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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO.: ER-2010-0356

REBUTTAL TESTIMONY

OF

GARY L. GOBLE

ON BEHALF OF

KCP&L GREATER MISSOURI OPERATIONS COMPANY

Kansas City, Missouri
December 2010

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REBUTTAL TESTIMONY

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I. INTRODUCTION OF WITNESS AND PURPOSE OF TESTIMONY

Q: Please state your name, occupation and business address.

A: My name is Gary L. Goble. I am a Managing Consultant with the firm of Management Applications Consulting, Inc. ("MAC"). MAC's primary offices are located at 1103 Rocky Drive, Suite 201, Reading, PA 19609. My business address is 11405 Cezanne Street, Austin, TX 78726.

Q: On whose behalf are you testifying and what is the purpose of your Rebuttal Testimony?

A: I am testifying on behalf of KCP&L Greater Missouri Operations Company ("GMO" or "Company"). The purpose of my Rebuttal Testimony is to respond to proposals made by Mr. John Reed testifying on behalf of Missouri Gas Energy ("MGE") relating to electric to gas substitution (also referred to as "fuel switching").

Q: Please describe your qualifications and experience.

A: I am a consultant with over 36 years of experience in regulatory matters. I have an undergraduate degree (BSPA) from the University of Arkansas at Fayetteville, Arkansas, and a graduate degree (MBA) from St. Edward's University in Austin, Texas. I have worked as a staff analyst for two regulatory commissions and as a consultant to natural gas utilities, electric utilities, municipalities, electric cooperatives, and industrial consumers. I have provided expert testimony before

state and local regulatory agencies and boards on numerous occasions. The primary focus of my work experience has been in the areas of cost analysis, pricing, and economic analysis. My qualifications and experience are provided in greater detail in Schedule GLG-1.

II. SUMMARY OF REBUTTAL ISSUES

Q: What issues are addressed in your Rebuttal Testimony?

A: My Rebuttal Testimony addresses issues related to MGE's proposed electric to gas substitution payments to consumers for the purpose of influencing electric customers to switch to using natural gas water heaters and space heaters rather than electric appliances. My Rebuttal Testimony provides the following:

1. A discussion and assessment of the policy goals of electric to natural gas substitution. MGE's proposal involves changes to the existing energy supply market, end use appliance market, and GMO energy efficiency ("EE"), demand side management ("DSM") and Demand Response ("DR") activities. A number of problems will potentially arise if the Commission adopts MGE's proposed electric to gas substitution program. These problems may be substantial and will require a careful examination of the effects of electric to gas substitution upon costs faced by end-use consumers.
2. An examination of the methods for assessing EE, DSM and DR impacts upon program participants, other ratepayers, the environment, and upon all societal resources.

3. A critical review of methods for assessing EE, DSM and DR impacts. There are a number of recognized measures of energy efficiency impacts. Site specific methods address decisions consumers face once they have made their choice of whether to use electricity or natural gas. Societal test measures attempt to incorporate the total costs from the point of fuel extraction to the use of energy at the end-use site. Other evaluation methods examine the impact of a given program upon other ratepayers of the utility. Environmental costs not already taken into account by market prices of fuel costs may be measured in an evaluation of environmental impact.
4. An examination of other miscellaneous issues related to the proposal. These other issues include economic and miscellaneous issues.

Q: Do you recommend that MGE's proposal for electric to gas substitution incentives to be paid for by GMO should be approved?

A: No, I do not. I recommend that the proposal be rejected in the current docket. As described in my Rebuttal Testimony below, MGE's proposal seeks to employ regulatory mandates to achieve a greater market saturation of natural gas using appliances rather than relying upon market interactions and consumers' economic preferences. MGE's proposal will result in GMO failing to recover the fixed costs associated with the lost revenues of customers switching. Moreover, I believe that MGE's analyses are flawed, do not reflect accurate information, and provide results that are not credible. Finally, MGE's proposal would seriously undermine EE, DSM and DR programs that have previously been shown to be beneficial to

all parties and would stifle development and implementation of additional EE, DSM and DR program activity.

III. POLICY ISSUES RELATED TO ELECTRIC TO GAS SUBSTITUTION

Q: In your opinion, would it be appropriate for the Missouri Public Service Commission ("MPSC" or "Commission") to first address certain fundamental policy decisions before approving the electric to gas substitution rebates that MGE witness Mr. Reed recommends on page 19, lines 7 through 17?

A: Yes, I believe that Mr. Reed has proposed a fundamental and potentially dramatic shift in regulatory policy that would interfere with market factors affecting electric and natural gas distribution industries. It is reasonable and prudent that regulators should undertake a close and careful examination of the proposed policies and undertake a thorough review of the consequences of MGE's electric to gas substitution proposal.

Q: What policy issues must the MPSC address in adopting Mr. Reed's recommendations?

A: I believe that the MPSC must examine and address the following issues in its consideration of MGE witness Mr. Reed's recommendations:

1. What is the appropriate role of the Missouri Public Service Commission in restructuring the power supply and end use appliance markets?
2. Should the Commission use this proceeding to implement electric to gas substitution?

3. How should the Commission balance social goals with economic efficiency goals?
4. What are the true environmental impacts of electric to gas substitution?
5. Should the Commission adopt policies to address environmental impacts in advance of pending investigations and deliberations currently underway at the national level?
6. Should the Commission address GMO's loss of revenue recovering its fixed costs which would result from electric to gas substitution?
7. Will MGE's proposal that GMO pay customers to switch from electric to natural gas appliances benefit non-participating customers?
8. What impacts will the proposed incentives for electric to gas substitution have upon existing or future energy efficiency, energy conservation, demand side management and demand response activities of GMO?
9. How accurate are the data that must be used to assess the costs and benefits of electric to gas substitution?
10. How have other stakeholders and regulatory agencies addressed electric to gas substitution?

Q: What do you believe is the appropriate role of the Missouri Public Service Commission concerning tariffs that serve to restructure the energy supply market?

A: I am not an attorney. Nor have I reviewed the statutes of the State of Missouri that determine the MPSC's jurisdiction. However, I have broad experience over the course of several decades before numerous regulatory agencies, and, based

upon my experience, it would seem reasonable that the MPSC has the authority to determine whether the programs implemented by a utility are just and reasonable. Similarly, the Commission likely has the authority to consider the potential for fuel switching as it applies to the more general "public interest" standard. Although the Commission likely has broad authority, its authority is not unlimited. In approaching any issue, including fuel-switching, the Commission typically must focus on regulating the companies and avoiding managing the businesses. The Commission is typically authorized to perform the former, while the latter is within the realm of the companies' management and board of directors.

Additionally, the question of whether the Commission should use its authority to supplant the competitive fuel market and to promote one type of energy industry over a competing energy industry is a different matter. In my opinion, the Commission should not use its regulatory authority to skew market behavior, particularly when the actions of that market are beyond the control of the Company and the Commission. The economic justification for regulation is to serve as a substitute for competition in a monopoly market, and, in so doing, make the utility operate and set prices as if it were subject to competitive forces while simultaneously enabling the lower average costs that result from a single supplier of high fixed costs services. I believe that this requires the Commission to allow the market to function in an efficient manner when competition is present. I do not believe that the Commission should reduce competition and pick market winners and losers as MGE's proposal would require.

Q: Is there any guidance available to the Commission that address this topic?

A: Yes, there is. A May 29, 2009 National Regulatory Research Institute ("NRRI") paper "Electric-to-Gas Substitution: What Should Regulators Do?" identified the risks of regulatory intervention in the following manner:

> Regulation has benefits and costs. The benefits are the removal of the economic efficiency losses associated with market defects and customer error. Regulatory failure occurs when there is intervention that is unwarranted, either because markets are performing adequately, because the intervention did not correct a market failure efficiently, or because the cost of regulatory intervention exceeds the benefits. The potential costs of regulatory intervention include: (1) inadvertent subsidies (e.g., improper price signals leading to a resource misallocation); (2) procedural delays and costs, especially those associated with multi-utility integrated resource planning; (3) welfare losses from stakeholders expending dollars and resources in the regulatory process to advance their positions (e.g., "fighting costs" from gas utilities pushing hard for electric-to-gas substitution, counteracted by electric utilities' resistance; and (4) administrative costs (e.g., the enforcement cost of regulatory mandates or targets).[1]

MGE's witness has not demonstrated that regulatory failure has occurred. Nor has he demonstrated that the costs of regulatory intervention outweigh any benefits that are likely to be derived as a result of MPSC market intervention in the manner recommended by Mr. Reed.

Q: Should the Commission use this proceeding to implement electric to gas substitution?

A: No, MGE's electric to gas substitution proposal should be rejected by the Commission. While Mr. Reed makes an argument for immediate action, there are far too many unanswered questions and far too much questionable information to implement fuel substitution in the immediate proceeding. Although a number of

[1] National Regulatory Research Institute "Electric-to-Gas Substitution: What Should Regulators Do?" by Ken Costello, Principal, May 29, 2009, page 13.

other state regulatory commissions have addressed the subject of electric to gas substitution, Mr. Reed fails to mention that most have examined the subject and chosen to reject electric to gas substitution. After a thorough analysis, the Commission may be able to determine whether some sort of electric to gas substitution program has merit. However, to undertake such an analysis, the specific merits of fuel substitution programs in Missouri should first be quantified. When, and only if, the programs are found to be meritorious, should the Commission address the next threshold question regarding how should the programs be implemented. Obviously, MGE could offer fuel switching incentives without any involvement from GMO.

As discussed below, MGE witness Mr. Reed's analyses do not employ the utility specific information necessary to determine whether the costs of the proposed subsidy outweigh its benefits. Furthermore, his analyses understate the costs of natural gas service while overstating the benefits of natural gas service. He has not provided evidence that his proposed level of incentives are necessary nor sufficient. His electric to gas substitution proposal relies upon faulty reasoning and is not supported by evidence. Furthermore, he has not provided compelling evidence to suggest that GMO must offer the necessary customer incentives.

Q: How should the Commission balance social goals with economic efficiency goals?

A: I believe that the Commission should seek to protect and promote informed, unbiased consumer choice of efficiently priced energy. To that end, I believe that

the Commission should seek to implement economically justified goals. Naturally, the Commission can and should examine and consider social goals in its regulatory decisions. But in so doing, the costs of implementing these social goals should also be considered. The economic goal of regulation can, and should, seek to "internalize" social goals such as environmental impact to the extent practicable. For example, in estimating the costs of generating electricity, GMO internalizes environmental impacts by including an estimate of incremental environmental costs in its energy cost forecasts. In estimating the incremental costs of natural gas that might be expected from a fuel switching program, one must impute a value to the cumulative environmental impact of importing pollution from remote generation plant locations to the concentrated urban areas containing many gas-consuming appliances.

Another point to consider is that GMO profitably markets energy available from its coal generating units in order to minimize revenues required from ratepayers. As a result, most electric energy conserved by fuel substitution programs will still be generated and sold. The net effect of the fuel substitution program will not produce a positive environmental impact in Missouri. Quite the contrary, the total impact of the program will have a deleterious effect.

As discussed in the following section of my Rebuttal Testimony, imputing values to external factors beyond the control and direct knowledge of GMO and the Commission is a practice whose results should be carefully and fully scrutinized. Although the costs of pursuing social objectives through the utility ratemaking process are difficult to quantify, they are, nonetheless, real and

significant. MGE has proposed that the Commission tilt the fuels supply market to favor natural gas by making GMO pay its customers to replace their electric appliances with natural gas burning appliances. That recommendation obviously comes at a high cost to GMO and potentially to its ratepayers. While that cost may be difficult to quantify, it should nonetheless be taken into consideration by the Commission in assessing whether the social objectives sought are worth the costs.

Q: What are the true environmental impacts of electric to gas substitution?

A: It is not evident that electric to gas substitution will reduce energy consumption and, thus, carbon dioxide ("CO_2") emissions. Mr. Reed's logic assumes that GMO would simply reduce electric generation if sales to residential customers declined. This is not likely to happen. GMO, like any economically rational utility with regulatory pressures to minimize its revenue requirements, would seek to market available capacity and energy in the wholesale power market. Any sales in such a market would lower the average costs of power to other customers and provide additional earnings to the Company. As long as GMO can sell the freed up capacity and energy at a price greater than its short-run marginal costs, both the Company and its customers will be better off if the capacity and energy can be marketed. Because the avoided energy resulting from electric to gas substitution would be sold to other energy market participants, total CO_2 emissions from GMO's generation resources would be more likely to increase since there would be little or no decrease in electric generation, but there would be added natural gas consumption at the customers' homes.

In addition, although natural gas CO_2 emissions are lower than for the coal generation of electricity, there are additional environmental consequences with the use of natural gas that must be considered. For example, CO_2 emissions that would have occurred at a remotely located generation station will now be imported to the appliance site, i.e., to the residential consumer's home. Although the CO_2 emissions of natural gas are lower than for the coal generation of electricity, none of the electric caused emissions are local while much of the natural gas emissions taken into account occur locally. Just as important, electric generation is a central station technology that allows for cost effective treatment. In past years, a number of technologies have been implemented such as taller smokestacks to disperse emissions more effectively into the higher atmosphere, CO_2, SO_2 and NOx treatments to lower emissions. The consumption of natural gas in a large number of dispersed small appliances makes it impractical to implement subsequent environmental protection strategies.

Furthermore, while Mr. Reed's testimony is quick to point out line losses on electric systems, he is silent concerning natural gas leaks. My experience is that natural gas systems lose between one to four percent of their throughput. Considering that natural gas is a greenhouse gas 20 times more potent than CO_2 in trapping heat in the atmosphere[2], it is far from clear that the environmental benefits of fuel switching are as advantageous as Mr. Reed claims.

Q: Are there concerns about the environmental consequences of natural gas extraction?

[2] "Methane as a Greenhouse Gas", fact sheet generated by the U.S. Climate Change Science Program Office, January 2006.

A: Yes, there are. Natural gas extraction is not without serious environmental consequences of its own. On page 40, lines 1 through 3, of his Direct Testimony, Mr. Reed testifies that "... the prevalence of shale gas has had a significant impact on gas supplies ...". On page 41, lines 8 through 10, he states that "Based upon 2009 natural gas consumption levels reported by EIA, U.S. natural gas reserves would not be exhausted for approximately 91 years." Although it is true that hydraulic fracturing of shale formations has led to significant increases in the availability of natural gas supplies, this process of natural gas extraction is not without its environmental critics. Critics have argued that the process of extraction of natural gas from shale formations has forced methane gas into people's homes and water supplies and that the fluid used to fracture shale formations regularly employs chemicals that have been linked to cancer or other health problems.[3] In New York concerns are so great that the New York state assembly recently passed a bill placing a moratorium on hydraulic fracturing. A Cornell University analysis stated that

> Natural gas is being widely advertised and promoted as a clean burning fuel that produces less greenhouse gas emission than coal when burned. While it is true that less carbon dioxide is emitted from burning natural gas than from burning coal per unit of energy generated, the combustion emissions are only part of [the] story and the comparison is quite misleading. **A complete consideration of all emissions from using natural gas seems likely to make natural gas far less attractive than other fossil fuels in terms of the consequences for global warming**.[4]

[3] For example, in June 2010, the Pennsylvania Department of Environmental Protection publication, "Chemicals Used by Hydraulic Fracturing Companies" identified ethyl benzene, thylene glycol, glutaraldehyde, isopropanol, and methanol as some of the chemicals employed in the fluid used in the hydro-fracturing process. These chemicals have been linked to cancer and other health problems.

[4] "Preliminary Assessment of the Greenhouse Gas Emissions from Natural Gas obtained by Hydraulic Fracturing" 17 March 2010 draft by Dr. Robert W. Howarth, Department of Ecology and Evolutionary Biology, Cornell University.

Any discussion of the environmental consequences of electric to gas substitution should also include an assessment of all environmental impacts of natural gas extraction. Failure to recognize the environmental costs of natural gas extraction would understate the environmental costs of natural gas use and give natural gas an undue market advantage over electricity.

Furthermore, the electric to gas substitution program proposed by Mr. Reed would result in additional MGE gas customers, which, in turn, would have an unintended consequence. Connecting existing customers requires excavation, construction and resurfacing, all of which have some environmental consequences. In addition, the new customer will require meter reading and billing, processes which also result in some impact to the environment.

The replacement of existing electric appliances represents another environmental factor to consider. An electric to gas substitution program may result in the premature replacement of serviceable electric equipment, which will affect the timing and level of environment impact considering the disposal of existing equipment and the impact of manufacturing new equipment. A fuel substitution program will also have an economic impact as resources are expended for the premature replacement of usable equipment.

Q: Do you believe that the Commission should adopt policies to address environmental impacts in advance of pending investigations at the national level?

A: No. I believe it would be more expedient and prudent to study the issues being addressed at the national level and allow those issues to be fully vetted before

attempting to address the issues at the state level. Determinations made by the MPSC in this proceeding would be premature insofar as its actions may be preempted or limited by subsequent federal action. Furthermore, the Commission could build upon the experiences of the DOE and others if it determines that the full-fuel-cycle analysis proposed by Mr. Reed should be adopted. For these reasons, I do not believe it would be prudent to approve MGE's proposed electric to gas substitution subsidy in this proceeding.

Q: Assuming for the sake of discussion that the Commission approves MGE's proposed electric to gas substitution programs, do you believe that the Commission should recognize the resulting GMO revenue shortfalls?

A: Yes, if the Commission approves MGE's proposal, I believe the Commission should provide a means to allow GMO recovery of that portion of revenues associated with the recovery of the Company's fixed costs. GMO will not be able to recover its allowed return under MGE's proposal, and this earnings shortfall should be addressed by the MPSC. Nowhere in MGE's proposal is a discussion of how GMO will recover the fixed costs embedded in the sales that migrate from electric appliances to natural gas appliances as a result of the proposed natural gas subsidy payments. Because GMO will not have a reasonable opportunity to earn its allowed return on the lost revenues, GMO stockholders will be harmed as a result of the proposed subsidies unless the Commission provides a means for GMO to recover the "lost" fixed cost revenue levels that would have otherwise occurred. For this reason, if the Commission finds it fair and reasonable to adopt MGE's proposal, I believe that it should also recognize GMO's loss of fixed cost

recovery and provide for the recovery of these earnings. Regardless of the cost recovery mechanism ultimately employed, GMO should not be adversely impacted financially by the promotion of EE, DSM and DR activities. From a policy standpoint, the Commission should avoid implementing programs that are not "self-policing". In this case, the programs should be designed so that implementation benefits the utility's ratepayers as well as its stockholders. Without this common goal, the program provides a disincentive for proper implementation.

Lost revenue is an important issue. It is also quite complex and does not lend itself to a one-size-fits-all policy. I understand that GMO and other parties have engaged in discussions regarding the cost recovery mechanisms that are needed for implementation of Senate Bill No. 376. A rulemaking addressing proposed rules to implement the provisions of the Missouri Energy Efficiency Investment Act consolidated the workshop dockets into Docket No. EX-2010-0368. Until such time as adequate cost recovery mechanisms are in place to assure GMO of a reasonable opportunity to earn its allowed rate of return it is premature to implement electric to gas substitution payments from GMO to promote natural gas service.

Q: In your opinion, will MGE's proposal that GMO pay customers to switch from electric to natural gas appliances benefit non-participating customers?

A: No, non-participating customers will see their bills rise as a result of the added costs as well as the stranding of fixed cost recovery. In describing the benefits of his recommendations on page 30, line 11, through page 31, line 2, MGE witness

Mr. Reed states that both program participants and non-participants will benefit from his electric to gas substitution proposal. One of the cost savings necessary for non-participants to benefit from this program is that future GMO revenue requirements will be lower with the electric to gas substitution than without it. As recognized by Mr. Reed on page 30, lines 18 and 19, deferral of future generation and transmission capacity expansion is the only benefit that GMO will theoretically receive from the proposal.

However, it is not evident that capacity will be deferred by MGE's proposed electricity to gas substitution proposal. Since GMO is primarily a summer peaking utility, a reduction in water heating and space heating load will have minimal impact to capacity needs. Since the impact to capacity needs will be minimal, MGE's electric to gas substitution proposal is more likely to have a negative impact on rates. Rather than lowering the rates to non-participating customers, MGE's proposal is more likely to increase the rates of non-participating customers in the long term. Revenues to be recovered from customers must inevitably increase, since the incentive payments must be recovered from ratepayers. Moreover, these increased costs as well as existing fixed costs must be spread among fewer and fewer billing determinants with each succeeding rate case causing prices to rise. See the discussion of the Ratepayer Impact Measurement ("RIM") test in Section V. Analysis of Costs and Benefits of my Rebuttal Testimony for more information about measuring the impact of electric to gas substitution upon ratepayers.

Q: Mr. Reed has justified his electric to gas substitution proposal using full fuel cycle economics. What impacts will a shift to full fuel cycle economics have upon GMO's existing and future energy efficiency, energy conservation and demand side management activities?

A: Because GMO, like most utilities, currently employs site based analyses of DSM, DR and EE programs, major changes in the market place and in the economics of these measures will require a complete re-evaluation of all GMO's existing and contemplated programs. Programs that have previously been justified by site based studies may no longer appear to be beneficial. As explained below, the numerous unsupported data assumptions inherent in the full-fuel-cycle approach MGE recommends make the results of any such study highly unreliable. MGE proposes to modify the energy market and estimate the impact of the market preferences based upon unreliable, suspect data. Decisions that establish market preferences should be made based upon reasonable information. I do not believe that it would be prudent for GMO to continue with its current EE, DSM and DR programs without a full re-evaluation of the programs if the MPSC were to adopt new EE, DSM and DR measurement standards, revise program requirements and adopt new methods of program evaluation in response to the MGE proposal. The need to establish EE, DSM and DR standards, methods, and data is likely to take some time and introduce delay further activity for some time to come. This result is contrary to the notion of giving customers more choices in their energy decisions. I believe that the Commission should be more focused on expanding rather than limiting the options available to utility customers in Missouri.

Q: How accurate are the data that Mr. Reed employ to assess the costs and benefits of electric to gas substitution?

A: The data are neither accurate nor reliable as described in Section IV below, most of the information employed by MGE witness Mr. Reed in support of his recommendations relies upon data that does not represent GMO's service territory, GMO's operating characteristics, or GMO customer characteristics. In my opinion, the quality and accuracy of the data and analyses employed by Mr. Reed are unreliable that the results of these analyses are not credible. The potential consequences of adopting MGE's proposed subsidy are sufficiently great that it would be imprudent to rely upon unreliable data to support such an action by the Commission.

Q: How have other stakeholders and regulatory agencies addressed electric to gas substitution?

A: Contrary to the implications of Mr. Reed's testimony, there has certainly been no significant nationwide movement to implement electric to gas substitution. Some regulatory agencies such as the Arkansas Public Service Commission and the Oregon Public Utility Commission have investigated electric to gas substitution and found that fuel switching should not be included as part of those states' energy efficiency programs. In Arkansas Public Service Commission Order No. 12 in APSC Docket No. 06-004-R (a rulemaking for developing and implementing energy efficiency programs), the Arkansas Commission ruled that fuel switching may not be included as part of utilities' energy efficiency and conservation (EE&C) program. Energy Trust of Oregon, Inc. (Energy Trust),

which provides guidance and whose guidelines are consistent with the Oregon Public Utility Commission, has developed a policy on fuel-switching as it applies to energy efficiency. This policy states, "Energy Trust should not advocate fuel-switching, but may provide fuel-neutral technical information on efficiency options."[5]

In the Kansas Corporation Commission Docket No. 09-GIMX-160-GIV, the Commission Staff filed its report and recommendations on September 28, 2010. Among other recommendations in the Staff report, the Staff recommended

> Finally, Staff recommends that the Commission should not pursue a policy to proactively encourage use of natural gas over electricity. Staff suggests that, at this time, the Commission maintain its definition of energy efficiency as encourage site efficiency of the particular fuel used for a particular end-use. Additionally, maintaining this definition will allow the Commission to preserve its current benefit-cost analysis for energy efficiency programs at least until the DOE makes progress in adopting the recommendation of the NAS Letter Report to incorporate source-to-site analysis. The Commission can then build upon the experience of the DOE if the Commission determines that source-to-site analysis should be incorporated into benefits-cost analysis at a later date.[6]

In addition, the Staff Report also pointed out that issues such as incentives offered to developers, builders and equipment dealers as well as the line extension policies of both electric and gas distribution utilities must also be examined. The Kansas Staff's recommendations are consistent with my recommendations contained herein.

In cases in which regulatory agencies have accepted electric to gas substitution within EE&C plans, some have allowed it as an option, but not a

[5] Source http://energytrust.org/library/policies/4.03.000-P.pdf
[6] "Second Staff Report and Recommendations", before the State Corporation Commission of the State of Kansas, Docket No. 09-GIMX-160-GIV, page 3.

mandate. This approach enables the regulatory agencies to neither encourage nor discourage electric to gas substitution. Instead, each specific electric to gas substitution proposal would compete against the other potential EE, DSM, and DR programs considered by the stakeholders to meet the mandated consumption and demand reduction targets.

With regard to the utilities that Mr. Reed indicates are contemplating providing incentives for fuel switching, on page 21, lines 11 through 15, of his Direct Testimony, Mr. Reed states that

> Additionally, the City of Austin and Texas Gas Service are discussing initiation of a fuel switching program under which customers who currently obtain their electric service from the City of Austin would be eligible for rebates if they switched certain electric appliances to natural gas and obtained gas service from Texas Gas Service.

A footnote to this assertion indicates that this statement was based on a telephone conversation with representatives of Texas Gas Service Company in October, 2010. However, I believe that the statement quoted above is incorrect. In response to my inquiry to Austin Energy[7] management regarding Mr. Reed's assertion, I was advised that Austin Energy has had discussions with Texas Gas Service aimed at reducing barriers to more efficient use of energy, but Austin Energy rebates are not being considered.

Based upon the above information, I believe that there is no clear indication that electric to gas substitution programs are gaining acceptance in other regulatory jurisdictions or by the energy industry.

[7] Austin Energy is the City of Austin's municipally-owned electric utility.

IV. CRITICAL ASSESSMENT OF MGE PROPOSED INCENTIVES

Q: Have you examined the Tables and Schedules prepared by Mr. Reed's ?

A: Yes.

Q: Please refer to Tables 1 and 2 presented on pages 10 and 11 of Mr. Reed's Direct Testimony. Are the data presented on these tables specific to GMO and MGE, or are the data based upon more general information from other sources that do not include GMO?

A: These data do not reflect GMO or Missouri specific information. Mr. Reed relied on an American Gas Association ("AGA") report to provide estimates of the electric consumption for electric water heaters and resistance space heating equipment. Unfortunately, this data is not utility specific, and Mr. Reed has not demonstrated that the data from the AGA report is representative of and applicable GMO. Consider that the footnotes of Mr. Reed's Tables 1 and 2, states that the data on these tables are from a document entitled "A Comparison of Energy Use, Operating Costs, and Carbon Dioxide Emissions of Home Appliances" prepared by the AGA. A review of that AGA document (that is the source of Mr. Reed's information) indicates that the AGA information was, in turn, developed by the Gas Technology Institute for Codes & Standards Research Consortium in a paper entitled "Source Energy and Emission Factors for Building Energy Consumption" which was published in August 2009. In this original source of the information relied upon by Mr. Reed is the following statement:

> Average energy and emissions calculations may be appropriate for inventory purposes, but they do not necessarily provide good

information when evaluating competing energy efficiency measures.[8]

The authors of the original information relied upon by Mr. Reed specifically state that the information used by MGE to evaluate competing energy efficiency measures do not provide good information for use in such evaluations. The process of "laundering" data through AGA publications does not make the data any more useful than they were in their original presentation. Therefore, Mr. Reed's analyses must be considered suspect and are not reliable for the purposes Mr. Reed has used them.

Q: Is the general data from the AGA study relied upon by Mr. Reed a reasonable proxy for data specific to GMO?

A: I cannot be certain, because the Company does not have appliance-specific consumption data. However, I am aware that usage varies significantly among utilities. As an example, Mr. Reed's Table 1 shows that site based water heater usage totaled 16.6 MMBtu annually. That is the equivalent to 4,864 kWh[9]. The DOE's Energy Information Administration states that the average household consumption for electric water heaters in 2001 was 2,552 kWh[10], which is a significantly lower figure. A 1985 Electric Power Research Institute ("EPRI") publication summarized electric water heater load research data for twelve different utilities measured in 1979. Of course, conservation measures such as flow restrictors and more efficient appliances have reduced consumption levels since that time. As a result, the absolute level of consumption from the 1979

[8] "Source Energy and Emission Factors for Building Energy Consumption", Natural Gas Codes and Standards Research Consortium, August 2009, page 31.
[9] One kWh = 0.003412 MMBtu
[10] See: http://www.eia.doe.gov/emeu/reps/enduse/er01_us_tab1.html

study may be overstated in comparison to today's usage. However, it is important to note that the utilities' average annual consumption at the time of the EPRI study ranged from 4,097 to 9,613 kWh per year. Obviously, with this large magnitude of variance in usage, one must question the credibility of Mr. Reed's reliance on the AGA figure as a proxy for GMO's Missouri customers.

Q: Please describe your understanding of the calculations shown on Mr. Reed's Schedule JJR-1 and summarized on Table 3 set forth on page 12 of Mr. Reed's Direct Testimony.

A: I believe these calculations are intended to measure the relative costs of employing water heating and space heating gas and electric appliances. On Schedule JJR-1 consumption is taken from Table 2, which is measured in MMBtu using the full fuel cycle approach. The prices are computed using average revenue per billing unit.

Q: Do you agree with Mr. Reed's calculated annual operating savings as computed on his Schedule JRR-1?

A: No, I do not agree that Mr. Reed's calculations reflect the cost savings of switching from electric water heating and space heating to natural gas appliances. I believe these calculations incorporate underlying conceptual errors which must be corrected before meaningful calculations are possible. In particular, the price does not reflect the actual decremental electric billings nor incremental natural gas billings expected from a fuel substitution program. Mr. Reed has chosen to apply average revenues rather than employ the actual price structures of the individual utilities which distorts the results. However, before discussing the

details of the calculations, it is useful to understand what each calculation is attempting to measure. I believe that two alternative calculations can and should be made to provide useful insights into the fuel substitution question:

1. Full Fuel Cycle - When consumption is measured using the full fuel cycle, the calculation will show the cost of society's resources consumed. That is accomplished by using well-head or energy feedstock prices. This calculation was not provided by Mr. Reed.
2. Rate Payer - The second calculation, similar to Mr. Reed's Schedule JJR-1, should present the conventional rate payer analysis showing the utility's metered and billed quantities and the rates charged consumers.

Both calculations provide meaningful results.

Q: Have you evaluated the full fuel cycle calculation?

A: Yes, but I must qualify it to say that the prices I employed are only approximations. I began with the full fuel cycle consumption levels including all losses. Using the forecasted prices available from the Department of Energy's Energy Information Administration, I computed the average price for wellhead gas and for mine-mouth coal, both in units of $/MMBtu. The data show that natural gas is a valued commodity with a price that is over three times that of coal, reflecting its desirability. Recognizing that natural gas and coal price forecasts are subject to error, I evaluated an alternative source of prices - the NYMEX futures market. Since these markets are actively traded and extend for a number of years into the future, they are not forecasts; they represent the competitive prices available today for natural gas and coal. Regardless of my

choice of pricing assumption, the conclusions remain the same - the resources consumed by gas water heaters are more costly than those required by coal generated electricity. As economists will agree, competitive prices are the best measure of the values society places on its resources. The conclusion is significant. The total cost of the natural gas resources consumed for water heating and space heating exceed the costs for coal, even recognizing the inefficiencies of converting coal to electricity to serve the end-use needs of consumers. While this conclusion ignores the absolute level of energy consumed and the environmental impacts of consuming that energy, the implications of this result are far from trivial; they have major policy implications.

Q: Have you performed the second calculation, the Rate Payer calculation to identify the potential savings to consumers?

A: Yes, I have identified the alternative annual utility charges for electric and gas water heating and space heating appliances and the resulting decremental and incremental consumer charges. In the case of electric rates, a fuel substitution program would reduce the customer's billed energy. Most of this consumption is currently billed in the tail block rate or in the water and space heating rates. All of these rates are substantially lower than the figures employed by Mr. Reed. In the case of natural gas rates, the fuel substitution program will create new gas customers form MGE. In accordance with MGE's tariffs, customers will be billed a fixed monthly delivery charge as well as a volumetric charge. Mr. Reed's use of an average revenue rate, significantly understates the actual costs customers will be billed, especially in the case for water heating fuel substitution. The difference

between electric and gas utility charges represents potential savings to the consumer.

Q: What conclusions can you draw from your calculations?

A: Rate payers switching from electricity to natural gas for their water heating needs alone will experience no savings. To the contrary, their annual bill will increase by approximately $178 per year. This result is markedly different than the $200 savings Mr. Reed computed on Table 3. Recall that Mr. Reed's expected first year acceptance rates for his proposed incentive program projected that 85% of the customers participating in the fuel substitution program would choose to convert only their water heater. This conclusion is not supported by any evidence. I strongly suspect that customers would reject the incentives for the water heater fuel substitution program knowing that they will experience no savings.

V. ANALYSIS OF COSTS AND BENEFITS

Q: Has the MPSC established a standard methodology for the evaluation of potential EE measures?

A: Yes, as Mr. Reed pointed out, the MPSC has routinely employed the Total Resource Cost ("TRC") test in its economic analyses.

Q: Could you briefly describe that method?

A: The TRC test, also known as the "All Rate Payers Test", provides a measure of the net resource expenditures of a DSM program from the point of view of the utility and its ratepayers as a whole. Resource benefits include the utility's avoided supply costs. Resource costs include the utility's and participant's direct

costs. Because the utility and its ratepayers are taken as a whole, incentives and revenue changes are ignored.

Q: Is that method commonly employed to evaluate the effectiveness of EE, DSM and DR measures?

A: Yes. From my experience, the TRC test is method most commonly employed by state regulators.

Q: Did Mr. Reed provide the results of any TRC tests for his proposed water heating and space heating fuel substitution programs?

A: No, he did not.

Q: Has he provided sufficient information to perform these tests?

A: No, I do not believe so. He has provided very little of the required information.

Q: Did you attempt to perform these tests?

A: Yes, I have attempted to estimate the required data in order to provide a very crude TRC test.

Q: Please summarize your analysis.

A: The costs exceed the benefits in absolute as well as on a present worth basis. Even using very favorable assumptions, the benefit-cost ratios from all perspectives is less than 1.0, with the more favorable combination over 24 years providing only a 0.97 benefit-cost ratio.

Q: Are you suggesting that all water heater fuel substitution programs should be shelved as a result of your TRC analysis?

A: I prefer not to generalize, especially knowing the quality of data I employed in my analysis is suspect. However, I can unequivocally conclude that it would be

imprudent to implement the hastily designed electric to gas water heater substitution program recommended by MGE's witness John Reed on the basis of economics. Mr. Reed's recommended electric to gas substitution recommendation should be rejected.

Q: Did you limit your analysis to the TRC test?

A: No, I conducted a Ratepayer Impact Measure test and a Total Participants Test, as well.

Q: Without delving into the details of these tests, please interpret the results of the Ratepayer Impact Measure test.

A: The net present value of the costs exceed the net present value of the benefits. While not unexpected, this result suggest that implementation of MGE's proposed water heater fuel substitution program will result in higher rates for GMO's customers.

Q: What were your results for the Total Participants test?

A: Again, the customer's costs would exceed the associated benefits every year as well as on a present worth basis. Even using very favorable assumptions, the Benefit-Cost ratio is only 0.6.

Q: Up until now, you have only discussed a water heater conversion program. Did you perform an analysis of MGE's proposed space heating electric to natural gas fuel substitution program?

A: Yes, I performed a similar analysis.

Q: How did the space heating analysis differ from the water heater analysis?

A: At a general level they did not differ. Even recognizing that much of the data were not rigorously developed, I still have no reason to believe that the proposed space heating fuel substitution program would pass the TRC test.

Q: What were the results of the Ratepayer Impact Measure and Total Participants tests?

A: All three tests revealed costs slightly in excess of benefits. Simply put, neither the participant, the non-participants, nor society as a whole would benefit economically from the substitution of electricity by natural gas for both the water and space heaters.

VI. ENVIRONMENTAL ISSUES

Q: Please summarize Mr. Reed's position regarding the potential benefits of fuel substitution.

A: Beginning on page 12, line 14, of his Direct Testimony, Mr. Reed sets forth his argument that using natural gas rather than electricity results in a reduction in carbon dioxide emissions. Mr. Reed's argument is predicated upon the assumption set forth on page 15, lines 10 through 15, that "... fuel switching programs would reduce the amount of generation required and therefore reduce the emissions associated with that reduction in generation."

Q: Do you agree with his arguments?

A: No, I do not agree. There are several problems with the assumptions made in his arguments. First, whether or not GMO will actually reduce output is problematic. It is more likely that GMO, like any economically rational utility, would sell available capacity and energy in the wholesale supply market whenever such a

sale was profitable. In selling the capacity and energy made available by fuel switching, GMO would be able to generate additional margins, thereby reducing the costs to serve to other customers. However, in the process of producing the power to sell the otherwise avoided energy, emissions will continue to occur as before from electric generation. These additional natural gas sales will continue to produce pollution as before. As a result, there is some likelihood that pollution may actually increase since the added pollution from natural gas is added to the pollution from electric generation. This raises the very real concern that the additional pollution caused by the natural gas appliances will occur at the customer's site rather than at a remote generation station whose location was carefully chosen as the most advantageous site for any emissions to occur. Electric appliances produce little or no carbon or other air pollutants, unlike natural gas appliances. This factor can and should be examined as a possible issue in urban non-attainment areas.

Second, Mr. Reed's assume some average mix of electric generation fuels. In practice, any reduction in generation will probably not be made from a base load coal generating unit, but from a generating resource that can cycle quickly and has a higher variable cost. Emissions vary by type of generation that is displaced by EE avoided energy. Moreover, the displaced generating unit will potentially change from minute to minute as generation units respond to load changes and other factors. Estimating the actual CO_2 emissions is far more involved than Mr. Reed's simple comparison suggests. Furthermore, the full fuel cycle approach advocated by Mr. Reed does not account for the efficiencies and

environmental benefits of renewable resources and nuclear power. The full fuel cycle analysis penalizes electricity generated by renewable resources and nuclear energy.

Q: Has he ignored other environmental impacts from his proposed fuel switching programs?

A: Yes, I believe he has. As mentioned earlier, generation is primarily a central station technology. In an electricity to natural gas fuel substitution program, central station emissions are replaced with the emissions from many dispersed natural gas-fired appliances. Future efforts to further reduce emissions are more easily and much most cost-efficiently achieved by treating a few central station sources rather than a large number of small individual in-home installations.

Q: Does the Total Resource Test include an analysis of environmental impacts?

A: Generally, the TRC does not include any considerations of environmental impacts. However, there is a variant of the TRC that does consider environmental costs, i.e., the Societal test. The Societal test is an expansion of the TRC that includes externalities such as environmental impacts, national security, national economic implications, and other similar hard to define societal costs. The Societal test also excludes tax credit benefits and uses a different discount rate. The Societal test has found little practical application with state regulatory agencies due to the difficulty in quantifying its additional data requirements.

Q: If state regulators are not addressing the question of environmental impacts, are they being addressed at the national level ?

A: Yes, as Mr. Reed points out in his direct testimony, the DOE is examining many issues of critical national importance, including consideration of the full fuel cycle analysis. The issue of pollution has been on the forefront of such examinations for many years. For the electric utility industry, the federal government has promulgated increasingly stringent regulations resulting in the development and implementation of numerous emissions reductions programs.

Q: Has the DOE drawn any conclusions to date?

A: To my knowledge, the DOE has not reached any conclusions regarding the use of the full fuel cycle approach or the more general policy of encouraging fuel switching. Since these topics are still under review at the national level, I believe that it would be premature to adopt the full fuel cycle approach until the approach has been fully vetted. This would allow the Commission to better review the benefits and problems with the approach prior to committing to its use and to more fully examine all aspects of the approach.

Q: At present, electric generators are provided many regulatory incentives to control emissions. How do you see these programs affecting consumer choice?

A: Over time, federal regulations are requiring successively cleaner, albeit more costly, electric generation technologies. In effect, the cost of generation emissions is being internalized into the price of electricity.

Q: If the environmental costs of emissions are internalized into the energy prices provided to consumers, would the competitive marketplace address many of the concerns Mr. Reed has voiced?

A: I am a firm believer in allowing the marketplace to guide consumer decisions. As electric prices necessarily increase, consumers will be able to examine the relative merits of electric to natural gas fuel switching and make logical decisions without the need to intervene. At some point, natural gas utilities might demonstrate cost effective incentives for fuel switching. After careful review, regulators may judge such expenses as prudent and allow gas utilities to actively encourage fuel substitution programs. However, those programs will not require a mandate for electric utility participation.

VII. OTHER ISSUES

Q: On page 6, lines 6 through 29, Mr. Reed states that the full fuel cycle approach was recommended to the Department of Energy ("DOE") by the National Research Council ("NRC"). Can you comment on this statement?

A: It is important to note that this is simply a recommendation at this time. To my knowledge, the DOE has not endorsed this recommendation and other parties have disputed it. Despite its status as "under review", Mr. Reed has recommended that the MPSC adopt the concept of full fuel cycle analysis immediately, treating it as a foregone conclusion. I believe that it would be premature to act upon the assumption that the DOE will approve the NRC report in total with no caveats or restrictions. I believe it would be much more reasonable to await the final outcome of the policy debate and to engage in a more deliberative examination of the full fuel cycle analysis.

Q: Does reliance upon the NRC report suggest that the interests of the State of Missouri and the interests of DOE are the same?

A: Yes, that is the implication of Mr. Reed's testimony. However, the portion of the report quoted on page 6 of Mr. Reed's testimony states, in part, on lines 9 through 12,

> The Committee's primary general recommendation is that the DOE/EERE consider moving over time to the use of a full-fuel-cycle measure of energy consumption **for assessment of national and environment impacts** ... [emphasis added]

Note that the report is specific to national impacts. However, I believe that the MPSC must also consider whether or not the interests of Missouri ratepayers are best served by use of the full fuel cycle approach. The interests of DOE are national and the interests of the MPSC are generally limited to the State of Missouri. From a national perspective, overall efficiency of energy is maximized through a combination of resources occurring across any number of states. From a national perspective, it does not matter in which states the costs of EE, DSM and DR programs occur nor which states receive the benefits of the activities. However, from the perspective of a single state, costs incurred elsewhere and/or benefits received by residents of other states may not be costs and benefits to inure to that single state. In other words, under the full fuel cycle approach, Missouri may well be paying the entire costs of increased energy efficiency, but not receiving all of the benefits resulting from these costs.

Q: Do you have any concerns about the procedures employed to measure energy efficiency using the full fuel cycle approach?

A: Yes, I do. The full fuel cycle approach should always employ the actual prices of electricity and natural gas instead of imputing some other value to the energy source to compensate for that energy source being either less efficient or more

efficient. The price of electricity should reflect its attendant higher consumption of energy in producing and delivering electricity compared with natural gas. Greater energy losses for electricity translated into a higher price, which would make electricity less economically favorable to natural gas. Therefore, imputing a separate value to natural gas because it has a higher energy efficiency from the full fuel cycle perspective will double count the benefits of natural gas.

Q: On page 18 of his Direct Testimony, MGE witness Mr. Reed states that GMO's residential rate structure provides a price incentive not to switch from electricity to natural gas for certain end-use applications such as space heating. Is that correct?

A: While it is true that GMO's rate structure offers lower rates to residential heating customers, it is also true that GMO's rate structure is designed to reflect the cost of providing service. GMO is a summer peaking system whose capacity needs are primarily driven by summer peak demands. GMO's cost of service study seasonally differentiates costs and clearly demonstrates that GMO's costs are significantly higher in the summer air-conditioning season than during the winter season. GMO's rate structure is designed to reflect the higher costs of providing service during peak summer periods. The Company's residential rate structure is not designed as an incentive to prevent customers from taking natural gas service. It is designed to reasonably reflect the costs of providing service.

Q: On page 40, lines 7 through 9, Mr. Reed downplays uncertainties surrounding natural gas prices and availability. Do you agree with his

statement on lines 8 and 9, that "... natural gas prices are forecasted to be much more stable than historical prices."

A: I neither agree nor disagree insofar as that conclusion cannot be reached from the graph that Mr. Reed references on Figure 1 of his testimony. The forecast is a point estimate of probabilistic future values. It cannot be compared to actual prices that were subject to market impacts that have been normalized out of the forecast. A more informative graph would have included high and low price forecast ranges as well as the range of prices likely to occur at a specified confidence level. The graph does not support Mr. Reed's contention that future gas prices will become more stable than past gas prices. As a result, the MPSC has no assurance that MGE's proposal will produce the best economic alternative for the consumer. As stated in the NRRI paper discussed earlier "The problem for regulators is discerning when electric-to-gas substitution makes economic sense to customers. Regulators may encourage electric-to-gas substitution, but risk harming customers when natural gas prices rise."[11] The potential for significant and sudden changes in natural gas prices is an important concern that the MPSC should not ignore.

Q: What is your position on long-run availability of natural gas?

A: Mr. Reed has emphasized that known gas reserves have increased with the quantification of shale gas. However, he misses the point. Natural gas is not a renewable energy resource; its availability is finite. The same is true of coal. Relatively speaking, coal is more available than natural gas and policies to encourage depletion of relative scarce resources should be viewed with caution.

[11] Ibid, page 9.

Q: In your opinion, would it be appropriate for the Commission to consider fuel substitution programs using renewable energy sources before implementing those using natural gas?

A: Yes. Sound policy would call for incentives to disseminate fuel switching programs employing renewable technologies before considering electric to gas substitution. Obviously, renewable programs, especially zero emissions programs such as solar water heating, should be considered before fuel substitution programs. However, Mr. Reed did not examine the economics of encouraging solar panels to pre-heat water feeding electric or gas-fired water heaters. In the same vein, solar panels could serve to reduce the energy requirements for oil-fired or gas-fired hot water heating systems. Frankly, I cannot comment on the economics of these alternatives without a much closer and in-depth analysis. I can only conclude that rushing to implement MGE's proposal for an electric to natural gas fuel switching program without considering other potentially more beneficial programs would be neither reasonable nor prudent.

VIII. SUMMARY AND CONCLUSION

Q: Please summarize your rebuttal of MGE's electric to gas substitution proposal.

A: I recommend that the MPSC reject MGE's proposed electric to gas substitution proposal at the present time. MGE's proposal seeks to achieve a greater market saturation of natural gas using appliances by regulatory mandates instead of market interactions, an action that will distort economically efficient price signals provided to consumers. MGE's proposal will result in GMO failing to recover the

fixed costs associated with the lost revenues of customers switching. Since MGE's proposal will not result in any avoided capacity, the ultimate effect of the proposal is to increase the rates paid by non-participants. Among the more egregious problems with Mr. Reed's recommendations is that his analyses are flawed and they do not reflect accurate information. As a result, the conclusions and results of his analyses are not credible. In addition, MGE's proposal would seriously undermine EE, DSM and DR programs that have previously been shown to be beneficial to all parties and would stifle development and implementation of additional EE, DSM and DR program activity. MGE's proposal fails to consider that these incentive programs could possibly be implemented without any participation from GMO. Finally, the costs and benefits measured by the full fuel cycle approach do not measure the costs and benefits of Missouri ratepayers and the process does not insure that either economic efficiency or energy efficiency in Missouri achieved. For these reasons and for the reasons set forth in my Rebuttal Testimony, I recommend that the Commission reject MGE's electric to gas substitution proposal.

Q: Does this conclude your Rebuttal Testimony?

A: Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of KCP&L Greater Missouri Operations Company to Modify Its Electric Tariffs to Effectuate a Rate Increase	)))	Docket No. ER-2010-0356

AFFIDAVIT OF GARY GOBLE

STATE OF TEXAS)
) **ss**
TRAVIS COUNTY)

Gary Goble, being first duly sworn on his oath, states:

1. My name is Gary Goble. I am a management consultant with the firm of Management Applications Consulting, Inc. of Reading, Pennsylvania and Austin, Texas. I have been retained by Great Plains Energy, Inc., the parent company of KCP&L Greater Missouri Operations Company, to serve as an expert witness to provide testimony on behalf of KCP&L Greater Missouri Operations Company.

2. Attached hereto and made a part hereof for all purposes is my Rebuttal Testimony on behalf of KCP&L Greater Missouri Operations Company consisting of thirty-eight (38) pages, having been prepared in written form for introduction into evidence in the above-captioned docket.

3. I have knowledge of the matters set forth therein. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded, including any attachments thereto, are true and accurate to the best of my knowledge, information and belief.

Gary Goble

Gary Goble

Subscribed and sworn before me this 14th day of December, 2010.

JAMES RHODES
Notary Public, State of Texas
My Comm. Expires Jan. 31, 2012

Notary Public

My commission expires: Jan. 31st 2012

QUALIFICATIONS AND EXPERIENCE

I graduated from the University of Arkansas at Fayetteville in 1974 with a Bachelor of Science degree in Public Administration. In 1980, I received a Master of Business Administration degree from Saint Edward's University in Austin, Texas. Upon graduation from the University of Arkansas, I was employed by the Arkansas Public Service Commission and held several positions with the Arkansas Public Service Commission staff, including Chief of the Rates Section and Interim Chief of the Finance Section. My activities in these positions included developing and presenting staff analyses and testimony concerning cost allocation studies and rate design for electric, natural gas, water, and telephone utilities; ensuring utility compliance with Arkansas Public Service Commission rate and tariff requirements; and providing supervision and management to staff financial analysts in the determination of utility cost of capital and capital structure.

In 1978, I accepted the position of Manager of Electric and Water Rates in the Economic Research Division of the Public Utility Commission of Texas. In this capacity, I was responsible for staff analyses, testimony, and activities concerning cost analysis, rate design, pricing strategies, tariffs, and econometric applications for regulated utilities.

In 1980, I was employed by Gilbert Associates, Inc. as a Management Consultant. I was promoted to Senior Management Consultant in March 1981 and to Principal Management Consultant in July 1981. In July 1981, I became Manager of Cost and Load Analysis in Gilbert Associates' Austin office. My responsibilities at this consulting firm included the duties and areas of expertise previously described, as well as management of projects and project teams working on behalf of utility clients.

I became a principal at Management Applications Consulting, ("MAC") at the time of its formation in May 1984. My experience at MAC included continued work in the electric and gas utility industry representing investor-owned utilities, electric cooperatives, and municipally-owned utility systems. My duties at MAC included the duties and areas of expertise described above. I remained a principal at MAC from May 1984 until January 2006.

From January 2006 through March 2007, I was employed as a management consultant by R. J. Covington Consulting, LLC. While employed by this firm, I continued to provide consulting services similar to those previously described as well as work in the areas of business valuation, affiliate transactions, and revenue requirement adjustments in regulatory proceedings.

In April 2007 I returned to MAC as a managing consultant. My responsibilities and job duties at MAC are the same as those previously described.

I have previously submitted testimony before the Public Service Commission of the State of Montana, the Public Utility Commission of Texas, the Arkansas Public Service Commission, the Louisiana Public Service Commission, the Railroad Commission of Texas, the Public Service Commission of Wyoming, the North Carolina Utilities Commission, the Arizona Corporation Commission, the New Mexico Public Regulation Commission, and the New Hampshire Public Utilities Commission. In addition, I have provided formal rate presentations to a number of municipally-owned and cooperative electric utilities. I am currently, or have in the past, been a member of the following organizations: Association of Energy Economics, Association of Energy Engineers, Association of Energy Services Professionals, American Statistical Association, NARUC Committee on Utility Billing Practices (past member), and the NARUC Ad Hoc Committee on Section l33 of PURPA (past member). During the past 34 years, I have made a number of presentations at various industry associations and trade groups.