivity and input price changes and testimony in support of an incentive-based formula to recover changes in gas distribution operating expenses. National Grid, 2010.

33. Prepare submission on rule change application and respond to consultant reports on TFP methodology. Essential Services Commission, 2010.

34. Advise on submission on rule change application. Victoria Department of Primary Industries, 2010.

35. Productivity research Victoria gas distribution industry, Essential Services Commission, 2010.

36. Productivity research Victorian power distribution industry, Essential Services Commission, 2010.

37. Advise on revenue decoupling and alternative regulatory strategies in context of upcoming gas distribution rate case. Northwest Natural Gas, 2009-2010.

38. Advise on revenue decoupling. Ontario Energy Board, 2009-2010.

39. Develop a "top down," econometrically-based measure of reductions in gas consumption resulting from utility DSM programs, and evaluate the merits of this approach compared to the existing "bottom up" methodology. Ontario Energy Board, 2009-2010.

40. Respond to proposals to amend National Energy Regulatory Framework to allow alternative approaches to incentive regulation. Essential Services Commission, 2009-2010.

41. Evaluate consultant reports and prepare submission on the update of price control formulas. New Zealand Energy Network Association, 2009.

42. Evaluate consultant reports in review on alternate regulatory arrangements. Essential Services Commission 2009.

43. Estimate TFP trend for New Zealand electricity distributors. New Zealand Energy Network Association 2009.

44. Evaluate consultant reports in review on alternate regulatory arrangements. Essential Services Commission 2009.

45. Submission on the application of total factor productivity in utility network regulation. Essential Services Commission, 2008-09.

46. Estimate total factor productivity trends, benchmark gas distribution cost performance, and testify in support of research. Bay State Gas, 2008-09.

47. Advise on appropriate regulatory treatment of early termination fees in retail energy markets. Essential Services Commission, 2008.

48. Advise on appropriate regulation of gas connection charges. Essential Services Commission, 2008.

49. Advise on appropriate cost of capital. Jamaica Public Service, 2008.

50. Estimate total factor productivity trends and benchmark bundled power cost performance for use in a productivity based regulation plan. Jamaica Public Service, 2008.

51. Estimate gas distribution total factor productivity trends. Essential Services Commission, 2008.

52. Update estimate total factor productivity trends electricity distributors. Essential Services Commission, 2008.

53. Respond to productivity and benchmarking studies. New Zealand Electricity Networks Association, 2008.

54. Response to comments on appropriate productivity and input price measures to be used to update gas distributors' operating expenses. Essential Services Commission, 2007-08.

55. Advise on update of performance based regulatory plan for power distributors, including recommendations for total-factor productivity based X factors. Ontario Energy Board, 2007-08.

56. Estimate lost wage and health damages. Wolfgram and Associates, 2007.

57. Response to critique of X factor recommendations. Ontario Energy Board, 2007.

58. Review of benchmarking methods and proposed benchmarking for the pricing of unbundled copper local loop. Telecom NZ, 2007.

59. Report on the relationship between revenue decoupling and performance-based regulatory mechanisms. Massachusetts energy distribution companies, 2007.

60. Research on revenue decoupling experience in California. National Grid, 2007.

61. Report on regulatory reforms needed to facilitate demand response, advanced metering infrastructure and energy efficiency objectives. Essential Services Commission, 2007.

62. Estimate lost wage and health damages. Wolfrgram and Associates, 2007.

63. Evaluation of gas distribution construction cost trends. Essential Services Commission, 2007.

64. Appropriate productivity trends and labor inflation rates to be used to adjust operating expenses in incentive-based ratemaking. Essential Services Commission, 2007.

65. Testify in support of rate adjustment under a performance based regulation plan. Bay State Gas, 2007.

66. Report on service quality regulation and benchmarking, submitted as expert witness testimony. Detroit Edison, 2007.

67. Develop and testify in support of alternative regulation plan for gas distribution services. Client confidential at this time, 2007.

68. Evolution of energy asset management companies and outsourcing relationships. Davidson Kempner Advisers, 2007.

69. O&M partial factor productivity trends for gas distribution services. Essential Services Commission, 2006-07.

70. Principles for designing gas supply PBR plans and assessing the impact of retail gas costs. DLA Piper Rudnick, 2006-07.

71. Framework for analyzing appropriate early termination fees in competitive retail electricity markets. Essential Services Commission, 2006-07.

72. Testify in support of exogenous factor recovery of revenues lost due to declining natural gas usage. Bay State Gas, 2006.

73. Service quality benchmarking. Canadian Electricity Association, 2006.

74. Analyze natural resource and recreational damage calculations for environmental damage to trout stream. Michael, Best and Friedrich, 2006.

75. Evaluate outsourcing contract and report benchmarking Envestra's gas distribution operations and maintenance expenses. ESCOSA, 2006.

76. Report on the use of partial factor productivity trends in the updated gas access arrangement. Essential Services Commission, 2006.

77. Advise on approved X factors and total factor productivity trends in approved alternative regulation plans for electric utilities. Central Maine Power, 2006.

78. Estimate total factor productivity and input price trends power distribution industries in all Australian States and territories, Essential Services Commission, 2006.

79. Develop and testify in support of an alternative regulation plan for gas distribution services. Client wishes to remain confidential at this time, 2006.

80. Develop and testify in support of an alternative regulation plan for gas distribution services. Client wishes to remain confidential at this time, 2006.

81. Testimony on treatment of outsourcing contract costs and labor-nonlabor cost allocations. Essential Services Commission, 2005-06.

82. Incorporate lessons from incentive regulation and benchmarking overseas into newly-established regulatory framework for nation's electric utilities. Bundesnetzagentur (BNA), Bonn Germany, 2005-2006.

83. Submission to Ministerial Council on Energy related to Regulatory Rulemaking. Essential Services Commission, 2005.

84. Evaluation of early termination fee policies for energy retailers. Essential Services Commission, 2005.

85. Advise on alternative regulation strategies for gas distribution services. Client wishes to remain confidential at this time, 2005-2006.

86. Report on comprehensive framework for using performance indicators to evaluate market power abuses, efficiency gains, and the distribution of benefits to stakeholders. Essential Services Commission, 2005.

87. Evaluation of regulatory options and estimation of total factor productivity for Port of Melbourne Corporation. Essential Services Commission, 2005.

88. Evaluation of regulatory options for taxi services in Melbourne, Australia. Essential Services Commission, 2005.

89. White Paper advising government agency on regulatory reform of State's electric power industry. Department of Natural Resources Newfoundland and Labrador, 2005.

90. Review report on CAPM and differences in beta between rural and urban power distributors. Essential Services Commission, 2005.

91. Develop "incentive power" model and apply towards evaluation of regulatory options in Victoria, Australia. Essential Services Commission, 2004-2005.

92. Review report on labor price forecasts for Victoria, Australia. Essential Services Commission, 2004-2005.

93. Develop and testify in support of performance-based regulation plan. Bay State Gas, 2004-2005.

94. Review of gas regulatory framework in Ontario, Canada. Ontario Energy Board, 2004-2005.

95. Benchmarking gas distribution operations. Powerco, Vector, NGC (New Zealand), 2004.

96. Report on methodologies for updating CPI-X price controls and assemble US gas transmission pipeline data, to be used in update of price controls for gas transmission services. Comision Reguladora de Energia (Mexico), 2004-2005.

97. Benchmark comprehensive power and water utility operations. Aqualectra (Curacao, Netherlands Antilles), 2004-2005.

98. Benchmarking power distribution operations. Energex and Ergon Energy, 2004.

99. Regulatory treatment of hub and storage facilities. NICOR Gas, 2004.

100. Review and comment on proposed service quality regulation. Essential Services Commission, 2004.

101. Review and contribute to report on ring fencing policies. Essential Services Commission, Victoria Australia, 2004.

102. Estimate lost earnings in litigation case. Wolfgram and Gherardini, 2004.

103. Respond to Productivity Commission report on Gas Access Arrangements. Essential Services Commission, Victoria Australia, 2004.

104. Analysis of PBR plans for rates and service quality worldwide. Jamaica Public Service, 2004.

105. Undertake benchmarking and total factor productivity studies in support of an X factor in a performance-based regulatory plan. Jamaica Public Service, 2003-2004.

106. Evaluate incentive regulation options. Questar Gas, 2003-2004.

107. Project evaluating implementation of total factor productivity in energy utility regulation. Essential Services Commission, Victoria Australia, 2003-2005.

108. Evaluate incentive regulation reports commissioned by Australian Competition and Consumer Commission. Essential Services Commission, Victoria Australia, 2003.

109. Evaluate proposed regulatory thresholds regime. Powerco New Zealand, 2003.

110. Evaluate benchmarking methods and regulatory reform proposals. Jamaica Public Service, 2003.

111. Evaluate proposals for service quality regulation in province of Ontario. Hydro One, 2003.

112. Evaluate benchmarking methods and regulatory reform proposals. Overseas New Zealand client wishes to remain confidential at this time, 2003.

113. US-Japan power transmission benchmarking. Central Research Institute of Electric Power Industry (Japan), 2003.

114. Benchmarking power distribution operations and maintenance (O&M) costs benchmarking and O&M productivity growth. Superintendente de Electricidad (Bolivia), 2003.

115. Benchmarking gas distribution operations and maintenance expenses. ACTEW (Australia), 2003.

116. Estimate lost earnings in wrongful death case. Wolfgram and Gherardini, 2003.

117. Advise on updating incentive plan for demand-side management. Hawaiian Electric, 2003.

118. Estimate and testify in support of damages in patent infringement case, Trombetta, LLC vs. Dana Corporation and AEC. Ryan, Kromholz and Mannion, 2003.

119. Analyze service quality proposals for a natural gas distributor, recommend modifications and testify in support of recommendations. New England Gas, 2002-2003.

120. Develop a service quality incentive plan for power distributors in Queensland, Australia; the plan is to be developed through a consultative process between the companies, major customer groups, and the regulator. Queensland Competition Authority, 2002-2003.

121. Consultation on developments regarding Wisconsin Electric's "Power the Future" initiative. Fidelity Investments, 2002.

122. Confidential report on US experience with benchmarking and alternative regulation. Central Research Institute of Electric Power Industry (Japan), 2002-2003.

123. Confidential report on capital cost measurement. Central Research Institute of Electric Power Industry (Japan), 2002-2003.

124. Report on merits and feasibility of benchmarking New Zealand power distributors. United Networks, 2002.

125. Impact of gas marketing expenditures on residential gas consumption. Envestra, 2002.

126. Advise on index-based performance-based regulation plan for a power distribution utility. Client wishes to remain confidential at this time, 2002.

127. Estimate productivity trend gas distribution industry and testify in support of trend. Boston Gas, 2002-2003.

128. Gas distribution benchmarking study. TXU Australia, Envestra and Multinet, 2002.

129. Benchmarking power transmission cost. Transend, 2002.

130. Advise on the development of an incentive regulation proposal for a North American power transmission utility. Hydro One Networks, 2001-2002.

131. Application of productivity and econometric benchmarking in an update of an incentive regulation plan. Ameren UE, 2001-2002.

132. Litigation regarding violations of Unfair Trade Practices Act for Tamoxifen, Taxol, and Buspar prescription drugs. Miner, Barnhill, and Galland, P.C., 2001-2002.

133. Recommend reforms of Western Australia power market, including reforms of wholesale markets, retail markets, structure of the incumbent utility, and regulatory arrangements; work was summarized in a report to the Electricity Reform Task Force. Western Power, 2001.

134. Faculty member of Regulatory Training Seminar in Bolivia. Seminar organized by the Public Utility Research Center and sponsored by SIRESE, 2001.

135. White Paper on implementing total factor productivity measures in regulation for the Utility Distributor's Forum. CitiPower, 2001.

136. Electronic forum on service quality incentives and research topics. Edison Electric Institute, 2001.

137. Economies of scale and scope in power services. Western Power, 2001.

138. Report evaluating the merits of alternative benchmarking methods and their application to energy distributors. Electricity Supply Association of Australia, 2001.

139. Response to report on benchmarking and incentive regulation. Client confidential at this time, 2000-2001.

140. Report on consistency of Price Determination with legislative mandates. TXU Australia, 2000-2001.

141. Develop methodology for service quality benchmarking and construction of appropriate deadbands. Massachusetts Gas and Electric Distribution Companies, 2000.

142. Advise on Performance-Based Regulation strategy, including development of a service quality incentive. BCGas, 2000.

143. Power distribution benchmarking. Queensland Competition Authority, 2000.

144. Develop and testify in support of service quality incentive. Western Resources, 2000.

145. Response to regulatory proposals for "ring fencing" operations. CitiPower, 2000.

146. Benchmarking evaluation of power distribution costs. Client name withheld, 2000.

147. Updated White Paper on Metering and Billing Competition in California. Edison Electric Institute, 2000.

148. Economies of scale and scope in power delivery and metering services. Massachusetts Utility Distribution Companies, 2000.

149. Evaluation of merger benefits. Client wishes to remain anonymous at this time, 2000.

150. Response to study on benchmarking capital spending. CitiPower, 2000.

151. Response to incentive regulation proposals of Pareto Economics in Victorian distribution price review. CitiPower, 2000.

152. Estimate scale economies in power generation, scope economies between power transmission and power generation, and implications for public policy in Western Australia. Western Power, 2000.

153. White Paper on "best practice" regulation and evaluation of price and non-price regulation of energy and water utilities in Australia, the US, and the UK. Electricity Association of New South Wales, 2000.

154. Power transmission benchmarking. Client confidential at this time, 2000.

155. Development of performance-based regulation plan for power distribution services. Texas Utilities, 2000.

156. Response to UMS benchmarking study on O&M costs. Victorian power distributors, 2000.

157. Response to Consultation Paper on Detailed Proposal for Form of the Price Control. CitiPower, 1999-2000.

158. White Paper on cost structure of power distribution. Australian power distributors (coalition contact: the Electricity Supply Association of Australia), 1999-2000.

159. White Paper on benchmarking principles and applications. Victorian power distributors, 1999-2000.

160. Service quality testimony. Hawaiian Electric, Maui Electric, and Hawaii Electric Light, 1999.

161. Faculty member of Regulatory Training Seminar in Argentina. Seminar organized by the Public Utility Research Center and sponsored by Enargas, 1999.

162. Service quality benchmarking study. Southern California Edison, 1999.

163. US-Australia performance benchmarking study. Victorian Distribution Businesses, Victoria, Australia, 1999.

164. Cost benchmarking for power delivery and customer services. Southern California Edison, 1999.

165. Development of Service Quality Incentive and Testimony in Support of Plan. Oklahoma Gas and Electric, 1999.

166. Evaluation of Intervenor Assessments of Customer Benefits in Proposed Merger. Western Resources, 1999.

167. Response to Regulator Proposals for Regulatory Methodology, Efficiency Measurement and Benefit-Sharing, and Form of Distribution Price Controls. CitiPower, Australia, 1999.

168. Response to Incentive Regulation Proposal of Australian Competition and Consumer Commission. CitiPower, Australia, 1998.

169. Report on Metering and Billing Competition in California. Edison Electric Institute, 1998-99.

170. Evaluation of Economies of Vertical Integration for Electric Utilities in Illinois. Edison Electric Institute, 1998.

171. Assessment of Cost Performance of Power Distributors in the United States and Australian state of Victoria. Victorian Power Distributors, 1998.

172. Formal Response to Regulatory Proposals for Price Cap Regulation/Development of Regulatory Options. Victorian Power Distributors, 1998.

173. Development of Service Quality Incentive and Testimony in Support of Plan. Louisville Gas and Electric/Kentucky Utilities, 1998.

174. Regulatory Support for Overall PBR Strategy. Louisville Gas and Electric/Kentucky Utilities, 1998.

175. Testimony on Impact of Brand Name Restrictions in Maine's Retail Energy Markets. Edison Electric Institute, 1998.

176. Development of Service Quality Incentive. Hawaiian Electric, 1998.

177. Regulatory Support for Comprehensive PBR Strategy and Feasibility of Retail Competition in Power Supply Services. Hawaiian Electric, 1997-98.

178. White Paper on Controlling Cross-Subsidization in Electric Utility Regulation. Edison Electric Institute, 1997-98.

179. White Paper on Cost Structure of Integrated Electric Utilities and Implications for Retail Competition. Edison Electric Institute, 1997-98.

180. Regulatory Support for a Price Cap Plan for Combination Utility. San Diego Gas and Electric, 1997-98.

181. White Paper on Price Cap Methodologies for Power Distributors in Victoria, Australia. Victorian Power Distributors, 1997.

182. Development of a Price Cap Plan for a Local Gas Distribution Utility. Atlanta Gas Light, 1997.

183. White Paper on Price Cap Regulation for Power Distribution. Edison Electric Institute, 1997.

184. Comprehensive Report on Performance-Based Regulatory Options for a Local Gas Distribution Utility. Atlanta Gas Light, 1997.

185. White Paper on Use of Electric Utility Brand Names in Competitive Markets. Edison Electric Institute, 1997.

186. Options for Price Cap Regulation for Power Distribution in Colombia. Comision Reguladora de Energía y Gas en Colombia, 1997.

187. Options for Performance-Based Regulation for Power Transmission and Stranded Cost Recovery for an Electric Utility. Client wishes to remain confidential at this time, 1997.

188. Regulatory Support for an Index-Based Incentive Plan of a Local Gas Distribution Utility. BCGas, 1997.

189. Recommendations for a service quality incentive plan. Hawaiian Electric, 1997.

190. Survey of Service Quality Incentive Plans and Assessment of Options. BCGas, 1996.

191. Regulatory Support for a Price Cap Plan. Southern California Gas, 1996.

192. Determination of service territories for newly-privatized gas distributors in Mexico. Comisión Reguladora de Energía, 1996.

193. Assessment of Regulatory Options for a Public Enterprise. United States Postal Service, 1996-97.

194. Regulatory support for a Price Cap Plan of a Local Gas Distribution Utility. Brooklyn Union Gas, 1996.

195. Development of a Price Cap Plan for the Gas Operations of a Combination Utility. Client wishes to remain confidential at this time, 1996.

196. Assessment of Options for Service Quality Incentives. Client wishes to remain confidential at this time, 1996.

197. Development of a Price Cap Plan for an Electric Utility. Client wishes to remain confidential at this time, 1996.

198. Assessment of Lessons from Natural Gas Restructuring for Electric Utilities. Client wishes to remain confidential at this time, 1996.

199. Advised on the Establishment of a Regulatory Framework for the Mexican Natural Gas Industry. Comision Reguladora de Energia, 1996.

200. White Paper on Unbundling Electric Utility Services. Edison Electric Institute, 1996.

201. Regulatory support for a Price Cap Plan of a Local Gas Distribution Utility. Boston Gas, 1995.

202. Development of a Price Cap Plan for a Local Gas Distribution Utility. Client wishes to remain confidential at this time, 1995.

203. Assessment of Incentive Regulation Options in the Context of a Proposed Restructuring of the Electric Utility Industry. Client outside of the United States wishes to remain confidential at this time, 1995.

204. Organization of a Conference on Price Cap Regulation. Edison Electric Institute, 1995.

205. Development of Regulatory Strategies Regarding the Transition to Retail Competition in the Electric Power Industry. Niagara Mohawk Power, 1995.

206. Assessment of Incentive Regulation Options in the Context of a Proposed Restructuring of the Electric Utility Industry. Alberta Power Limited, 1995.

207. Development of a Price Cap Plan for the Gas Operations of a Combination Utility. Public Service Electric and Gas, 1995.

208. Development of a Price Cap Plan for the Electric Operations of a Combination Utility. Public Service Electric and Gas, 1995.

209. White Paper on Incentive Regulation Theory and Its Application to Electric Utilities. Electric Power Research Institute, 1994-95.

210. Productivity Trends of U.S. Gas Distributors. Southern California Gas, 1994-95.

211. White Paper on Price Cap Regulation. Edison Electric Institute, 1994.

212. Regulatory Support for a Price Cap Plan. Central Maine Power, 1994.

213. Advanced Benchmarking Methods for U.S. Electric Utilities. Southern Electrical System, 1994.

214. Development of and Regulatory Support for a Price Cap Plan. Niagara Mohawk Power, 1994.

215. Competitive Price Scenarios for Power Markets in the Northeastern U.S. Niagara Mohawk Power, 1993-94.

216. Survey of Price Cap Plans in the U.S. and Abroad. Niagara Mohawk Power, 1993.

Expert Witness Testimony:

1. Before the Puerto Rico Energy Commission, evidence on behalf of the Puerto Rico Electric Power Authority, 2016. Subject: national and international cost and wage benchmarking.

2. Before the Wisconsin Public Service Commission, evidence on behalf of Associated Builders and Contractors of Wisconsin, 2015. Subject: assessing the merits of an expanded bidding process for the expansion of the Alliant Riverside Energy Center facility.

3. Before the Ontario Energy Board, evidence on behalf of OEB Staff, 2015. Subject: review of Custom Incentive Regulation proposal and benchmarking evidence of Toronto Hydro.

4. Before the Wisconsin Public Service Commission; evidence on behalf of Kwik Trip, 2014. Subject: surrebuttal testimony on the impact of gas extension tariffs on the development of the CNG marketplace in Wisconsin.

5. Before the Wisconsin Public Service Commission; evidence on behalf of Kwik Trip, 2014. Subject: the impact of gas extension tariffs on the development of the CNG marketplace in Wisconsin.

6. Before the Ontario Energy Board; evidence on behalf of OEB Staff, 2014: Subject: review of Customized Incentive Regulation proposal for Enbridge Gas Distribution.

7. Before the Ontario Energy Board; evidence on behalf of OEB Staff, 2013. Subject: total factor productivity estimation, cost benchmarking, and establishing incentive regulation plans for Ontario electricity distributors.

8. Before the Wisconsin Public Service Commission; evidence on behalf of Wisconsin Public Service, 2013. Subject: sur-surrebuttal testimony on the value of reliability improvements from undergrounding power lines.

9. Before the Wisconsin Public Service Commission; evidence on behalf of Wisconsin Public Service, 2013. Subject: rebuttal testimony on the value of reliability improvements from undergrounding power lines.

10. Before the Wisconsin Public Service Commission; evidence on behalf of SMART Water, 2012. Statement on appropriate opt-out policies for smart meters.

11. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of National Grid, 2010. Subject: rebuttal testimony in support of a net inflation adjustment mechanism applied to operating and maintenance expenditures.

12. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of National Grid, 2010. Subject: empirical support for a net inflation adjustment mechanism applied to operating and maintenance expenditures.

13. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2009. Subject: direct testimony on performance based regulation.

14. Before the Appeal Panel Constituted Pursuant to Section 55 of the *Essential Services Commission Act* 2001, Victoria Australia; evidence on behalf of the Essential Services Commission, 2008. Subject: estimating partial factor productivity growth for O&M expenditures for natural gas distributors.

15. Before the Ontario Energy Board, 2008. Subject: appropriate values for total factor productivity-based productivity factor; benchmarking-based productivity "stretch factors;" and appropriate thresholds for capital investment modules; in an incentive regulation plan for electricity distributors in the Province.

16. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2007. Subject: direct testimony on performance based regulation.

17. Before the Circuit Court of the City of St. Louis, Missouri, Division 9, in Michele Thrash v. Freightliner *et al*, 2007. Subject: deposition testimony on estimated damages for lost income and medical treatment.

18. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2007. Subject: panel testimony on revenue decoupling and performance based regulation.

19. Before the New Zealand Commerce Commission, evidence on behalf of Telecom New Zealand, 2007. Subject: principles for price benchmarking and the merits of alternative methods of benchmarking unbundled copper local loop prices.

20. Before the Circuit Court of the City of St. Louis, Missouri, Division 13, in Anastacia McNutt v. Globe Transport, Inc *et al*, 2007. Subject: deposition testimony on estimated damages for lost income and past and future medical treatment.

21. Before the Michigan Public Service Commission; evidence on behalf of Detroit Edison, 2007. Subject: service quality regulation and benchmarking.

22. Before the Appeal Panel, South Australia, Australia; evidence on behalf of the Essential Services Commission of South Australia, 2006. Subject: the operating expenditures and outsourcing management fee of Envestra Ltd.

23. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2006. Subject: rebuttal testimony on exogenous recovery of revenues lost due to declining natural gas usage.

24. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2006. Subject: direct testimony on exogenous recovery of revenues lost due to declining natural gas usage.

25. Before the Appeal Panel Constituted Pursuant to Section 55 of the *Essential Services Commission Act* 2001, Victoria Australia; evidence on behalf of the Essential Services Commission, 2006. Subject: regulatory treatment of an outsourcing contract to a related corporate party in a power distribution price determination.

26. Before the Appeal Panel Constituted Pursuant to Section 55 of the *Essential Services Commission Act* 2001, Victoria Australia; evidence on behalf of the Essential Services Commission, 2005. Subject: labor and non-labor shares in operating expenditures.

27. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2005. Subject: rebuttal testimony on performance based regulation and benchmarking.

28. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Bay State Gas, 2005. Subject: performance based regulation and benchmarking.

29. Before the New Zealand Commerce Commission, evidence on behalf of Vector and NGC, 2004. Benchmarking evidence for New Zealand gas distributors.

30. Before the New Zealand Commerce Commission, evidence on behalf of Powerco, 2003. Evaluation of total factor productivity and benchmarking evidence in studies undertaken for the Commission.

31. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Boston Gas, 2003. Subject: rebuttal testimony on performance based regulation, total factor productivity measurement and benchmarking

32. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Boston Gas, 2003. Subject: performance based regulation, total factor productivity measurement and benchmarking

33. Before the US District Court for the Western District of Wisconsin, Trombetta, LLC vs. Dana Corporation and AEC, 2003. Subject: estimate damages in solenoid patent infringement case.

34. Before the Rhode Island Public Utilities Commission: evidence on behalf of New England Gas, 2003. Subject: direct testimony on alternative service quality regulation proposals.

35. Before the Kansas Corporation Commission; evidence on behalf of Western Resources, 2001. Subject: reply to surrebuttal testimony in support of service quality incentive plan.

36. Before the Kansas Corporation Commission; evidence on behalf of Western Resources, 2000. Subject: rebuttal testimony in support of service quality incentive plan.

37. Before the Supreme Court of Victoria, Australia; evidence on behalf of TXU Australia, 2000. Subject: Whether the regulator's price determination complied with legal mandates to use price-based incentive regulation.

38. Before the Kansas Corporation Commission; evidence on behalf of Western Resources, 2000. Subject: Support of a service quality incentive plan, including valuation of quality and other intangible aspects of customer welfare.

39. Before the Massachusetts Department of Telecommunications and Energy; evidence on behalf of Massachusetts gas and electric distribution companies, 2000. Subject: Service quality benchmarking.

40. Before the Hawaii Public Service Commission; evidence on behalf of Hawaiian Electric, 1999. Subject: Support of a service quality incentive plan, including valuation of quality and other intangible aspects of customer welfare.

41. Before the Oklahoma Corporation Commission; evidence on behalf of Oklahoma Gas and Electric, 1999. Subject: Support of a service quality incentive plan, including valuation of quality and other intangible aspects of customer welfare.

42. Before the Kentucky Public Service Commission; evidence on behalf of Louisville Gas and Electric and Kentucky Utilities, 1998. Subject: Rebuttal testimony in support of service quality incentive plan and benefits of companies' regulatory proposal to low-income customers.

43. Before the Kentucky Public Service Commission; evidence on behalf of Louisville Gas and Electric and Kentucky Utilities, 1998. Subject: Support of a service quality incentive plan, including valuation of quality and other intangible aspects of customer welfare.

44. Before the Maine Public Utilities Commission, evidence on behalf of the Edison Electric Institute, 1998. Subject: Merits of allowing utility companies to use their brand names in competitive retail energy markets.

45. Before the California Public Utilities Commission, evidence on behalf of the Edison Electric Institute, 1997. Subject: Merits of allowing utility companies to use their brand names in competitive retail energy markets.

Publications:

1. *The Price Cap Designers Handbook* (with M. N. Lowry), Edison Electric Institute, 1995.

2. "The Treatment of Z Factors in Price Cap Plans" (with Mark Newton Lowry), *Applied Economics Letters*, 2: 1995.

3. "Forecasting Productivity Trends of Natural Gas Distributors" (with Mark Newton Lowry), *AGA Forecasting Review*, March 1996.

4. *Performance-Based Regulation for Electric Utilities: The State of the Art and Directions for Further Research* (with Mark Newton Lowry), Palo Alto: Electric Power Research Institute, 1996.

5. *Developing Unbundled Electric Power Service Offerings: Case Studies of Methods and Issues* (with Laurence Kirsch), Washington: Edison Electric Institute, 1996.

6. "A Theoretical Model of Spillovers Through Labor Recruitment", *International Economic Journal*, Autumn 1997.

7. *Branding Electric Utility Products: Analysis and Experience in Related Industries* (with Mark Newton Lowry and David Hovde), Washington: Edison Electric Institute, 1997.

8. "The Branding Benefit", *Electric Perspectives*, November 1997.

9. *Price Cap Regulation for Power Distribution* (with Mark Newton Lowry), Washington: Edison Electric Institute, 1998.

10. *Controlling for Cross-Subsidization in Electric Utility Regulation* (with Mark Meitzen and Mark Netwon Lowry), Washington: Edison Electric Institute, 1998.

11. "Price Caps for Distribution Service: Do They Make Sense?", *Edison Times*, December 1998 (with Eric Ackerman and Mark Newton Lowry).

12. *Economies of Scale and Scope in Power Distribution* (with Mark Newton Lowry), Washington: Edison Electric Institute, 1999.

13. *Competition for Metering, Billing and Information Services: The Experience in California So Far*, Edison Electric Institute, 1999.

14. *Third Party Metering, Billing and Information Services: Further Evidence from California*, Edison Electric Institute, 2000.

15. "Performance Based Regulation of Energy Utilities" (with Mark Newton Lowry), *Energy Law Journal*, 2002

16. "Performance Based Regulation and Business Strategy" (with Mark Newton Lowry), *Natural Gas*, 2003.

17. "Performance Based Regulation and Energy Utility Business Strategy" (with Mark Newton Lowry), *Natural Gas and Electric Power Industries Analysis 2003*, Financial Communications, Houston, 2003

18. "Price Control Regulation in North America: Role of Indexing and Benchmarking," (with M.N. Lowry and L. Getachew), *Proceedings of Market Design Conference*, Stockholm, Sweden, 2003.

19. "Performance Based Regulation Developments for Natural Gas Utilities" (with Mark Newton Lowry), *Natural Gas and Electricity*, 2004.

20. "Incentive Power and the Design of Regulatory Regimes," *Network*, December 2005.

21. "Alternative Regulation for Electric Utilities" (with Mark Newton Lowry), *Electricity Journal*, June 2006.

22. "Performance Indicators and Price Monitoring: Assessing Market Power," *Network*, March 2007.

23. "Incentive Regulation in North American Energy Markets" *Energy Law and Policy*, Carswell Publishing, Toronto, Canada, 2009.

24. "Regulatory Reform in Ontario: Successes, Shortcomings and Unfinished Business" *Public Utilities Fortnightly*, November 2009

25. "An Update to Keystone XL Development," *CERI Crude Oil Report*, September 2015

26. "Mexico Natural Gas Reform," *Geopolitics of Energy*, January-February 2016

Presentations at Seminars and Professional Meetings:

1. Department of Energy/NARUC, Orlando, FL, 1995.
2. Illinois Commerce Commission and the Center for Regulatory Studies, St. Charles, IL, 1995.
3. Regulatory Studies Program, NARUC/Michigan State University, East Lansing, MI, 1995.

4. Marketing Conference, Edison Electric Institute, Chicago, IL, 1997.
5. Advanced Rate School, Edison Electric Institute, Indianapolis, IN, 1997.
6. Code of Conduct Conference, Denver, CO, 1997.
7. Code of Conduct Conference, Denver, CO, 1998.
8. Forum on Price Cap Regulation for Power Distribution. Melbourne, Australia, 1998.
9. Conference on Competition and Regulatory Reform in Hawaii. Honolulu, HI, 1998
10. Alternative Approaches Towards Price Cap Regulation. Melbourne, Australia, 1998.
11. Economics Meetings, Edison Electric Institute. Charlotte, NC, 1998.
12. Metering, Billing and Information Services Policy Convention, EEI, Chicago, IL, 1999.
13. Electricity Deregulation Conference. Vail, CO, 1999.
14. PURC Regulatory Training Seminar for Natural Gas Policy, Buenos Aires, Argentina, 1999.
15. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2000.
16. Seminar on Theory and Practice of Economic Regulation, Sydney, Australia, 2000.
17. Power Delivery Reliability Conference. Denver, CO, 2000.
18. Performance-Based Regulation Conference. Chicago, IL, 2000.
19. Regulatory Studies Program, NARUC/Michigan State University, East Lansing, MI, 2000.
20. Performance-Based Ratemaking Conference, Denver, CO 2000.
21. Energy Forum, Institute of Public Affairs, Melbourne, Australia, 2000.
22. Chamber of Commerce and Industry, Perth, Australia, 2001.
23. Energy Regulation Conference, Melbourne, Australia, 2001.
24. Advanced Rate School, Edison Electric Institute, Indianapolis, IN, 2001.
25. PURC Regulatory Training Seminar, La Paz, Bolivia, 2001.
26. Performance-Based Regulation Conference, Denver, CO, 2001.
27. Cost Structure of Energy Networks, Sydney, Australia, 2002.
28. Advanced Rate School, Edison Electric Institute, Indianapolis, IN, 2002.
29. Performance-Based Ratemaking Conference, Denver, CO 2002.
30. How to Regulate Electricity Lines Companies?, New Zealand Institute for the Study of Competition and Regulation, Wellington, New Zealand, 2003
31. Public Utility Regulation Seminar: Tariff Design and Incentives, Acapulco, Mexico, 2003
32. Rates and Regulation Meeting: Southeastern Electric Exchange, Williamsburg, VA, 2003.
33. Workshop on Service Quality Regulation in Ontario, Toronto, ON 2003.
34. Joint Canadian Electricity Association Distribution Council and Customer Council Meeting, Halifax, Nova Scotia, 2004.
35. Asia-Pacific Productivity Conference, Brisbane, Australia, 2004. [invitation, paper submitted]
36. Workshop on Productivity Measurement, Melbourne Australia, 2005.
37. Utility Regulators Forum, Canberra Australia, 2005.
38. CAMPUT Energy Regulation Course, Kingston Canada, 2006.
39. Performance Based Regulation Seminar, Toronto Canada, 2006.
40. Performance Benchmarking for Energy Utilities, Arlington, Virginia, 2006.
41. Performance Benchmarking for Energy Utilities, Seattle, Washington, 2007.
42. Alternative Regulation Seminar, Boston, Massachusetts, 2007.
43. CAMPUT Energy Regulation Course, Kingston Canada, 2007.
44. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2008.
45. Performance Benchmarking for Energy Utilities, Denver, Colorado, 2008.
46. Alternative Regulation Seminar, Toronto, Canada, 2008.
47. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2008.
48. CAMPUT Energy Regulation Course, Kingston Canada, 2008.

49. Performance Benchmarking for Energy Utilities, Chicago, IL, 2008.
50. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2009.
51. Alternative Regulation Seminar, Boston, MA, 2009.
52. CAMPUT Energy Regulation Course, Kingston Canada, 2009.
53. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2010.
54. Alternative Regulation Seminar, Boston, MA, 2010.
55. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2010.
56. CAMPUT Energy Regulation Course, Kingston Canada, 2010.
57. Alternative Regulation Seminar, Toronto Canada 2010.
58. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2011.
59. Alternative Regulation Seminar, Philadelphia PA, 2011.
60. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2012.
61. Alternative Regulation Seminar, Chicago, IL, 2012.
62. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2013.
63. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2013.
64. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2014.
65. Alternative Regulation Seminar, Chicago, 2014.
66. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2014.
67. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2015.
68. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2015.
69. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2016.
70. Latin American Natural Gas Conference, Naturgas, Cartegena, Colombia, 2016.
71. World Bank International Training Program on Utility Regulation, Gainesville, FL, 2016 (pending).

Exhibit 6.02: Sample Vertically-Integrated U.S. Electric Utilities

1. Alabama Power Company
2. Alaska Electric Light and Power Company
3. ALLETE Inc.
4. Ameren Missouri
5. American Electric Power Company Inc.
6. Appalachian Power Company
7. Arizona Public Service Company
8. Avista Corporation
9. Black Hills Power Inc.
10. Central Hudson Gas and Electric Corp.
11. CLECO Power LLC
12. Consolidated Edison Company
13. Consumers Energy Company
14. Dayton Power and Light Company
15. DTE Company
16. Duke Energy Carolinas
17. Duke Energy Florida
18. Duke Energy Indiana
19. Duke Energy Kentucky
20. Duke Energy Progress
21. El Paso Electric Company
22. Empire District Electric Company
23. Entergy Arkansas Inc.
24. Entergy Gulf States Louisiana Inc.
25. Entergy Louisiana Inc.
26. Entergy Mississippi Inc.
27. Entergy New Orleans Inc.
28. Entergy Texas Inc.
29. Florida Power and Light Company
30. Georgia Power Company
31. Gulf Power Company
32. Idaho Power Company
33. Indiana Michigan Power Company
34. Indianapolis Power and Light Company
35. Interstate Power Company
36. Kansas City Power & Light Co
37. Kansas Gas & Electric Co
38. KCP&L Greater Missouri Operations Co
39. Kentucky Utilities Co
40. Louisville Gas & Electric Co

41. Madison Gas and Electric Company
42. MDU Resources Group Inc.
43. MidAmerican Energy Company
44. Mississippi Power Company
45. Monongahela Power Company
46. Nevada Power Company
47. Northern Indiana Public Service Company
48. Northern States Power Company – Minnesota
49. Northern States Power Company - Wisconsin
50. Northwestern Corp.
51. Northwestern Wisconsin Electric Company
52. Oklahoma Gas and Electric Company
53. Otter Tail Power Company
54. Pacific Gas and Electric Company
55. Pacificorp
56. Portland General Electric Company
57. Public Service of Colorado
58. Public Service of New Mexico
59. Public Service of Oklahoma
60. Puget Sound Energy Inc.
61. San Diego Gas and Electric Company
62. Sierra Pacific Power Company
63. South Carolina Electric and Gas Company
64. Southern California Edison Company
65. South Indiana Gas and Electric Company
66. Tampa Electric Company
67. Tucson Electric Power Company
68. Upper Peninsula Power Company
69. Virginia Electric Power Company
70. Westar Energy Inc.
71. Wisconsin Electric Power Company
72. Wisconsin Power and Light
73. Wisconsin Public Service Corp.
74. Xcel Energy Inc.

ATTESTATION

STATE OF TEXAS)
) ss.
COUNTY OF TRAVIS)

Affiant, Larry Kaufmann, being first duly sworn, states the following:

The prepared pre-filed Direct Testimony and the Schedules and Exhibits attached thereto and the Schedules I am sponsoring constitute the direct testimony of Affiant in the above-styled case. Affiant states that he would give the answers set forth in the pre-filed Direct Testimony if asked the questions propounded therein at the time of the filing. Affiant further states that, to the best of his knowledge, his statements made are true and correct.

Larry Kaufmann

Affidavit No.____

Acknowledged and subscribed before me by Larry Kaufmann, of the personal circumstances above mentioned, in his capacity as Senior Advisor to Navigant Consulting, Inc., who is personally known to me or whom I have identified by means of his driver's license number 40670150, in Austin, Texas, this 25th day of May 2016.

Notary Public

NOTARY PUBLIC STATE OF TEXAS
RYAN HENDERSON
My Commission Expires
February 23, 2019

IN THE NAME AND BY THE AUTHORITY OF THE STATE OF TEXAS

Notary Public Commission

TO ALL TO WHOM THESE PRESENTS SHALL COME—GREETINGS:

Whereas **Ryan Henderson**

has been appointed by the Secretary of State of Texas a Notary Public in the State of Texas. Now, therefore, the above named person is hereby commissioned a Notary Public for the State of Texas under the laws of the State of Texas with all the rights, privileges and emoluments appertaining to said office.

TERM OF OFFICE: 02/23/2015 - 02/23/2019

NOTARY ID# 13012739-8

Greg Abbott

GREG ABBOTT, GOVERNOR OF TEXAS

Coby Shorter III

Coby Shorter
Deputy Secretary of State

NOTARY PUBLIC OATH OF OFFICE

State of Texas
County of Travis

I, Ryan Henderson, do solemnly swear (or affirm), that I will faithfully execute the duties of the office of notary public of the State of Texas, and will to the best of my ability preserve, protect, and defend the Constitution and laws of the United States and this state, so help me God.

X [signature]

Sworn to and subscribed before me on this 21st day of April, 2015.

Jennifer Harman
Notary Public Signature

Seal

JENNIFER HARMAN
My Commission Expires
December 31, 2018