E V I D E N C E I N C H I E F O F M A R K N E W T O N L O W R Y A N D D A V I D H O V D E

G A Z M E T R O

I N C E N T I V E M E C H A N I S M

TABLE DES MATIÈRES

INTRODUCTION

Q.1 What is the name, title, and business address of the first witness?

A.1 My name is Mark Newton Lowry. I am the President of Pacific Economics Group (« PEG ») Research LLC. My business address is 22 East Mifflin Street, Suite 302, Madison, Wisconsin USA 53703.

Q.2 What are your credentials to provide testimony in this proceeding?

A.2 PEG Research is a company in the Pacific Economics Group consortium that is engaged in research on utility industries. Incentive regulation (« IR ») and other alternatives to the traditional cost of service approach to utility regulation (a/k/a « Altreg ») are company specialties. Our personnel, which include four PhD economists, have been pioneers in the use of rigorous statistical cost research in energy utility regulation. We were involved in some of the earliest uses of input price and productivity research to develop IR plans. We have also investigated and testified on other innovations in regulation such as revenue decoupling and capital cost trackers.

Work for a mix of utilities, regulators, and consumer groups has contributed to our reputation for objectivity and dedication to regulatory science. Our practice is international in scope and has included dozens of projects in Canada. Most notably, we assisted the Gaz Métro Groupe de Travail in the development of its recent IR proposal in Phase 2 of this proceeding.

My duties as President of PEG Research include the management of the firm, Altreg consulting, the supervision of statistical cost research, and expert witness testimony. In total, I have served as a consultant and/or expert witness on more than one hundred and fifty matters and have testified more than twenty times on productivity issues. Venues for my Altreg and statistical cost research testimony have included California, Colorado, Delaware, the District of Columbia, Georgia, Hawaii, Illinois, Kentucky, Maine, Maryland, Massachusetts, Missouri, New Jersey, New York, Oklahoma, Rhode Island, Vermont,

Washington, the US Surface Transportation Board, and in Canada, Alberta, British Columbia, Ontario, and Quebec.

Before assuming my present position I was a partner of Pacific Economics Group LLC for ten years and managed that company's office in Madison. Before that, I worked for nine years at Christensen Associates in Madison, first as a Senior Economist and later as a Vice President. My career has also included work as an academic economist. I was for several years a professor of mineral economics at the Pennsylvania State University and was a visiting professor at l'Ecole des Hautes Etudes Commerciales in Montreal.

In total, I have twenty-seven years of experience as a practicing economist, spending the last twenty-one years doing work on utility industries. I have numerous professional publications, been a referee for several scholarly journals, and chaired several conferences on Altreg and utility cost research. I hold an undergraduate degree in Ibero-American Studies and a PhD in Applied Economics from the University of Wisconsin. My curriculum vitae is attached as Appendix A.

Q.3 What is the name, title, and business address of the second witness?

A.3 My name is David Hovde. I am a Vice President at PEG Research LLC. My business address is also 22 East Mifflin Street, Suite 302, Madison, Wisconsin USA 53703.

Q.4 What are your credentials to provide testimony in this proceeding?

A.4 In my capacity as a Vice President at PEG Research, I play a leading role in the company's statistical cost research. I supervise our data collection efforts and write the code that computes cost and input price and productivity indexes. I have served as a consultant on more than 100 matters. These matters include nearly every instance in which Dr. Lowry has provided productivity testimony. I have also served as a consultant on numerous projects that did not involve Dr. Lowry. These include projects in Massachusetts, Curacao, Jamaica, and New Zealand and for regulatory agencies in Ontario and Australia. My duties also include a role in the company's personnel management.

Outside the office, I have been active for several years in collegiate economics instruction. Institutions where I have taught economics include Madison College and Carroll University. Before joining PEG Research I worked for nearly a decade at Christensen Associates, first as a Staff Economist and later as a Senior Economist.

In total, I have 22 years of experience as a practicing economist. I have coauthored several papers in the field of statistical cost research. I hold undergraduate degrees in Economics, History, and International Relations and a Master's degree in Economics from the University of Wisconsin. My curriculum vitae is attached as Appendix B.

Q.5 Please explain the work you performed for the Groupe de Travail in Phase 2.

A.5 Decision D-2010-116 of the Régie de l'Energie («the Régie») authorized the Groupe de Travail to develop a new IR plan containing a rate escalation formula with an X factor. The Régie stated in the order that the X factor should "représente le seuil minimal attendu de croissance de la productivité en deça duquel une bonification ne peut être accordée"[1]. To aid in the choice of the X factor, Gaz Métro was directed to prepare a study of its historical productivity trend. The Régie expressed particular interest in the trend over the last ten years.[2] The Régie also asked the Groupe de Travail "d'inclure dans son rapport une proposition quant à la productivité attendue du distributeur pour les cinq prochaines années, incluant une réflexion sur la possibilité d'un dividende client (*stretch factor*)"[3].

Following this order the Groupe de Travail prepared a mandate for assistance from outside consultants which included the following tasks:

- review the literature on the X factor and the stretch factor;
- calculate Gaz Métro's recent multifactor productivity («MFP») trend; and
- recommend a range for what the X Factor should be.

[1] Decision D-2010-116, paragraph 95.

[2] Decision D-2010-116, paragraph 97.

[3] Decision D-2010-116, paragraph 99.

The mandate was later expanded to include development of an industry-specific input price index and a "forward looking" MFP growth target that is consistent with expected trends in Gaz Métro's business conditions. PEG Research calculated the forward looking target using Gaz Métro forecasts of growth in its operating scale, econometric estimates of cost elasticities with respect to growth in scale and other business conditions, and the mathematical analysis of some well known Canadian economists on the sources of MFP growth. The econometric research used recent historical data on gas utility cost and business conditions in the United States. We measured the MFP growth of Gaz Métro using a two-category output index because this better captured the impact of output growth on cost. The growth of the output index was a weighted average of the growth in the total number of customers and the total number of line kilometers. We used econometric estimates of the elasticity of cost with respect to each output variable to establish the weights. Preliminary final results of our research were provided in an 8 March 2011 report that we will hereafter call the («Phase 2 report»). The study was never finalized.

Q.6 Please describe the mandate you received for Phase 3.

A.6 In June of this year the Régie in Decision D-2012-076 rejected the Groupe de Travail's proposed IR plan, disbanded the Groupe, and directed the Company to file a plan proposal with different characteristics. Gaz Métro retained us to assist in the development of the new plan. This work has included an expansion of the analysis on the role of statistical cost research in IR plan design which we presented in Section 2.2 of our Phase 2 report. This expansion addressed the research needed to design X factors for the kind of IR plan that the Régie ordered last June. Gaz Métro's historical MFP trend and forward looking econometric MFP growth projection have been recalculated to be consistent with this new analysis. The input price trend of Gaz Métro was also recalculated. Additionally, we calculated the average MFP trends of the gas utilities in our US sample. Results of our new work for Gaz Métro are presented in the Phase 3 report.

WORK DONE IN PHASE 2 OF GAZ MÉTRO INCENTIVE MECHANISM

Q.7 Have you examined Régie decision D-2012-076?

A.7 Yes.

Q.8 Please identify the elements in the decision that, in your view, are the most significant.

A.8 Gaz Métro was ordered to develop an IR plan featuring revenue caps that are "modulée par catégories tarifaires" (« baskets of services ») . The allowed revenue for each basket must be escalated each fiscal year by a formula that includes the inflation of the consumer price index («CPI») (all-items) for Canada, an X factor based on productivity research, and growth in the number of customers of services in the basket. Revenues are to be decoupled from system use using variance accounts.

Q.9 What elements of the Régie's decision have an impact on the conclusions from your Phase 2 report?

A.9 A key result of the analysis we presented in Section 2.2 of our Phase 2 report was that the X factor of an IR plan which is based on rigorous (*e.g.* mathematically logical) statistical research depends on certain key features of the plan. For example, the output measure for productivity research for the design of a *revenue* cap index may be quite different than that for the design of a *price* cap index and this may materially affect the base productivity growth target. The Régie's decision favoring revenue caps that are escalated for basket-specific customer growth but not line length growth also has important implications for output index design. Under the Régie's approach, customer growth in one basket can have a markedly different impact on revenue than customer growth in another basket. For example, the addition of a low-volume customer is likely to have much less revenue impact than the addition of a high-volume customer. The output indexes that we used to measure Gaz Métro's MFP trend in our Phase 2 study are therefore inappropriate for the new IR approach. Line lengths should not appear in the output index. The total number of customers is also inappropriate because this variable does not recognize the different cost and revenue impacts of different customer groups.

The correct output index should be much less sensitive to the addition of a small-volume customer than it is to the addition of a large-volume customer. Given the changes in the output index, Gaz Métro's MFP index must be recalculated and the forward looking MFP growth target must be based on a new formula and new econometric work. New empirical research is also needed to provide the Régie with updated estimates of Gaz Métro's MFP and input price trends over the most recent years for which data are available.

Q.10 Given those elements from the decision, are the conclusions from your Phase 2 report still applicable? If not, please explain.

A.10 No they are not. There is clearly a need to revise and update the empirical studies undertaken for our Phase 2 report.

PHASE 3 REPORT

Q.11 How have you modified the methodology used in the Phase 3 empirical work?

A.11 Our analysis, detailed in Section 2.1 of our Phase 3 report, reveals that the output index that is consistent with the Régie's requirement of multiple revenue caps with their own customer escalators is a *revenue-weighted index* of the number of customers served. The construction of such an index should be consistent with the specification of service baskets in the revenue caps. Gaz Métro provided us with the data needed to construct an index with two service baskets --- petits et moyens debits («PMD») customers and ventes grandes entreprises («VGE») customers. We recalculated Gaz Métro's MFP index using the revenue-weighted customer index as the sole output measure.

The Régie's proposal for basket-specific revenue caps also required changes in our methodology for calculating forward looking MFP growth targets. There is a new term called the "output differential" in the formula that reflects the fact that the number of customers is not the only dimension of operating scale to affect cost. New econometric research was required to compute the elasticity estimates needed for the forward looking base MFP growth targets.

As discussed in Appendix 1 of our Phase 3 report, we made several upgrades to the econometric work in the new study. A delivery volume variable and a system age variable were recognized as important cost drivers.[4] There are thus three dimensions of operating scale to consider when projecting MFP growth: customers, line length, and volumes. The output differential considers how growth in the customer index differs from the average growth in all three output variables. Including the new variables in the model improves the accuracy of the estimates of the cost elasticities for customers and line length. A flexible "translog" functional form was used that made it easier to calculate cost elasticities for Gaz Métro which are tailored to its local conditions. Separate service baskets also raise the question of whether the X factors for service baskets should be basket-specific. We used the new econometric results to calculate forward looking X factors that are basket-specific.

To provide the Régie with a methodologically simpler alternative to the econometric MFP growth targets, we used the data set for the econometric work to calculate the average trend in the MFP of the sampled US gas utilities.

Small refinements were made in our methodology for calculating Gaz Métro's MFP growth. For example, we estimated the Company's labor quantity trend using the Statistics Canada index of average hourly earnings («AHE») for the Quebec *industrial aggregate* rather than the AHE for the Quebec *utility* sector. The Régie expressed reservations about the use of the AHE for the Quebec utility sector in its June order.[5]

Q.12 Does the sample used in your research differ from that in your Phase 2 study?

A.12 Yes. As discussed in Section 4.1.2 of our Phase 3 report, accurate estimation of the more numerous parameters in a cost function of translog form required additional data. In order to expand the dataset we added the latest two years of available data on US gas

[4] Some variables appearing in the econometric model in our Phase 2 study (*e.g.* the number of electric customers served) were found to have statistically insignificant parameter estimates and were not included in the new model.

[5] Decision D-2012-076, paragraph 83.

utility operations and moved the "benchmark year" for the calculation of capital cost to 1995 so as to access data on the operations of more utilities. These changes permitted us to roughly double the number of observations used in model estimation, and to add to the sample more companies that are similar to Gaz Métro. It also permitted us to end our reliance on older proprietary data on US gas utility capital costs and to instead rely solely on publicly available US data.

As for the sample used to calculate Gaz Métro's MFP trend, our previous 2000-2009 sample period required data for two years --- 1999 and 2000 --- for which data on key variables had to be imputed. To continue including these years in the sample we would also have to make some imputations concerning the number of customers in the PMD and VGE service baskets. The addition of two years of new data on Gaz Métro's operations (2010 and 2011) permitted us to no longer use 1999 and 2000 data and still produce a ten year historical trend.

X FACTOR

Q.13 Please summarize the results of your new research on the MFP trend of Gaz Métro and compare them to your Phase 2 results.

A.13 As discussed in Section 3 of our Phase 3 report, we calculated Gaz Métro's MFP growth over the ten year 2002-2011 period. Using the revenue-weighted customer index as the output measure in the MFP index, the Company's MFP growth averaged 1.29% annually.

In Section 3.3.4 of our Phase 2 report we noted that Gaz Métro's MFP growth averaged 1.66%. This outcome is modestly higher than in the new study. The lower trend estimate in our new study is due in part to slower measured output growth, as less weight is assigned to the brisk growth in the number of Gaz Métro's residential customers that occurred during the sample period.

Q.14 Please summarize the results of your research on the MFP trends of US gas distributors.

A.14 As discussed in Section 4.3 of our Phase 3 report, we calculated the average MFP trends of the sampled US gas distributors from 1999 to 2010. Using a revenue-weighted

customer index to measure output growth, growth in the MFP index averaged 0.85% annually. Note that MFP growth was unusually slow in 2009 and 2010, years that were not included in our previous US sample.

Comparing the MFP results for Gaz Métro and the US sample, it can be seen that Gaz Métro's MFP growth trend materially exceeded the US norm. Capital productivity growth was well above the norm whereas the Company's O&M productivity growth was well below the norm.

Q.15 Please summarize the latest results of your work to calculate forward looking MFP growth targets for Gaz Métro and compare them to the Phase 2 results.

A.15 As discussed in Section 4.2 of our Phase 3 report, we used the new econometric results and Gaz Métro's latest forecasts of its customer, volume, and line kilometer growth to develop new MFP growth targets for the Company over the plan period. Alternative assumptions about growth in customers, volumes, and line kilometers were also considered. Our research indicates that, under the base case output growth scenario, the base MFP growth target for Gaz Métro is 1.00%. The MFP growth target in our Phase 2 report was 1.11%.

Q.16 What is the outcome of your work to develop separate X factors for the PMD and VGE service baskets?

A.16 We developed separate MFP growth targets for the PMD and VGE service baskets using an extension of the mathematical analysis of the Canadian economists and the results of our econometric research. The analysis is detailed in Appendix Section 2 of our Phase 3 report. The targets for the two service baskets differ because of differences in the forecasted growth in customers and delivery volumes. Our econometric work indicates that, under the base case output growth scenario, the appropriate base MFP growth targets for the PMD and VGE baskets are 1.20% and 0.18% respectively.

Q.17 Please discuss your input price research.

A.17 We explained in Section 2.2.4 of our Phase 2 report that, when a macroeconomic inflation index such as a CPI is used as the inflation measure of a rate or revenue cap index, the X factor is sometimes adjusted for a perceived tendency of the measure to inadequately track the input price trend of the utility. As discussed in Section 5.1 of our

Phase 3 report, the all-items CPIs assign a heavy weight to price-volatile consumer products, such as food and fuel, that do not loom large in the cost of a gas utility's base rate inputs. A core CPI is available that excludes the volatile prices. Inflation in the all-items CPIs varies considerably from that of the core CPI from year to year but is similar in the long run. The trend in the core CPI over the sample period considered may actually be a better estimate of the long-run trend in the all-items CPIs.

We computed the input price trend of Gaz Métro and compared it to the trends in the all-items and core CPIs. We found that the input price trend of Gaz Métro was similar to that of the all-items Canadian CPI but considerably more rapid than that of the core CPI. This suggests that the trend in CPI^{Canada} (all-items) was similar to the input price trend of Gaz Métro due to rapid growth in price volatile consumer products which may not continue in the next five years. This raises a concern that the all-items Canadian CPI may not provide sufficient compensation for Gaz Métro's input price inflation in the next five years.

Q.18 What are your views on the stretch factor?

A.18 We discussed the stretch factor issue extensively in Section 4.2 of our Phase 2 report and update our analysis of this issue in Section 4.4 of our Phase 3 report. Should the Régie use the US statistical research to select the base MFP growth target, our research shows that the stretch factor of 0.20% discussed in the Phase 2 report may be on the high side. The appropriate stretch factor depends on the sharing mechanism that the Régie chooses. Gaz Métro's materially superior MFP growth in recent years is also a pertinent consideration. Should the Régie use the MFP trend of Gaz Métro to establish the base MFP growth target, there is no need for a stretch factor since no improvement in performance incentives is likely under the new IR plan.

Q.19 What is your proposed X factor for Gaz Métro?

A.19 Our recommendations depend on the Régie's decisions on such issues as a uniform X factor, the choice of service baskets, and the sharing mechanism. Suppose, for example, that the Régie wants a uniform X factor for the service baskets and accepts the 2-basket PMD/VGE split which we have used in our research. We then recommend that the Régie choose a base MFP growth target in the [0.85%, 1.00%] range. The higher bound of the

range is the forward looking econometric MFP growth target. The lower bound is the corresponding average MFP trend of the US sample.

Assuming a 0.20% stretch factor, our research supports an X factor in the [1.05%, 1.20%] range. In choosing a number in this range, the Régie should bear in mind our concern about the possible inadequacy of the inflation relief provide by CPI^{Canada}. The ability of Gaz Métro to achieve MFP growth materially in excess of the US norm is also pertinent.

Q.20 Why isn't the MFP trend of Gaz Métro relevant in choosing a base MFP growth target?

A.20 As we discuss in Section 2.2.3 of our Phase 2 report, it is rare in incentive regulation to set the base MFP growth target equal to the historical MFP trend of the subject utility. This practice weakens the utility's performance incentives if there is a possibility that it will be used repeatedly. Furthermore, the MFP trend of any utility in a recent ten year period may differ greatly from its expected MFP trend in the next five years. The base MFP growth targets of IR plans should for these reasons be based on *external* information (*e.g.* data on the operations of other companies in the industry) wherever such information permits the identification of a reasonable X.

Company-specific MFP trends have in our experience rarely been used in the US or Canada to establish base MFP growth targets in IR proceedings. Most commonly, the base MFP growth target reflects the average growth in the MFP of a large group of utilities. This approach has been used by regulators in Ontario to set the base MFP growth targets of provincial power distributors. In Alberta, it has recently been used to set the base MFP growth targets of gas as well as electric power distributors.

In the case of Gaz Métro, an abundance of quality data are available from the neighboring United States and we have provided the Régie with a range of possible MFP growth targets that make use of these data and two rigorous calculation methods. We respectfully encourage the Régie to choose a base MFP growth target that is based on

the external data. If the Régie does use the company's historical MFP trend as the growth target, the stretch factor should be set at zero, as noted in our Phase 2 report.

Q.21 Does this conclude your evidence in chief?

A.21 Yes it does.

RESUME OF
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November 2012

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Date of Birth: August 7, 1952

Education: High School: Hawken School, Gates Mills, Ohio, 1970
BA: Ibero-American Studies, University of Wisconsin-Madison, May 1977
Ph.D.: Agricultural and Resource Economics, University of Wisconsin -Madison, May 1984

Relevant Work Experience, Primary Positions:

Present Position **President, Pacific Economics Group Research LLC, Madison WI**

Chief executive of the research unit of the Pacific Economics Group consortium. Leads internationally recognized practice in alternative regulation ("Altreg") and utility statistical research. Other research specialties include: codes of competitive conduct, markets for oil and gas, and commodity storage. Duties include senior management, supervision of research, and expert witness testimony.

October 1998-February 2009 **Partner, Pacific Economics Group LLC, Madison, WI**

Managed PEG's Madison office. Specific duties include project management and research, written reports, public presentations, expert witness testimony, personnel management, and marketing.

January 1993-October 1998 **Vice President**
January 1989-December 1992 **Senior Economist, Christensen Associates, Madison, WI**

Directed the company's Regulatory Strategy group. Participated in all Christensen Associates testimony on energy utility PBR and statistical benchmarking during these years.

Aug. 1984-Dec. 1988 **Assistant Professor, Department of Mineral Economics, The Pennsylvania State University, University Park, PA**

Responsibilities included research and graduate and undergraduate teaching and advising. Courses taught: Min Ec 387 (Introduction to Mineral Economics); 390 (Mineral Market Modeling); 484 (Political Economy of Energy and the Environment) and 506 (Applied Econometrics). Teaching and research specialty: analysis of markets for energy products and metals.

August 1983-July 1984 **Instructor, Department of Mineral Economics, The Pennsylvania State University, University Park, PA**

Taught courses in Mineral Economics (noted above) while completing Ph.D. thesis.

April 1982-August 1983 **Research Assistant, Department of Agricultural and Resource Economics, University of Wisconsin-Madison**

Dissertation research under Dr. Peter Helmberger on the role of speculative storage in markets for field crops. Work included the development of an econometric rational expectations model of the U.S. soybean market.

March 1981-March 1982 **Natural Gas Industry Analyst, Madison Consulting Group, Madison, Wisconsin**

Research under Dr. Charles Cicchetti in two areas:

- Impact of the Natural Gas Policy Act on the production and average wellhead price of natural gas in the United States.
- Research supporting litigation testimony in an antitrust suit involving natural gas producers and pipelines in the San Juan Basin of New Mexico.

Relevant Work Experience, Visiting Positions:

May-August 1985 **Professeur Visiteur, Centre for International Business Studies, Ecole des Hautes Etudes Commerciales, Montreal, Quebec.**

Research on the behavior of inventories in non-competitive metal markets.

Major Consulting Projects:

1. Research on Gas Market Competition for a Western Electric Utility. 1981.
2. Research on the Natural Gas Policy Act for a Northeast Trade Association. 1981
3. Interruptible Service Research for an Industry Research Institute. 1989.
4. Research on Load Relief from Interruptible Services for a Northeast Electric Utility. 1989.
5. Design of Time-of-Use Rates for a Midwest Electric Utility. 1989.
6. PBR Consultation for a Southeast Gas Transmission Company. 1989.
7. Gas Transmission Productivity Research for a U.S. Trade Association. 1990.
8. Productivity Research for a Northeast Gas and Electric Utility. 1990-91.
9. Comprehensive Performance Indexes for a Northeast Gas and Electric Utility. 1990-1991.
10. PBR Consultation for a Southeast Electric Utility. 1991.
11. Research on Electric Revenue Adjustment Mechanisms for a Northeast Electric Utility. 1991.
12. Productivity Research for a Western Gas Distributor. 1991.
13. Cost Performance Indexes for a Northeast U.S. Gas and Electric Utility. 1991.
14. Gas Transmission Rate Design for a Western U.S. Electric Utility. 1991.
15. Gas Supply Cost Indexing for a Western U.S. Gas Distributor. 1992.
16. Gas Transmission Strategy for a Western Electric Utility. 1992.
17. Design and Negotiation of Comprehensive Benchmark Incentive Plans for a Northeast Gas and Electric Utility. 1992.
18. Gas Supply Cost Benchmarking and Testimony for a Northeast U.S. Gas Distributor, 1992.
19. Bundled Power Service Productivity Research for a Western Electric Utility. 1993-96.
20. Development of PBR Options for a Western Electric Utility. 1993.
21. Review of the Regional Gas Transmission Market for a Western Electric Utility. 1993.

22. Productivity and PBR Research and Testimony for a Northeast Electric Utility. 1993.
23. Productivity and PBR Research and Testimony for a Northeast Electric Utility. 1994.
24. Productivity Research for a Western Gas Distributor. 1994.
25. White Paper on Price Cap Regulation for a U.S. Trade Association. 1994.
26. Bundled Power Service Benchmarking for a Western Electric Utility. 1994.
27. White Paper on PBR for a U.S. Trade Association. 1995.
28. Productivity Research and PBR Plan Design for a Northeast Gas and Electric Company. 1995.
29. Regulatory Strategy for a Restructuring Canadian Electric Utility. 1995.
30. PBR Consultation for a Japanese Electric Utility. 1995.
31. Regulatory Strategy for a Restructuring Northeast Electric Utility. 1995.
32. Productivity Research and Plan Design Testimony for a Western Gas Distributor. 1995.
33. Productivity Testimony for a Northeast Gas Distributor. 1995.
34. Speech on PBR for a Western Electric Utility. 1995.
35. Development of a PBR Plan for a Midwest Gas Distributor. 1996.
36. Stranded Cost Recovery and Power Distribution PBR for a Northeast Electric Utility. 1996.
37. Benchmarking and Productivity Research and Testimony for a Northeast Gas Distributor. 1996.
38. Consultation on Gas Production, Transmission, and Distribution PBR for a Latin American Regulator. 1996.
39. Power Distribution Benchmarking for a Northeast Electric Utility. 1996.
40. Testimony on PBR for a Northeast Power Distributor. 1996.
41. Bundled Power Service Benchmarking for a Northeast Electric Utility. 1996.
42. Design of Gas Distributor Service Territories for a Latin American Regulator. 1996.
43. Bundled Power Service Benchmarking for a Northeast Electric Utility. 1996.
44. Service Quality PBR for a Canadian Gas Distributor. 1996.
45. Productivity and PBR Research and Testimony for a Canadian Gas Distributor. 1997.
46. Bundled Power Service Benchmarking for a Northeast Electric Utility. 1997.
47. Design of a Price Cap Plan for a South American Regulator. 1997.
48. White Paper on Utility Brand Name Policy for a U.S. Trade Association. 1997.
49. Bundled Power Service Benchmarking and Testimony for a Western Electric Utility. 1997.
50. Review of a Power Purchase Contract Dispute for a Midwest City. 1997.
51. Research on Benchmarking and Stranded Cost Recovery for a U.S. Trade Association. 1997.
52. Research and Testimony on Productivity Trends for a Northeast Gas Distributor. 1997.
53. PBR Plan Design, Benchmarking, and Testimony for a Southeast Gas Distributor. 1997.
54. White Paper on Power Distribution PBR for a U.S. Trade Association. 1997-99.
55. White Paper and Public Appearances on PBR Options for Australian Power Distributors. 1997-98.
56. Gas and Power Distribution PBR Research and Testimony for a Western Energy Utility. 1997-98.
57. Research on the Cost Structure of Power Distribution for a U.S. Trade Association. 1998.
58. Research on Cross-Subsidization for a U.S. Trade Association. 1998.
59. Testimony on Brand Names for a U.S. Trade Association. 1998.
60. Research and Testimony on Economies of Scale in Power Supply for a Western Electric Utility. 1998.
61. PBR Plan Design and Testimony for a Western Electric Utility. 1998-99.
62. PBR and Bundled Power Service Testimony and Testimony for Two Southeast U.S. Electric Utilities. 1998-99.
63. Statistical Benchmarking for an Australian Power Distributor. 1998-9.
64. Testimony on Functional Separation of Power Generation and Delivery for a U.S. Trade Association. 1998.
65. Design of a Stranded Benefit Passthrough Mechanism for a Restructuring Electric Utility. 1998.
66. Consultation on PBR and Code of Conduct Issues for a Western Electric Utility. 1999.
67. PBR and Bundled Power Service Benchmarking Research and Testimony for a Southwest Electric Utility. 1999.
68. Power Transmission and Distribution Cost Benchmarking for a Western Electric Utility. 1999.

69. Cost Benchmarking for Three Australian Power Distributors. 1999.
70. Bundled Power Service Benchmarking for a Northeast Electric Utility. 1999.
71. Benchmarking Research for an Australian Power Distributor. 2000.
72. Critique of a Commission-Sponsored Benchmarking Study for Three Australian Power Distributors. 2000.
73. Statistical Benchmarking for an Australian Power Transco. 2000.
74. PBR and Benchmarking Testimony for a Southwest Electric Utility. 2000.
75. PBR Workshop (for Regulators) for a Northeast Gas and Electric Utility. 2000.
76. Research on Economies of Scale and Scope for an Australian Electric Utility. 2000.
77. Research and Testimony on Economies of Scale in Power Delivery, Metering, and Billing for a Consortium of Northeast Electric Utilities. 2000.
78. Research and Testimony on Service Quality PBR for a Consortium of Northeast Energy Utilities. 2000.
79. Power and Natural Gas Procurement PBR for a Western Electric Utility. 2000.
80. PBR Plan Design for a Canadian Natural Gas Distributor. 2000.
81. TFP and Benchmarking Research for a Western Gas and Electric Utility. 2000.
82. E-Forum on PBR for Power Procurement for a U.S. Trade Association. 2001.
83. PBR Presentation to Florida's Energy 2000 Commission for a U.S. Trade Association. 2001.
84. Research on Power Market Competition for an Australian Electric Utility. 2001.
85. TFP and Other PBR Research and Testimony for a Northeast Power Distributor. 2000.
86. PBR and Productivity for a Canadian Electric Utility. 2002
87. Statistical Benchmarking for an Australian Power Transco. 2002.
88. PBR and Bundled Power Service Benchmarking Research and Testimony for a Midwest Energy Utility. 2002.
89. Consultation on the Future of Power Transmission and Distribution Regulation for a Western Electric Utility. 2002.
90. Benchmarking and Productivity Research and Testimony for Two Western U.S. Energy Distributors. 2002.
91. Workshop on PBR (for Regulators) for a Canadian Trade Association. 2003.
92. PBR, Productivity, and Benchmarking Research for a Mid-Atlantic Gas and Electric Utility. 2003.
93. Workshop on PBR (for Regulators) for a Southeast Electric Utility. 2003.
94. Strategic Advice for a Midwest Power Transmission Company. 2003.
95. PBR Research for a Canadian Gas Distributor. 2003.
96. Benchmarking Research and Testimony for a Canadian Gas Distributor. 2003-2004.
97. Consultation on Benchmarking and Productivity Issues for Two British Power Distributors. 2003.
98. Power Distribution Productivity and Benchmarking Research for a South American Regulator. 2003-2004.
99. Statistical Benchmarking of Power Transmission for a Japanese Research Institute. 2003-4.
100. Consultation on PBR for a Western Gas Distributor. 2003-4.
101. Research and Advice on PBR for Gas Distribution for a Western Gas Distributor. 2004.
102. PBR, Benchmarking and Productivity Research and Testimony for Two Western Energy Distributors. 2004.
103. Advice on Productivity for Two British Power Distributors. 2004.
104. Workshop on Service Quality Regulation for a Canadian Trade Association. 2004.
105. Strategic Advice for a Canadian Trade Association. 2004.
106. White Paper on Unbundled Storage and Local Gas Markets for a Midwestern Gas Distributor. 2004.
107. Statistical Benchmarking Research for a British Power Distributor. 2004.
108. Statistical Benchmarking Research for Three British Power Distributors. 2004.
109. Benchmarking Testimony for Three Ontario Power Distributors. 2004.
110. Indexation of O&M Expenses for an Australian Power Distributor. 2004.
111. Statistical Benchmarking of O&M Expenses for a Canadian Gas Distributor. 2004.

112. Benchmarking Testimony for a Canadian Power Distributor. 2005.
113. Statistical Benchmarking for a Canadian Power Distributor. 2005.
114. White Paper on Power Distribution Benchmarking for a Canadian Trade Association. 2005.
115. Statistical Benchmarking for a Southeast Bundled Power Utility. 2005.
116. Statistical Benchmarking of a Nuclear Power Plant and Testimony. 2005.
117. White Paper on Utility Rate Trends for a U.S. Trade Association. 2005.
118. TFP Research for a Northeast U.S. Power Distributor, 2005.
119. Seminars on PBR and Statistical Benchmarking for a Northeast Electric Utility, 2005.
120. Statistical Benchmarking and Testimony for a Northeast U.S. Power Distributor, 2005.
121. Testimony Transmission PBR for a Canadian Electric Utility, 2005.
122. TFP and Benchmarking Research and Testimony for Two California Energy Utilities. 2006.
123. White Paper on Power Transmission PBR for a Canadian Electric Utility. 2006.
124. Testimony on Statistical Benchmarking for a Canadian Electric Utility. 2006.
125. White Paper on PBR for Major Plant Additions for a U.S. Trade Association. 2006.
126. PBR Plan Design for a Canadian Regulatory Commission. 2006.
127. White Paper on Regulatory Benchmarking for a Canadian Trade Association. 2007.
128. Productivity Research and Testimony for a Northeastern Power Distributor. 2007.
129. Revenue Decoupling Research and Presentation for a Northeast Power Distributor. 2007.
130. Gas Utility Productivity Research and PBR Plan Design for a Canadian Regulator. 2007.
131. Productivity Research and PBR Plan Design for a Western Bundled Power Service Utility. 2007.
132. Statistical Benchmarking for a Canadian Energy Regulator. 2007.
133. Research and Testimony in Support of a Revenue Adjustment Mechanism for a Northeastern Power Utility. 2008.
134. Consultation on Alternative Regulation for a Midwestern Electric Utility. 2008.
135. Research and Draft Testimony in Support of a Revenue Decoupling Mechanism for a Large Midwestern Gas Utility. 2008.
136. White Paper: Use of Statistical Benchmarking in Regulation. 2005-2009.
137. Statistical Cost Benchmarking of Canadian Power Distributors. 2007-2009.
138. Research and Testimony on Revenue Decoupling for 3 US Electric Utilities. 2008-2009.
139. Benchmarking Research and Testimony for a Midwestern Electric Utility. 2009.
140. Consultation and Testimony on Revenue Decoupling for a New England DSM Advisory Council. 2009.
141. Research and Testimony on Forward Test Years and the cost performance of a Vertically Integrated Western Electric Utility. 2009.
142. White Paper for a National Trade Association on the Importance of Forward Test Years for U.S. Electric Utilities. 2009-2010.
143. Research and Testimony on Altreg for Western Gas and Electric Utilities Operating under Decoupling. 2009-2010.
144. Research and Report on PBR Designed to Incent Long Term Performance Gains. 2009-2010.
145. Research and Report on Revenue Decoupling for Ontario Gas and Electric Utilities. 2009-2010.
146. Research and Testimony on the Performance of a Western Electric Utility. 2009-2010.
147. Research on Decoupling for a Western Gas Distributor. 2009-2010.
148. Research on AltReg Precedents for a Midwestern Electric Utility. 2010.
149. Research on Revenue Decoupling for a Northwestern Gas & Electric Utility. 2010.
150. Benchmarking Research and Report on the Performance of a Midwestern Electric Utility. 2010.
151. Research and Testimony on Forward Test Years and the cost performance of a large Western Gas Distributor. 2010-2011.
152. Research and Testimony in Support of Revenue Decoupling for a Midwestern Power Distributor. 2010-2011.
153. Benchmarking Research and Report on the Generation Maintenance Performance of a Midwestern Electric Utility. 2010-2011.

154. Research and Testimony on the Design of an Incentivized Formula Rate for a Canadian Gas Distributor. 2010-2011.
155. White Paper for a National Trade Association on Remedies for Regulatory Lag. 2010-2011.
156. Benchmarking Research and Report on the Performance of a Midwestern Electric Utility. 2011.
157. Assistance with an Alternative Regulation Settlement Conference for a Northeastern Power Distributor. 2011.
158. Research and Testimony on Remedies for Regulatory Lag for Three Northeastern Power Distributors. 2011-2012.
159. Research and Testimony on the Design of Performance Based Ratemaking Mechanisms for a Canadian Consumer Group. 2011-2012.
160. Research and Testimony on Projected Attrition for a Western Electric Utility. 2011-2012.
161. Research and Testimony on the Design of a Performance Based Ratemaking Plan for a Canadian Gas Utility. 2012-2013.
162. Testimony for US Coal Shippers on the Treatment of Cross Traffic in US Surface Transportation Board Stand Alone Cost Tests. 2012

Publications:

1. Public vs. Private Management of Mineral Inventories: A Statement of the Issues. Earth and Mineral Sciences 53, (3) Spring 1984.
2. Review of Energy, Foresight, and Strategy, Thomas Sargent, ed. (Baltimore: Resources for the Future, 1985). Energy Journal 6 (4), 1986.
3. The Changing Role of the United States in World Mineral Trade in W.R. Bush, editor, The Economics of Internationally Traded Minerals. (Littleton, CO: Society of Mining Engineers, 1986).
4. Assessing Metals Demand in Less Developed Countries: Another Look at the Leapfrog Effect. Materials and Society 10 (3), 1986.
5. Modeling the Convenience Yield from Precautionary Storage of Refined Oil Products (with junior author Bok Jae Lee) in John Rowse, ed. World Energy Markets: Coping with Instability (Calgary, AL: Friesen Printers, 1987).
6. Pricing and Storage of Field Crops: A Quarterly Model Applied to Soybeans (with junior authors Joseph Glauber, Mario Miranda, and Peter Helmberger). American Journal of Agricultural Economics 69 (4), November, 1987.
7. Storage, Monopoly Power, and Sticky Prices. les Cahiers du CETAI no. 87-03 March 1987.
8. Monopoly Power, Rigid Prices, and the Management of Inventories by Metals Producers. Materials and Society 12 (1) 1988.
9. Review of Oil Prices, Market Response, and Contingency Planning, by George Horwich and David Leo Weimer, (Washington, American Enterprise Institute, 1984), Energy Journal 8 (3) 1988.
10. A Competitive Model of Primary Sector Storage of Refined Oil Products. July 1987, Resources and Energy 10 (2) 1988.
11. Modeling the Convenience Yield from Precautionary Storage: The Case of Distillate Fuel Oil. Energy Economics 10 (4) 1988.
12. Speculative Stocks and Working Stocks. Economic Letters 28 1988.
13. Theory of Pricing and Storage of Field Crops With an Application to Soybeans [with Joseph Glauber (senior author), Mario Miranda, and Peter Helmberger]. University of Wisconsin-Madison College of Agricultural and Life Sciences Research Report no. R3421, 1988.
14. Competitive Speculative Storage and the Cost of Petroleum Supply. The Energy Journal 10 (1) 1989.
15. Evaluating Alternative Measures of Credited Load Relief: Results From a Recent Study For New England Electric. In Demand Side Management: Partnerships in Planning for the Next Decade (Palo Alto: Electric Power Research Institute,1991).

16. Futures Prices and Hidden Stocks of Refined Oil Products. In O. Guvanen, W.C. Labys, and J.B. Lesourd, editors, International Commodity Market Models: Advances in Methodology and Applications (London: Chapman and Hall, 1991).
17. Indexed Price Caps for U.S. Electric Utilities. The Electricity Journal, September-October 1991.
18. Gas Supply Cost Incentive Plans for Local Distribution Companies. Proceedings of the Eight NARUC Biennial Regulatory Information Conference (Columbus: National Regulatory Research Institute, 1993).
19. TFP Trends of U.S. Electric Utilities, 1975-92 (with Herb Thompson). Proceedings of the Ninth NARUC Biennial Regulatory Information Conference, (Columbus: National Regulatory Research Institute, 1994).
20. A Price Cap Designers Handbook (with Lawrence Kaufmann). (Washington: Edison Electric Institute, 1995.)
21. The Treatment of Z Factors in Price Cap Plans (with Lawrence Kaufmann), Applied Economics Letters 2 1995.
22. Performance-Based Regulation of U.S. Electric Utilities: The State of the Art and Directions for Further Research (with Lawrence Kaufmann). Palo Alto: Electric Power Research Institute, December 1995.
23. Forecasting the Productivity Growth of Natural Gas Distributors (with Lawrence Kaufmann). AGA Forecasting Review, Vol. 5, March 1996.
24. Branding Electric Utility Products: Analysis and Experience in Regulated Industries (with Lawrence Kaufmann), Washington: Edison Electric Institute, 1997.
25. Price Cap Regulation for Power Distribution (with Larry Kaufmann), Washington: Edison Electric Institute, 1998.
26. Controlling for Cross-Subsidization in Electric Utility Regulation (with Lawrence Kaufmann), Washington: Edison Electric Institute, 1998.
27. The Cost Structure of Power Distribution with Implications for Public Policy (with Lawrence Kaufmann), Washington: Edison Electric Institute 1999.
28. Price Caps for Distribution Service: Do They Make Sense? (with Eric Ackerman and Lawrence Kaufmann), *Edison Times*, 1999.
29. Performance-Based Regulation of Utilities (with Lawrence Kaufmann), Energy Law Journal, 2002.
30. "Performance-Based Regulation and Business Strategy" (with Lawrence Kaufmann), Natural Gas, February 2003
31. "Performance-Based Regulation and Energy Utility Business Strategy (With Lawrence Kaufmann), in Natural Gas and Electric Power Industries Analysis 2003, Houston: Financial Communications, 2003.
32. "Price Control Regulation in North America: The Role of Indexing and Benchmarking", Methods to Regulate Unbundled Transmission and Distribution Business on Electricity Markets: Proceedings, Stockholm: Elforsk, 2003.
33. "Performance-Based Regulation Developments for Gas Utilities (with Lawrence Kaufmann), Natural Gas and Electricity, April 2004.
34. "Econometric Cost Benchmarking of Power Distribution Cost" (with Lullit Getachew and David Hovde), Energy Journal, July 2005.
35. "Alternative Regulation for North American Electric Utilities" (with Lawrence Kaufmann), Electricity Journal, 2006.
36. "Regulating Natural Gas Distributors with Declining Average Use" (with Lullit Getachew and Steven Fenrick), USAEE Dialogue, 2006.
37. "AltReg Rate Designs Address Declining Average Gas Use" (with Lullit Getachew, David Hovde and Steve Fenrick), *Natural Gas & Electricity*, April 2008.
38. "Price Control Regulation in North America: Role of Indexing and Benchmarking", Electricity Journal, January 2009
39. "Statistical Benchmarking in Utility Regulation: Role, Standards and Methods," (with Lullit Getachew), Energy Policy, 2009.

40. "Alternative Regulation, Benchmarking, and Efficient Diversification", USAEE Dialogue, August 2009.
41. "The Economics and Regulation of Power Transmission and Distribution: The Developed World Case" (with Lullit Getachew), in Lester C. Hunt and Joanne Evans, eds., International Handbook on the Economics of Energy, 2009.
42. "Econometric TFP Targets, Incentive Regulation and the Ontario Gas Distribution Industry," Review of Network Economics, December 2009.

Professional Presentations:

1. American Institute of Mining Engineering, New Orleans, LA, March 1986
2. International Association of Energy Economists, Calgary, AL, July 1987
3. American Agricultural Economics Association, Knoxville, TN, August 1988
4. Association d'Econometrie Appliqué, Washington, DC, October 1988
5. Electric Council of New England, Boston, MA, November 1989
6. Electric Power Research Institute, Milwaukee, WI, May 1990
7. New York State Energy Office, Saratoga Springs, NY, October 1990
8. National Association of Regulatory Utility Commissioners, Columbus, OH, September 1992
9. Midwest Gas Association, Aspen, CO, October 1993
10. National Association of Regulatory Utility Commissioners, Williamsburg, VA, January 1994
11. National Association of Regulatory Utility Commissioners, Kalispell, MT, May 1994
12. Edison Electric Institute, Washington, DC, March 1995
13. National Association of Regulatory Utility Commissioners, Orlando, FL, March 1995
14. Illinois Commerce Commission, St. Charles, IL, June 1995
15. Michigan State University Public Utilities Institute, Williamsburg, VA, December 1996
16. Edison Electric Institute, Washington DC, December 1995
17. IBC Conferences, San Francisco, CA, April 1996
18. AIC Conferences, Orlando, FL, April 1996
19. IBC Conferences, San Antonio, TX, June 1996
20. American Gas Association, Arlington, VA, July 1996
21. IBC Conferences, Washington, DC, October 1996
22. Center for Regulatory Studies, Springfield, IL, December 1996
23. Michigan State University Public Utilities Institute, Williamsburg, VA, December 1996
24. IBC Conferences, Houston TX, January 1997
25. Michigan State University Public Utilities Institute, Edmonton, AL, July 1997
26. American Gas Association, Edison Electric Institute, Advanced Public Utility Accounting School, Irving, TX, Sept. 1997
27. American Gas Association, Washington, DC [national telecast], September 1997
28. Infocast, Miami Beach, FL, Oct. 1997
29. Edison Electric Institute, Arlington, VA, March 1998
30. Electric Utility Consultants, Denver, CO, April 1998
31. University of Indiana, Indianapolis, IN, August 1998
32. Edison Electric Institute, Newport, RI, September 1998
33. University of Southern California, Los Angeles, CA, April 1999
34. Edison Electric Institute, Indianapolis, IN, August 1999
35. IBC Conferences, Washington, DC, February 2000
36. Center for Business Intelligence, Miami, FL, March 2000
37. Edison Electric Institute, San Antonio, TX, April 2000
38. Infocast, Chicago, IL, July 2000
39. Edison Electric Institute, July 2000
40. IOU-EDA, Brewster, MA, July 2000

41. Infocast, Washington, DC, October 2000
42. Wisconsin Public Utility Institute, Madison, WI, November 2000
43. Infocast, Boston, MA, March 2001
44. Florida 2000 Commission, Tampa, FL, August 2001
45. Infocast, Washington, DC, December 2001
46. Canadian Gas Association, Toronto, ON, March 2002
47. Canadian Electricity Association, Whistler, BC, May 2002
48. Canadian Electricity Association, Montreal, PQ, September 2002
49. Ontario Energy Association, Toronto, ON, November 2002
50. Canadian Gas Association, Toronto, ON, February 2003
51. Louisiana Public Service Commission, Baton Rouge, LA, February 2003
52. CAMPUT, Banff, ALTA, May 2003
53. Elforsk, Stockholm, Sweden, June 2003
54. Edison Electric Institute, national e forum, June 2003
55. Eurelectric, Brussels, Belgium, October 2003
56. CAMPUT, Halifax, May 2004
57. Edison Electric Institute, national eforum, March 2005
58. Edison Electric Institute, Madison, August 2005
59. Edison Electric Institute, national e forum, August 2005
60. Edison Electric Institute, Madison, WI, August 2006
61. EUCI, Arlington, VA, 2006
62. EUCI, Arlington, VA, 2006 [Conference chair]
63. EUCI, Seattle, WA, 2007. [Conference chair]
64. Massachusetts Energy Distribution Companies, Waltham, MA, July, 2007.
65. Edison Electric Institute, Madison, WI, July-August 2007.
66. Institute of Public Utilities, Lansing, MI, 2007.
67. EUCI, Denver, CO, 2008. [Conference chair]
68. EUCI, Chicago, IL, 2008. [Conference chair]
69. EUCI, Toronto, ON, 2008. [Conference chair]
70. Edison Electric Institute, Madison WI, August 2008
71. EUCI, Cambridge, MA, March 2009 [Conference chair]
72. Edison Electric Institute, national eforum, May 2009
73. Edison Electric Institute, Madison WI, July 2009
74. EUCI, Cambridge, MA, March 2010[,Conference chair]
75. Edison Electric Institute, Madison, WI, July 2010
76. EUCI, Toronto, ON, November 2010[Conference chair]
77. Edison Electric Institute, Madison, WI, July 2011
78. EUCI, Philadelphia, PA, November 2011 [Conference chair]
79. Edison Electric Institute, Madison, WI, July 2012
80. EUCI, Chicago, IL, November 2012 [Conference chair]

Journal Referee:

Agribusiness
American Journal of Agricultural Economics
Energy Journal
Journal of Economic Dynamics and Control
Materials and Society

RESUME OF
DAVID ALAN HOVDE

November 2012

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Date of Birth: November 1, 1965

Education: MS: Economics, University of Wisconsin - Madison, May 1990
BA: Majors in Economics, Political Science, and International Relations, University of Wisconsin-Madison, August 1988
High School: Waukesha North High School, Waukesha, WI, 1984

Relevant Work Experience, Primary Positions:

March 2009 – Present	Vice President, Pacific Economics Group Research, LLC
December 2005 – March 2009	Vice President, Pacific Economics Group, LLC
November 1998 - December 2005	Senior Economist, Pacific Economics Group, LLC

Responsible for database services in support of PEG research. Other responsibilities include the training and supervision of staff and the preparation of studies, analyses and other research for clients in the electric power, natural gas, and other industries.

April 1998-October 1998	Senior Economist
April 1990-April 1998	Economist
	Christensen Associates, Madison, WI

Member of the regulatory strategy group. Responsibilities included the preparation and analysis of electric and gas utility productivity and cost performance studies.

Teaching Experience:

Madison College (2007-2012): Instructor of Economics
Duties include teaching introductory economics and obtaining advanced training as required. Experience includes teaching accelerated and distance learning versions of the class.

Carroll University (2009): Adjunct Faculty Member
Duties include teaching an undergraduate course in Microeconomics.

University of Wisconsin – Madison (1989-1990): Teaching assistant
Duties included holding weekly discussion sections to reinforce material delivered via lecture.

Recent Pro Bono Work:

Woodside Farms Neighborhood Association (2/2009-2/2012): Board Member and Board Secretary. The board is responsible for the maintenance and improvement of common areas. Members are responsible for drafting a budget and assessing an appropriate levy on lot owners. Secretarial responsibilities include neighborhood communications such as meeting notifications, minutes, and other communications as required.

West Madison Senior Coalition (6/2005-6/2007): Board Member, Chair of Personnel Committee
The WMSC serves older adults in Madison by providing resources, programs, and advocacy that allow seniors to live more active and creative lives. As a board member, I advised the board on strategic planning, budgeting, personnel, fundraising feasibility, and led a search committee that successfully hired a new executive director.

Publications:

1. Gas Supply Cost Incentive Plans for Local Distribution Companies (with Mark Lowry). Proceedings of the Eight NARUC Biennial Regulatory Information Conference (Columbus: National Regulatory Research Institute, 1993).
2. TFP Trends of U.S. Electric Utilities, 1975-92 (with Herb Thompson and Mark Lowry). Proceedings of the Ninth NARUC Biennial Regulatory Information Conference, (Columbus: National Regulatory Research Institute, 1994).
3. Economies of Scale and Vertical Integration in the Investor-Owned Electric Utility Industry (with Herb Thompson). The National Regulatory Research Institute, January 1996.
4. Branding Electric Utility Products: Analysis and Experience in Regulated Industries (with Lawrence Kaufmann), Washington: Edison Electric Institute, 1997.
5. Econometric Benchmarking of Cost Performance: The Case of U.S. Power Distributors (with Mark Lowry and Lullit Getachew), The Energy Journal, Volume 26. No. 3, 2005.
6. AltReg Rate Designs Address Declining Average Gas Use (with Mark Lowry, Lullit Getachew, and Steve Fenrick), Natural Gas & Electricity, April 2008.

Major Research Projects:

1. Development of Comprehensive Performance Indexes for a Northeastern Combined Electric and Gas Utility, 1990-1991.
2. Measuring Productivity Trends in the Local Gas Distribution Industry for a Northeastern Gas Distributor, 1990.
3. Measurement of Productivity Trends for the U.S. Electric Power Industry for a Northeastern Vertically Integrated Electric Utility, 1990-91.
4. Productivity Growth Estimates for U.S. Gas Distributors and Their Use in Incentive Regulation for a Western Gas Distributor, 1991.
5. Development of Cost Performance Indexes for a Northeastern Combined Electric and Gas Utility, 1991.
6. Efficient Rate Design for Interstate Gas Transporters for a Western Vertically Integrated Electric Utility, 1991.
7. Gas Transportation Strategy for a Western Electric Utility, 1992.
8. Design of a Comprehensive Benchmark Incentive Plan for a Northeastern Electric Utility, 1992.
9. Design of a Comprehensive Benchmark Incentive Plan for a Northeastern Gas Distributor, 1992.
10. TFP Measurement for a Western Electric Utility, 1993-96.
11. Development of and Regulatory Support for a Price Cap Plan for a Northeastern Electric Utility, 1993.
12. Productivity Research in Support of a Price Cap Plan for a Northeastern Electric Utility, 1994.
13. Productivity Research in Support of a Price Cap Plan for a Western Gas Distributor, 1994.
14. Statistical Benchmarking for Bundled Power Services of a Western Electric Utility, 1994.
15. Development of Price Cap Plans for a Northeastern Combined Gas & Electric Utility, 1995.
16. Productivity Research for a Price Cap Filing for a Northeastern Gas Distributor, 1996.
17. Stranded Cost Recovery and Power Distribution Regulation for a Restructuring U.S. Electric Utility, 1996.
18. Power Distribution Benchmarking for a Northeast Electric Utility, 1996.
19. Comprehensive Benchmarking for a Northeast Electric Utility, 1996.
20. Comprehensive Benchmarking for a Tropical Island Electric Utility, 1996.
21. White Paper on Utility Brand Name Policy for a Trade Association, 1997.
22. Generation and Power Transmission PBR for a Restructuring Canadian Electric Utility, 1997.
23. Statistical Benchmarking for a Western Electric Utility, 1997-98.
24. Analysis of a Purchased Power Agreement for a Midwestern Municipality, 1997.
25. Statistical Benchmarking and Stranded Cost Recovery for a Trade Association, 1997.
26. Inflation and Productivity Trends of U.S. Power Distributors for a Northeastern Electric Utility, 1997.
27. Statistical Benchmarking and Productivity Trends for a Southeast Gas Distributor, 1997-98.
28. PBR Research and Testimony for a Western Energy Utility, 1997-98.
29. Research into the Vintage of Electric Utility Plant in the United States for a Western Electric Utility, 1998.
30. Productivity Research for two Midwestern Electric Utilities, 1998.
31. Statistical Benchmarking for two Midwestern Electric Utilities, 1998-99.
32. Design of an Incentive Fuel Clause for two Midwestern Electric Utilities, 1998.
33. Benchmarking Study of T&D Capital Input for a Western Electric Utility, 1998.

34. Economies of Scale for an Island Electric Utility, 1998.
35. Litigation Support in a Price Fixing Case Involving Agricultural Products, 1998.
36. Comprehensive Benchmarking for a Midwestern Electric Utility, 1999.
37. Cost Benchmarking of Power Transmission and Distribution, 1999.
38. Distribution Benchmarking for Multiple Australian Power Distributors, 1999.
39. Comprehensive National TFP Trends for an Island Electric Utility, 1999.
40. Transmission and Distribution Benchmarking for a Northeast Utility, 1999-2000.
41. Prepare Evidence for Rebuttal of a Benchmarking Study on Behalf of Multiple Australian Power Distributors, 2000.
42. Litigation Support on Benchmarking Issues to an Australia Gas Distributor, 2000.
43. Transmission Benchmarking for an Australian Power Transmission Utility, 2000.
44. Cost Benchmarking for Power Transmission and Distribution for a Northeastern Electric Utility, 2000.
45. Benchmarking Evaluation of Power Distribution Costs, 2000.
46. Economies of Scale and Scope in Power Delivery and Metering Services for a Group of Northeastern Electric Utilities, 2000.
47. Estimate Scale Economies in Power Generation, Scope Economies Between Power Transmission and Power Generation, and Implications for Public Policy in Western Australia, 2000.
48. Service Quality Benchmarking and Construction of Appropriate Deadbands for a Group of Northeastern Electric Utilities, 2001.
49. Gas Distribution TFP Trends and Benchmarking for two Western Gas Distributors, 2001.
50. Power Distribution TFP Trends and Benchmarking for a Western Power Utility, 2001.
51. Power Distribution TFP Trends for a Northeastern Power Distributor, 2001.
52. Statistical Benchmarking for three Australian Gas Utilities, 2001.
53. Research on Productivity and Benchmarking for a Western Power Distributor, 2002.
54. Research on Productivity and Benchmarking for two Western Natural Gas Distributors, 2002.
55. Statistical Benchmarking for an Australian Electric Power Transmission Utility, 2002.
56. Research on Benchmarking for a Western Bundled Power Service Utility, 2002.
57. Research on Productivity and Benchmarking for a Northeastern Natural Gas Distributor, 2002-3.
58. Research on Productivity for a Power Distributor, 2002-3.
59. Research on Productivity and Benchmarking for a Canadian Natural Gas Distributor, 2002-3.
60. Research on Productivity and Benchmarking for a Canadian Power Transmission Company, 2002.
61. Cost Analysis Research and Benchmarking for a South American Power Regulator, 2003.
62. Assemble a Power Transmission Database for a Japanese Regulator, 2003.
63. Benchmarking of Power Distribution Performance of New Zealand, 2003.
64. Benchmarking and Total Factor Productivity for an Island Electric Utility, 2003-2004.
65. Research on Productivity and Benchmarking for a Canadian Gas Distributor, 2004.
66. Benchmarking Power Distribution Performance for two Australian Power Distributors, 2004.
67. Statistical Benchmarking, Productivity, and Incentive Power Research for a Northeastern Combined Gas and Electric Company, 2003.
68. Benchmark Comprehensive Power and Water Utility Operations for an Island Electric & Water Utility, 2004.
69. Assemble a U.S. Gas Transmission Database for a Mexican Regulator, 2004.
70. Benchmarking Gas Distribution Operations for three New Zealand Gas Distributors, 2004.
71. Research on Productivity Trends for the National Power Distribution and Natural Gas Industries for two Gas Distributors and one Power Distributor, 2004.

72. Research on Productivity Trends for the Power Distribution Industry of Victoria, Australia for an Australian Regulator, 2004.
73. Statistical Benchmarking for a Northeastern U.S. Natural Gas Distributor, 2004-2005.
74. Statistical Benchmarking for a Canadian Power Distributor, 2005.
75. Statistical Benchmarking for Total Electric Utility Operations for a Southeastern Vertically Integrated Electric Utility, 2005.
76. Statistical Benchmarking of the Nuclear Operations of Regulated Utilities for a Western Electric Utility, 2005.
77. Research on Productivity Trends for the U.S. Power Distribution Industry for a Northeastern Power Distributor, 2005.
78. Calculation of Adjusted Refund Liability as a Result of the Western Power Crisis for two Western Vertically Integrated Electric Utilities, 2005-2006.
79. Research on Abnormal Bidding Patterns for a Western Power Generation Utility, 2005.
80. Statistical Benchmarking for a Northeastern Power Distributor, 2005-2006.
81. Statistical Benchmarking for a Northeastern Gas Distributor, 2006.
82. Research on Productivity Trends for the Power Distribution Industry of Victoria, Australia for an Australian Regulator, 2005-2007.
83. Research on Productivity Trends for the U.S. Natural Gas Distribution Industry for two Western Gas Distributors, 2006-2007.
84. Statistical Benchmarking for a Northeastern Gas Distributor, 2006-2007.
85. Measurement of Gas Distribution TFP of Australia, 2006-2007.
86. Research on Productivity Trends for Natural Gas Distribution for a Canadian Regulator, 2006 – 2007.
87. Litigation Support for a Northwestern U.S. Power Company, 2007.
88. Generation Benchmarking for a Southwestern Power Company, 2007.
89. Gas Distribution Productivity Research for a Canadian Regulator, 2007-2008.
90. Power Distribution Productivity Research for a Canadian Regulator, 2007-2008.
91. Power Distribution Productivity Research of Victoria, Australia for an Australian Regulator, 2007-2008.
92. Natural Gas Distribution Productivity of Victoria, Australia for an Australian Regulator, 2008.
93. Unit Cost Research for a large Midwestern Natural Gas Distributor, 2008.
94. Power Distribution Productivity Research for an Island Electric Utility, 2008.
95. Input Price and Productivity Research in Support of a Decoupling Mechanism for an Island Electric Utility, 2009.
96. Benchmarking the Base Rate Cost of a Midwestern Vertically Integrated Electric Utility, 2009.
97. Productivity and O&M Benchmarking for a Northeastern Natural Gas Distributor, 2009.
98. TFP Research for New Zealand Power Distributors for a New Zealand Trade Association, 2009.
99. Research and Testimony in Support of a Forward Test Year Rate Filing by a Vertically Integrated Western Electric Utility, 2009.
100. Simulation of Productivity within a Building Block Model for an Australian Regulator, 2009.
101. Research and Report on the Importance of Forward Test Years for U.S. Electric Utilities for a U.S. Trade Association, 2009-2010.
102. Research and Testimony on Altreg for Western Gas and Electric Utilities Operating under Decoupling, 2009-2010.
103. Research and Report on Revenue Decoupling for Ontario's Gas and Electric Utilities for a Canadian Regulator, 2009-2010.

104. Research and Report on the Performance of a Western Electric Utility, 2009-2010.
105. Research and Report on the Effectiveness of Decoupling for a Western Gas Distributor, 2009-2010.
106. Statistical Cost Benchmarking for a Midwestern Electric Utility, 2010.
107. Research and Testimony in Support of a Forward Test Year Rate Filing by a Western Gas Distributor, 2010.
108. Partial Factor Productivity Measurement for a Northeastern Gas Distributor, 2010.
109. Productivity Trends of Victoria, Australia's Power Distribution Companies for an Australian Regulator, 2010.
110. Research and Testimony in Support of Revenue Decoupling for a Midwestern Power Distributor, 2010-2011.
111. Research and Report on the Design of an Incentivized Formula Rate for a Canadian Gas Distributor, 2010-2011.
112. Productivity Trends for New Zealand Gas Distributors for a New Zealand Gas Distributor, 2011.
113. Benchmarking Research and Report on the Performance of a Midwestern Electric Utility, 2011.
114. Research and Testimony on Approaches to Reduce Regulatory Lag for a Northeastern Power Distributor, 2011.
115. Assistance with an Alternative Regulation Settlement Conference for a Northeastern Power Distributor, 2011.
116. Research and Testimony on Remedies for Regulatory Lag for two Northeastern Power Distributors, 2011-2012.
117. Research and Testimony on Projected Attrition for a Western Electric Utility, 2011-2012.
118. Natural Gas Productivity Research and Evaluation of Productivity Research of Other Parties on Behalf of a Canadian Consumers' Group, 2012.
119. Productivity and Plan Design Research and Testimony in Support of a PBR Plan for a Canadian Gas Distributor, 2012-2013.
120. Power Distribution Productivity and Cost Benchmarking Research for a Canadian Regulator, 2012.