STATE OF MISSOURI

PUBLIC SERVICE COMMISSION

In the Matter of a Working Case to Address Legislative Concerns Regarding Proposals to Modify Ratemaking Procedures for Electric Utilities	)))))))	**File No. EW-2013-0425**

Comments of the Missouri Industrial Energy Consumers

In Response to the March 20, 2013

Order Opening an Investigation to Address Legislative Concerns Regarding Proposals to Modify Ratemaking Procedures for Electric Utilities and Establishing a Procedural Schedule

April 1, 2013

Preface

The Missouri Industrial Energy Consumers ("MIEC") is pleased to respond to the Missouri Public Commission's ("Commission") March 20, 2013 Order opening this investigation, and to provide the information that is available at this time to MIEC.

While MIEC understands the time constraints related to this docket, it believes that additional time for gathering and filing information would have been useful. In addition, requiring testimony and responsive testimony to be filed under oath by the utilities and other parties, and conducting a formal hearing process with cross-examination, would have contributed greatly to the development of comprehensive and reliable information.

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I. Introduction and Summary

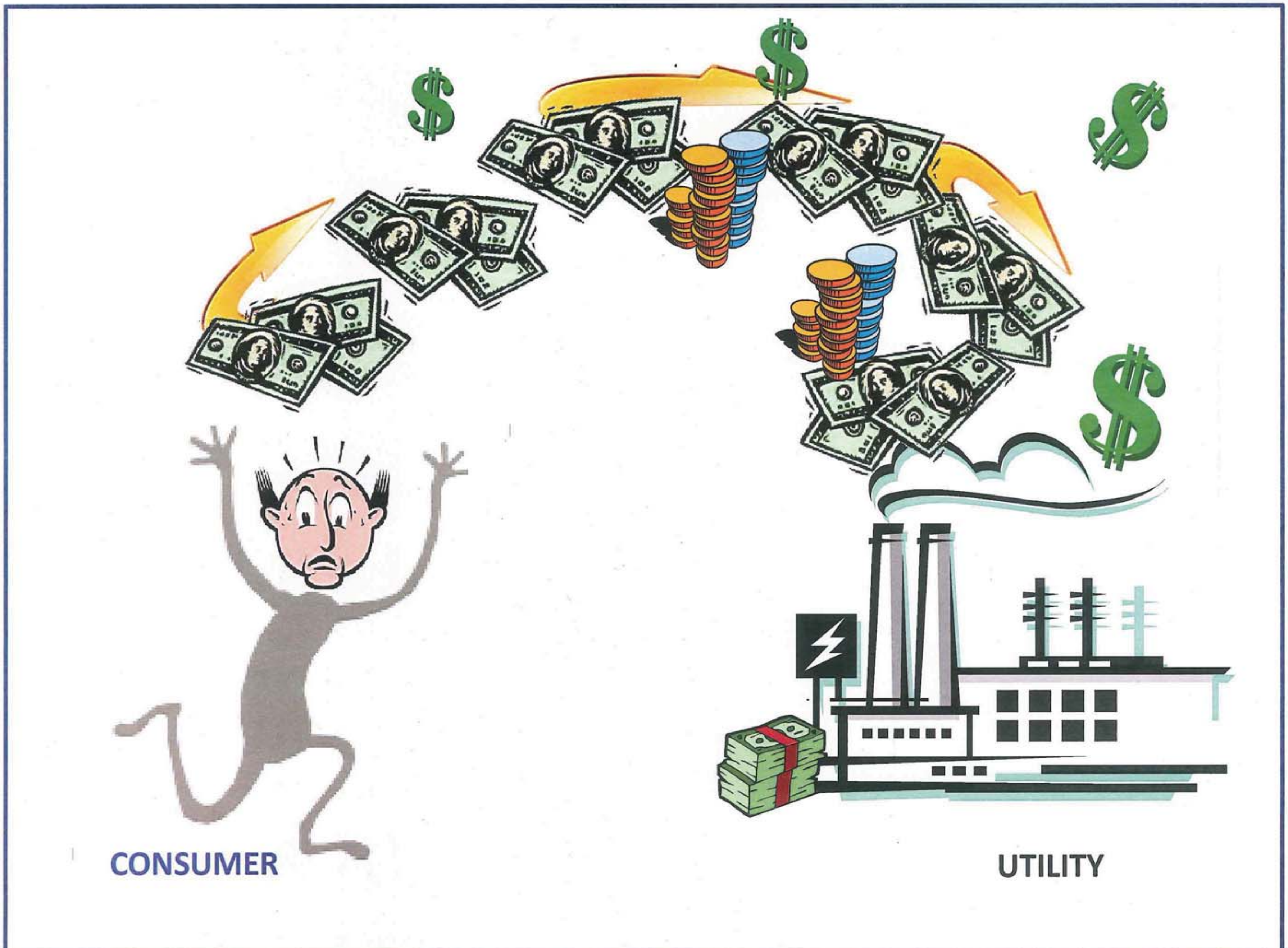
The information MIEC is providing in these comments is as comprehensive as available data permits. However, the comments are constrained by the lack of availability of information from the utilities that outlines their perceived infrastructure construction needs in relation to their current construction program. MIEC submitted data requests to each of the utilities (the data requests are filed in EFIS), but has not received responses. MIEC has been requesting similar information from the utilities as a part of the Legislature's consideration of Senate Bill 207 ("SB 207") and House Bill 398 ("HB 398"), but the utilities have not provided any meaningful response in that context either.

Having the resources necessary to provide safe, adequate and reliable service is a serious matter. The utilities have an obligation to do so and to inform the Commission and other stakeholders when problems arise that require special consideration. An example of a solution to a real issue would be the process that resulted in the regulatory plans that supported the construction of Iatan 2 and various environmental installations and upgrades. When a deficiency or other problem is identified and the stakeholders collaborate, solutions that are satisfactory to all can be reached. Unfortunately, the utilities have been unwilling to participate in such a process in connection with the current legislative initiatives, and that has impeded the development of solutions, if indeed there are problems that are in need of solutions.

MIEC is forced to conclude that the current legislative initiatives are not focused upon meeting an unmet requirement or allowing utilities to finance needed construction. Rather, it is apparent that these initiatives are simply designed to create more wealth for utility stockholders by transferring additional amounts of money from the pockets of consumers to the utilities, and doing so sooner and faster than under normal circumstances.

MIEC believes that the evidence clearly shows that the current processes are working effectively and efficiently, and that no additional legislation is required.

The information in the various sections of these comments was prepared by the joint efforts of the Bryan Cave LLP law firm, the Analysis Group, Inc., Professor Gilbert Metcalf, and Brubaker & Associates, Inc.


CONSUMER
UTILITY

II. Safety, Adequacy and Reliability of Electric Infrastructure and Identification of Problems, Costs and Needs

Since the time that SB 207 was filed, MIEC has been requesting the utilities to identify safety-related, reliability-related or other types of problems or shortcomings with their systems. MIEC even prepared listings of information that it desired, and more recently in this docket, has filed specific discovery requests. MIEC's efforts to understand the needs of the utilities have been rebuffed by the utilities, and only limited anecdotal examples have been provided to illustrate the utilities' claims. MIEC has always been willing to engage with the utilities and other stakeholders to discuss and develop solutions to real problems. The unwillingness of the utilities to be forthcoming about problems and needs has prevented productive discussions from taking place in connection with the infrastructure issues they have raised.

The claims that the utilities are making at the legislature and in the media are at odds with what they have told the regulators and the investment community. For example:

- Warner Baxter, Ameren's President and Chief Executive Officer told the Commission in his prepared testimony in February 2012 in Case No. ER-2012-0166 (page 9) that Ameren's reliability is in the top 25% of electric companies and he noted that reliability has improved 27% since 2006.

- Ameren reported to the investment community that in 2012 it had the best safety performance in company history and the best electric distribution system reliability performance in company history. (February 20, 2013, "Fourth Quarter 2012 Results and 2013 Earnings Guidance.")

- In KCPL's most recent electric rate case, Missouri PSC Case No. ER-2012-0174, Terry Bassham, Chief Operating Officer for KCPL's parent, Great Plains Energy, noted that KCPL is recognized as one of the Midwest's most reliable and affordable energy suppliers. (Direct Testimony at pages 3 and 6.)

Utilities with infrastructure problems couldn't credibly make there statements.

III. Utility Financial Condition and Need for Legislation

Proponents of the legislation have claimed that it was needed to improve the financial condition of the electric utilities. To the contrary, Missouri's electric utilities are strong financially, have a stable or positive outlook, and have access to needed capital at reasonable costs. No utility has identified any problem with accessing necessary capital.

In addition, the proponents have argued that the legislation would increase bond ratings and reduce costs to consumers. The following analysis will highlight the current strong financial standing of each of the electric utilities, and will demonstrate that the debt savings are nowhere near sufficient to offset the added cost to customers of raising the credit rating.

Current Credit Ratings

Schedule III-1 shows current credit ratings for the senior-secured indebtedness (first mortgage bonds) of Missouri's electric utilities. All of the utilities are rated A3 by Moody's and A- by Standard & Poor's ("S&P"), which are comparable rankings on their respective scales. In fact, both Ameren Missouri ("Ameren") and Empire District Electric Company ("Empire") were upgraded by S&P in March 2013.

Schedule III-2 sets forth the rating ranges described by the Moody's and S&P ratings. Note that the A3/A- rating falls into the "upper-medium grade" tier of the investment grade category.

Ranking and Recent Experience

Schedule III-3 shows the number of integrated electric utility operating companies in each of Moody's long-term rating categories. Note that the vast majority of utilities are in the A3 category, where Ameren, Kansas City Power & Light Company ("KCPL") and Empire reside. Also note the low population of the upper tiers in the rating categories: only three utilities have a double-A rating, and none have a triple-A rating.

The experience of Ameren with its recent $485 million long-term debt offering is instructive as to the ability to raise capital at low interest rates. Schedule III-4 shows, by rating category, all long-term mortgage bonds issued by integrated electric utilities during the period January 2012 through March 2013. Note that although Ameren is in the A3 credit rating category, the interest cost on its debt was comparable to the average interest cost on the debt issued by utilities in the A2, A1 and double-A credit rating categories.

Bond Ratings and Utility Rates

Utilities and their surrogates have made exaggerated claims about the benefits to consumers that would result from the lower interest rates that are associated with higher bond ratings. While it is acknowledged that a higher credit quality produces lower interest rates, all other factors equal, no one has talked about the cost of achieving the higher bond ratings or the interest rate benefit of having done so. Schedule III-5 summarizes the results of an analysis recently conducted to estimate the probable cost to consumers of achieving a higher bond rating. Based on that analysis, which draws from information in Ameren's most recently completed electric rate case, indications are that customers would have to pay between $100 million and $150 million per year more in electric rates in order to produce the higher return on equity and higher cash flow that would be required for Ameren to achieve an A rating by S&P or the equivalent Moody's rating.

As indicated in Schedule III-5, any benefit in interest rate reduction would be minimal, estimated to be at most $20 million per year, and would not even be achievable until after all of the outstanding first mortgage bonds have been retired/refinanced. **The conclusion is that customers would have to pay $5 more in electric rates for each $1 of interest savings, obviously not a good deal!**

This analysis validates the premise that the middle of the pack is the place to be. This conclusion is borne out by Schedule III-3 which shows that the vast majority of utilities are in the middle category. If the higher bond ratings were such a good deal for consumers, it only stands to reason that regulators would have made sure that more utilities were in the higher bond rating categories.

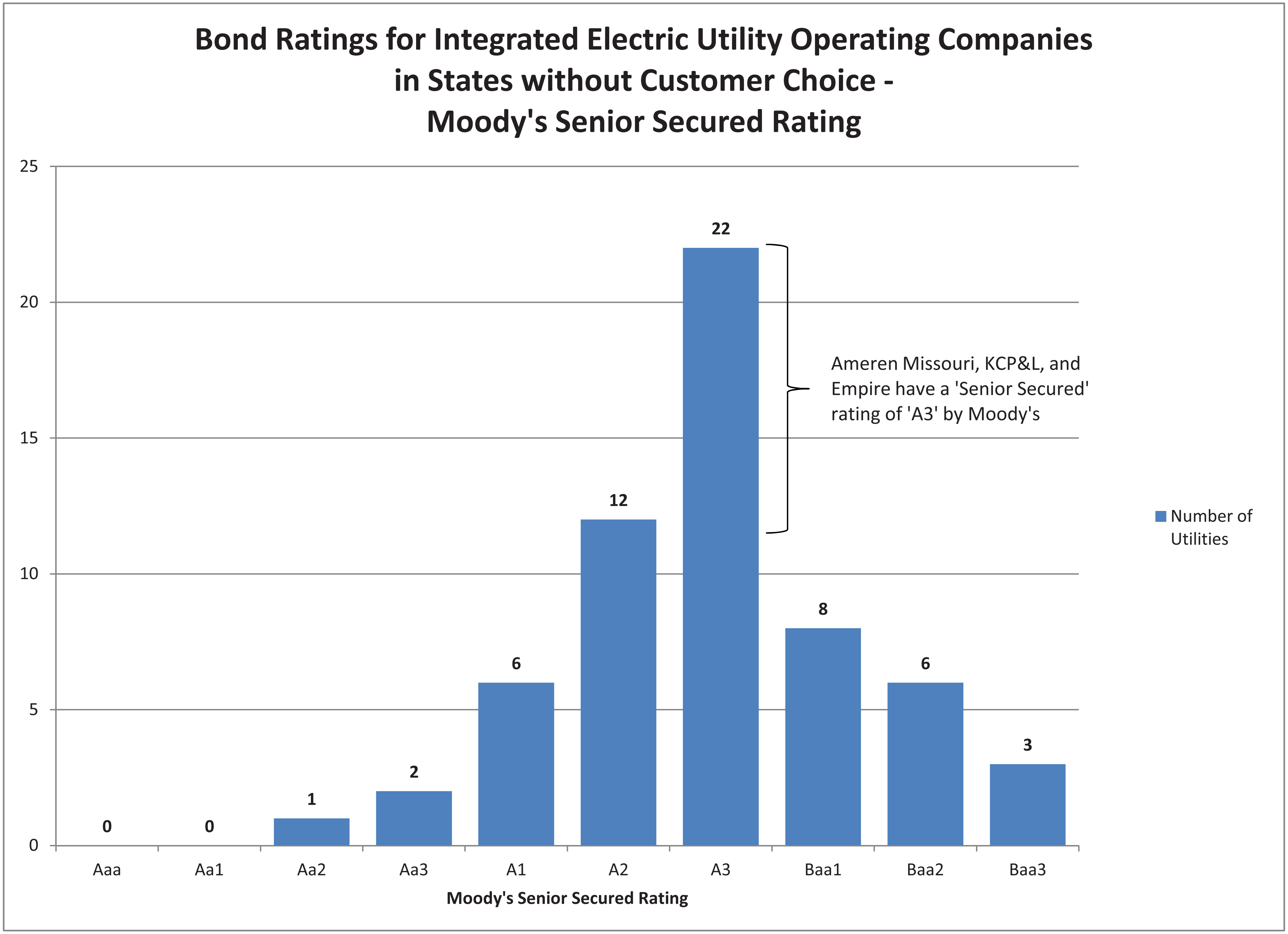
Credit Ratings for Senior Secured Debt (First Mortgage Bonds) of Missouri Electric Utilities

Utility	Moody's	Standard Poor's
Ameren Missouri[1]	A3	A-
Empire District Electric Company[2]	A3	A-
Great Plains Energy/ Kansas City Power & Light Company	A3	A-

[1]Upgraded from BBB+ to A- by S&P on March 14, 2013
[2]Upgraded from BBB+ to A- by S&P on March 11, 2013

Credit Rating Ranges for Moody's and S&P

	Designation	Moody's	Standard & Poor's
Investment Grade	Maximum Safety	Aaa	AAA
	High Grade	Aa1	AA+
		Aa2	AA
		Aa3	AA-
	Upper Medium Grade	A1	A+
		A2	A
		A3	A-
	Lower Medium Grade	Baa1	BBB+
		Baa2	BBB
		Baa3	BBB-
Non-Investment Grade	Speculative	Ba1	BB+
		Ba2	BB
		Ba3	BB-
	Highly Speculative	B1	B+
		B2	B
		B3	B-



Note: If a utility did not have a 'Senior Secured' rating by Moody's, the 'Long-Term Issuer' rating was used. Duke Energy Kentucky did not have a rating in either category.

Debt Rating and Interest Rates on 30-Year Mortgage Bonds Issued by Integrated Electric Utilities during the period January 2012 - March 2013

Line	Institution Name	Offering Completion Date (1)	Amount ($000) (2)	Offer Price ($) (3)	Maturity Date (4)	Coupon Rate (5)	Description (6)	Moody's (7)	S&P (9)
	Aa3 Credit Rating								
1	Florida Power & Light Company	05/10/2012	600,000	99.8600	06/01/2042	4.05%	First mortgage bonds, due June 1, 2042	Aa3	A
2	Florida Power & Light Company	12/17/2012	400,000	99.5040	12/15/2042	3.80%	First mortgage bonds, due Dec 15, 2042	Aa3	A
3	San Diego Gas & Electric Co.	03/19/2012	250,000	99.4810	04/01/2042	4.30%	Series MMM first mortgage bonds, due Apr 1, 2042	Aa3	A+
4	**Average Rate**					**4.05%**			
	A1 Credit Rating								
5	Carolina Power & Light Company	05/15/2012	500,000	99.5040	05/15/2042	4.10%	First mortgage bonds, due May 15, 2042	A1	A
6	Carolina Power & Light Company	03/07/2013	500,000	99.2650	03/15/2043	4.10%	First mortgage bonds, due Mar 15, 2043	A1	A
7	Duke Energy Carolinas, LLC	09/18/2012	650,000	99.2040	09/30/2042	4.00%	First and refunding mortgage bonds, due Sept 30, 2042	A1	A
8	Northern States Power Company - WI	10/02/2012	100,000	99.1770	10/01/2042	3.70%	First mortgage bonds, due Oct 1, 2042	A1	A
9	Southern California Edison Co.	03/08/2012	400,000	98.8180	03/15/2042	4.05%	Series 2012A first and refunding mortgage bonds, due Mar 15, 2042	A1	A
10	Southern California Edison Co.	03/04/2013	400,000	99.4030	03/15/2043	4.15%	Series 2013A first and refunding mortgage bonds, due Mar 15, 2043		
11	**Average Rate**					**4.02%**			
	A2 Credit Rating								
12	Duke Energy Indiana, Inc.	03/12/2012	250,000	99.8140	03/15/2042	4.20%	Series UUU first mortgage bonds, due Mar 15, 2042	A2	A
13	Florida Power Corporation	11/15/2012	400,000	99.6830	11/15/2042	3.85%	First mortgage bonds, due Nov 15, 2042	A2	A
14	Idaho Power Co.	04/10/2012	75,000	99.9340	04/01/2042	4.30%	Series I first mortgage bonds, due Apr 1, 2042	A2	A-
15	PacifiCorp	01/03/2012	300,000	99.6710	02/01/2042	4.10%	First mortgage bonds, due Feb 1, 2042	A2	A
16	Public Service Company of Colorado	09/04/2012	500,000	99.6540	09/15/2042	3.60%	Series 24 first mortgage bonds, due Sept 15, 2042	A2	A
17	**Average Rate**					**4.01%**			
	A3 Credit Rating								
18	**Ameren Missouri**	**09/06/2012**	**485,000**	**99.4740**	**09/15/2042**	**3.90%**	**Series OO FMB collateralizing sr. secured notes, due Sept 15, 2042**	**A3**	**A**
19	Commonwealth Edison Company	09/24/2012	350,000	99.8220	10/01/2042	3.80%	Series 113 first mortgage bonds, due Oct 1, 2042	A3	A-
20	Delmarva Power & Light Company	06/19/2012	250,000	99.4490	06/01/2042	4.00%	First mortgage bonds, due June 1, 2042	A3	A
21	Potomac Electric Power Company	03/11/2013	250,000	99.6090	03/15/2043	4.15%	First mortgage bonds, due Mar 15, 2043	A3	A
22	South Carolina Electric & Gas Co.	01/23/2012	250,000	99.9170	02/01/2042	4.35%	First mortgage bonds, due Feb 1, 2042	A3	A
23	South Carolina Electric & Gas Co.	07/10/2012	250,000	108.6280	02/01/2042	4.35%	First mortgage bonds, due Feb 1, 2042	A3	A
24	Southwestern Public Service Company	06/05/2012	100,000	110.0580	08/15/2041	4.50%	Series 1 first mortgage bonds , due Aug 15, 2041	A3	A-
25	Westar Energy, Inc.	02/27/2012	250,000	99.9140	03/01/2042	4.13%	First mortgage bonds, due Mar 1, 2042	A3	A-
26	Westar Energy, Inc.	05/14/2012	300,000	99.4510	03/01/2042	4.13%	First mortgage bonds, due Mar 1, 2042	A3	A-
27	Westar Energy, Inc.	03/21/2013	250,000	99.6230	04/01/2043	4.10%	First mortgage bonds, due Apr 1, 2043	A3	A-
28	**Average Rate**					**4.14%**			

Bond Ratings and Utility Rates

Ameren Missouri's first mortgage bonds are rated A- by Standard and Poor's and A3 by Moody's. A claim has been made that higher bond ratings will result in lower utility rates. An examination of Ameren Missouri's circumstances reveals that this claim is not true for the reasons stated below.

The primary financial factors driving utility bond ratings are utility cash flow and utility income. (This analysis puts aside the fact that Ameren Missouri also is adversely affected by the lack of financial separation between its Missouri utility operations and its unregulated merchant operations.) Ameren Missouri's cash flow and income are produced from the rates charged to Missouri customers.

The analysis indicates that to achieve the higher cash flow and higher income that would support a solid A bond rating would require that customers pay between $100 million and $150 million per year more in electric rates. Spreads between bond rating categories have recently been very narrow. More typically, the interest rate spread between BBB and A utility bonds has been in the vicinity of one-half of 1% (50 basis points), so the spread between A- and A would be even less.

If Ameren Missouri's rates were increased to achieve the expected higher bond rating, the benefit of lower interest rates would not be immediately realized on any of the debt that is currently outstanding. Rather, the benefit would be realized over time as new bonds are issued or existing bonds are refinanced. Ameren Missouri has approximately $4 billion of first mortgage bonds outstanding. Even if (unrealistically) we assume that it could reduce its bond interest cost by one-half of 1%, the annual savings in interest would be only $20 million.

Therefore, customers would not receive any net benefit, and in fact would be significantly worse off because they would have had to pay an additional $100 million to $150 million per year in return for the prospect of, at most, saving $20 million per year after Ameren Missouri's current debt is refinanced, or additional bonds are issued. There is no reasonable scenario under which the higher rates necessary to achieve the higher bond rating would be beneficial to customers.

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STATE OF MISSOURI)
) **SS**
COUNTY OF ST. LOUIS)

Affidavit of Michael P. Gorman

Michael P. Gorman, being first duly sworn, on his oath states:

1. My name is Michael P. Gorman. I am a consultant with Brubaker & Associates, Inc., having its principal place of business at 16690 Swingley Ridge Road, Suite 140, Chesterfield, Missouri 63017. We have been retained by the Missouri Industrial Energy Consumers in this proceeding on their behalf.

2. I am responsible for Section III in the April 1, 2013 "COMMENTS OF THE MISSOURI INDUSTRIAL ENERGY CONSUMERS." A brief summary of my education and experience is attached.

3. I hereby swear and affirm that the comments and schedules are true and correct and that they show the matters and things that they purport to show.

[signature]
Michael P. Gorman

Subscribed and sworn to before me this 1st day of April, 2013.

TAMMY S. KLOSSNER
Notary Public - Notary Seal
STATE OF MISSOURI
St. Charles County
My Commission Expires: Mar. 14, 2015
Commission # 11024862

[signature: Tammy S. Klossner]
Notary Public

Michael Gorman

Areas of Expertise

Competitive Procurement
Competitive Energy Procurement
Price Forecasts
Risk Management
Supplier Management

Cost of Service/Rate Design
Alternative/Incentive Regulatory Plans/Mechanisms
Cost of Service
Electric Fuel and Gas Cost Reviews and Rates
Marginal Cost Analysis
Nuclear Decommissioning Costs
Performance Based Rates
Prudence and Used/Useful Evaluation
Rate Design and Tariff Analysis
Storage Cost/Necessity

Financial
Asset /Enterprise Valuation
Cost of Capital
Depreciation Studies
Financial Integrity
Merger Evaluations
Revenue Requirement Issues

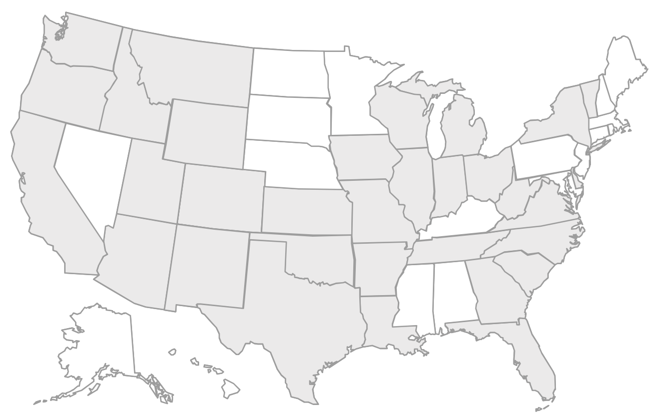
Special Projects
Site Selection and Evaluation
Training Seminars

Mr. Gorman is a Managing Principal at BAI. He received Degrees of Bachelor of Science in Electrical Engineering from Southern Illinois University at Carbondale and Master of Business Administration from the University of Illinois at Springfield. Mr. Gorman has also done extensive graduate studies in Financial Economics. He earned the designation Chartered Financial Analyst (CFA) from the CFA Institute.

Mr. Gorman has been in the consulting practice since 1990, and in the energy business since 1983. Mr. Gorman was employed by the Illinois Commerce Commission and held positions including Director of the Financial Analysis Department, Senior Analyst, Planning Analyst and Utility Engineer. Mr. Gorman was also employed by Merrill Lynch as a Financial Consultant. In this position, he consulted on cash management and investment strategies.

His responsibilities at BAI include project management, cost of capital studies, depreciation studies, financial integrity studies, system resource planning studies, alternative regulation plan/mechanisms, cost of service, rate design, production cost evaluations, commodity risk management, commodity procurement management, competitive supplier management and counterparty credit risk.

Project Work



Other Project Work

- Alberta
- Board of Public Utilities of Kansas City, Kansas
- City of Austin Electric Utility Council
- Federal Energy Regulatory Commission (FERC)
- LaGrange, Georgia / Municipal Electric Authority of Georgia
- Newfoundland
- Nova Scotia
- Salt River Project

BRUBAKER & ASSOCIATES, INC.

IV. Rate Impacts

SB 207 (Senate Substitute for Senate Committee Substitute or SS for SCS) allows for an investment cost recovery surcharge of up to 8% as applied to utility revenues and customers' bills. In addition, it allows a utility to track escalations in expenses between rate cases and collect those accumulated costs over a subsequent three-year period, with a maximum charge of 2% to customers in each year. The table below illustrates the potential four-year costs to Missouri consumers under this Legislation. These calculations assume that surcharge spending would ramp-up uniformly over a four-year period. The cost to customers would be $1.2 billion. (The details for this table, as well as the cost under the assumption of more accelerated spending, appear in Schedules IV-1 through IV-5.)

Potential Four-Year Costs to Consumers
Under SB 207 (SS for SCS) – Uniform Ramp-Up ($ Millions)

Utility	Schedule	Surcharge	Tracker	Total
Ameren Missouri	IV-1	$ 560	$ 168	$ 728
Empire District	IV-2	74	22	96
Kansas City Power & Light Company	IV-3	152	46	198
KCPL-GMO-MPS	IV-4	112	34	146
KCPL-GMO-L&P	IV-5	38	11	49
Total		$ 936	$ 281	$1,217

As shown in the attached schedules, the accelerated expenditure scenario that we have modeled would result in even higher charges to consumers …. nearly $1.5 billion over a four-year period. While utilities may claim that they do not "expect" to spend to the full extent permitted by the legislation,[1] such claims must not be given any weight unless accompanied by an absolute guarantee of specific “not-to-exceed” expenditure levels.

From a broader perspective, Schedule IV-6 explains in narrative form, and illustrates graphically, the large and unnecessary impact on consumers if infrastructure spending were to be unnecessarily speeded up in order to take advantage of the perceived current low interest rate environment. These graphs and calculations vividly demonstrate the damage that would be done to consumers if this line of reasoning were followed. For example, accelerating spending by $200 million per year for a five-year period would increase costs to consumers by over $500 million during the next eight years.

[1]Such a claim would raise this question: “Then, why aren’t the limits in the legislation lower levels?”

POTENTIAL SB 207 (SS for SCS) IMPACT

AMEREN MISSOURI

Annual Base Rate Revenue $2.8 Billion

	Uniform Ramping Scenario		Accelerated Spending	
ISRS Surcharge				
Year	Percent of Revenue	Revenue $ Millions	Percent of Revenue	Revenue $ Millions
1	2%	$56	4%	$112
2	4%	$112	6%	$168
3	6%	$168	7%	$196
4	8%	$224	8%	$224
Total Surcharge		$560		$700
Expense Tracker *				
1	2%	$56	2%	$56
2	2%	$56	2%	$56
3	2%	$56	2%	$56
Total Tracker		$168		$168
Total Impact		$728		$868

* After first cycle

POTENTIAL SB 207 (SS for SCS) IMPACT

EMPIRE

Annual Base Rate Revenue $370 Million

ISRS Surcharge	Uniform Ramping Scenario		Accelerated Spending	
Year	Percent of Revenue	Revenue $ Millions	Percent of Revenue	Revenue $ Millions
1	2%	$7	4%	$15
2	4%	$15	6%	$22
3	6%	$22	7%	$26
4	8%	$30	8%	$30
Total Surcharge		$74		$93
Expense Tracker *				
1	2%	$7	2%	$7
2	2%	$7	2%	$7
3	2%	$7	2%	$7
Total Tracker		$22		$22
Total Impact		$96		$115

* After first cycle

POTENTIAL SB 207 (SS for SCS) IMPACT

KCPL

Annual Base Rate Revenue $760 Million

	Uniform Ramping Scenario		Accelerated Spending	
ISRS Surcharge				
Year	Percent of Revenue	Revenue $ Millions	Percent of Revenue	Revenue $ Millions
1	2%	$15	4%	$30
2	4%	$30	6%	$46
3	6%	$46	7%	$53
4	8%	$61	8%	$61
Total Surcharge		$152		$190
Expense Tracker *				
1	2%	$15	2%	$15
2	2%	$15	2%	$15
3	2%	$15	2%	$15
Total Tracker		$46		$46
Total Impact		$198		$236

* After first cycle

POTENTIAL SB 207 (SS for SCS) IMPACT

KCPL - GMO MPS DIVISION

Annual Base Rate Revenue $560 Million

ISRS Surcharge	Uniform Ramping Scenario		Accelerated Spending	
Year	Percent of Revenue	Revenue $ Millions	Percent of Revenue	Revenue $ Millions
1	2%	$11	4%	$22
2	4%	$22	6%	$34
3	6%	$34	7%	$39
4	8%	$45	8%	$45
Total Surcharge		$112		$140
Expense Tracker *				
1	2%	$11	2%	$11
2	2%	$11	2%	$11
3	2%	$11	2%	$11
Total Tracker		$34		$34
Total Impact		$146		$174

* After first cycle

POTENTIAL SB 207 (SS for SCS) IMPACT

KCPL - GMO L&P DIVISION

Annual Base Rate Revenue $190 Million

ISRS Surcharge	Uniform Ramping Scenario		Accelerated Spending	
Year	Percent of Revenue	Revenue $ Millions	Percent of Revenue	Revenue $ Millions
1	2%	$4	4%	$8
2	4%	$8	6%	$11
3	6%	$11	7%	$13
4	8%	$15	8%	$15
Total Surcharge		$38		$48
Expense Tracker *				
1	2%	$4	2%	$4
2	2%	$4	2%	$4
3	2%	$4	2%	$4
Total Tracker		$11		$11
Total Impact		$49		$59

* After first cycle

Accelerating Infrastructure Investment is Costly to Customers

Proponents of Senate Bill 207 and House Bill 398 claim Missouri's infrastructure is in need of major replacements or additions. In order to address this unsubstantiated claim, proponents promise that Missouri electric utilities will make additional investments above what they currently make today if they get special rate treatment. In other words, they will build new infrastructure sooner than they otherwise would.

What is the cost associated with such a proposal? Interestingly, proponents of the bill do not discuss costs. Why? … Because they don't want to show that accelerating infrastructure investment would cost customers hundreds of millions of dollars.

Attached is a graph that illustrates this by showing the extra cost imposed on customers if a utility moved (accelerated) $100 million of annual infrastructure investments from the years 2019 - 2024 to the years 2014 - 2018. Under normal conditions, the utility would not need to invest any additional funds beyond its current construction program for the five years 2014 - 2018, and customers would not pay any additional charges. However, under the accelerated scenario, the utility would invest an additional $100 million for each of these five years, and customers would pay more.[1]

Comparing the accelerated line to the normal line reveals that in eight years Missouri customers would pay an additional $280 million for electric service per $100 million of accelerated investment ($560 million for $200 million, $840 million for $300 million, as shown on the attached additional graphs). Graphs showing the impacts for $200 and $300 million are also attached.

You must ask: Is it good policy to charge Missouri customers millions more for accelerated infrastructure replacements and additions without some proof that it is needed?

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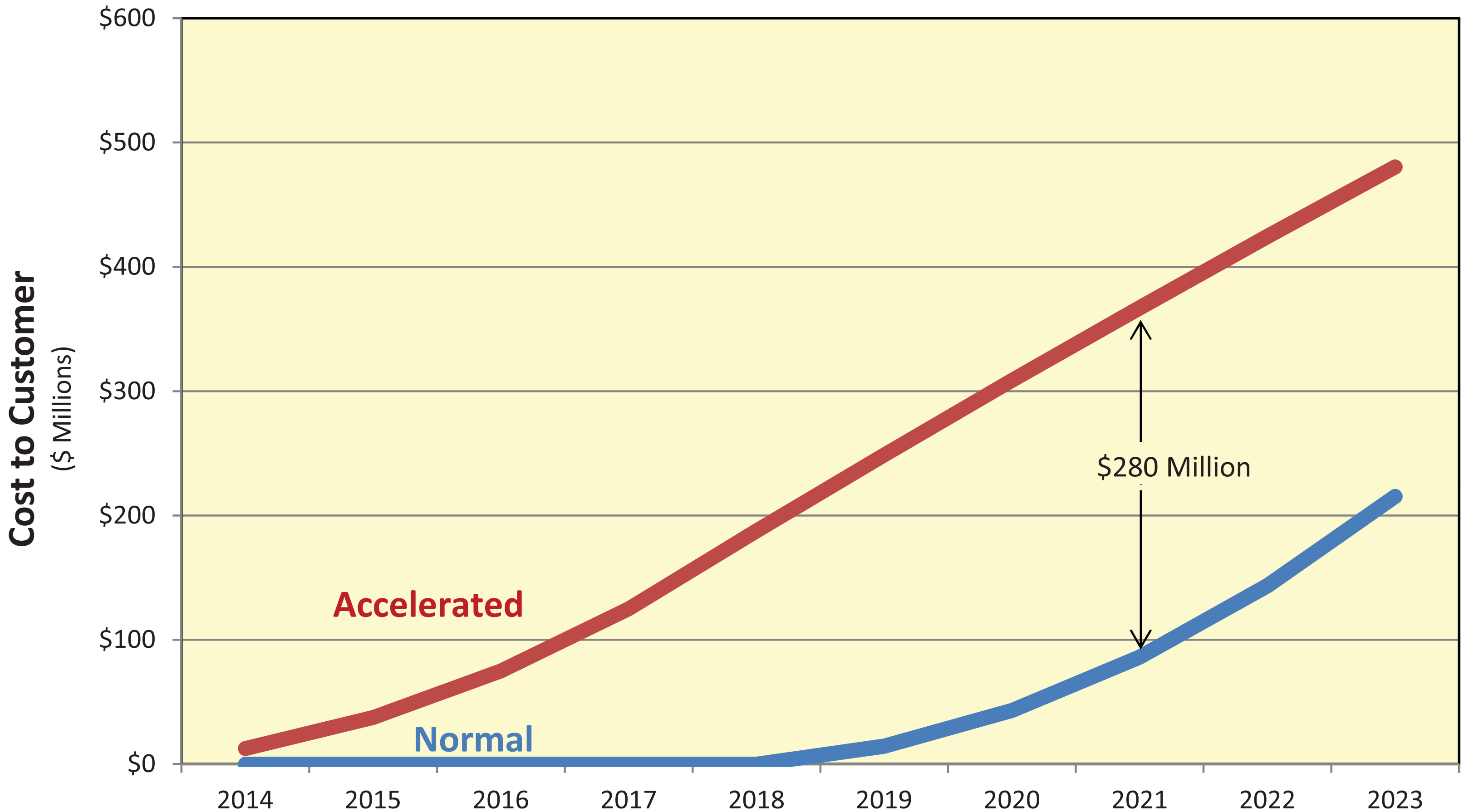
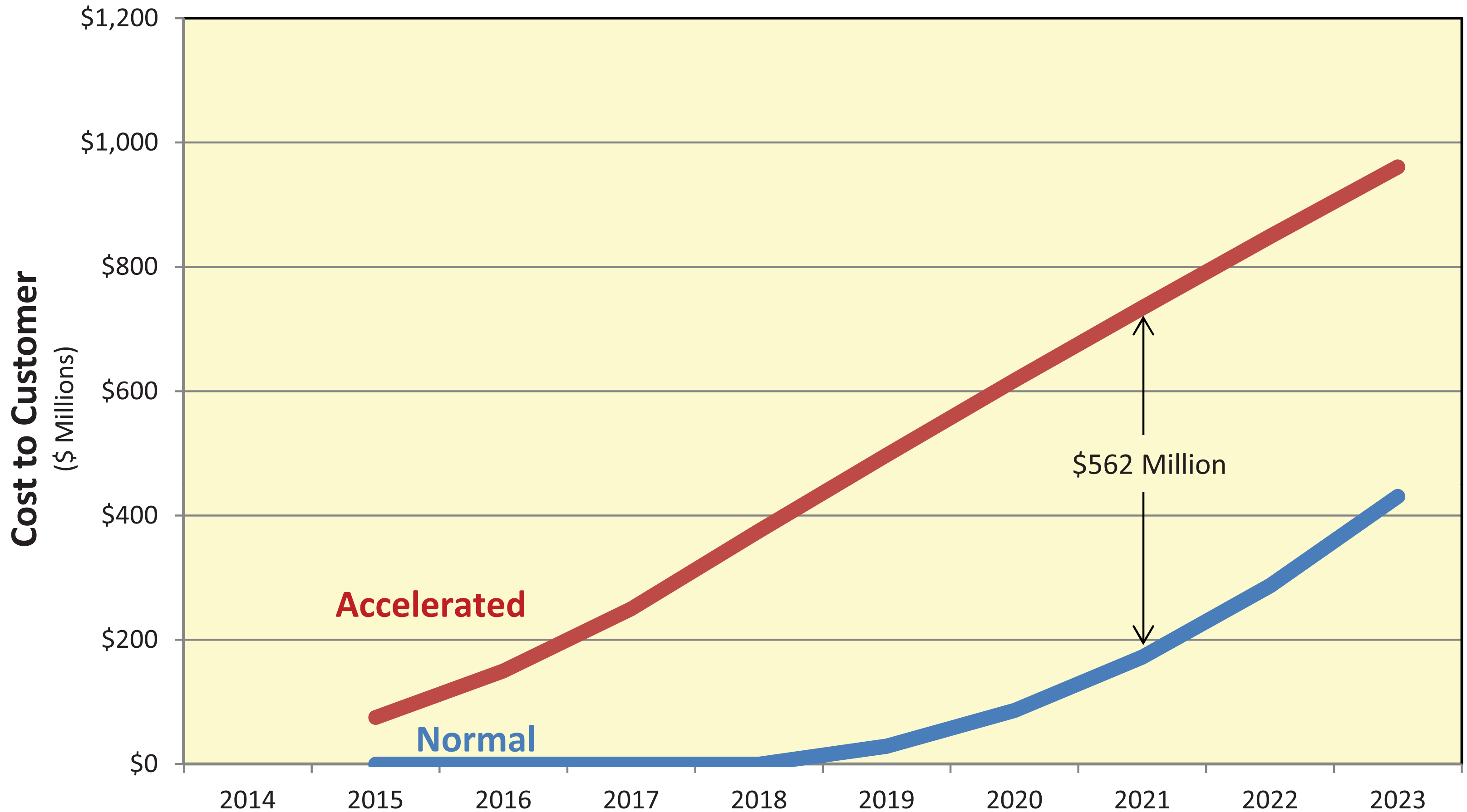
[1]To recognize price escalation, a 2% per year increase in investment cost is included; to recognize the current low interest rate environment, the interest rate was increased a total of one percentage point over the five-year period.

Ten Year Comparison of Cumulative Rate Impacts Between Accelerated and Normal Investment Schedules



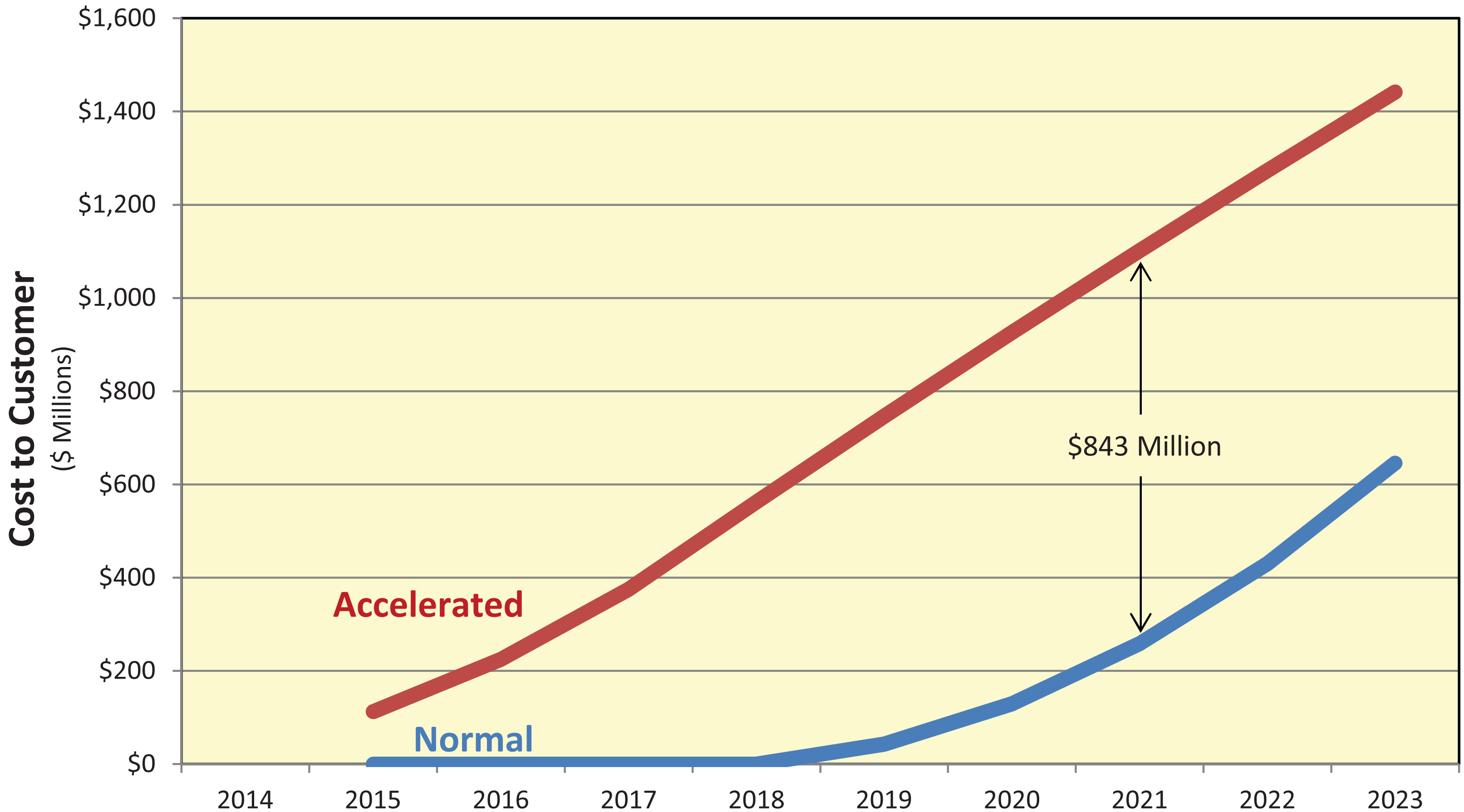
** Assumes Accelerated Investment Schedule of $100 million per year for five years.*

Ten Year Comparison of Cumulative Rate Impacts Between Accelerated and Normal Investment Schedules



** Assumes Accelerated Investment Schedule of $200 million per year for five years.*

Ten Year Comparison of Cumulative Rate Impacts Between Accelerated and Normal Investment Schedules



** Assumes Accelerated Investment Schedule of $300 million per year for five years.*

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COUNTY OF ST. LOUIS)

Affidavit of Maurice Brubaker

Maurice Brubaker, being first duly sworn, on his oath states:

1. My name is Maurice Brubaker. I am a consultant with Brubaker & Associates, Inc., having its principal place of business at 16690 Swingley Ridge Road, Suite 140, Chesterfield, Missouri 63017. We have been retained by the Missouri Industrial Energy Consumers in this proceeding on their behalf.

2. I am responsible for Section IV in the April 1, 2013 "COMMENTS OF THE MISSOURI INDUSTRIAL ENERGY CONSUMERS." A brief summary of my education and experience is attached.

3. I hereby swear and affirm that the comments and schedules are true and correct and that they show the matters and things that they purport to show.

M E Brubaker
Maurice Brubaker

Subscribed and sworn to before me this 1st day of April, 2013.

TAMMY S. KLOSSNER
Notary Public - Notary Seal
STATE OF MISSOURI
St. Charles County
My Commission Expires: Mar. 14, 2015
Commission # 11024862

Tammy S Klossner
Notary Public

Maurice Brubaker

Areas of Expertise

Competitive Procurement
Alternative Energy Supply Options
Cogeneration
Contract Development, Evaluation and Negotiations
Customer Gas Supply Programs
Electric Retail Competition and Customer Choice
Market Price Surveys
Price Forecasts
Request for Proposals

Cost of Service/Rate Design
Ancillary Service Rates
Cost of Service
Gas Transportation Rates and Policy
Demand-Side Management
Interruptible Rates
Marginal Cost Analysis
Performance Based Rates
Prudence and Used/Useful Evaluation
Purchase Power Contracts
Rate Design and Tariff Analysis
Real-Time Pricing
Resource Planning
Standby Rates
Stranded Costs
Transmission Pricing and Access

Financial
Fuel Cost Recovery
Fuel Purchasing Strategies
Merger Evaluations
Revenue Requirement Issues

Special Projects
Economic Dispatch
Legislation and Public Policy
Market Structure
Site Selection and Evaluation
Utility Privatization Studies

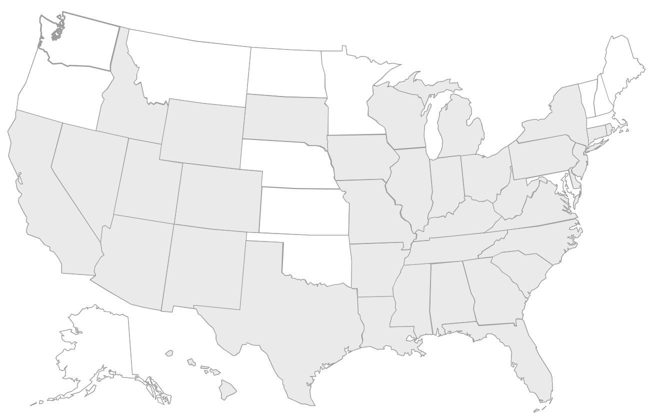
Mr. Brubaker is a Managing Principal and President of BAI. He received the Degrees of Bachelor of Science in Electrical Engineering from the University of Missouri at Rolla; Master of Business Administration (with a Major in Finance) and Master of Science in Engineering from Washington University in St. Louis.

Prior to entering the utility consulting practice in 1970, Mr. Brubaker was employed by Emerson Electric Company.

Recent engagements have concentrated on development of energy strategies and competitive sourcing of power for customers, utility fuel and purchased power cost recovery, resource planning and utility rate cases.

He has extensive experience in virtually all aspects of regulated and competitive electricity and natural gas, and has presented testimony on more than 400 occasions before over 30 state regulating commissions, the Federal Energy Regulatory Commission, and before various state courts, municipal regulatory bodies and state legislatures.

Project Work



Other Project Work

- Federal Energy Regulatory Commission (FERC)
- Guam
- Iceland
- Italy

Principal Advisor to:

- Illinois Industrial Energy Consumers
- Louisiana Energy Users Group
- Missouri Industrial Energy Consumers
- United States Navy
- Utah Industrial Energy Consumers

V. Application of Current Regulatory Procedures

Although the utilities complain about current Missouri regulatory procedures, these procedures have been more than adequate to allow the utilities to fulfill their obligations to consumers and to have an opportunity to earn a reasonable rate of return on their investments. The utilities have not brought forth any need that cannot adequately be addressed under current regulatory procedures. And while utilities complain about having to ask the Commission when they want to raise their rates, the ability to do so is really a privilege and should not be viewed as an inconvenience. A utility has the ability to file a rate case at any time, provided one is not already pending. The ability to seek rate increases at any point in time allows a utility to constantly revise its rates to meet its financial objectives. No other business gets to have its prices set on a cost plus basis. Rather, they have to take a chance in the competitive marketplace that they will be able to pass costs on to customers by selling goods and services that customers want at a price they are willing to pay.

Missouri's electric utilities have not been bashful about taking advantage of the opportunities to raise rates. Since 2007, they have been granted over $1 billion of rate increases and have been allowed to collect nearly $500 million in additional revenues through the Fuel Adjustment Clause. For individual utilities, the impact on consumers of these rate increases has ranged from about 40% to over 70%. Putting together all of the additional dollars consumers have had to pay since 2007 adds up to about $4.2 billion more paid to utilities just through the end of 2012, an amount which will grow to $5.8 billion by the end of 2013.

In addition to the right to file a rate case at any time, the utilities have the benefit of many enhancements that help their earnings and/or cash flow. Among the mechanisms that have been developed within the last 10 years are those discussed in points 2, 3, 4, 5, 6, and 9. While Missouri's regulatory practices may not be as generous as the utilities would like, many significant changes have been made in recent years to accommodate changing circumstances.

Thus, any suggestion that Missouri's practices are "100 years old" would be highly inaccurate.

Regulatory Enhancements Available To Missouri Electric Utilities

1. Accounting Authority Orders – An accounting mechanism which allows a utility to defer expense recognition of extraordinary events outside of a rate case and preserve them for possible future recovery in a subsequent rate case. This mechanism allows a utility to protect its earnings from the impact of extraordinary events.

2. Fuel Adjustment Clause – Allows a utility to recover fuel expenses which are greater than the level of fuel expense included in current rates. Fuel expense is approximately 35-50% of a utility's total operating expenses. Allowing a utility to recover increases in fuel expense whenever they occur between rate cases is a significant regulatory concession.

3. Trackers – Expense trackers allow a utility to track expenses actually incurred compared to the level of expenses built into rates, and to seek collection of the difference in the utility's next rate case. Trackers virtually guarantee recovery of the expense items tracked between rate cases.

   Current Trackers Allowed by the Commission
   - Vegetation Management
   - Infrastructure Inspections
   - Pensions
   - Other Post Employment Benefits ("OPEB")
   - Storms

4. Environmental Cost Recovery Mechanism ("ECRM") – Allows a utility to change rates between rate cases to recover costs associated with qualified projects required by federal, state or local governments.

5. Renewable Energy Standard Rate Adjustment Mechanism ("RESRAM") – Allows a utility to change rates between rate cases to recover costs associated with meeting the renewable energy standards.

6. Missouri Energy Efficiency Investment Act ("MEEIA") – Allows a utility to track costs associated with energy efficiency projects and collect those added expenses above what was included in the previous rate case in a subsequent rate case. (Some argue that MEEIA also allows a utility to change rates between rate cases.)

7. True-up for Rate Cases – This regulatory mechanism allows the utility's costs to be brought to a more recent period for use in setting rates in a rate case. The use of a true-up moves all relevant operations of the utility to within 4-5 months of the effective date of new rates in the rate case. The use of true-ups is a very helpful regulatory mechanism because it reduces the time period between reviewing the utility operations and setting rates. True-ups significantly reduce regulatory lag and allow the Commission to establish rates using very recent cost data.

8. Construction Accounting – Construction accounting allows the utility to defer the return on investment and depreciation expense on major construction projects until rates are established in a rate case. It can then collect those costs over a period of years. Construction accounting exempts the utility from having to precisely predict when a major construction project will be used and useful. This mechanism was used by Ameren for the scrubbers at Sioux.

9. Regulatory Plans – Regulatory plans have been used successfully for KCPL and Empire to facilitate construction of Iatan 2. The regulatory plans were developed collaboratively by the stakeholders (utilities, PSC Commission Staff and utility customers) and provided the utilities with higher rates in order to create the financial integrity needed to construct the project.

10. Performance-Based Regulation – Utilities have at times operated under an incentive regulation plan whereby earnings are measured against a specific sharing grid. If the utility is efficient and finds ways to reduce its costs, it is able to keep part of the higher earnings.

11. Emergency Rate Relief – The Commission found that, if justified, it can grant rate relief to a utility without first going through the usual suspension period.

WITH ALL OF THE ABOVE REGULATORY TOOLS AVAILABLE UNDER CURRENT MISSOURI PRACTICES, ELECTRIC UTILITIES DO NOT NEED THE ADDITIONAL REGULATORY GIFTS FROM SENATE BILL 207 OR HOUSE BILL 398.

STATE OF MISSOURI

PUBLIC SERVICE COMMISSION

In the Matter of a Working Case to Address Legislative Concerns Regarding Proposals to Modify Ratemaking Procedures for Electric Utilities	)	**File No. EW-2013-0425**

STATE OF MISSOURI)
) **SS**
COUNTY OF ST. LOUIS)

Affidavit of Greg R. Meyer

Greg R. Meyer, being first duly sworn, on his oath states:

1. My name is Greg R. Meyer. I am a consultant with Brubaker & Associates, Inc., having its principal place of business at 16690 Swingley Ridge Road, Suite 140, Chesterfield, Missouri 63017. We have been retained by the Missouri Industrial Energy Consumers in this proceeding on their behalf.

2. I am responsible for Section V in the April 1, 2013 "COMMENTS OF THE MISSOURI INDUSTRIAL ENERGY CONSUMERS." A brief summary of my education and experience is attached.

3. I hereby swear and affirm that the comments and schedules are true and correct and that they show the matters and things that they purport to show.

Greg R Meyer

Greg R. Meyer

Subscribed and sworn to before me this 1st day of April, 2013.

TAMMY S. KLOSSNER
Notary Public - Notary Seal
STATE OF MISSOURI
St. Charles County
My Commission Expires: Mar. 14, 2015
Commission # 11024862

Tammy S Klossner

Notary Public

Greg R. Meyer

Areas of Expertise

Competitive Procurement
Contract Development,
Evaluation and Negotiations
Request for Proposals

Cost of Service/Rate Design
Demand-Side Management
Performance Based Rates
Resource Planning
Transmission Pricing and Access

Financial
Fuel Cost Recovery
Merger Evaluations
Revenue Requirement Issues

Special Projects
Economic Dispatch
Legislation and Public Policy

Mr. Meyer is an Associate at BAI. Mr. Meyer graduated from the University of Missouri – Columbia with a Bachelor of Science Degree in Business Administration, with a major in Accounting.

Prior to joining BAI on June 1, 2008, Mr. Meyer was employed for 29 years at the Missouri Public Service Commission. He began his employment at the Commission as a Junior Auditor. During his tenure at the Commission, Mr. Meyer advanced to higher auditing classifications. His final position at the Commission was an Auditor V, which he held for approximately ten years.

As an Auditor V, Mr. Meyer conducted audits and examinations of the accounts, books, records and reports of jurisdictional utilities. Mr. Meyer served as Lead Auditor or Case Supervisor on numerous rate cases before the Commission. In addition, he assisted in the technical training of other auditors, which included the preparation of auditors' workpapers, oral and written testimony.

Mr. Meyer has extensive experience in virtually all aspects of revenue requirements of regulated electric, gas and water utilities. Mr. Meyer has presented testimony on numerous occasions before the Missouri Public Service Commission. Mr. Meyer also was a member of the Cost Allocation Working Group at the Southwest Power Pool, developing transmission policy and pricing proposals.

Project Work

Other Project Work

- Alberta
- Nova Scotia

VI. Economic Development – Impact on Jobs

Utilities and their surrogates like to claim that the legislative proposals will create new jobs. While they may create temporary construction jobs, the broader and longer term impact on the economy of Missouri is not positive.

The attached study prepared by Gilbert Metcalf, Professor of Economics at Tufts University, in association with the Analysis Group, Inc., a respected consulting firm that also has done work for electric utilities, including Ameren, considers all factors at work in the economy and all interactive effects. It concludes that a 10% increase in electricity prices is likely to result in over 61,000 lost jobs in Missouri, which is approximately 1.8% of the workforce.

The adverse impact of higher electric rates on the economy is intuitively obvious, but the proponents of the legislation conveniently attempt to ignore these effects. The Abstract of the study is included as Schedule VI-1, and the full study is included in Appendix A.

The Relationship Between Electricity Prices and Jobs in Missouri

Gilbert E. Metcalf[1]

February 27, 2013

ABSTRACT

The relationship between electricity prices and employment has been a topic of interest for researchers in government, academia, and the private sector. Recent studies on this issue demonstrate that higher electricity prices are associated with job losses, particularly in economic sectors that are energy intensive. I investigated this issue as it pertains specifically to Missouri. To do so, I used a statistical technique called regression analysis to study the historical relationship between electricity prices and employment, controlling for other factors that may affect this relationship. The results of my analysis confirm the findings of previous researchers: an increase in electricity prices in Missouri (e.g., as a result of an infrastructure surcharge) have historically been associated with job losses across the state economy. My analysis suggests that a ten percent increase in electricity prices, for example, is likely to result in over 61,000 lost jobs in Missouri (approximately 1.8 percent of the workforce). Indeed, this may be a conservative estimate; a refinement to my first regression model – i.e., looking at the impact of changes in electricity prices on jobs in both the short-term and the long-term – suggests even larger job losses are possible. These job losses would be concentrated most heavily in the manufacturing sector, although job losses would be spread throughout the Missouri economy.

[1] I am a Professor of Economics at Tufts University and a Research Associate at the National Bureau of Economic Research and MIT's Joint Program on the Science and Policy of Global Change. I have taught at Princeton University, the Kennedy School of Government at Harvard, and MIT. I have frequently testified before Congress, served on expert panels including a recent National Academies of Sciences panel on energy externalities, and served as a consultant to various organizations. During 2011 and 2012, I served as the Deputy Assistant Secretary for Environment and Energy at the U.S. Department of Treasury. I was assisted in this research and analysis by Analysis Group, Inc., and support was provided by the Missouri Industrial Energy Consumers, but the opinions expressed herein are exclusively my own.

APPENDIX A

The Relationship Between Electricity Prices and Jobs in Missouri

Gilbert E. Metcalf
Tufts University

February 27, 2013

The Relationship Between Electricity Prices and Jobs in Missouri

Gilbert E. Metcalf[1]

February 27, 2013

ABSTRACT

The relationship between electricity prices and employment has been a topic of interest for researchers in government, academia, and the private sector. Recent studies on this issue demonstrate that higher electricity prices are associated with job losses, particularly in economic sectors that are energy intensive. I investigated this issue as it pertains specifically to Missouri. To do so, I used a statistical technique called regression analysis to study the historical relationship between electricity prices and employment, controlling for other factors that may affect this relationship. The results of my analysis confirm the findings of previous researchers: an increase in electricity prices in Missouri (e.g., as a result of an infrastructure surcharge) have historically been associated with job losses across the state economy. My analysis suggests that a ten percent increase in electricity prices, for example, is likely to result in over 61,000 lost jobs in Missouri (approximately 1.8 percent of the workforce). Indeed, this may be a conservative estimate; a refinement to my first regression model – i.e., looking at the impact of changes in electricity prices on jobs in both the short-term and the long-term – suggests even larger job losses are possible. These job losses would be concentrated most heavily in the manufacturing sector, although job losses would be spread throughout the Missouri economy.

[1] I am a Professor of Economics at Tufts University and a Research Associate at the National Bureau of Economic Research and MIT's Joint Program on the Science and Policy of Global Change. I have taught at Princeton University, the Kennedy School of Government at Harvard, and MIT. I have frequently testified before Congress, served on expert panels including a recent National Academies of Sciences panel on energy externalities, and served as a consultant to various organizations. During 2011 and 2012, I served as the Deputy Assistant Secretary for Environment and Energy at the U.S. Department of Treasury. I was assisted in this research and analysis by Analysis Group, Inc., and support was provided by the Missouri Industrial Energy Consumers, but the opinions expressed herein are exclusively my own.

I. INTRODUCTION

Over the past several years, researchers from government, academia, and the private sector have been interested in understanding the relationship between electricity prices and employment. There are several reasons for interest in the topic. First, while the recent recession has moderated electricity prices over the last few years, average prices have been growing over time, sometimes substantially year-to-year.[2] Second, proposed environmental policies, such as regulatory efforts to reduce emissions of greenhouse gases, are expected to increase electricity prices if implemented. Third, ongoing concerns about the health of the U.S. manufacturing sector has motivated research into the impacts of all types of costs, including the cost of electricity, that manufacturers face.

Research on the relationship between electricity prices and employment seeks to answer two fundamental and related questions. First, will the demand for labor go up or down as electricity prices rise? Theory does not provide an unambiguous answer to this question. Let me illustrate the point using manufacturing as an example for specificity. Higher electricity prices raise the cost of producing manufactured goods. This in turn reduces demand for those goods. As demand falls, there is less need for all inputs into manufacturing, including labor. But there is a potentially offsetting effect on labor used in manufacturing. The higher price of electricity makes the use of other inputs in production (including labor) more attractive.[3] Whether the demand for labor in the manufacturing sector goes up or down cannot be determined on the basis of economic theory alone. This observation is true for all economic sectors and the response of employment to higher electricity prices can differ across industries.[4]

Second, how strong is the relationship between electricity prices and employment levels? In other words, do employment levels react substantially to changes in electricity prices, or do they change little, if at all? Economists express the strength of this relationship using a concept known as *elasticity*. (See Box 1.) The larger the elasticity (in absolute value), the more responsive employment levels are to changes in electricity prices.

[2] For example, see average retail electricity prices provided by the U.S. Energy Information Administration (EIA), available online at http://www.eia.gov/cneaf/electricity/page/sales_revenue.xls.

[3] For example, businesses might use workers to perform some tasks that would otherwise require electricity powered equipment.

[4] Economists going back to Harberger (1962) have decomposed input price impacts such as increased energy costs in production into two components. The *substitution effect* measures the extent to which a price increase for one factor of production (e.g. energy) induces a shift towards other factors (such as labor) holding overall production constant. In addition, the higher production costs may lead to higher prices for the good under consideration leading to a decline in demand for that good. The decline in demand means reduced demand for all inputs in production (including labor). This is known as the *output effect*. In the statistical analysis described in this report, both effects are taken into account when considering how employment is affected by an increase in electricity prices.

Studies seek to answer these questions using a standard set of economic tools. Many studies – including this one – rely on a statistical technique called *regression analysis* to estimate the historical relationships between electricity prices and employment levels. These studies typically gather multiple years of data on average electricity prices and employment and then use variation in electricity prices over time and across states to estimate the effect that higher prices have on employment, taking into account other factors that may influence both electricity prices and employment.

Exhibit 1 summarizes a selection of recent studies examining this issue. Some of the studies in Exhibit 1 focus on employment in the manufacturing sector and/or specific industries, while other studies estimate employment impacts across the entire economy. Most of the studies in Exhibit 1 analyze years of data from across the United States using regression analysis.

The results of the studies summarized in Exhibit 1 are consistent: higher electricity prices are associated with job losses. Those studies that examine the U.S. economy as a whole find that higher electricity prices are associated with modest to sizable job losses.[5] Specifically, these studies find elasticities between -0.0045 and -0.363 – meaning that a 1 percent increase in the price of electricity is associated with a decline in employment of between 0.0045 percent and 0.363 percent.

Box 1. Elasticity

The elasticity of employment with respect to electricity prices measures the percentage change in employment associated with a one percent increase in the price of electricity. An elasticity of -0.3, for example, means that a one percent increase in the price of electricity is associated with a 0.3 percent decline in employment.

A positive elasticity indicates the demand for labor will go up as electricity prices rise. This would occur if the shift from higher-priced electricity into labor in the production process more than outweighed the fall in overall production due to higher electricity prices. A negative elasticity indicates that demand for labor falls as electricity prices rise. A larger elasticity (that is, an elasticity further away from zero) indicates that employment is more responsive to changes in electricity prices.

For small percentage changes in electricity prices, the change in employment can be scaled up or down proportionally. For example, if the elasticity is measured to be -0.3, it is reasonable to infer that a 2 percent increase in the price of electricity is associated with a 0.6 percent decline in employment.

The studies summarized in Exhibit 1 also demonstrate that elasticities are higher in economic sectors that are more energy intensive. In other words, industries that use more electricity per dollar value of production may be expected to be more sensitive to electricity prices. Research summarized in Exhibit 1 confirms this.

While there is some variation in the estimates of the relationship between electricity prices and jobs, none of the studies summarized in Exhibit 1 find that higher electricity prices lead to overall job

5 Hamilton and Robison (2006); Garen, Jepsen, and Saunoris (2011); and Deschênes (2012).

gains.[6] In other words, the recent economic literature suggests that higher electricity prices appear to cause a fall in the demand for labor.

I understand that the Missouri legislature is currently debating a bill that would allow electric utilities to levy a surcharge to support infrastructure projects. All else equal, a higher surcharge would raise electricity prices in the state. My goal in this report is to replicate the type of analyses used in many of the studies summarized in Exhibit 1 to estimate the impact of a permanent increase in electricity prices on employment in Missouri.

In Section II below, I summarize the data and methods I used in my analysis. In Section III, I describe my results. In Section IV, I summarize my report and offer several conclusions. I provide further technical details in Appendix A.

II. EMPIRICAL APPROACH

A. Data

To conduct my analysis, I collected a variety of economic and demographic data for each of the 48 contiguous U.S. states for each of the years 1990 through 2010, the maximum time period for which all of the necessary data for my analysis were available. My data largely come from three sources: the Energy Information Administration (EIA), the Bureau of Economic Analysis (BEA), and the Census Bureau.

The most important variables in my analysis are employment and electricity price. I collected separate annual employment numbers for each economic sector in the 48 contiguous states from the BEA. I determined annual average electricity prices for each of the 48 states from data obtained from the EIA.[7]

I also collected data on other economic and demographic variables to serve as control variables in my analysis. As I explain in more detail below, control variables (or "covariates") are used to help isolate the specific relationship being examined (electricity prices and jobs, in this case). For example, an important influence on employment levels likely is the general state of the economy. By considering state

6 While some studies summarized in Exhibit 1 (e.g., Deschênes (2012)) find that higher electricity prices are associated with higher employment in some less energy-intensive economic sectors, these effects are small and/or are not statistically significant and are overwhelmed by larger job losses in the remaining sectors. In other words, even these studies find that higher electricity prices are associated with net job losses when all the economic sectors are considered in aggregate.

7 Annual electricity prices, in dollars per kWh, were calculated as the ratio of total electric utilities' revenue over the total kilowatt-hours of electricity consumed in that state and year. This variable was extracted from the State Energy Data System of the EIA, for each of the 48 states for years 1990 to 2010. I adjusted electricity prices for the effects of inflation and converted them into the real 2010 dollars using the Bureau of Labor Statistics (BLS) Consumer Price Index (CPI).

GDP in my analysis, I help to control for this confounding effect. Control variables used in my analysis include the state GDP, the percentage of the population with a bachelor's degree, and the population size.[8]

B. Methods

Like many of the studies summarized in Exhibit 1, I used a technique called *regression analysis* to estimate the relationship between electricity prices and employment. Regression analysis is a powerful tool for identifying relationships among variables in a dataset. Because both electricity prices and employment numbers have changed over time, both within and across states, I can use regression analysis to estimate the average change in employment that occurred when electricity prices went up (or down).

Regression analysis also provides the ability to adjust for other factors that might be associated with both electricity prices and employment. For example, when an economic boom hits a particular state, both electricity prices and employment may increase. In such a scenario, it would be important not to attribute the increase in employment to an increase in electricity prices. Regression analysis allows us to control (i.e., adjust) for the impacts of such confounding effects through the use of covariates. Covariates allow us to assess the effects of electricity prices on employment, holding other relevant factors constant.

The regression analysis I have conducted is similar to that in Patrick (2012), Garen, Jepsen, and Saunoris (2011), and several other studies summarized in Exhibit 1. More specifically, I use regression approaches to estimate elasticities for the top five economic sectors (by number of employees) in Missouri – Government, Health Care and Social Assistance, Retail Trade, Manufacturing, and Accommodation and Food Services, as shown in Figure 1 – as well as a sixth group of all other sectors combined.[9]

I estimate two different regression models, "Model 1" and "Model 2," which I describe in Appendix A. Model 1 is a standard fixed-effects model. Model 2 builds upon Model 1 but also

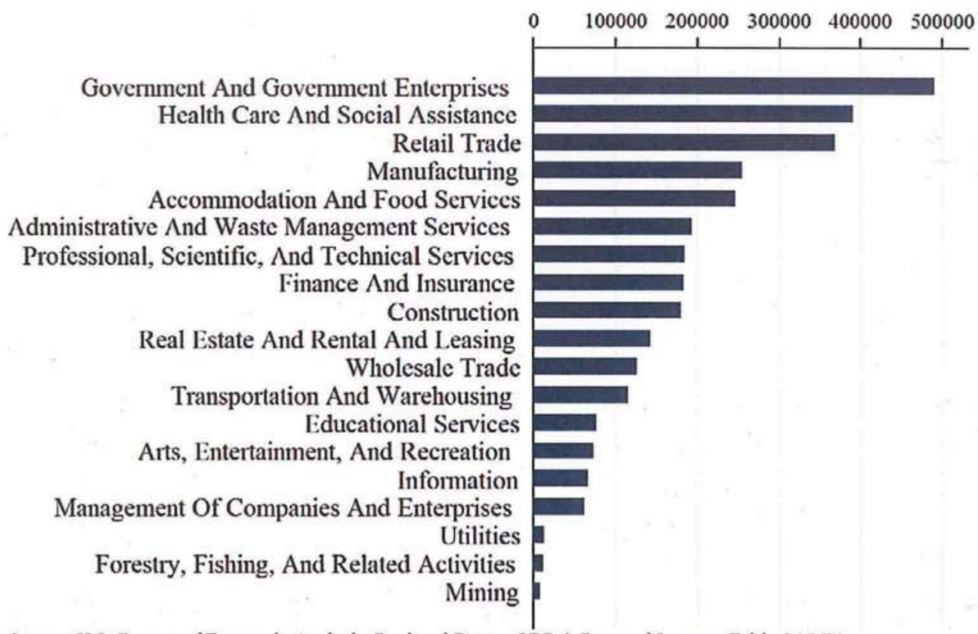
[8] The percentage of the population (age 25 years and older) with a bachelor's degree or higher (collected from the Census Bureau American Community Survey and Current Population Survey) allows me to control for the quality of labor. The state GDP (collected from the BEA) and population size (collected from the Census Bureau) are included to scale the regression to account for differences in size of different states. State GDP also serves as a control for general economic conditions in the state. Finally, since higher employment levels might be associated with lower energy intensities, I also use energy intensity (defined as the ratio of total energy consumption in the state to state GDP) in my analysis. I adjusted state GDP values for the effects of inflation just as I adjusted electricity prices (described above). I also tested but ultimately decided not to include labor force unionization and climate index (defined as the sum of heating degree days and cooling degree days) as control variables in my regressions. The effects of these variables were either small or statistically insignificant, and including them did not materially affect the estimated elasticity of employment with respect to energy prices.

[9] I used the North American Industry Classification System (NAICS) codes to identify economic sectors. Government is NAICS code 92. Health Care and Social Assistance is NAICS code 62. Retail Trade is NAICS codes 44 and 45. Manufacturing is NAICS codes 31, 32, and 33. Accommodation and Food Services is NAICS code 72.

introduces a partial-adjustment mechanism that allows me to estimate both the short-run as well as the long-run elasticity in each sector. "Short run" is the time horizon within which businesses have difficulty changing their electricity consumption in response to changes in electricity prices. In this report, the short run is within the same year. "Long run" is the time horizon long enough for businesses to adjust their behavior in response to changes in electricity prices. For example, they may implement energy efficiency measures to lower electricity consumption; substitute electricity with alternative energy sources; or, in the extreme case, shut down production or relocate to areas with lower electricity costs.[10]

Using both Model 1 and Model 2, I estimate elasticities for both the United States as a whole and for Missouri specifically.[11] Throughout my analysis, as explained above, I control for important economic and demographic phenomena that may also affect employment. Appendix A provides the technical details of my approach.

Figure 1. Missouri Employment by Economic Sector, 2010

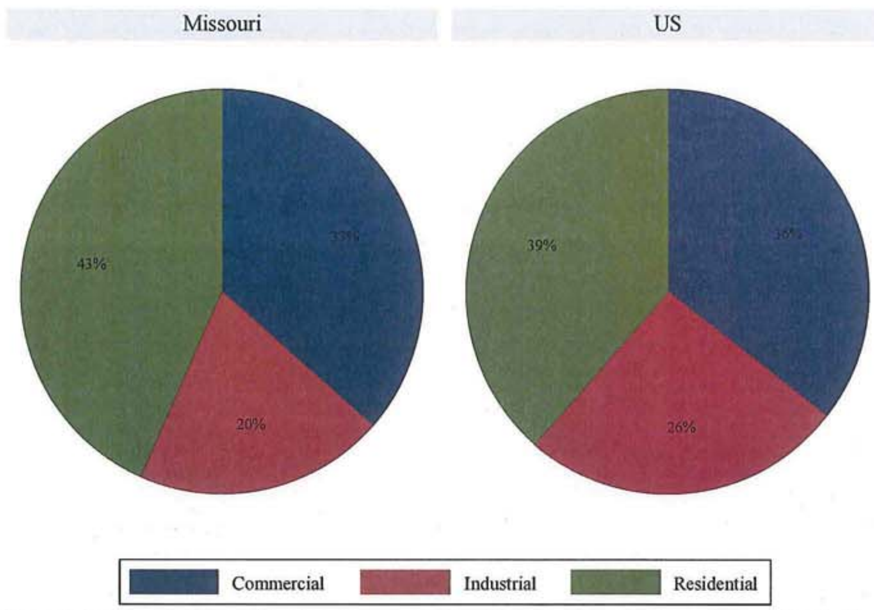


Source: U.S. Bureau of Economic Analysis, Regional Data – GDP & Personal Income, Table SA25N accessed at http://bea.gov/iTable/index_regional.cfm

10 Given this flexibility in the long term that is not available to businesses in the short term, I would expect the elasticities I estimate to be larger in magnitude in the long term than in the short term. As shown below, this is what I find in my analysis.

11 I note that electricity consumption by economic sector in Missouri closely approximates that of the United States as a whole. See Figure 2.

Figure 2. Electricity Consumption by Economic Sector, Missouri vs. the United States, 2010



Source: U.S. Energy Information Administration – State Energy Data System, accessed at www.eia.gov/state/seds

III. RESULTS

The results of my analysis are consistent with those found in the literature and summarized in Exhibit 1: higher electricity prices are associated with lower employment, across the economy generally and particularly within the manufacturing sector. My results are consistent across different regression models and are statistically precise, meaning the results are unlikely to be due to randomness in the data. In other words, the effects I see appear to be real.

In Table 1 below, I summarize the results of my analysis. Not surprisingly, I find that elasticities vary across economic sectors.[12] For example, the employment elasticity in the Manufacturing sector is consistently higher (in absolute value) than the corresponding elasticity in Food and Accommodations or

[12] I also estimated total employment elasticities for the 48 contiguous states as a whole, as well as for Missouri specifically. I found these to be between -0.005 and -0.016 for the 48 states and between -0.064 and -0.188 for Missouri specifically (results not shown). However, not differentiating among economic sectors obscures important variation across industries; as discussed above, industries that are heavy consumers of electricity could reasonably be expected to react differently to changes in electricity prices compared to industries for which electricity prices are not as important. Indeed, the sector-specific results I obtain demonstrate this to be the case. Total employment elasticities therefore become less useful, because one cannot confidently apply these to a specific sector. Hence, my main focus in this report is the analysis which considers the relevant economic sectors separately.

Government. More specifically, I estimate the Missouri-specific elasticity in the Manufacturing sector to be between -0.495 (in the short run) and -3.177 (in the long run). This means that, on average in the time period I studied, a one percent increase in electricity prices in Missouri was associated with a decrease in employment of between 0.495 percent and 3.177 percent. For the Government sector (which presumably is less dependent on energy), I find that the Missouri-specific elasticity to be between -0.182 (in the short run) and -0.340 (in the long run).

The elasticities are precisely estimated for the most part. All of the elasticities estimated in Model 1 for Missouri have p-values of at most 0.05, meaning there is less than a five percent probability that we are estimating a negative elasticity when the true elasticity is zero. Most of the estimates from Model 1, in fact, have p-values of 0.01 or less. For Model 2, I cannot reject the possibility that the true elasticity is zero for Retail Trade, Health Care and Social Assistance, and Other Sectors at a reasonable level. Exhibits 2 and 3 indicate the level of statistical precision for each of the elasticity estimates.

Table 1. Estimated Elasticities of Employment with Respect to Electricity Prices

	Missouri Elasticity		
	Model 1	Model 2	
Sector		Short Run	Long Run
Manufacturing	-0.591	-0.495	-3.177
Retail Trade	-0.420	-0.078	-0.619
Health Care and Social Assistance	-0.049	0.034	0.109
Food and Accommodation	-0.131	-0.160	-1.528
Government	-0.146	-0.182	-0.340
Other Sectors	-0.107	-0.115	-0.243

I used my estimated elasticities to calculate the expected effects of an increase in electricity prices on employment in Missouri. Table 2 shows the results for various permanent hypothetical increases in electricity prices. (Exhibit 4 provides more details.) To generate these estimates, I used the Missouri-specific elasticities shown in Table 1. I find that most sectors (except perhaps Health Care and Social Assistance) would be expected to lose thousands of jobs under such a scenario. Focusing on the Fixed Effect regressions (Model 1), across the Missouri economy, I estimate that a permanent 10 percent increase in electricity prices would be associated with losses of over 61,000 jobs (approximately 1.8 percent of the Missouri workforce in 2010). The partial adjustment model (Model 2) suggests an even larger impact in the long run with a potential loss of 195,000 jobs in the adjustment to a new long-run equilibrium. I also report estimated job losses for larger price increases in Table 2 but note that one should not put too much stock in the specific estimate for very large price changes given the risk of predicting too far out of sample. Suffice it to say, however, that job losses are likely to be larger the larger the increase in the price of electricity.

Table 2. Estimated Effects on Missouri Employment of a Permanent 5, 10, 15, 20, or 25 Percent Increase in Electricity Prices

	Model 1				
	% Change in Electricity Price				
Sector	**5%**	**10%**	**15%**	**20%**	**25%**
Manufacturing	-7,523	-15,046	-22,569	-30,092	-37,614
Retail Trade	-7,734	-15,469	-23,203	-30,937	-38,671
Health Care and Social Assistance	-967	-1,934	-2,901	-3,868	-4,835
Food and Accommodation	-1,616	-3,232	-4,848	-6,464	-8,080
Government	-3,579	-7,159	-10,738	-14,318	-17,897
Other Sectors	-9,252	-18,505	-27,757	-37,010	-46,262
Total	**-30,672**	**-61,344**	**-92,017**	**-122,689**	**-153,361**
	Model 2, Short Run				
	% Change in Electricity Price				
Sector	**5%**	**10%**	**15%**	**20%**	**25%**
Manufacturing	-6,300	-12,600	-18,899	-25,199	-31,499
Retail Trade	-1,436	-2,871	-4,307	-5,742	-7,178
Health Care and Social Assistance	662	1,325	1,987	2,649	3,312
Food and Accommodation	-1,977	-3,955	-5,932	-7,910	-9,887
Government	-4,476	-8,951	-13,427	-17,902	-22,378
Other Sectors	-9,897	-19,794	-29,691	-39,588	-49,485
Total	**-23,423**	**-46,846**	**-70,269**	**-93,692**	**-117,115**
	Model 2, Long Run				
	% Change in Electricity Price				
Sector	**5%**	**10%**	**15%**	**20%**	**25%**
Manufacturing	-40,416	-80,832	-121,249	-161,665	-202,081
Retail Trade	-11,392	-22,783	-34,175	-45,566	-56,958
Health Care and Social Assistance	2,127	4,253	6,380	8,506	10,633
Food and Accommodation	-18,841	-37,681	-56,522	-75,363	-94,203
Government	-8,343	-16,687	-25,030	-33,373	-41,717
Other Sectors	-20,989	-41,977	-62,966	-83,955	-104,944
Total	**-97,854**	**-195,708**	**-293,562**	**-391,416**	**-489,270**

IV. CONCLUSIONS

Recent research on the relationship between electricity prices and employment demonstrates that higher electricity prices are associated with job losses, particularly in economic sectors that are energy intensive. The results of my analysis confirm these findings. The direct implication of my analysis is that an increase in electricity prices as a result of an infrastructure surcharge in Missouri would be expected to result in statewide job losses. For example, as shown in Table 2 and focusing on Model 1, my regression analysis indicates that a permanent ten percent increase in electricity prices would be expected to result in losses of over 61,000 jobs. This may be a conservative estimate. Assuming a partial adjustment process (Model 2) suggests even larger losses in the adjustment to a new equilibrium. These job losses would be concentrated most heavily in the manufacturing sector, although job losses would be spread throughout the Missouri economy.

APPENDIX A – METHODOLOGICAL DETAILS

Model 1 – Fixed Effects Model

I used a fixed effects model to study the effect of changes in the real price of electricity from 1990 to 2010 on employment in the top five economic sectors in Missouri (manufacturing, retail trade, food and accommodation, health care and social assistance, and government) as well as a sixth group of all other sectors combined.

The fixed effects model can be generally written as $Y_{it} = \beta_0 + \sum_j \beta_j X_{jit} + \alpha_i + \varepsilon_{it}$, where Y_{it} is the employment by industry, in state i and year t; β_0 is the constant intercept across all states; X is a vector of controls (i.e., electricity prices, population, GDP, and energy intensity) affecting state-level employment; α_i is the time-invariant state fixed effect; and ε_{it} is the random disturbance term. The state fixed effects can be interpreted as any unmeasured characteristic of a given state that leads the state to have a particular level of employment that does not vary over time. I also included state specific time trends to allow for employment trends to vary across states in ways unrelated to the vector of controls in the regression.

I converted the dependent variable Y_{it} and the control variables X to their natural logarithms, so the resulting coefficients β_j may be simply interpreted as elasticities, i.e., the percentage change in the dependent variable given a percentage change in one of the independent variables. To obtain Missouri-specific price elasticities, I added to the regression the interaction of the electricity price with a binary variable equal to one if the state is Missouri.

Results of the estimation are presented in Exhibit 2. Note that I estimated several variations on this model. For example, I tested the results using data from all 50 U.S. states and the District of Columbia. I also ran regressions in which I employed industrial, commercial, or industrial and commercial electricity prices (rather than electricity prices determined by dividing total electric utilities' revenue by total kilowatt-hours of electricity consumed in that state and year, as described above) depending on which economic sector I was analyzing. These various model runs, though not reported here, showed similar results to those reported here, indicating the estimated elasticities are not sensitive to the choice of sample size or construction of electricity price variables.

Model 2 – Fixed Effects with Partial Adjustment

Next I explored the potential impact of electricity prices on employment in both the short run and the long run since the response to a change in electricity prices may be different in the short run because some factors may be difficult to modify over a short period.

I relied on a partial adjustment model: $Y_{it} - Y_{it-1} = \lambda(Y^* - Y_{it-1})$, where Y^* is the equilibrium level of employment, and parameter λ is a measure of the adjustment process in moving from the desired to actual level of employment. When $\lambda = 1$, there is instantaneous adjustment and when $\lambda = 0$, there is no adjustment.

Solving for Y_{it} we get: $Y_{it} = (1-\lambda)Y_{it-1} + \lambda Y^*$. Assuming that the equilibrium value of employment is a function of electricity prices and other covariates (state GDP, educational attainment, etc.) and is given by $Y^* = \beta_0 + \beta X_{it}$, we get the following: $Y_{it} = \lambda\beta_0 + (1-\lambda)Y_{it-1} + \lambda\beta X_{it} = \alpha + \gamma Y_{it-1} + \delta X_{it}$. In this specification, the short-run elasticities are the coefficients δ, and the long-run elasticities: $\frac{\delta}{1-\gamma}$.

Results comparing the short-run and long-run elasticities are presented in Exhibit 3. These regressions were run using Arellano-Bond estimator. The Arellano-Bond estimator provides consistent (e.g. unbiased in large sample) estimates of the coefficients in regressions with lagged dependent variables and state fixed effects. As with Model 1, I estimated several variations on this model and found the results to be robust to model specification.

Calculations of Changes in Employment

I used my estimated elasticities from Models 1 and 2 to calculate the expected employment effects in each of the manufacturing sectors given different permanent increases in the price of electricity. The calculation was straightforward: for each sector in each state, I multiplied the elasticity estimate by the assumed percent change in electricity prices by the number of employees in that sector in 2010. Results are presented in Exhibit 4.

APPENDIX B – REFERENCES

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Exhibit 1. Selected Studies of the Relationship Between Electricity Prices and Employment in the United States

Study	Purpose	Methodology	Relevant Findings
"Economic Impacts from Rate Increases to Non-DSI Federal Power Customers Resulting from Concessional Rates to the DSIs" Joel R. Hamilton and M. Henry Robison Hamilton Water Economics and Economic Modeling Specialists Inc. May 31, 2006	To estimate the impacts on employment and value added of an electricity rate increase on certain electricity customers in the Pacific Northwest.	Input-output model of the U.S. economy.	An electricity rate increase of 1 percent is expected to result in job losses of 0.0045 percent in the short term and 0.0057 percent in the long term across the regional economy in the Pacific Northwest.
"The Competitiveness Impacts of Climate Change Mitigation Policies" Joseph E. Aldy and William A. Pizer Pew Center on Global Climate Change May 2009	To estimate the relationship between electricity prices and production, consumption, and employment in over 400 manufacturing industries.	Regression-based methodology. Data from 1986 to 1994 from the U.S. manufacturing sector.	Higher electricity prices are associated with lower employment in more energy-intensive industries. A 1 percent increase in electricity prices is associated with reduction in employment of approximately 0.3 percent in primary aluminum production and select other industries. No discernible relationship between electricity prices and employment for the manufacturing sector as a whole.
"How Do Energy Prices, and Labor and Environmental Regulations Affect Local Manufacturing Employment Dynamics? A Regression Discontinuity Approach" Matthew E. Kahn and Erin T. Mansur NBER Working Paper 16538 November 2010	To estimate how electricity prices, labor regulations, and environmental regulations affect employment in different manufacturing sectors.	Regression-based methodology. Data from 1998 to 2006 from the U.S. manufacturing sector.	Based on the main regression model, an increase in the electricity price of 1.1 cents per kWh (from a hypothetical carbon tax of $15 per ton) would result in 4,133 jobs lost in Missouri. Updated estimates of job losses may be higher based on revised analysis (see below).

Exhibit 1. Selected Studies of the Relationship Between Electricity Prices and Employment in the United States

Study	Purpose	Methodology	Relevant Findings
"The Relationship Between Electricity Prices and Electricity Demand, Economic Growth, and Employment" John Garen, Christopher Jepsen, and James Saunoris Center for Business and Economic Research Department of Economics University of Kentucky October 19, 2011	To estimate the effects of increased electricity prices on the demand for electricity, Gross State Product (GSP), and employment in Kentucky.	Regression-based methodology. Data from 1970 to 2010 from all sectors of the U.S. economy.	A permanent electricity price increase of 1 percent is expected to reduce employment by 0.012 percent in the short term and 0.363 percent in the long term.
"The Vulnerability of Kentucky's Manufacturing Economy to Increasing Electricity Prices" Aron Patrick Kentucky Energy and Environment Cabinet, Department for Energy Development and Independence October 2012	To estimate the relationship between electricity prices and employment in five sectors important to the economy of Kentucky.	Regression-based methodology. Data from 1990 to 2010 from five sectors (manufacturing, retail services, hospitality, health care, and government) across the United States.	Higher electricity prices are associated with lower employment in the manufacturing, retail services, and hospitality sectors. A 1 percent increase in electricity prices is associated with a decline in employment of 0.337 percent in the manufacturing sector, 0.157 percent in the retail services sector, and 0.142 percent in the hospitality sector. No discernible relationship between electricity prices and employment in the health care and government sectors.
"The Economic Impact of Missouri's Renewable Energy Standard" David G. Tuerck, Paul Bachman, and Michael Head The Beacon Hill Institute at Suffolk University November 2012	To estimate the possible impact of Missouri's Renewable Energy Standard on electricity prices and employment in the state.	A customized "computable general equilibrium" model of state economies calibrated with economic data, parameters from the literature, and professional judgment.	Generally, a 1 percent increase in electricity prices is expected to result in a 0.022 percent decrease in state-wide employment in the long-term. Specifically, an electricity price increase of 1.27 cents per kWh starting in 2012 is expected to result in 6,065 lost jobs in 2021 in Missouri.

Exhibit 1. Selected Studies of the Relationship Between Electricity Prices and Employment in the United States

Study	Purpose	Methodology	Relevant Findings
"Climate Policy and Labor Markets" Olivier Deschênes Chapter 2 in *The Design and Implementation of US Climate Policy*, Don Fullerton and Catherine Wolfram, Editors, The Univerisity of Chicago Press 2012	To estimate the relationship between electricity prices and economy-wide employment.	Regression-based methodology. Data from 1976 to 2007 from all sectors of the U.S. economy.	Higher electricity prices lead to reductions in employment overall. A 1 percent increase in electricity prices leads to a decline in FTE employment of between 0.10 and 0.16 percent. Higher electricity prices lead to reductions in employment in most industries, with the greatest effects in the agriculture and transportation industries.
"Do Local Energy Prices and Regulation Affect the Geographic Concentration of Employment?" Matthew E. Kahn and Erin T. Mansur Working Paper January 14, 2013	To estimate how electricity prices, labor regulations, and environmental regulations affect employment in different manufacturing sectors. Update of Kahn and Mansur (2010). See above.	Regression-based methodology. Data from 1998 to 2009 from the U.S. manufacturing sector.	Higher electricity prices are associated with lower employment in 18 of 21 manufacturing industries. The largest negative relationship between electricity prices and employment is in primary metals manufacturing. Based on the main regression model, a 1 percent increase in electricity prices is associated with a decline of 2.17 percent in employment in primary metals manufacturing. Across all manufacturing industries, a 1 percent increase in electricity prices is associated with 0.204 percent decline in employment, and the association is only weakly significant statistically.

Exhibit 2. Models of Electricity Prices and Employment by Economic Sector: Fixed-Effects Model

	Manufacturing	Retail Trade	Health Care and Social Assistance	Food and Accommodation	Government	Other Sectors
Variable (Log)	coef/se	coef/se	coef/se	coef/se	coef/se	coef/se
Electricity Price	**-0.455*****	**-0.283*****	**-0.094*****	**-0.144*****	**-0.016**	**-0.056**
	(0.050)	(0.031)	(0.020)	(0.037)	(0.013)	(0.039)
MO=1 x Electricity Price	**-0.136****	**-0.137*****	**0.044****	**0.013**	**-0.129*****	**-0.051****
	(0.055)	(0.029)	(0.022)	(0.037)	(0.013)	(0.025)
Population with Bachelor Degree	-0.019	0.024	-0.002	0.038	0.018*	-0.022
	(0.043)	(0.026)	(0.015)	(0.032)	(0.010)	(0.015)
State GDP	0.157***	0.129***	0.255***	0.018***	0.273***	0.399***
	(0.040)	(0.020)	(0.038)	(0.005)	(0.035)	(0.061)
Population	0.911**	0.741***	-0.040	1.165***	0.571***	0.581***
	(0.431)	(0.206)	(0.167)	(0.204)	(0.086)	(0.141)
Energy Intensity	-0.123	-0.163***	-0.010	-0.064	0.003	0.064
	(0.083)	(0.052)	(0.042)	(0.059)	(0.028)	(0.039)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State-Specific Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
N	1,007	1,008	1,008	1,007	1,008	1,008
r2	0.863	0.872	0.988	0.952	0.971	0.976
National-Level Elasticities	**-0.455*****	**-0.283*****	**-0.094*****	**-0.144*****	**-0.016**	**-0.056**
Missouri-Specific Elasticities	**-0.591*****	**-0.420*****	**-0.049*****	**-0.131*****	**-0.146*****	**-0.107****

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes:
[A] Data are for the contiguous 48 states, from 1990 to 2010.
[B] Standard errors of Missouri-specific elasticities are obtained using delta method.

Exhibit 3. Models of Electricity Prices and Employment by Economic Sector: Fixed-Effects Model
Short-Run vs. Long-Run Elasticities

	Manufacturing	Retail Trade	Health Care and Social Assistance	Food and Accommodation	Government	Other Sectors
Variable (Log)	**coef/se**	**coef/se**	**coef/se**	**coef/se**	**coef/se**	**coef/se**
Electricity Price	**-0.126*****	**-0.105*****	**-0.026*****	**-0.131*****	**-0.015*****	**-0.008**
	(0.016)	(0.009)	(0.006)	(0.011)	(0.004)	(0.009)
MO=1 x Electricity Price	**-0.369****	**0.027**	**0.060**	**-0.029**	**-0.167*****	**-0.106**
	(0.151)	(0.084)	(0.058)	(0.088)	(0.038)	(0.079)
Lag of Employment	0.844***	0.874***	0.689***	0.895***	0.464***	0.528***
	(0.020)	(0.019)	(0.022)	(0.024)	(0.029)	(0.022)
Population with Bachelor Degree	-0.082***	-0.038***	-0.020***	0.004	-0.005	-0.045***
	(0.019)	(0.011)	(0.008)	(0.014)	(0.005)	(0.010)
State GDP	0.158***	0.192***	0.106***	-0.012***	0.105***	0.388***
	(0.010)	(0.010)	(0.014)	(0.002)	(0.013)	(0.016)
Population	-0.412***	-0.244***	0.017	0.069	0.473***	-0.123**
	(0.102)	(0.060)	(0.043)	(0.073)	(0.034)	(0.058)
Energy Intensity	-0.023	-0.050***	-0.007	-0.119***	-0.023***	0.098***
	(0.031)	(0.018)	(0.012)	(0.022)	(0.009)	(0.020)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State-Specific Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
N	909	912	912	909	912	912
National-Level Elasticities						
Short-Run Elasticity	**-0.126*****	**-0.105*****	**-0.026*****	**-0.131*****	**-0.015*****	**-0.008**
Long-Run Elasticity	**-0.808*****	**-0.835*****	**-0.083*****	**-1.253*****	**-0.029*****	**-0.017**
Missouri-Specific Elasticities						
Short-Run Elasticity	**-0.495*****	**-0.078**	**0.034**	**-0.160***	**-0.182*****	**-0.115**
Long-Run Elasticity	**-3.177*****	**-0.619**	**0.109**	**-1.528***	**-0.340*****	**-0.243**

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes:
[A] Data are for the contiguous 48 states, from 1990 to 2010.
[B] Regressions with lagged dependent variable are run using Arellano-Bond estimator.
[C] Standard errors of Missouri-specific and long-run elasticities are obtained using delta method.

Exhibit 4. Resulting Job Losses by Economic Sector

Manufacturing

	Elasticity of Employment with Respect to Electricity Price	Number of Employees in 2010: **254,464** — % Change in Electricity Price 5%	10%	15%	20%	25%
		Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-0.455	-5,794	-11,589	-17,383	-23,178	-28,972
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-0.591	-7,523	-15,046	-22,569	-30,092	-37,614
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level						
Short-Run	-0.126	-1,602	-3,203	-4,805	-6,407	-8,008
Long-Run	-0.808	-10,275	-20,550	-30,826	-41,101	-51,376
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific						
Short-Run	-0.495	-6,300	-12,600	-18,899	-25,199	-31,499
Long-Run	-3.177	-40,416	-80,832	-121,249	-161,665	-202,081

Retail Trade

	Elasticity of Employment with Respect to Electricity Price	Number of Employees in 2010: **368,284** — % Change in Electricity Price 5%	10%	15%	20%	25%
		Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-0.283	-5,210	-10,421	-15,631	-20,842	-26,052
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-0.420	-7,734	-15,469	-23,203	-30,937	-38,671
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level						
Short-Run	-0.105	-1,938	-3,877	-5,815	-7,754	-9,692
Long-Run	-0.835	-15,383	-30,766	-46,149	-61,532	-76,915
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific						
Short-Run	-0.078	-1,436	-2,871	-4,307	-5,742	-7,178
Long-Run	-0.619	-11,392	-22,783	-34,175	-45,566	-56,958

Health Care & Social Assistance

	Elasticity of Employment with Respect to Electricity Price	Number of Employees in 2010: **390,950** — % Change in Electricity Price 5%	10%	15%	20%	25%
		Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-0.094	-1,834	-3,667	-5,501	-7,334	-9,168
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-0.049	-967	-1,934	-2,901	-3,868	-4,835
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level						
Short-Run	-0.026	-506	-1,012	-1,518	-2,024	-2,530
Long-Run	-0.083	-1,624	-3,249	-4,873	-6,497	-8,122
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific						
Short-Run	0.034	662	1,325	1,987	2,649	3,312
Long-Run	0.109	2,127	4,253	6,380	8,506	10,633

Food & Accommodation

	Elasticity of Employment with Respect to Electricity Price	Number of Employees in 2010: **246,626** — % Change in Electricity Price 5%	10%	15%	20%	25%
		Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-0.144	-1,777	-3,553	-5,330	-7,107	-8,884
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-0.131	-1,616	-3,232	-4,848	-6,464	-8,080
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level						
Short-Run	-0.131	-1,621	-3,242	-4,864	-6,485	-8,106
Long-Run	-1.253	-15,447	-30,894	-46,341	-61,787	-77,234
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific						
Short-Run	-0.160	-1,977	-3,955	-5,932	-7,910	-9,887
Long-Run	-1.528	-18,841	-37,681	-56,522	-75,363	-94,203

Exhibit 4. Resulting Job Losses by Economic Sector, continued

Government

Number of Employees in 2010: 490,751

	Elasticity of Employment with Respect to Electricity Price	5%	10%	15%	20%	25%
		Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-0.016	-404	-808	-1,213	-1,617	-2,021
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-0.146	-3,579	-7,159	-10,738	-14,318	-17,897
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level						
Short-Run	-0.015	-376	-753	-1,129	-1,506	-1,882
Long-Run	-0.029	-702	-1,403	-2,105	-2,807	-3,508
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific						
Short-Run	-0.182	-4,476	-8,951	-13,427	-17,902	-22,378
Long-Run	-0.340	-8,343	-16,687	-25,030	-33,373	-41,717

Other Sectors

Number of Employees in 2010: 1,727,391

	Elasticity of Employment with Respect to Electricity Price	5%	10%	15%	20%	25%
		Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-0.056	-4,842	-9,685	-14,527	-19,369	-24,212
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-0.107	-9,252	-18,505	-27,757	-37,010	-46,262
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level						
Short-Run	-0.008	-712	-1,424	-2,136	-2,848	-3,561
Long-Run	-0.017	-1,510	-3,020	-4,531	-6,041	-7,551
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific						
Short-Run	-0.115	-9,897	-19,794	-29,691	-39,588	-49,485
Long-Run	-0.243	-20,989	-41,977	-62,966	-83,955	-104,944

Total Economy

Number of Employees in 2010: 3,478,466

	5%	10%	15%	20%	25%
	Estimated Employment Loss				
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level	-19,862	-39,724	-59,585	-79,447	-99,309
Estimates from Exhibit 2. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific	-30,672	-61,344	-92,017	-122,689	-153,361
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, national-level					
Short-Run	-6,756	-13,512	-20,267	-27,023	-33,779
Long-Run	-44,941	-89,882	-134,823	-179,765	-224,706
Estimates from Exhibit 3. Fixed-Effects Model with Missouri Dummy Interacted with Electricity Price, Missouri-specific					
Short-Run	-23,423	-46,846	-70,269	-93,692	-117,115
Long-Run	-97,854	-195,708	-293,562	-391,416	-489,270

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of a Working Case to	)	
Address Legislative Concerns Regarding	)	Case No. EW-2013-0425
Proposals to Modify Ratemaking	)	
Procedures for Electric Utilities	)	

AFFIDAVIT OF GILBERT E. METCALF

STATE OF MASSACHUSETTS)
) ss
COUNTY OF MIDDLESEX)

Gilbert E. Metcalf, being first duly sworn on his oath, states:

1. My name is Gilbert E. Metcalf. I am a Professor of Economics at Tufts University. My business address is Department of Economics, Braker Hall, Tufts University, Medford, MA 02155.

2. Attached hereto and made a part hereof for all purposes is my report entitled The Relationship Between Electricity Prices and Jobs in Missouri, consisting of twenty-one (21) pages, for comment in the above-captioned case.

3. I have knowledge of the matters set forth therein. I hereby swear and affirm that the information contained in the attached report is true and accurate to the best of my knowledge, information and belief.

Gilbert E. Metcalf

Subscribed and sworn before me this 29th day of March, 2013.

Notary Public

My commission expires: 7/16/15

NORMA J. McEVOY
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
July 16, 2015

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