BEFORE THE CORPORATION COMMISSION OF OKLAHOMA

IN THE MATTER OF THE APPLICATION OF OKLAHOMA GAS AND ELECTRIC COMPANY FOR COMMISSION AUTHORIZATION OF A PLAN TO COMPLY WITH THE FEDERAL CLEAN AIR ACT AND COST RECOVERY; AND FOR APPROVAL OF THE MUSTANG MODERNIZATION AND COST RECOVERY	))))))	CAUSE NO. PUD 201400229

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Pre-filed Responsive Testimony and Exhibits of:

Scott Norwood

On behalf of

Oklahoma Industrial Energy Consumers (OIEC)

December 16, 2014

CONFIDENTIAL INFORMATION REDACTED - SUBJECT TO PROTECTIVE ORDER IN OKLAHOMA CORPORATION COMMISSION CAUSE NO. PUD 201400229

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RESPONSIVE TESTIMONY

OF

SCOTT NORWOOD

ON BEHALF OF

OKLAHOMA INDUSTRIAL ENERGY CONSUMERS

DECEMBER 16, 2014

RESPONSIVE TESTIMONY OF SCOTT NORWOOD

TABLE OF CONTENTS

EXHIBITS:

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TABLE OF CONTENTS

EXHIBITS (Continued):

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Scott Norwood. I am President of Norwood Energy Consulting, L.L.C. My business address is 9408 Bell Mountain Drive, Austin, Texas 78730.

Q. WHAT IS YOUR OCCUPATION?

A. I am an energy consultant specializing in the areas of electric utility regulation, resource planning and energy procurement.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have over 33 years of experience in the electric utility industry. Since January of 2004, I have served as President and sole proprietor of Norwood Energy Consulting. In this capacity I have provided electric utility regulatory consulting services to electric consumer and governmental organizations. My consulting practice has been focused primarily on the areas of electric resource planning, power supply system dispatch and operations, transmission planning analyses, and evaluations of electric utility fuel supply and purchased power issues. Before founding Norwood Energy Consulting, I was employed for 18 years as a Principal and Director of the Deregulation Services Department of GDS Associates, Inc., an electric utility consulting firm. From 1984 to 1986 I was employed as Manager of Power Plant Engineering for the Staff of the Public Utility Commission of Texas, where I was responsible for analyzing and presenting

testimony addressing resource planning, fuel and purchased power cost issues arising from electric utility regulatory filings with the Commission. From 1980 to 1984, I was employed by Austin Energy as a Power Plant Engineer, in which capacity I directed electrical maintenance and design projects at three gas-fired power plants. I received my Bachelor of Science degree in electrical engineering from the University of Texas in December of 1980. Exhibit SN-1 provides a more detailed summary of my background and experience.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of Oklahoma Industrial Energy Consumers ("OIEC").

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE CORPORATION COMMISSION OF OKLAHOMA?

A. Yes. I have testified in numerous proceedings before the Oklahoma Corporation Commission ("OCC" or "Commission"), including Oklahoma Gas and Electric Company's ("OG&E") 2007 application for approval of the Red Rock coal-fired generating station (PUD 200700012); OG&E's 2005 and 2008 base rate cases (PUD 200500151 and PUD 200800398); OG&E's application for approval of a $211 million, 120 mile, 345 kV transmission line from Woodward to Oklahoma City to facilitate wind energy imports from western Oklahoma (PUD 200800148); OG&E's applications for approval of the OU Spirit and Crossroads wind generation projects (PUD 200900167 and PUD 201000037); OG&E's 2006 and 2009 fuel prudence reviews (PUD 200700364 and PUD 201000175); and OG&E's application for approval of a rider to recover Southwest

Power Pool ("SPP") transmission charges (PUD 201000146). I have also participated on behalf of OIEC in past Commission proceedings involving environmental compliance issues, including Public Service Company of Oklahoma's ("PSO") request for approval of an environmental compliance plan (PUD 201200054) as well as recent Commission public meetings involving environmental compliance proposals presented in the 2014 Integrated Resource Plans ("IRP") filed by OG&E and PSO. Through my participation in these past projects, and similar proceedings in other jurisdictions, I have become familiar with the operations of power supply resources on OG&E's system and the environmental compliance and resource planning issues under review in this case.

My Exhibit SN-1 provides a list of my past testimony in regulatory proceedings in Oklahoma and other jurisdictions since 2005, including proceedings before state commissions in Arkansas, Florida, Georgia, Iowa, Illinois, Louisiana, Michigan, Missouri, New Jersey, Ohio, Texas, Virginia, Washington, and Wisconsin, and before the Federal Energy Regulatory Commission ("FERC").

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

A. The purpose of my testimony is to present my findings and recommendations regarding OG&E's request for pre-approval of its proposed environmental compliance plan and Mustang modernization plan. My testimony also addresses certain limited aspects of OG&E's request for approval to recover costs of these proposed projects through a proposed new Environmental and Generation Plan Rider ("EGP Rider"). OIEC witness Mark Garrett also addresses a number of issues regarding OG&E's cost recovery proposals in his responsive testimony in this case.

Q. WHAT IS OIEC'S INTEREST IN THIS CASE?

A. OIEC's members are large users of electricity on OG&E's system, and therefore are very sensitive to any electric rate increases proposed by OG&E. OIEC's interest in this case is to assess the reasonableness and forecasted costs and rate impacts associated with OG&E's proposed environmental compliance plan and Mustang modernization plan, including the Company's proposed new EGP Rider and its proposal to recover future environmental control system operating costs through the Fuel Adjustment Clause ("FAC") Rider.

Q. HAVE YOU PREPARED ANY EXHIBITS TO SUPPORT YOUR TESTIMONY?

A. Yes. I have prepared 18 exhibits in support of my testimony.

II. SUMMARY OF TESTIMONY

Q. PLEASE SUMMARIZE YOUR MAJOR FINDINGS AND RECOMMENDATIONS REGARDING OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN AND MUSTANG MODERNIZATION PLAN.

A. My primary findings are as follows:

- The modeling process used by OG&E to evaluate environmental compliance plan options generally appears reasonable and was conducted with widely-accepted industry standard production cost models. With the exception of modeling of the SPP's new integrated market ("SPP IM"), the compliance plan

evaluation process is consistent with past OG&E Integrated Resource Plan ("IRP") analyses.

- OG&E evaluated the impact of uncertainty in key variables that impact the forecasted costs of environmental compliance plan options. The Company's CO2 sensitivity appears to significantly overstate costs that would likely be incurred as a result of EPA's recently proposed regulations of carbon emissions from existing generating units.

- OG&E's proposed Scrub/Convert environmental compliance plan would reduce the Company's existing owned coal-fired generating capability by 39%, from the existing level of 37% to a level of approximately 21% of total installed capacity by 2020, and would thereby greatly diminish the existing fuel diversity of OG&E's system.

- Under the Replace compliance plan, which assumes replacement of four coal units with new combined cycle units, OG&E's owned coal-fired generating capability would drop by 80%, from the existing level of 37% to a level of approximately 7% of total installed capacity by 2020, and would thereby leave the Company heavily dependent on natural gas and SPP market purchases for future energy requirements.

- Under the Scrub compliance plan, there would be no permanent loss of fuel diversity on OG&E's system, and coal fired generating capacity would represent approximately 35% of the Company's total installed capacity in 2020.

- Under OG&E's base case analysis, the cost of the alternative Scrub compliance plan is approximately $700 million lower on a nominal basis than the Company's proposed Scrub/Convert compliance plan. The cost of the Scrub compliance plan is approximately $5.6 billion lower than the proposed Scrub/Convert plan under OG&E's high gas price sensitivity analysis.

- As shown in Table 1, below, the Scrub and Scrub/Convert plans have lower costs than the Convert, Replace, and Scrub/Replace alternative compliance plans, under OG&E's base case analysis, and much lower costs under the high gas sensitivity analysis, while the costs of all options are relatively close under OG&E's CO2 sensitivity analysis.

Table 1

OG&E Cost Forecast for Environmental Compliance Options
2015-2044 (Cumulative NPV, $Millions)

	Base Case	High Gas	CO2
Scrub	$22,423	$24,676	$27,046
Scrub/Convert	$22,351	$25,822	$26,402
Convert	$22,484	$27,234	$25,877
Scrub/Replace	$23,229	$26,572	$26,868
Replace	$24,237	$28,931	$26,806

Source: OG&E's response to OIEC 3-12, Attachment 86.

- The estimated capital cost of OG&E's proposed Mustang Modernization plan is approximately $414 million, and the estimated annual revenue requirement of this plan is $73.8 million in 2020. This proposal is unrelated to OG&E's environmental compliance plan.

- OG&E has not demonstrated that its proposal to accelerate the retirement of Mustang Units 3 and 4 by 4 to 8 years is reasonable or necessary. The Company also has not demonstrated that its proposal to replace the retired Mustang generating units with new gas-fired simple cycle combustion turbine ("CT") units represents the lowest reasonable cost alternative, and did not evaluate deferral or market purchase alternatives to these new CT units.

- OG&E has failed to justify its decision not to acquire additional wind energy as part of its environmental compliance plan. At current price levels, the energy savings resulting from additional wind energy purchases by OG&E could help offset rate impacts of the proposed environmental compliance plan while at the same time providing environmental benefits and long-term fuel price hedge benefits to the OG&E system.

My primary recommendations are as follows:

- I recommend that OG&E reconsider the Scrub compliance plan based on the fact that OG&E's analysis indicates that this plan provides a lower total nominal cost in the base case analysis, only modestly higher costs in the CO2 sensitivity analysis case, and much greater fuel diversity benefits than the Company's proposed Scrub/Convert plan and other compliance options.

- In the event that the Commission believes that OG&E's ownership of coal-fired generation should be lower than 35% (the level provided under the Scrub plan) due to concerns regarding future environmental regulations, I recommend that OG&E's Scrub/Convert plan be adopted as the most reasonable alternative to the Scrub compliance plan.

- As explained further in the responsive testimony of OG&E witness Mark Garrett, I recommend that consideration of cost recovery for the proposed environmental compliance plan be deferred until OG&E's next base rate case, which is expected to be filed in the summer of 2015.

- I recommend that the Commission reject OG&E's Mustang Modernization plan.

- I recommend that OG&E be encouraged to solicit bids to acquire additional wind energy as soon as possible.

My recommendations regarding OG&E's environmental compliance plan are based on capital and operating cost assumptions presented by the Company in this case. To the extent future costs prove to be higher than represented by OG&E in this case, the Company should be held fully accountable for demonstrating the reasonableness of such cost variances in future rate proceedings.

III. SUMMARY OF OG&E'S APPLICATION

Q. WHAT IS OG&E REQUESTING IN THIS CASE?

A. OG&E is seeking Commission approval of: 1) the Company's environmental compliance plan; 2) the Company's Mustang Modernization plan; 3) the proposed EGP Rider for recovery of the revenue requirement for OG&E's environmental compliance plan and Mustang plant modernization plan; 4) regulatory assets for certain stranded assets and operation and maintenance ("O&M") costs; 5) inclusion of air quality control systems ("AQCS") consumables through the FAC Rider; and 6) proposed depreciation rates for emission control technology and the Mustang Plant. (Rowlett direct testimony, page 2)

Q. PLEASE DESCRIBE OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN?

A. OG&E's environmental compliance plan is designed to address new emissions limits for sulfur dioxide (SO2), nitrogen oxide (NOx) and mercury under the Environmental Protection Agency's ("EPA") recently promulgated Regional Haze ("RH") rule, and the

Mercury and Air Toxics Standards ("MATS") rule. There are four primary components of OG&E's proposed environmental compliance plan:

- Dry scrubbers would be installed on both of the Sooner plant coal-fired generating units in order to control SO2 emissions.
- Two of the three coal-fired generating units at the Muskogee power plant would be converted to burn natural gas in order to control SO2 emissions.
- Low NOx burners would be installed on Sooner Units 1 and 2, Muskogee Units 4 and 5, and on three gas-fired units at the Seminole power plant to comply with NOx emissions limits.
- Activated Carbon Injection ("ACI") systems would be installed on all of OG&E's coal-fired generating units by April of 2016 to control mercury emissions.

(Rowlett direct testimony, page 3)

Q. WHAT WERE THE PRIMARY OBJECTIVES CONSIDERED BY OG&E IN DESIGNING ITS ENVIRONMENTAL COMPLIANCE PLAN?

A. OG&E indicates that the key objectives of its environmental compliance plan are:

1) Comply with currently effective environmental regulations and ensure reliability by meeting SPP capacity requirements;

2) Maintain fuel diversity without relying upon coal or gas as a predominant fuel source;

3) Provide the lowest reasonable cost to customers; and

4) Provide operational and planning flexibility to handle future challenges including potential environmental regulatory risks, and uncertainty around future fuel costs.

(Rowlett direct testimony, page 2)

Q. WHAT IS THE ESTIMATED COST FOR IMPLEMENTING OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN?

A. OG&E indicates that the capital investment for implementing its proposed environmental compliance plan would be approximately $730 million. The forecasted annual base rate revenue requirement for OG&E's proposed Scrub/Convert compliance plan is $140.2 million in 2020. (See Exhibit SN-2, derived from OG&E's response to OIEC 10-1.)

Q. WHAT ARE THE EXPECTED BENEFITS OF OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN?

A. OG&E's proposed plan will allow the Company to comply with emission limits under the EPA's RH and MATS rules. More specifically, the Company indicates that the environmental control systems it proposes to install on its coal-fired plants are expected to reduce NOx emissions by 50%, reduce mercury emissions by approximately 80% and reduce SO2 emissions by 90%. (Rowlett direct testimony, page 10) In addition, the Company's proposal to convert Muskogee Units 4 and 5 to burn natural gas would virtually eliminate SO2 emissions from these units.

Q. PLEASE DESCRIBE OG&E'S PROPOSED MUSTANG MODERNIZATION PLAN?

A. OG&E proposes to retire and replace four existing gas-fired steam generating units at the Mustang Generating Facility, which is located on the west side of Oklahoma City. The Company proposes to retire Mustang Unit 1 by the end of 2015, and to retire the other three Mustang units by the end of 2017. (Burch direct testimony, page 17.) As summarized in Table 2 below, the combined capacity of these generating units is approximately 463 MW, and the age of the units ranges from 55 to 64 years.

Table 2

Age and Capacity Rating of Mustang Gas Units

	Rated MW	COD	Age
Mustang 1	50	1950	64
Mustang 2	50	1951	63
Mustang 3	121	1955	59
Mustang 4	242	1959	55
	463		

Source is OG&E's response to OIEC 1-13.

Q. WHY IS OG&E PROPOSING TO RETIRE THE MUSTANG GENERATING UNITS BY 2017?

A. OG&E indicates that a recent study by Burns & McDonnell ("B&M") recommends that an operating age of 65 years represents a maximum expected life for gas-fired units such as the Mustang units. (Burch direct testimony, page 18.) Mustang Units 1 and 2 will be 65 years old at their planned retirement dates of 2015 and 2017. Although Mustang Units

3 and 4 will not be 65 years old until 2020 and 2024, respectively, OG&E cites increasing reliability concerns, economic considerations, technical obsolescence, increasing risk of catastrophic failure and certain permitting advantages, as the primary reasons for retiring these units several years earlier in 2017. (Burch direct testimony, pages 20-21.)

Q. HOW DOES OG&E PROPOSE TO REPLACE THE CAPACITY PROVIDED BY THE EXISTING MUSTANG GENERATING UNITS?

A. OG&E proposes to replace the four existing Mustang units with ten new 40MW gas-fired simple cycle combustion turbine ("CT") peaking units, which the Company plans to locate at the existing Mustang station site. The Company expects these new CT units to be operational beginning in 2018. (Burch direct testimony, page 26.)

Q. WHAT IS THE ESTIMATED COST OF THE PROPOSED NEW CTS?

A. The estimated capital cost of the proposed new CTs is approximately $414 million ($1,035/kW). The forecasted annual base rate revenue requirement for the Mustang Modernization plan is $73.8 million in 2020. (See Exhibit SN-2, derived from OG&E's response to OIEC 10-1.)

Q. PLEASE DESCRIBE OG&E'S PROPOSAL TO RECOVER FUTURE AQCS COSTS THROUGH ITS FAC RIDER?

A. OG&E is seeking to recover certain non-fuel operating costs associated with new AQCS which are implemented under its environmental compliance plan through its FAC Rider. (Richards' direct testimony, pages 5-6.) According to information provided in discovery,

it appears that these non-fuel costs that OG&E seeks to recover through its FAC Rider will be approximately $47 million per year by 2020, when the Company's proposed environmental compliance plan is fully implemented. (See Exhibit SN-3, OG&E's response to OIEC 5-14.)

Q. WHAT IS THE ESTIMATED COMBINED ANNUAL REVENUE REQUIREMENT FOR OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN AND MUSTANG MODERNIZATION PLAN?

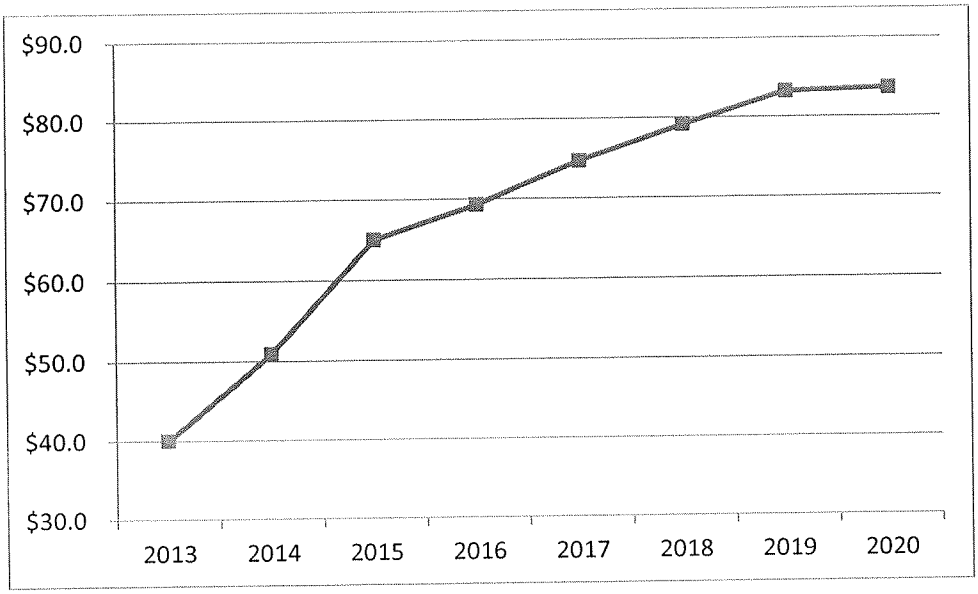
A. The estimated combined annual base rate revenue requirement for OG&E's environmental compliance plan and Mustang Modernization plan is approximately $214 million per year by 2020. (See Exhibit SN-2, OG&E's response to OIEC 10-1.)

Q. DOES OG&E ANTICIPATE OTHER SIGNIFICANT COST INCREASES OVER THE NEXT FIVE YEARS?

A. Yes. As shown in Table 3, OG&E also forecasts that annual charges from SPP for new transmission facilities and administrative charges will more than double from approximately $40 million in 2013 to $83.6 million per year by 2020.

Table 3

Forecasted OG&E Charges from SPP ($Millions)



Source: OG&E's response to OIEC 2-10.

Furthermore, OG&E's 2014 IRP indicates that it plans to add a new 560 MW gas-fired combined cycle unit in 2020. Based on OG&E's base case environmental compliance analysis, the capital and non-fuel operating cost of this new facility is expected to be approximately $130 million per year by 2020. (See Exhibit SN-4.) Taken together, the combined additional base rate revenue requirement for OG&E's environmental compliance plan, Mustang Modernization plan, SPP transmission charge increases and the new combined cycle unit to be added in 2020 is expected to be approximately $387 million per year by 2020.

IV. FUEL DIVERSITY VALUE

Q. DID OG&E CONSIDER THE VALUE OF FUEL DIVERSITY IN ITS EVALUATION OF ENVIRONMENTAL COMPLIANCE PLAN ALTERNATIVES?

A. Yes; in fact OG&E indicates that maintaining fuel diversity was one of its key objectives in designing its environmental compliance plan. The Company explained the importance of maintaining fuel diversity by noting that a recent study published by IHS Energy indicates that generation supply diversity had reduced U.S. power supply costs by $93 billion per year during the 2010-2012 period and that an evaluation over a longer period would show even greater benefits of fuel diversity in managing fuel price risk. (Rowlett direct testimony, page 9)

Q. HAS OG&E TAKEN STEPS TO PRESERVE THE BENEFITS OF FUEL DIVERSITY FOR ITS CUSTOMERS?

A. Yes. Unlike PSO, OG&E challenged the EPA's proposed RH FIP in the courts and in so doing was successful in delaying the compliance deadline from January of 2017 until January of 2019. Based on OG&E's forecasts of the differential between coal and SPP market energy prices, this delay in the RH compliance deadline is expected to result in significant fuel cost savings for OG&E's customers.

Q. HOW WOULD OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN IMPACT THE FUEL DIVERSITY OF OG&E'S SYSTEM?

A. Coal-fired generating capacity currently represents approximately 37% of the total installed capacity of OG&E's system. Under OG&E's proposed environmental compliance plan, coal-fired generating capacity would drop by approximately 39% to 21% of the Company's total system capacity by 2020. (See Exhibit SN-5)

As shown in Table 4 below, due to the approximate 39% reduction in coal-fired generating capacity under OG&E's proposed environmental compliance plan, coal-fired energy would decline from 42% of the total energy requirement of OG&E's system in 2013 to 27.9% of total energy supply by 2020. In contrast, OG&E's reliance upon natural gas and purchased energy would increase from 48% of the total system requirement in 2013 to 63.8% of the total requirement by 2020.

Table 4

OG&E's Energy Supply Mix for "Scrub/Convert" Plan

	Current 2013	Base Case 2020	Base Case 2030
Coal	42.0%	27.9%	27.9%
Natural Gas	32.1%	25.2%	44.0%
Purchased Power	15.9%	38.0%	19.8%
Wind	10.0%	8.9%	8.2%
Total	100.0%	100.0%	100.0%

Source: OG&E's response to OIEC 1-14.

Q. IS THE LOSS OF FUEL DIVERSITY ON OG&E'S SYSTEM AN INEVITABLE RESULT OF RECENTLY IMPLEMENTED AND PROPOSED EPA ENVIRONMENTAL REGULATIONS?

A. Not necessarily. It is important to note that OG&E could fully comply with MATS and RH requirements without early retirement or conversion of any of its coal units, simply by adding scrubbers to four units as prescribed under EPA's approved RH FIP. The Company's economic analyses suggest that the cost of such a plan would be essentially equivalent to OG&E's selected plan, even without considering the enormous fuel diversity value that would result from maintaining all five coal units in service.

Moreover, it is not possible to know for certain whether, when, or in what form, the EPA's recent proposed carbon regulations will be adopted. Furthermore, if and when carbon regulations are implemented by EPA, it is not possible to know how or when OG&E would be impacted by the Oklahoma's statewide carbon reduction compliance plan. For example, to the extent Oklahoma is allowed to use its vast potential for wind energy as a carbon mitigation resource, there may be little need for re-dispatch of coal resources for carbon mitigation, particularly if the 1,410 MW of early coal unit retirements and conversions already proposed by the Grand River Dam Authority ("GRDA") and PSO are implemented. For all of these reasons, OG&E should take a cautious approach to compliance and, to the extent possible, should not take actions that are irreversible and that would significantly diminish fuel diversity of its system.

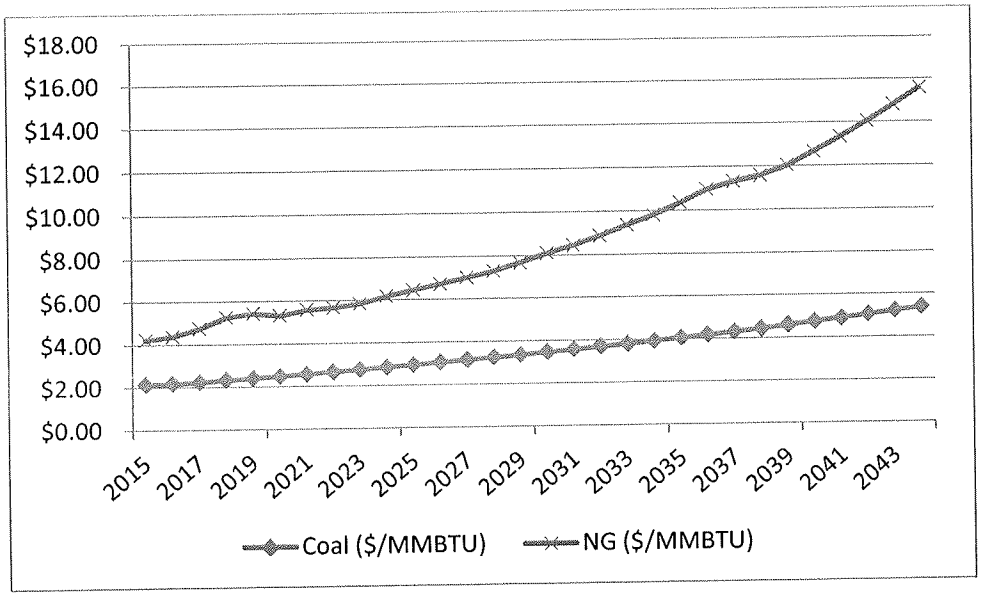
Q. WHY WOULD THE LOSS OF FUEL DIVERSITY UNDER OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN BE BAD FOR OKLAHOMA CONSUMERS AND INDUSTRY?

A. As shown in Table 5 below, according to OG&E's base case commodity price forecast, which is based on the U.S. Energy Information Administration's ("EIA") latest long-term

forecasts, natural gas prices are expected to be two to three times higher than coal prices over the next 25 years.

Table 5

OG&E's Base Case Fuel Price Forecast



Source is OG&E's response to OIEC 1-25

Due to the fact that natural gas prices are expected to remain significantly higher than coal prices, the increased reliance on natural gas and purchased power under OG&E's proposed environmental plan will result in much higher and more volatile fuel prices for its customers in the future. This significant increase in fuel costs under OG&E's proposed compliance plan, as well as other plans that further reduce coal-fired generation, is particularly problematic for OG&E's high load factor customers, such as OIEC's members, who consume large amounts of energy.

Q. WHAT IS THE EXPECTED IMPACT OF THE LOSS OF FUEL DIVERSITY UNDER OG&E'S PROPOSED PLAN AND THE RETIREMENT ALTERNATIVE ON OG&E'S SYSTEM FUEL COSTS?

A. According to OG&E's base case analysis, fuel and variable production costs under the Company's proposed Scrub/Convert plan are forecasted to be $3.6 billion higher on a nominal basis than the Scrub plan, and approximately $4 billion higher under the Replace plan, which assumes that four of the five existing OG&E coal units are retrofitted with scrubbers. (See Exhibit SN-6, OG&E's response to OIEC 3-12, Attachment 86.)

Q. WHAT IS THE FORECASTED INCREASE IN FUEL COSTS DUE TO THE LOSS OF FUEL DIVERSITY UNDER OG&E'S HIGH GAS PRICE SENSITIVITY?

A. As shown in Table 6 below, under OG&E's high gas sensitivity analysis, fuel and variable production costs would be approximately $8.5 billion higher on a nominal basis under the Company's proposed environmental compliance than costs under the Scrub alternative, and approximately $13.2 billion higher under the Replace option.

Table 6

Forecasted Increase in Fuel and Variable Production Costs
for OG&E Environmental Compliance Options
High Gas Price Sensitivity Case; 2015-2044 ($Millions)

	Total Nominal	Difference	%Difference
Scrub	$62,204		
Scrub/Convert	$70,687	$8,483	13.6%
Convert	$80,517	$18,313	29.4%
Scrub/Replace	$68,119	$5,915	9.5%
Replace	$75,383	$13,179	21.2%

Source: OG&E's response to OIEC 3-12, Attachment 86.

Q. WOULD OG&E'S CUSTOMERS BE AT RISK OF INCURRING SIMILAR COST INCREASES UNDER THE SCRUB COMPLIANCE PLAN IF THE EPA'S PROPOSED CARBON REGULATIONS WERE TO BE IMPLEMENTED?

A. OG&E has not analyzed the potential impact of the specific details of EPA's proposed carbon regulations on the Company's recommended Scrub/Convert compliance plan or on alternative compliance plans such as the Scrub plan. (See Exhibit SN-7, OG&E's response to OIEC 1-6.) While OG&E did evaluate a CO2 sensitivity case in an attempt to assess carbon risk, this sensitivity analysis does not attempt to model the provisions of EPA's proposal and, in fact, appears to significantly overstate the potential cost impact of EPA's proposed carbon regulations in a number of ways. For example, OG&E's CO2 analysis does not consider the carbon mitigation that would result from potentially higher levels of energy efficiency or wind energy purchases by OG&E. OG&E's analysis also does not consider the significant carbon mitigation that has already occurred in Oklahoma

due to the announced early retirement of approximately 1,410 MW of existing coal-fired generating capacity owned by PSO and GRDA. These planned retirements represent approximately 27% of the total existing coal-fired generating capacity in Oklahoma. When combined with carbon mitigation that would result from additional low-cost wind energy purchases, and the natural reduction in future carbon emissions that will occur as older gas-fired units are retired or displaced by energy produced from new gas-fired combined cycle units, Oklahoma may already be in position to meet the carbon emission limits established by EPA, with little additional compliance cost.

Finally, OG&E's CO2 sensitivity analysis does not appear to account for the probable increase in the demand for, and price of, natural gas due to future restrictions on CO2 emissions. As discussed later in my testimony, OG&E's high gas sensitivity analysis indicates that the cost advantage of the Scrub and Scrub/Convert plans over the Replace and Convert compliance alternatives increases when gas prices are higher. For these reasons, and because it seems quite possible that the final carbon regulations will be less stringent than the EPA's initial proposal, OG&E's CO2 sensitivity analysis provides a high estimate of the compliance cost for the Scrub and Scrub/Convert options that retain greater levels of coal-fired generation in operation.

Q. DOES OG&E HAVE OPTIONS TO OFFSET THE LOSS OF FUEL DIVERSITY THAT WOULD OCCUR UNDER THE COMPANY'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN?

A. Yes. As discussed later in my testimony, OG&E could acquire additional wind energy resources as a low-cost hedge against the increased exposure to potential natural gas and market price increases that would occur due to the permanent loss of 1,000 MW of coal-

fired generating capacity under its proposed environmental compliance plan. In fact, due to the very low level of current wind energy prices and the threat of new carbon regulations, the Company should immediately move forward to evaluate the acquisition of additional wind energy resources regardless of the environmental compliance plan which is ultimately selected.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE IMPORTANCE OF CONSIDERING FUEL DIVERSITY IN EVALUATING OG&E'S ENVIRONMENTAL COMPLIANCE PLAN.

A. There will be a significant permanent loss of fuel diversity under OG&E's proposed environmental compliance plan, due to the planned conversion of approximately 39% of the Company's existing owned coal-fired generating capacity to burn natural gas by 2019. The probable impact of this fuel diversity loss will be much higher and more volatile fuel prices on OG&E's system, which is particularly problematic for large and high load factor energy users. This fuel diversity impact should be carefully considered by the Commission in evaluating the Company's proposed compliance plan against alternative proposals. In any event, OG&E should immediately move forward to diversify its energy supply mix by soliciting bids to acquire additional wind energy resources.

V. OG&E'S ANALYSIS OF COMPLIANCE OPTIONS

Q. HAVE YOU REVIEWED THE ECONOMIC ANALYSIS PREPARED BY OG&E IN SUPPORT OF ITS PROPOSED ENVIRONMENTAL COMPLIANCE PLAN?

A. Yes. I have reviewed the modeling process, input assumptions and results of OG&E's economic analysis supporting the Company's proposed environmental compliance plan.

Q. PLEASE DESCRIBE OG&E'S MODELING OF ECONOMIC COSTS AND BENEFITS OF ENVIRONMENTAL COMPLIANCE OPTIONS?

A. OG&E's modeling of environmental compliance options is discussed in the direct testimony of OG&E witness Leon Howell, and also documented in the Company's 2014 Integrated Resource Plan ("IRP") Report. OG&E analyzed its environmental compliance plan in the context of its 2014 IRP analysis. This analysis reflects the Company's current forecasts of load (MWh), peak demand, unit retirements, new generation costs, emission control costs, fuel prices and CO2 costs. The analysis reflects forecasted operations of OG&E's resources within the new SPP IM environment, in which the Company now sells all of its generated energy into the market and purchases all of its energy from the SPP IM. (See Howell direct testimony, page 4.)

OG&E uses a multi-step modeling process for its IRP analysis. First, the Company uses the Ventyx PROMOD IV model to simulate the dispatch and energy prices for the SPP IM. OG&E then uses these SPP IM prices as an input to the PCI GenTrader production cost model, to calculate the production costs and generation revenues OG&E will be paid for energy it supplies to the SPP IM. (See Howell direct testimony, page 6.)

Q. WHAT COMPLIANCE ALTERNATIVES WERE EVALUATED BY OG&E?

A. OG&E evaluated the following five environmental compliance alternatives:

- Scrub/Convert - Scrub Sooner 1 by 2018 and Sooner 2 by 2019, and convert Muskogee Units 4 and 5 to burn natural gas by 2019;
- Scrub - Scrub Sooner 1 and Muskogee 4 by 2018, and scrub Sooner 2 and Muskogee 5 by 2019;
- Convert - Convert Sooner 1 and 2, and Muskogee Units 4 and 5 to burn natural gas by 2019;
- Scrub/Replace - Scrub Sooner 1 by 2018 and Sooner 2 by 2019, and replace Muskogee Units 4 and 5 with new gas combined cycle units by 2019; and
- Replace - Replace Sooner Units 1 and 2 and Muskogee Units 4 and 5 with new gas combined cycle units by 2019.

(See Howell direct testimony, page 6.)

Q. WAS THE MUSTANG MODERNIZATION PLAN REFLECTED IN OG&E'S ENVIRONMENTAL COMPLIANCE ANALYSIS?

A. Yes. OG&E's compliance analysis assumed that the existing Mustang gas-fired units were retired in all scenarios. The Company's compliance analysis further assumed that the existing Mustang units were either replaced by 400 MW of gas-fired simple cycle CT units (added in 2018 or 2019) or by a 560 MW gas-fired combined cycle unit added in 2018. (See Exhibit SN-8, OG&E's response to OIEC 10-6.)

Q. DID OG&E'S ENVIRONMENTAL COMPLIANCE ANALYSIS ADDRESS THE IMPACT OF UNCERTAINTY IN COMMODITY PRICES, EMISSIONS COSTS AND OTHER KEY FACTORS?

A. Yes. OG&E evaluated the effects of uncertainty in key variables on the costs of each the five environmental compliance options that were evaluated, including sensitivity analyses of higher gas prices, lower gas prices, higher coal unit retirements, lower coal unit retirements, lower load growth, and implementation of carbon taxes. (See Howell direct testimony, page 14.)

Q. HOW DOES THE COST OF OG&E'S PROPOSED SCRUB/CONVERT PLAN COMPARE TO OTHER OPTIONS UNDER OG&E'S BASE CASE ANALYSIS?

A. The costs of each of the compliance options evaluated by OG&E under the Company's base case analysis are summarized in Table 7 below. As shown, under OG&E's base case analysis, the Scrub and Scrub/Convert alternatives are the lowest cost compliance options and are forecasted to have similar costs, with the Scrub alternative having a $700 million lower nominal cost over the 30-year study period.

Table 7

Forecasted Base Case Revenue Requirement of Environmental Compliance Options
2015-2044 ($Millions)

	Total Nominal	Difference	Cumulative NPV	Difference
Scrub/Convert	$80,805		$22,351	
Scrub	$80,097	-0.9%	$22,423	0.3%
Convert	$82,505	2.1%	$22,484	0.6%
Scrub/Replace	$82,717	2.4%	$23,229	3.9%
Replace	$86,266	6.8%	$24,237	8.4%

Source: OG&E's response to OIEC 3-12, Attachment 86.

Q. HOW DOES THE COST OF OG&E'S PROPOSED COMPLIANCE PLAN COMPARE TO OTHER OPTIONS UNDER OG&E'S HIGH GAS COST SENSITIVITY ANALYSIS?

A. The costs of each of the compliance options evaluated by OG&E under the Company's high gas cost sensitivity analysis are summarized in Table 8 below. As shown, under OG&E's high gas case analysis the Scrub and Scrub/Convert alternatives are by far the lowest cost compliance options, with the Scrub alternative maintaining a $5.6 billion nominal cost advantage over the Scrub/Convert plan and a $15.4 billion cost advantage over the Replace alternative. These results reflect the significant value of fuel diversity produced under compliance plans that allow OG&E to retain higher levels of coal-fired generation.

Table 8

Forecasted High Gas Case Revenue Requirement of Environmental Compliance Options
2015-2044 ($Millions)

	Total Nominal	Difference	Cumulative NPV	Difference
Scrub/Convert	$95,819		$25,822	
Scrub	$90,207	-5.9%	$24,676	-4.4%
Convert	$103,026	7.5%	$27,234	5.5%
Scrub/Replace	$97,138	1.4%	$26,572	2.9%
Replace	$105,600	10.2%	$28,931	12.0%

Source: OG&E's response to OIEC 3-12, Attachment 86.

Q. HOW DOES THE COST OF OG&E'S PROPOSED COMPLIANCE PLAN COMPARE TO OTHER OPTIONS UNDER OG&E'S CO2 SENSITIVITY ANALYSIS?

A. The costs of each of the compliance options evaluated by OG&E under the Company's CO2 sensitivity analysis are summarized in Table 9 below. As shown, under OG&E's CO2 case analysis the proposed Scrub/Convert alternative maintains a slight present value advantage over other alternatives, with the exception of the Convert option which would convert four of OG&E's five coal units to burn natural gas by 2019. The total cost of the Scrub/Convert plan is approximately 1.5% lower on a present value basis than the cost of the Replace alternative, which assumes four of OG&E's five coal units are retired and replaced by new gas-fired combined cycle generating units.

Table 9

Forecasted CO2 Case Revenue Requirement of Environmental Compliance Options
2015-2044 ($Millions)

	Total Nominal	Difference	Cumulative NPV	Difference
Scrub/Convert	$100,211		$26,402	
Scrub	$102,163	1.9%	$27,046	2.4%
Convert	$98,639	-1.6%	$25,877	-2.0%
Scrub/Replace	$100,202	0.0%	$26,868	1.8%
Replace	$98,557	-1.7%	$26,806	1.5%

Source: OG&E's response to OIEC 3-12, Attachment 86.

Q. DO THE RESULTS OF OG&E'S CO2 SENSITIVITY ANALYSIS DEMONSTRATE THAT OG&E SHOULD RETIRE OR CONVERT ADDITIONAL OG&E COAL UNITS TO NATURAL GAS?

A. No. Under OG&E's compliance plan, coal-fired generating capacity will drop to approximately 21% of the Company's total installed capacity, which arguably would be at or near the minimum level that could reasonably provide a balanced power supply portfolio. The 1.5% to 2.4% difference between the proposed Scrub/Convert plan and other compliance alternatives is relatively small and well within the uncertainty inherent in a 30-year regional production cost analysis of this nature. Moreover, as explained earlier in my testimony, OG&E's CO2 sensitivity analysis overstates the potential cost impact of the EPA's proposed carbon regulations; therefore, the real cost difference between the Scrub/Convert and Scrub plans and the Replace and Convert alternatives is lower than suggested in Table 9. Furthermore, it is reasonable to expect that when and if

carbon regulations are finally adopted, the compliance requirements will be somewhat relaxed from EPA's initial proposal.

Q. ARE THERE OTHER REASONS WHY THE SCRUB AND SCRUB/CONVERT OPTIONS REPRESENT THE MOST APPROPRIATE COMPLIANCE ALTERNATIVES?

A. Yes. As discussed earlier in my testimony, by maintaining a diverse generation resource portfolio where coal provides in the range of 20% to 35% of the Company's total installed generating capacity, the Scrub and Scrub/Convert compliance plans would produce additional fuel diversity and operational flexibility that should allow OG&E to better respond to future market changes. In contrast, if additional OG&E coal units were to be retired or converted to natural gas, costs to customers would be higher and OG&E would no longer have sufficient coal-fired generating capability to protect customers from future natural gas and market price spikes and price volatility. For example, there is presently significant uncertainty regarding future SPP IM operations and energy price levels. If SPP IM prices are higher than currently forecasted due to unanticipated congestion or other factors, the additional coal-fired capacity that OG&E could access under the Scrub or Scrub/Convert compliance options, along with additional wind energy purchases, would provide a reasonable means to hedge against such increases.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS REGARDING OG&E'S ANALYSIS OF ENVIRONMENTAL COMPLIANCE OPTIONS.

A. OG&E analysis of environmental compliance options generally appears to have been conducted in a reasonable, thorough and balanced manner, using widely-accepted industry standard production cost models. The analytical approach used by OG&E is generally consistent with its past IRP evaluations, with the exception that it had to consider the impacts of the recently initiated SPP IM structure upon the future operations and energy costs of the OG&E system. The Company's analysis appears to have reasonably addressed the uncertainty in key variables that could significantly impact OG&E's future production costs under various compliance alternatives, including a range of natural gas prices and consideration of potential future CO2 compliance costs. The results of OG&E's analysis generally indicate that the Scrub and Scrub/Convert compliance options would offer the lowest base case costs, while also maintaining the highest levels of fuel diversity and operational flexibility to respond to future uncertainty in energy prices. For this reason, and due to the fact that the Scrub alternative provides much greater fuel diversity value than the Scrub/Convert plan, the Scrub alternative appears to represent the most reasonable compliance option for OG&E.

Q. ARE YOU CONCERNED THAT OG&E'S CUSTOMERS MAY BE EXPOSED TO ENVIRONMENTAL RISK IF THE SCRUB PLAN IS ADOPTED?

A. I have some concerns regarding future environmental cost exposure under the Scrub plan; however, I am more concerned that plans which call for higher level of coal plant retirements would leave customers far more exposed to future natural gas and market price increases. For example, OG&E's CO2 sensitivity analysis indicates that the forecasted cost of the Scrub plan is less than 1% higher than the forecasted cost of the

Replace alternative over the 30-year study period. However, under the high gas scenario, costs under the Replace compliance plan would be $4.2 billion (17%) higher than under the Scrub plan. Nevertheless, in the event the Commission remains concerned that future environmental regulations are likely to significantly increase the cost of coal-fired generation above the levels reflected in OG&E's analysis and outweighs the risk of a 39% loss of fuel diversity, I recommend adoption of the Company's proposed Scrub/Convert alternative, which represents the most reasonable alternative to the Scrub plan, in balancing lowest reasonable cost considerations against future concerns regarding environmental compliance while maintaining the significant fuel diversity value provided by coal-fired generation. In either case, OG&E should immediately solicit bids to acquire additional wind energy resources in order to reduce energy costs and to further enhance environmental compliance and fuel diversity of the Company's system.

VI. MUSTANG MODERNIZATION PLAN

Q. WHAT ASPECTS OF OG&E'S MUSTANG MODERNIZATION PLAN HAVE YOU REVIEWED IN THE COURSE OF PREPARING YOUR TESTIMONY?

A. I have reviewed the evidence presented by OG&E to support its proposal to retire the four existing Mustang gas-fired generating units by 2017. I also reviewed the evidence presented by OG&E to support its proposal to replace the retired Mustang generating units with approximately 400 MW of new gas-fired simple cycle CT generating capacity. Finally, I have evaluated whether OG&E has demonstrated that its request to recover

costs of the Mustang Modernization plan through the Company's proposed EGP Rider is reasonable and necessary.

Q. IS THE MUSTANG MODERNIZATION PLAN A PART OF OG&E'S ENVIRONMENTAL COMPLIANCE PLAN?

A. No.

Q. SHOULD THE MUSTANG MODERNIZATION PLAN BE APPROVED?

A. No.

Q. WHY DO YOU RECOMMEND THAT THE MUSTANG MODERNIZATION PLAN BE REJECTED?

A. OG&E included the Mustang Modernization plan in all modeling scenarios, except for a case that considered the replacement of retired Mustang capacity with a new 560 MW gas-fired combined cycle unit in 2018 instead of 400 MW of gas-fired simple cycle CTs. For example, OG&E admits that it has not solicited bids for acquisition or purchase of power from existing generating plants as an alternative to the proposed new Mustang CTs; that it did not consider short-term capacity purchase alternatives; and that it did not evaluate the option of repairing and deferral of the Mustang unit retirement dates until 2021 or later. (See Exhibit SN-9, OG&E's responses to OIEC 3-18, 10-12 and 10-14.) Without such alternative analyses, it is not possible to determine whether the proposed $414 million investment for new CTs to replace the retiring Mustang units is truly reasonable and necessary, or whether it represents the lowest reasonable cost alternative for supplying OG&E's future capacity requirements.

In addition, the workpapers provided by OG&E to support the capital and operating cost assumptions for the proposed Mustang replacement CTs consist of a single page without any detailed backup. (See Confidential Exhibit SN-10, OG&E's confidential response to OIEC 2-4.) This lack of detailed backup for the Mustang replacement costs raises serious questions regarding the accuracy of OG&E's forecasted costs and benefits of the plan. Moreover, because OG&E evaluated the Mustang Modernization plan in conjunction with its analyses of environmental compliance options, it is difficult to isolate the true costs and benefits of the proposed replacement CTs.

Q. NOTWITHSTANDING THE ABOVE DEFICIENCIES, DOES OG&E'S ECONOMIC ANALYSIS DEMONSTRATE THAT GAS-FIRED CTS ARE THE LOWEST REASONABLE COST ALTERNATIVE FOR REPLACEMENT OF THE EXISTING MUSTANG UNITS?

A. No. As summarized in Table 10 below, OG&E's analysis indicates that the forecasted base case cost of the proposed replacement CTs is approximately 0.1% (one tenth of one percent) lower than the combined cycle alternative over the 30-year study period. This very small difference falls well within the range of uncertainty that exists in forecasts of commodity prices and SPP IM prices over a 30-year period. Moreover, as shown in Table 10 below, OG&E's analysis indicates that the combined cycle alternative actually has a slight forecasted economic advantage over the CT replacement option in the high gas and CO2 sensitivity cases.

Table 10

Forecasted Revenue Requirement of Mustang Replacement Alternatives
Evaluated by OG&E (Cumulative NPV,2015-2044, $Millions)

	Base Case	High Gas Sensitivity	CO2 Sensitivity	Average
Combustion Turbines, 400 MW	$22,351	$25,822	$26,402	$24,858
Combined Cycle, 560 MW	$22,375	$25,812	$26,290	$24,826
Difference	0.107%	-0.039%	-0.424%	-0.131%

Source: OG&E's response to OIEC 3-12, Att. 86.

Q. DO THE RESULTS IN TABLE 10 ABOVE REASONABLY REFLECT THE COST OF THE COMBINED CYCLE ALTERNATIVE FOR REPLACEMENT OF RETIRED MUSTANG CAPACITY?

A. No. It is important to note that OG&E's analysis of the combined cycle alternative for replacement of the retired Mustang gas units, includes 160 MW more capacity (560 MW in 2018) than was included in OG&E's analysis of the CT replacement option (400 MW by 2019). (See Exhibit SN-8.) Based on OG&E's cost estimates for new combined cycle units, this 160 MW capacity difference increases the evaluated capital cost of the combined cycle alternative by approximately $205 million. If OG&E's analysis were revised to include 400 MW rather than 560 MW of new combined cycle capacity in 2018, consistent with the level of new capacity added in the CT case, the $205 million reduction in combined cycle capital costs would more than offset the very small base case

economic advantage of the proposed CT replacement alternative presented in Table 10 above.

Q. HAS OG&E PROVIDED ANY ANALYSIS THAT ADDRESSES THE RETIREMENT DATES FOR THE FOUR EXISTING MUSTANG GAS-FIRED UNITS?

A. Yes. The Company has provided a January 2012 engineering analysis by Burns & McDonnell ("B&M Report") that addresses the physical condition of the four Mustang gas units, and which was used to support the retirement dates used for OG&E's 2012 IRP. As summarized below in Table 11, the retirement dates based on the B&M Report are generally consistent with the retirement dates proposed by OG&E in this case for Mustang Units 1 and 2; however, the new retirement dates for Mustang Units 3 and 4 have been accelerated by 4 to 8 years, respectively.

Table 11

Change in Retirement Dates for Mustang Gas Units

	Rated MW	Age	2012 IRP Retire Dates	Current Proposed Retire Dates
Mustang 1	50	64	2016	2015
Mustang 2	50	63	2018	2017
Mustang 3	121	59	2021	2017
Mustang 4	242	55	2025	2017
	463			

Source is OG&E's responses to OIEC 1-13 and 1-18.

Q. IS OG&E'S PROPOSAL TO ACCELERATE THE RETIREMENT OF MUSTANG UNITS 1 AND 2 BY ONE YEAR REASONABLE?

A. Yes. Although there is no evidence that the reliability of these units has been a problem, or that the risk of catastrophic failure has materially increased since the 2012 IRP, Mustang Units 1 and 2 are relatively old and represent less than 1.5% of the Company's total system capacity. For this reason, OG&E should be able to accelerate their retirement and, if necessary, replace the retired capacity with short-term capacity purchases, without materially impacting the reliability or costs of the OG&E system. Moreover, the capacity factors of Mustang Units 1 and 2 have declined over the last four years and averaged just over 2% in 2013; therefore, acceleration of their retirement by one year should have little if any impact on OG&E's energy requirements or system energy costs. (See Confidential Exhibit SN-11.)

Q. HAS OG&E PROVIDED ANY NEW ANALYSIS TO DEMONSTRATE THAT ITS DECISION TO ACCELERATE THE RETIREMENT DATES FOR MUSTANG 3 AND 4 IS PRUDENT?

A. No. The 2012 B&M retirement analysis has not been updated. (See Exhibit SN-12, OG&E's response to OIEC 10-8.) As discussed earlier in my testimony, OG&E generally claims that certain reliability and economic concerns support its decision to accelerate the retirement dates of Mustang Units 3 and 4. However, OG&E has not provided convincing evidence to back these claims. For example, as shown in my Confidential Exhibit SN-11, the average equivalent availability ("EAF") performance of Mustang Units 3 and 4 over the last ten years has been very good. Moreover, there has been no discernible declining trend in reliability performance of the units since the Company's 2012 IRP analysis. Therefore, OG&E's claims that increasing reliability concerns led to its decision to accelerate the retirement dates for these units, appear to be unfounded.

Q. HAS OG&E PROVIDED CONVINCING SUPPORT FOR ITS EXPRESSED CONCERNS THAT MUSTANG UNITS 3 AND 4 ARE AT SIGNFICANT RISK OF CATASTROPHIC FAILURE IF THEY ARE OPERATED BEYOND 2017?

A. No. The Company has not identified any specific equipment problems that would increase the probability that Mustang Units 3 and 4 would experience catastrophic failure if they are operated beyond the proposed retirement date of 2017. (See Exhibit SN-13, OG&E's response to OIEC 1-20.) Moreover, Mustang Units 1 and 2 have operated for nearly 65 years with very high reliability and no catastrophic failures, which

demonstrates that similar operating experience could be achieved by Mustang Units 3 and 4 if they were operated until a similar age (i.e., until 2021 and 2025, respectively) (See Confidential Exhibit SN-11.)

Q. ARE THE ESTIMATED CAPITAL INVESTMENTS THAT MAY BE REQUIRED TO EXTEND RELIABLE OPERATIONS OF MUSTANG UNITS 3 AND 4 UNTIL 2021 OR LATER SIGNIFICANT?

A. According to the B&M Report, the estimated total capital investment necessary to continue reliable operations of Mustang Units 3 and 4 until 2021 or later are approximately $59 million. (See Confidential Exhibit SN-14.) This additional investment is significant, but far lower than the estimated $360 million cost to replace these units with new gas-fired combustion turbine units as proposed by OG&E. By repairing and deferring retirement of Mustang Units 3 and 4, OG&E could mitigate the significant rate impacts which are forecasted to occur during the next five years due to the Company's environmental compliance plan, rising costs for new high voltage transmission facilities authorized by SPP, and the Company's next new generating resource which is currently planned to be placed in service in 2020.

Q. ARE THERE OTHER REASONS WHY OG&E SHOULD CONSIDER EXTENDING THE RETIREMENT DATES OF MUSTANG UNITS 3 AND 4 UNTIL 2021 OR LATER?

A. Yes. In addition to mitigating the rate impacts resulting from replacement capacity that would occur over the next five years, as noted earlier in my testimony, OG&E's

economic analysis of replacement alternatives for the retired Mustang units indicates that a new combined cycle unit is likely to be a lower cost alternative to the new Mustang CTs proposed by OG&E. Moreover, as I previously noted, OG&E has not evaluated short-term market capacity purchases or solicited competitive bids for generating resources that might provide an even lower cost replacement for the retired Mustang capacity. For example, by delaying the retirement of Mustang Units 3 and 4 until 2021 or later, the Company could also investigate other options, such as potential extension of the existing PowerSmith and AES Shady Point purchased power agreements which are scheduled to expire in 2019 and 2022, respectively, which may further reduce the cost of replacement of Mustang 3 and 4.

Delaying the retirement of Mustang Units 3 and 4 until 2021 or later would also allow OG&E to gain additional experience with and understanding of SPP IM operations, thereby ensuring that its analysis of new resources to replace the retired Mustang capacity is more certain. In addition, delaying the retirements would allow time for OG&E to have a better understanding of the final form of the EPA's proposed carbon regulations, which also could influence the decision regarding the appropriate type of replacement capacity for Mustang Units 3 and 4.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS REGARDING OG&E'S REQUEST FOR PRE-APPROVAL AND RIDER COST RECOVERY FOR THE PROPOSED MUSTANG MODERNIZATION PLAN.

A. OG&E's Mustang Modernization plan is unrelated to the Company's environmental compliance plan and should be rejected. The evidence presented by OG&E in this case

does not demonstrate that retirement of Mustang Units 3 and 4 is necessary at this time, or that the replacement of the retired Mustang units with new gas-fired CT units is the lowest reasonable cost alternative. Based on analysis presented in the 2012 B&M Report, and the performance of Mustang Units 1 and 2 over the last ten years, it appears that Mustang Units 3 and 4 should be capable of operating reliably until 2021 or later with reasonable investments for replacement of critical systems as indicated by the B&M Report. Delaying the retirement of Mustang Units 3 and 4 until 2021 or later will help mitigate near-term rate impacts associated with replacement capacity, while also allowing OG&E additional time to solicit potentially lower cost alternatives, to gain more experience with the SPP IM operations, and to become more certain with the impacts of EPA's proposed carbon regulations on its resource requirements. For all of these reasons, I recommend that OG&E's request for pre-approval and cost recovery for the Mustang Modernization plan be denied.

VII. VALUE OF WIND ENERGY RESOURCES

Q. WHAT IS THE CURRENT LEVEL OF WIND ENERGY PURCHASED BY OG&E?

A. OG&E currently purchases 841 MW of wind energy. In 2013, these wind energy purchases supplied approximately 3 million MWh, which represented approximately 10% of OG&E's total system energy requirements. (See Table 4 of my testimony.)

Q. HAS OG&E RECENTLY EVALUATED THE AVAILABILITY AND PRICE OF WIND ENERGY RESOURCES?

A. Yes. OG&E issued a request for information ("RFI") from wind energy suppliers in 2013. (See Howell direct testimony, page 11.) According to the Company's 2014 IRP Report, in response to the 2013 RFI, 9 different companies offered wind pricing for projects in 20 locations in Oklahoma and Kansas, with average pricing of approximately $22/MWh for 20-year wind contracts. (See 2014 IRP Report, page 30.)

Q. DOES OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN INCLUDE NEW WIND ENERGY RESOURCES?

A. No. OG&E has not included any new wind energy purchases in its environmental compliance plan. Despite the recent declining trend in wind energy prices, and the fact that wind energy directly offsets SO2 and carbon emissions, the Company asserts that wind generation provides little capacity value and therefore does not effectively address the capacity needs of its environmental compliance plan. OG&E further states that it is concerned about low SPP IM prices for wind in areas where new wind resources are likely to be constructed as a result of transmission congestion charges in those areas. (See Howell direct testimony, page 20.)

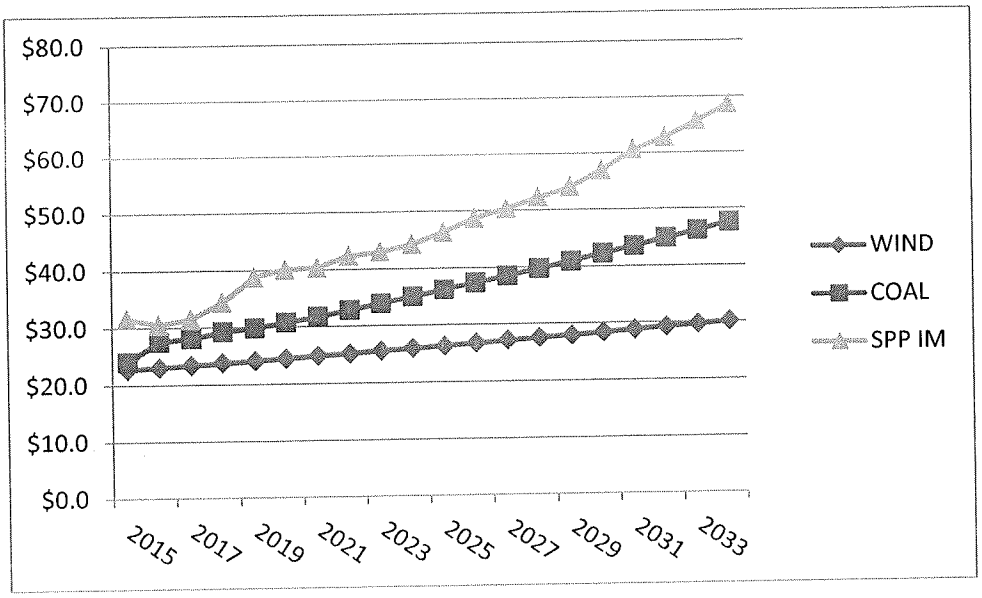
Q. IS OG&E'S CONCERN REGARDING THE LIMITED CAPACITY VALUE OF WIND ENERGY A VALID REASON TO EXCLUDE NEW WIND ENERGY RESOURCES FROM THE COMPANY'S ENVIRONMENTAL COMPLIANCE PLAN?

A. No. As shown in Table 12 below, the average price of wind energy resulting from responses to OG&E's 2013 RFI is significantly lower than the forecasted costs of coal-

fired energy and SPP IM energy prices over the next 20 years. For this reason, OG&E should acquire more wind energy simply based on the significant energy savings that would be produced from additional wind energy.

Table 12

OG&E's Base Forecasts of Wind, Coal and SPP IM Energy Costs ($/MWh)



Source is OG&E's response to OIEC 1-25.

Furthermore, new wind energy resources would increase fuel diversity of OG&E's system and would provide an effective long-term hedge against rising natural gas prices, at a time when OG&E is transitioning to greater usage of natural gas on its system.

Q. HAS OG&E PROVIDED ANY INFORMATION TO SUPPORT ITS EXPRESSED CONCERN THAT TRANSMISSION CONGESTION MAY RESULT IN CURTAILMENT OF WIND ENERGY DELIVERIES TO THE OG&E SYSTEM?

A. No. OG&E admits that it is not able to quantify the level of wind energy MWh lost due to curtailments. (See Exhibit SN-15, OG&E's responses to OIEC 3-25.)

Q. HAS OG&E CONDUCTED ANY ANALYSIS TO SUPPORT ITS EXPRESSED CONCERN THAT CONGESTION MAY RESULT IN VERY LOW SPP IM PRICES FOR WIND ENERGY?

A. No. OG&E admits that it does not yet have sufficient information on operations of the SPP IM to evaluate the impact of transmission congestions on wind energy deliveries to its system (See Exhibit SN-16, OG&E's response to OIEC 2-5.)

Q. HAS OG&E CONDUCTED ANY OTHER ECONOMIC ANALYSIS TO SUPPORT ITS DECISION NOT TO ACQUIRE ADDITIONAL WIND ENERGY AT THIS TIME?

A. No. (See Exhibit SN-16.)

Q. WOULD ADDITIONAL WIND ENERGY PURCHASES BY OG&E PRODUCE ENERGY SAVINGS THAT WOULD HELP OFFSET THE SIGNIFICANT RATE IMPACTS OF THE COMPANY'S ENVIRONMENTAL COMPLIANCE PLAN?

A. Yes. For example, based on current wind energy purchase levels of PSO, it appears that OG&E could at least double the current level of its wind energy purchases, since wind energy currently supplies only approximately 10% of the Company's total system energy requirements. If OG&E were able to purchase an additional 3 million MWh per year at an average cost of $22/MWh reflected in offers it received in response to the 2013 RFI, it could reduce energy costs on its system by approximately $47 million per year by 2020,

and thereby significantly offset the estimated rate impact of the Company's proposed environmental compliance plan. The total estimated energy savings of such additional wind energy would be over $1.2 billion on a total nominal cost basis over a 20-year contract period, based on OG&E's base case projections of SPP IM energy prices. (See Exhibit SN-17.)

Q. IS THERE SIGNIFICANT RISK THAT TRANSMISSION CONSTRAINTS AND CONGESTION CHARGES WILL PREVENT OG&E FROM IMPORTING ADDITIONAL WIND ENERGY AT ECONOMIC PRICES OVER THE NEXT 20 YEARS?

A. Given SPP's historical financial commitment to the development of high voltage transmission lines to facilitate wind energy exports and efficient market operations, it seems unlikely that transmission constraints or congestion would be likely to significantly limit OG&E's ability to import another 700 MW or more of wind energy over the next 20 years. OG&E has noted that new high voltage transmission facilities were recently placed in service that could alleviate the claimed congestion constraints that apparently have adversely impacted the cost of wind energy imports to OG&E since the SPP IM was implemented. (See Exhibit SN-18, OG&E's response to OIEC 5-5.) Moreover, the information provided by OG&E in response to discovery indicates that there have been relatively few and minor instances to date of curtailments of wind energy deliveries to OG&E. (See Exhibit SN-15.) Given these facts, and the growing importance of wind energy as a source of carbon mitigation, it seems unlikely that SPP

would allow transmission constraints or congestion to significantly impede the economic transfer of wind energy to OG&E and other utilities within SPP over a long-term period.

Q. WOULD ADDITIONAL WIND ENERGY ALSO PROVIDE ENVIRONMENTAL BENEFITS TO THE OG&E SYSTEM?

A. Yes. Although additional wind energy purchases are justified on their energy value alone, wind energy also directly offsets emissions that otherwise would be produced from OG&E's coal- and gas-fired power plants. In particular, additional wind energy purchases would help OG&E to comply with any new regulations which are adopted to reduce future carbon emissions from existing power plants.

Q. ARE THERE OTHER REASONS WHY OG&E SHOULD ACQUIRE ADDITIONAL WIND ENERGY RESOURCES AT THIS TIME?

A. Yes. Oklahoma is rich in wind energy potential and the state has established an energy policy to encourage the development of wind energy resources in Oklahoma. Moreover, there is no guarantee that existing federal wind energy production tax credits will be extended; therefore, wind energy prices may not remain at their currently low level in the future. Furthermore, to the extent that the EPA's proposed new carbon regulations serve to increase demand for wind energy, there could also be upward pressure on wind energy prices in the future. All of these considerations suggest that OG&E should actively pursue additional wind energy purchases at this time as an important component of its environmental compliance plan and overall system fuel diversity strategy.

Q. HAVE OTHER OKLAHOMA UTILITIES RECENTLY MOVED TO TAKE ADVANTAGE OF THE CURRENT LOW WIND ENERGY PRICES IN OKLAHOMA?

A. Yes. Earlier this year, Public Service Company of Oklahoma ("PSO") obtained Commission approval of three new 20-year wind energy contracts having a combined capacity of approximately 600 MW. These new contracts, which resulted from a request for proposals ("RFP") for renewable energy issued by PSO in June of 2013, generally reflect the pricing levels presented in OG&E's 2013 Wind RFI. (See OCC Cause No. 201300188.) For example, with these new wind energy contracts, PSO will have a total of approximately 1,288 MW of wind energy, which is expected to supply approximately 20% of the total annual energy requirement of the PSO system by 2016.

Q. HAS OG&E INDICATED THAT IT PLANS TO CONTINUE TO EVALUATE THE POTENTIAL FOR ACQUISITION OF NEW WIND RESOURCES?

A. Yes. The Company indicates that it intends to issue another Wind RFI in the Spring of 2015 to "gather market intelligence" that will be used to study wind energy options in its 2015 IRP. (See Howell direct testimony, page 20.) However, for the reasons I have discussed, there is no need to continue to study wind; the Company should instead issue an RFP seeking binding proposals for long-term wind energy resources as soon as possible.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS REGARDING OG&E'S FAILURE TO INCORPORATE NEW WIND ENERGY RESOURCES AS PART OF ITS ENVIRONMENTAL COMPLIANCE PLAN.

A. Oklahoma has abundant potential for wind energy development, and wind energy prices are at historic low levels. New wind resources could serve as a valuable long-term hedge against future increases in natural gas prices and could also produce immediate and significant fuel savings for customers, while at the same time providing a low-cost alternative for achieving OG&E's environmental compliance goals.

VIII. CONCLUSIONS

Q. PLEASE SUMMARIZE YOUR MAJOR CONCLUSIONS AND RECOMMENDATIONS REGARDING OG&E'S PROPOSED ENVIRONMENTAL COMPLIANCE PLAN AND MUSTANG MODERNIZATION PLAN?

A. OG&E's proposed Scrub/Convert compliance plan would reduce OG&E's coal-fired energy production capability by approximately 39% and greatly diminish fuel diversity of the Company's system. The forecasted total costs of the Scrub compliance plan is approximately $700 million lower on a nominal basis than the Scrub/Convert plan under OG&E's base case analysis, and $5.6 billion lower under the high gas price scenario. For these reasons I recommend that OG&E reconsider the Scrub compliance plan as an alternative to the proposed Scrub/Convert plan.

In addition, I recommend that OG&E's proposed $414 million Mustang Modernization plan be rejected due to the lack of evidence that this proposal is necessary

or that it represents the lowest reasonable cost option, and for other reasons addressed in my testimony.

Finally, I recommend that OG&E solicit and evaluate bids to acquire additional wind energy as soon as possible. Recent wind energy offers suggest that new long-term wind energy contracts would provide significant energy savings to offset rate impacts of OG&E's the environmental compliance plan, and at the same time increase fuel diversity and provide environmental benefits to OG&E's system.

Q. DOES THIS CONCLUDE YOUR RESPONSIVE TESTIMONY?

A. Yes.

CERTIFICATE OF SERVICE

On this 16th day of December 2014, a true and correct copy of the above and foregoing instrument was sent via electronic mail and/or regular U.S. Postal Service, postage fully prepaid there on to the following interested parties:

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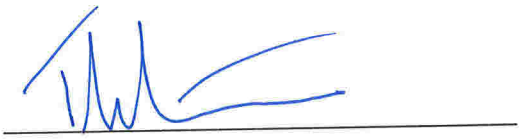

Thomas P. Schroedter

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RESUME OF DON SCOTT NORWOOD

Norwood Energy Consulting, L.L.C.

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SUMMARY

Scott Norwood is an energy consultant with over 30 years of experience in electric utility regulatory consulting, resource planning and energy procurement. Mr. Norwood has presented expert testimony in electric utility regulatory proceedings in Arkansas, Florida, Georgia, Iowa, Illinois, Michigan, Missouri, New Jersey, Oklahoma, South Dakota, Texas, Virginia, Washington and Wisconsin. His clients include government agencies, municipalities, industrial consortiums and various other electric consumer interests.

Since January of 2004 Mr. Norwood has served as President and sole proprietor of Norwood Energy Consulting, L.L.C. During this period he has provided electric utility regulatory consulting services focused primarily on the areas of electric resource planning, power supply system dispatch and operations, transmission planning analyses, and evaluations of electric utility fuel supply and purchased power issues. Before founding Norwood Energy Consulting, Mr. Norwood was employed for 18 years as a Principal and Director of the Deregulation Services Department of GDS Associates, Inc., an electric utility consulting firm based in Georgia. From 1984 to 1986 Mr. Norwood was employed as Manager of Power Plant Engineering for the Staff of the Public Utility Commission of Texas, and from 1980 to 1984 he was employed by Austin Energy as a Power Plant Engineer, in which capacity he directed electrical maintenance and design projects at three gas-fired power plants.

Mr. Norwood earned a Bachelor of Science degree in Electrical Engineering from the University of Texas in December of 1980.

EXPERIENCE

Energy Planning and Procurement Services

Dell Computer Corporation – Negotiated retail power supply agreement for Dell's Round Rock, Texas facilities producing annual savings in excess of $2 million.

Texas Association of School Boards Electric Aggregation Program – Serve as TASB's consultant in the development, marketing and administration of a retail electric aggregation program consisting of 2,500 Texas schools with a total load of over 300 MW. Program produced annual savings of more than $30 million in

its first year.

Oklahoma Industrial Energy Consumers - Analyzed and drafted comments addressing integrated resource plan filings by Public Service Company of Oklahoma and Oklahoma Gas and Electric Company.

S.C. Johnson - Analyzed and presented testimony addressing Wisconsin Electric Power Company's $4.1 billion CPCN application to construct three coal-fired generating units in southeast Wisconsin.

Oklahoma Industrial Energy Consumers - Analyzed wind energy project ownership proposals by Oklahoma Gas and Electric Company and presented testimony addressing project economics and operational impacts.

City of Chicago, Illinois Attorney General, Illinois Citizens' Utility Board - Analyzed Commonwealth Edison's proposed divestiture of the Kincaid and State Line power plants to SEI and Dominion Resources.

Georgia Public Service Commission - Analyzed and presented testimony on Georgia Power Company's integrated resource plan in a certification proceeding for an eight unit, 640 MW combustion turbine facility.

South Dakota Public Service Commission - Evaluated integrated resource plan and power plant certification filing of Black Hills Power & Light Company.

Shell Leasing Co. - Evaluated market value of 540 MW western coal-fired power plant.

Community Energy Electric Aggregation Program – Served as Community Energy's consultant in the development, marketing and start-up of a retail electric aggregation program consisting of major charitable organizations and their donors in Texas.

Austin Energy – Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Austin Energy - Provided technical assistance in the evaluation of the economic viability of the City of Austin's ownership interest in the South Texas Project.

Austin Energy - Assisted with regional production cost modeling analysis to assess production cost savings associated with various public power merger and power pool alternatives.

Sam Rayburn G&T Electric Cooperative - Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Rio Grande Electric Cooperative, Inc. - Directed preparation of power supply solicitation and conducted economic and technical analysis of offers.

Electric Restructuring Analyses

Electric Power Research Institute - Evaluated regional resource planning and power market dispatch impacts on rail transportation and coal supply procurement strategies and costs.

Arkansas House of Representatives – Critiqued proposed electric restructuring legislation and identified suggested amendments to provide increased protections for small consumers.

Virginia Legislative Committee on Electric Utility Restructuring – Presented report on status of stranded cost recovery for Virginia's electric utilities.

Georgia Public Service Commission – Developed models and a modeling process for preparing initial estimates of stranded costs for major electric utilities serving the state of Georgia.

City of Houston – Evaluated and recommended adjustments to Reliant Energy's stranded cost proposal before the Public Utility Commission of Texas.

Oklahoma Attorney General – Evaluated and advised the Attorney General on technical, economic and regulatory policy issues arising from various electric restructuring proposals considered by the Oklahoma Electric Restructuring Advisory Committee.

State of Hawaii Department of Business, Economics and Tourism – Evaluated electric restructuring proposals and developed models to assess the potential savings from deregulation of the Oahu power market.

Virginia Attorney General - Served as the Attorney General's consultant and expert witness in the evaluation of electric restructuring legislation, restructuring rulemakings and utility proposals addressing retail pilot programs, stranded costs, rate unbundling, functional separation plans, and competitive metering.

Western Public Power Producers, Inc. - Evaluated operational, cost and regional competitive impacts of the proposed merger of Southwestern Public Service Company and Public Service Company of Colorado.

Iowa Department of Justice, Consumer Advocate Division - Analyzed stranded investment and fuel recover issues resulting from a market-based pricing proposal submitted by MidAmerican Energy Company.

Cullen Weston Pines & Bach/Citizens' Utility Board - Evaluated estimated costs and benefits of the proposed merger of Wisconsin Energy Corporation and

Northern States Power Company (Primergy).

City of El Paso - Evaluated merger synergies and plant valuation issues related to the proposed acquisition and merger of El Paso Electric Company and Central & Southwest Company.

Rio Grande Electric Cooperative, Inc. - Analyzed stranded generation investment issues for Central Power & Light Company.

Regulatory Consulting

Oklahoma Industrial Energy Consumers - Assisted client with technical and economic analysis of proposed EPA regulations and compliance plans involving control of air emissions and potential conversion of coal-to-gas conversion options.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Consolidated Edison Company to provide the New York Public Service Commission with guidance in determining areas that should be reviewed in detailed management audit of the company.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony on affiliate energy trading transactions by AEP in ERCOT.

Georgia Public Service Commission - Presented testimony before the Georgia Public Service Commission in Docket 3840-U, providing recommendations on nuclear O&M levels for Hatch and Vogtle and recommending that a nuclear performance standard be implemented in the State of Georgia.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony addressing power production and coal plant dispatch issues in fuel prudence cases involving Oklahoma Gas and Electric Company.

Georgia Public Service Commission - Analyzed and provided recommendations regarding the reasonableness of nuclear O&M costs, fossil O&M costs and coal inventory levels reported in GPC's 1990 Surveillance Filing.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Rochester Gas & Electric Company to provide the New York Public Service Commission with guidance in determining areas which should be reviewed in detailed management audit of the company.

Oklahoma Attorney General – Analyzed and presented testimony regarding fuel and purchased power, depreciation and other expense items in Oklahoma Gas & Electric Company's 2001 rate case before the Oklahoma Corporation Commission.

City of Houston - Analyzed and presented testimony regarding fossil plant O&M expense levels in Houston Lighting & Power Company's rate case before the Public Utility Commission of Texas.

City of El Paso - Analyzed and presented testimony regarding regulatory and technical issues related to the Central & Southwest/El Paso Electric Company merger and rate proceedings before the PUCT, including analysis of merger synergy studies, fossil O&M and purchased power margins.

Residential Ratepayer Consortium - Analyzed Fermi 2 replacement power and operating performance issues in 1994 and 1995 fuel reconciliation proceedings for Detroit Edison Company before the Michigan Public Service Commission.

Residential Ratepayer Consortium - Analyzed and prepared testimony addressing coal plant outage rate projections in the Consumer's Power Company fuel proceeding before the Michigan Public Service Commission.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1991 rate case before the Public Utility Commission of Texas.

City of Houston - Analyzed and developed testimony regarding the operations and maintenance expenses and performance standards for the South Texas Nuclear Project, and operations and maintenance expenses for the Limestone and Parish coal-fired power plants in HL&P's 1991 rate case before the PUCT.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1990 rate case before the Public Utility Commission of Texas. Recommendations were adopted.

Power Plant Management

City of Austin Electric Utility Department - Analyzed the 1994 Operating Budget for the South Texas Nuclear Project (STNP) and assisted in the development of long-term performance and expense projections and divestiture strategies for Austin's ownership interest in the STNP.

City of Austin Electric Utility Department - Analyzed and provided recommendations regarding the 1991 capital and O&M budgets for the South Texas Nuclear Project.

Sam Rayburn G&T Electric Cooperative - Developed and conducted operational monitoring program relative to minority owner's interest in Nelson 6 Coal Station operated by Gulf States Utilities.

KAMO Electric Cooperative, City of Brownsville and Oklahoma Municipal

Power Agency - Directed an operational audit of the Oklaunion coal-fired power plant.

Sam Rayburn G&T Electric Cooperative - Conducted a management/technical assessment of the Big Cajun II coal-fired power plant in conjunction with ownership feasibility studies for the project.

Kamo Electric Power Cooperative - Developed and conducted operational monitoring program for client's minority interest in GRDA Unit 2 Coal Fired Station.

Northeast Texas Electric Cooperative - Developed and conducted operational monitoring program concerning NTEC's interest in Pirkey Coal Station operated by Southwestern Electric Power Company and Dolet Hills Station operated by Central Louisiana Electric Company.

Corn Belt Electric Cooperative/Central Iowa Power Cooperative - Perform operational monitoring and budget analysis on behalf of co-owners of the Duane Arnold Energy Center.

PRESENTATIONS

Quantifying Impacts of Electric Restructuring: Dynamic Analysis of Power Markets, 1997 NARUC Winter Meetings, Committee on Finance and Technology.

Quantifying Costs and Benefits of Electric Utility Deregulation: Dynamic Analysis of Regional Power Markets, International Association for Energy Economics, 1996 Annual North American Conference.

Railroad Rates and Utility Dispatch Case Studies, 1996 EPRI Fuel Supply Seminar.

Quantifying Potentially Stranded Costs: Modeling and Policy Issues, 1996 NASUCA Annual Meeting.

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
1	06/1995	South Dakota Public Utilities Commission	EL95-003	Black Hills Power & Light Company	Integrated resource plan evaluation.
2	07/11/96	Texas Public Utility Commission	14965	Central Power & Light Company	Method and Level of Potential Stranded Generation Cost Estimates
3	07/22/96	Public Service Commission of Wisconsin	6630-UR-109	Wisconsin Power & Light Company (Direct)	Revitalization Program Savings, A&G Expenses,
4	08/07/96	Illinois Commerce Commission	96-0245	Commonwealth Edison (Direct and Rebuttal)	Reasonableness of ComEd's Proposed Sale &
5	08/07/96	Illinois Commerce Commission	96-9248	Commonwealth Edison (Direct and Rebuttal)	Market Valuation of Kincaid & State Line Power Plants
6	08/08/96	Michigan Public Service Commission	U-10702-R	Commonwealth Edison (Direct and Supplement Direct)	Fermi 2 Replacement Power Costs
7	09/17/96	Iowa Department of Commerce Utilities Board	APP-96-1	MidAmerican Energy Company (Direct and Rebuttal)	Market-based Pricing Proposal and Potential Stranded
8	10/07/96	Public Service Commission of Wisconsin	6680-UM-100	Wisconsin Power & Light Company	Forecasted Primergy Merger Costs and Benefits
9	11/21/96	Iowa Department of Commerce Utilities Board	APP-96-1	MidAmerican Energy Company (Surrebuttal)	Market-based Pricing Proposal and Potential Stranded
10	05/14/97	Public Service Commission of Wisconsin	6680-UM-1000	Joint: WPL Holdings, Inc., and	Market-based Pricing Proposal and Potential Stranded
11	07/31/97	Arkansas Public Service Commission	96-360-U	Entergy Arkansas,Inc. (Direct)	Potential Stranded Costs, Forecasted Market Prices,
12	08/29/97	Michigan Public Service Commission	U-11453	Consumers Energy Company (Direct)	Electric Restructuring Policy, Proposed Abolition of
13	08/29/97	Michigan Public Service Commission	U-11449	The Detroit Edison Company (Direct)	Electric Restructuring Policy, Proposed Abolition of
14	09/19/97	Arkansas Public Service Commission	96-360-U	Entergy Arkansas, Inc. (Surrebuttal)	Potential Stranded Costs, Forecasted Market Prices,
15	12/23/97	State Corporation Commission of Virginia	PUE960296	Virginia Electric & Power Company	Stranded Costs, Alternative Rate Plan Provisions,
16	01/26/98	State of New Jersey Office of Administrative Law	EO97070461	Public Service Electric & Gas Company (Surrebuttal)	Analysis of Potential Impacts of Restructuring
17	02/17/98	Illinois Commerce Commission	98-0005	City of Chicago/Joint Petitioners (Direct)	Electric Reliabiltiy Rulemaking
18	02/17/98	Texas State Office of Administrative Hearings	473-97-1561 and 17751	Texas New Mexico Power Company	Analysis of Market Value of Generating Units and Evaluation of ECOM Attributable to Generating Assets and Purchased Power Contracts
19	03/09/98	Illinois Commerce Commission	98-0005	City of Chicago/Joint Petitioners (Rebuttal)	Electric Reliabiltiy Rulemaking
20	05/29/98	Georgia Public Service Commission	8708-U	Savannah Electric & Power Company (Direct)	Evaluation of the 1998 IRP Filing
21	11/25/98	State Corporation Commission of Virginia	PUE980462	Virginia Electric & Power Company (Direct)	Applicable Bidding Rules and the Appropriateness of Proposed Combustion Turbine Projects
22	03/05/99	Michigan Public Service Commission	U-11800	The Detroit Edison Company (Direct)	Reasonableness of 1999 PSCR Plan
23	05/21/99	State Corporation Commission of Virginia	PUE980814	American Electric Power-Virginia (Direct)	Retail Access Pilot Program
24	07/16/99	State Corporation Commission of Virginia	PUE980813	Virginia Electric & Power Company (Direct)	Retail Access Pilot Program
25	07/29/99	Michigan Public Service Commission	U-11528-R	The Detroit Edison Company (Direct)	Reasonableness of 1998 PSCR Reconciliation Proposal

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
26	10/14/99	State Corporation Commission of Virginia	PUE980814	American Electric Power-Virginia (Supplemental)	Retail Access Pilot Program
27	11/29/99	Corporation Commission of the State of Oklahoma	PUD 990000417	Oklahoma Gas & Electric Company (Direct)	Retail Access Pilot Program
28	12/06/99	Corporation Commission of the State of Oklahoma	PUD 990000417	Oklahoma Gas & Electric Company (Rebuttal)	Fluctuation Review and Fixed Fuel Cost Calculation
29	03/03/00	Michigan Public Service Commission	U-12121	The Detroit Edison Company (Direct)	Reasonableness of 2000 PSCR Plan
30	04/06/00	Public Service Commission of the State of Missouri	EC-99-553	Kansas City Power & Light Company (Surrebuttal)	Analysis and Conclusions of Benchmarking and Evaluation of Generating Assets Owned and Operated by KCPL
31	04/25/00	Corporation Commission of Oklahoma	PUD 200000020	Oklahoma Gas & Electric Company (Direct)	Generation Efficiency Performance Rider
32	05/19/00	Corporation Commission of Oklahoma	PUD 200000020	Oklahoma Gas & Electric Company (Rebuttal)	Generation Efficiency Performance Rider
33	08/08/00	Texas Public Utility Commission	22344	Generic Issues Associates with Unbundled Cost of Service Rate	Proposed Gas Price Solicitation Process used to Update ECOM Gas Prices and Market Prices
34	09/26/00	Texas Public Utility Commission	22349	Texas New Mexico Power Company (Direct *)	ECOM Modeling Proecess, Assumptions, and Results
35	09/19/00	Texas Public Utility Commission	22355	Reliant Energy HL&P (Direct)	Updated ECOM Calculations and Recommended Adjustments
36	09/26/00	Texas State Office of Administrative Hearings	473-00-1014	Texas New Mexico Power Company	Updated ECOM Calculations and Recommended Adjustments
37	09/26/00	Arkansas Public Service Commission	00-177-U	Entergy Arkansas, Inc.	Updated Stranded Cost Analysis and Stranded Cost Mitigation Measures
38	10/03/00	Texas Public Utility Commission	22352	Central Power and Light Company (Direct)	ECOM Modeling Proecess, Assumptions, and Results
39	12/12/00	Texas Public Utility Commission	22355	Reliant Energy HL&P (Supplemental)	Excess Mitigation and Methods for Crediting Excess Mitigation to Ratepayers
40	01/09/01	Texas State Office of Administrative Hearings	473-00-1017	Entergy Gulf States, Inc. (Direct)	ECOM Calculations
41	02/16/01	Michigan Public Service Commission	U-12604	Upper Peninsula Power Company (Direct)	2001 PSCR Factor
42	04/24/01	Texas Public Utility Commission	23718	Southwestern Public Service Company (Direct)	Reasonableness of SWEPCO's Application for Revised Fuel Factor
43	07/05/01	Texas State Office of Administrative Hearings	473-01-2667	Reliant Energy, Inc. (Direct)	Reconcilable Fuel Costs and Headroom Adjustments to the PTB
44	08/08/01	Texas State Office of Administrative Hearings	473-01-2825	TXU Electric Company (Direct)	PTB Fuel Factor Calculation and Rate Year Reconcilable Fuel Costs
45	08/24/01	State Corporation Commission of Virginia	PUE000584	Virginia Electric & Power Company (Direct)	Unbundled Rate and Capped Rate Fuel Cost Adjustment Proposal
46	09/07/01	State Corporation Commission of Virginia	PUE010011	Appalachian Power Company d/b/a American Electric Power-Virginia (Direct)	APCo's Unbundled Rate Proposal
47	09/17/01	Texas State Office of Administrative Hearings	473-01-3394	Entergy Gulf States, Inc. (Direct)	PTB Fuel Factor Calculation and Rate Year Reconcilable Fuel Costs
48	10/12/01	Texas Public Utility Commission	24460	Proceeding to Implement PUC Subst. R. 25.41(f)(3)(D) (Direct)	Gas Price Update to PTB Fuel Factor Proposal
49	10/26/01	Texas Public Utility Commission	24460	Proceeding to Implement PUC Subst. R. 25.41(f)(3)(D) (Direct)	Gas Price Update to PTB Fuel Factor Proposal and Initial Headroom
50	10/26/01	Texas State Office of Administrative Hearings	473-01-2825	TXU Electric Company (Direct)	Gas Price Update to PTB Fuel Factor Proposal and Initial Headroom

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
51	10/26/01	Texas Public Utility Commission	24236	TXU Electric Company (Direct)	Gas Price Update to PTB Fuel Factor Proposal and Initial Headroom
52	10/26/01	Texas State Office of Administrative Hearings	473-01-2667	Reliant Energy, Inc. (Direct)	Gas Price Update to PTB Fuel Factor Proposal and Initial Headroom
53	05/29/02	Texas Public Utility Commission	23320	ERCOT (Direct)	Proposed Rates and Reasonableness Standard set in PURA §39.151(e); ERCOT's Functional Accounting
54	06/11/02	Oklahoma Corporation Commission	PUD 200100455	Oklahoma Gas and Electric (Direct)	Proposed Revenue Requirement; Reasonableness of CUP Rider, TIR Rider, and Rate Moratorium Proposals; Modifications to Rider for Off-System Sales and
55	08/15/02	Oklahoma Corporation Commission	PUD 200100455	Oklahoma Gas and Electric (Surrebuttal)	Review and Reconciliation of Off-System Sales Margin Credit Calculations
56	10/03/02	Texas State Office of Administrative Hearings	473-02-3169	West Texas Utilities Company (Direct)	Reasonableness of Final Fuel Reconciliation
57	11/07/02	Texas State Office of Administrative Hearings	473-02-3169	West Texas Utilities Company (2nd Supplemental)	Reasonableness of Final Fuel Reconciliation
58	12/03/02	Texas Public Utility Commission	26933	Reliant Energy Retail Services, LLC (Direct)	Reasonableness of Proposed Adjustments to PTB Fuel Factor
59	12/31/02	Texas Public Utility Commission	26195	Texas Genco and CenterPoint Energy (Direct)	Reasonableness of Estimated Costs and Benefits under a Joint Operating Agreement
60	01/27/03	Texas Public Utility Commission	26186	Southwestern Public Service Company (Direct)	Reasonableness of Reconcilable Fuel and Purchased Power Expenses for 24-month Reconciliation Period
61	02/10/03	Texas Public Utility Commission	27320	Reliant Energy Retail Services, LLC (Direct)	Reasonableness of Proposed Increase to PTB Fuel Factor and the Reasonableness of Rate Case Expenses
62	04/09/03	Texas Public Utility Commission	27035	Central Power and Light Company (Direct)	Reasonableness of CPL's Request to Reconcile Fuel Costs
63	04/10/03	Texas Public Utility Commission	26194	El Paso Electric Company (Direct)	Reasonableness of EPE's Request to Reconcile Fuel Costs
64	06/26/03	Texas Public Utility Commission	27956	Reliant Energy, and Retail Services, LCC (Direct)	Reasonableness of Reliant's Proposal to Increase PTB Fuel Factors
65	07/07/03	Public Service Commission of Wisconsin	05-CE-130	Wisconsin Electric Power Company (Direct)	Reasonableness of Input Assumptions and Results of Economic Analysis of ERGS
66	07/18/03	Texas Public Utility Commission	27576	Texas-New Mexico Power Company (Direct)*	Reasonableness of TNMP's Application for Final Reconciliation of Fuel Costs
67	08/19/03	Texas Public Utility Commission	26000	West Texas Utilities Company (Remand Direct)	Reasonableness of WTU's Application to Reconcile Eligible Fuel Expenses and Fuel Factor Revenues
68	08/26/03	Public Service Commission of Wisconsin	05-CE-130	Wisconsin Electric Power Company (Rebuttal)	Reasonableness of FEIS Economic Analysis of ERGS
69	08/26/03	Public Service Commission of Wisconsin	05-CE-130	Wisconsin Electric Power Company (Surrebuttal)	Reasonableness of Input Assumptions and Results of Economic Analysis of ERGS
70	09/05/03	State Corporation Commission of Virginia	PUE-2003-00285	Virgnia Electric and Power Company (Direct)	Reasonableness of VEPCO's natural gas, coal, and purchased energy price forecasts underlying the Company's Fuel Factor Proposal
71	10/28/03	Texas Public Utility Commission	26195	Texas Genco and CenterPoint Energy (Refiled Direct)	Reasonableness of Estimated Costs and Benefits under a Joint Operating Agreement
72	11/05/03	Texas Public Utility Commission	28045	Southwestern Public Service Company (Direct)	Reasonableness of SWEPCO's Application for Reconciliation of Fuel Costs
73	12/12/03	Michigan Public Service Commission	U-13808	The Detroit Edison Company (Direct)	Analysis and Recommendations regarding DECO's proposed 2004 PSCR Plan applications and PSCR factor
74	02/27/04	Oklahoma Corporation Commission	PUD 200400004	Oklahoma Gas and Electric (Direct)	Request for Approval of McClain PPA
75	03/26/04	Michigan Public Service Commission	U-13808	The Detroit Edison Company (Direct)	Rebuttal Testimony Addressing DECO's proposed 2004 PSCR Plan applications and PSCR factor

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
76	03/29/04	Texas Public Utility Commission	29206	Texas New Mexico Power Company	Reasonableness of TNMP's Application for Final True-up of Stranded Costs
77	06/01/04	Texas Public Utility Commission	29526	CenterPoint, TGN, Reliant	Reasonableness of Applicants' Application for Final True-up of Stranded Costs
78	07/19/04	State of Wisconsin Division of Hearings and Appeals	3-SE-01-41-0005-0019	Wisconsin Electric Power Company	Authority for construction of ERGS facilities in Lake Michigan lakebed.
79	07/24/04	State of Wisconsin Division of Hearings and Appeals	IH-04-03	Wisconsin Electric Power Company	Comparison of environmental, social, capital and operating costs of proposed ERGS SCPC units to IGCC alternatives
80	8/9/04	State of Wisconsin Division of Hearings and Appeals	3-SE-01-41-0005-0019	Wisconsin Electric Power Company	WEPCO's failure to conduct a practicable alternatives analysis for wetlands impact of the ERGS.
81	8/18/04	Texas Public Utility Commission	29526	CenterPoint, TGN, Reliant	Reasonableness of Applicants' request for interest on claimed stranded costs; contribution of capacity auction true-up to return on stranded costs.
82	09/02/04	Texas Public Utility Commission	29526	CenterPoint, TGN, Reliant	Reasonableness of Applicants' request for interest on claimed stranded costs; contribution of capacity auction true-up to return on stranded costs.
83	9/10/04	Texas Public Utility Commission	27035	AEP TCC	Level and cost of capacity included in TCC's summer on-peak block energy purchases
84	09/27/04	State of Wisconsin Division of Hearings and Appeals	3-SE-01-41-0005-0019	Wisconsin Electric Power Company	Authority for construction of ERGS facilities in Lake Michigan lakebed.
85	10/26/04	Texas Public Utility Commission	29801	Southwestern Public Service Company (Direct)	Reasonableness of SWEPCO's Application for Reconciliation of Fuel Costs
86	11/22/04	Texas Public Utility Commission	29206	Texas New Mexico Power Company (Remand Direct)	Reasonableness of TNMP's Claim for Interest on Final True-up Costs
87	1/18/05	Texas Public Utility Commission	29703	AEP Texas North Company (Direct)	Reasonableness of TNC's Final True-up Costs
88	1/20/05	Michigan Public Service Commission	U-14274	Consumers Energy Company (Direct)	Reasonableness of CECO's proposed 2005 PSCR Plan
89	2/23/05	Texas Public Utility Commission	30143	El Paso Electric Company (Direct)	Reasonableness of EPE's Request to Reconcile Fuel Costs
90	5/26/05	State Corporation Commission of Virginia	PUE2005-0012	Craig-Botetourt ECI (Direct)	General Rate Case, Power Supply Procurement Process
91	7/25/05	Oklahoma Corporation Commission	PUD 2002-00754	Public Service Company of Oklahoma (Direct)	Energy Trading Margins Allocation
92	09/02/05	Texas Public Utility Commission	31056	AEP TCC (Direct)	Reasonableness of TCC's Final True-up Costs
93	9/12/05	Oklahoma Corporation Commission	PUD 2005-00151	Oklahoma Gas and Electric (Direct)	Revenue Requirements, planning prudence, cost allocation
94	11/28/05	Louisiana Public Service Commission	U-27469	Entergy Gulf States, Inc. and Entergy Louisiana, Inc. (Direct)	Reasonableness of Settlement on Avoided Energy Costs
95	11/29/05	State Corporation Commission of Virginia	PUE2005-00056	Appalachian Power Company (Direct)	General Rate Case, Environmental and Reliability Costs
96	4/17/06	Texas Public Utility Commission	32475	AEP TCC (Direct)	Reasonableness of TCC's Securitization Proposal
97	4/25/06	State Corporation Commission of Virginia	PUE2006-00032	Delmarva Power & Light Company (Direct)	General Rate Case, Purchased Power Costs
98	5/15/06	Texas Public Utility Commission	31994	Texas New Mexico Power Company (Direct)	Reasonableness of TNP's CTC Proposal
99	8/24/06	Texas Public Utility Commission	32758	AEP TCC (Direct)	Reasonableness of TCC's CTC Proposal
100	10/04/06	State Corporation Commission of Virginia	PUE2006-00065	Appalachian Power Company (Direct)	General Rate Case, Off-System Sales and Jurisdictional Allocation

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY / COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
101	8/24/06	Texas Public Utility Commission	32758	AEP TCC (Direct)	Reasonableness of TCC's CTC Proposal
102	12/15/06	Texas Public Utility Commission	32766	Southwestern Public Service Company (Direct)	General Rate Case, Purchased Power Costs, Market-Based Sales
103	1/25/07	Texas Public Utility Commission	33106	Texas New Mexico Power Company (Direct)	Reasonableness of TNMP's CTC Carrying Charge Proposal
104	1/30/07	Texas Public Utility Commission	32898	Southwestern Electric Power Company (Direct)	Reasonableness of Fuel and Purchased Power Costs
105	2/15/07	Texas Public Utility Commission	31461	AEP TNC (Direct)	Reasonableness of TNC's CTC Proposal
106	3/13/07	Texas Public Utility Commission	33309	AEP TCC (Direct)	Reasonableness of Proposed Cost Allocation, Rate Design and Tariffs
107	3/13/07	Texas Public Utility Commission	33310	AEP TNC (Direct)	Reasonableness of Proposed Cost Allocation, Rate Design and Tariffs
108	3/20/07	Oklahoma Corporation Commission	PUD 2006-00285	Public Service Company of Oklahoma (Direct)	Non-fuel O&M, fuel costs, energy trading margins, purchased capacity costs
109	4/9/07	Oklahoma Corporation Commission	PUD 2006-00285	Public Service Company of Oklahoma (Rebuttal)	Non-fuel O&M, fuel costs, energy trading margins, purchased capacity costs
110	4/27/07	Texas Public Utility Commission	33687	Entergy Gulf States, Inc.	Transition to Competition Plan
111	5/21/07	Oklahoma Corporation Commission	PUD 2006-00030	Public Service Company of Oklahoma (Direct)	Prudence of Red Rock Generating Plant
112	5/21/07	Oklahoma Corporation Commission	PUD 2007-00012	Oklahoma Gas & Electric Company (Direct)	Prudence of Red Rock Generating Plant
113	6/8/07	Texas Public Utility Commission	33734	AEP/ETT	Formation of ETT Transmission Utility
114	6/18/07	Oklahoma Corporation Commission	PUD 2006-00030	Public Service Company of Oklahoma (Rebuttal)	Prudence of Red Rock Generating Plant
115	6/18/07	Oklahoma Corporation Commission	PUD 2007-00012	Oklahoma Gas & Electric Company (Rebuttal)	Prudence of Red Rock Generating Plant
116	6/19/07	Arkansas Public Service Commission	04-113-U	Entergy Arkansas Inc. (Direct)	Calculation of Avoided Energy Costs
117	7/24/07	Arkansas Public Service Commission	04-113-U	Entergy Arkansas Inc. (Surrebuttal)	Calculation of Avoided Energy Costs
118	9/26/07	Texas Public Utility Commission	34470	Southwestern Public Service Company (Direct)	System Loss Evaluation
119	10/01/07	State Corporation Commission of Virginia	PUE-2007-00067	Appalachian Power Company (Direct)	Fuel Factor Evaluation
120	10/03/07	State Corporation Commission of Virginia	PUE-2007-00069	Appalachian Power Company (Direct)	Environmental and Reliability Surcharge
121	11/02/07	State Corporation Commission of Virginia	PUE-2007-00066	Dominion Virginia Power (Direct)	Wise County Coal Plant Application
122	12/10/07	State Corporation Commission of Virginia	PUE-2007-00068	Appalachian Power Company (Direct)	WV IGCC Power Plant Proposal
123	1/18/08	Texas Public Utility Commission	34410	AEP TCC (Direct)	Oklaunion Sale True-up
124	4/4/08	Oklahoma Corporation Commission	PUE 2007-00365	Public Service Company of Oklahoma (Direct)	Fuel Prudence Review
125	4/11/08	Texas Public Utility Commission	34800	Entergy Gulf States, Inc. (Direct)	Fuel Reconciliation Case

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
126	5/15/08	Oklahoma Corporation Commission	PUD 2007-00364	Oklahoma Gas & Electric Company (Direct)	Fuel Prudence Review
127	5/23/08	Texas Public Utility Commission	33672	ERCOT (Direct)	Competitive Renewable Energy Zones for Wind Generation
128	6/3/08	Texas Public Utility Commission	33672	ERCOT (Rebuttal)	Competitive Renewable Energy Zones for Wind Generation
129	6/12/07	State Corporation Commission of Virginia	PUE-2008-00039	Dominion Virginia Power (Direct)	Fuel Factor Application
130	7/11/08	Oklahoma Corporation Commission	PUD 2008-00148	Oklahoma Gas & Electric Company (Direct)	Proposed Transmission for Wind Generation
131	7/17/08	Oklahoma Corporation Commission	PUD 2007-00364	Oklahoma Gas & Electric Company (Rebuttal)	Fuel Prudence Review
132	8/13/08	State Corporation Commission of Virginia	PUE-2008-00045	Appalachian Power Company (Direct)	Environmental and Reliability Surcharge
133	9/26/08	State Corporation Commission of Virginia	PUE-2008-00046	Appalachian Power Company (Direct)	Capacity Equalization, capital additions, production O&M
134	10/3/08	State Corporation Commission of Virginia	PUE-2008-00033	Potomac Edison Company (Direct)	Purchased Power Cost Recovery
135	10/13/08	Texas Public Utility Commission	35763	Southwestern Public Service Company (Direct)	Incremental Cost of Wholesale Sales, OSS and Commodity Trading Margins
136	10/29/08	Oklahoma Corporation Commission	PUE 2008-00144	Public Service Company of Oklahoma (Direct)	Capital additions, affiliate charges, corporate strategy
137	11/5/08	Oklahoma Corporation Commission	PUE 2008-00144	Public Service Company of Oklahoma (Direct)	Base rate fuel costs, reactive power charges
138	1/7/09	Texas Public Utility Commission	36324	Southwestern Electric Power Company (Direct)	Interim Fuel Factor Proposal
139	6/23/09	State Corporation Commission of Virginia	PUE-2009-00038	Appalachian Power Company (Direct)	Fuel Factor Evaluation
140	6/24/09	Oklahoma Corporation Commission	PUD 2008-00398	Oklahoma Gas & Electric Company (Direct)	General Rate Case, Rate Design Issues
141	6/25/09	State Corporation Commission of Virginia	PUE-2009-00016	Dominion Virginia Power (Direct)	Fuel Factor Application
142	8/27/09	State Corporation Commission of Virginia	PUE-2009-00039	Appalachian Power Company (Direct)	Environmental and Reliability Surcharge
143	9/29/09	Oklahoma Corporation Commission	PUD 2009-00167	Oklahoma Gas & Electric Company (Direct)	Certification of OU Spirit Wind Generation Project
144	11/2/09	State Corporation Commission of Virginia	PUE-2009-00019	Dominion Virginia Power (Direct)	General Rate Case
145	11/17/09	Washington Utilities and Trade Commission	UE-090704	Puget Sound Energy (Direct)	General Rate Case
146	12/28/09	State Corporation Commission of Virginia	PUE-2009-00030	Appalachian Power Company (Direct)	Base rate case, capacity equalization charges
147	1/13/10	State Corporation Commission of Virginia	PUE-2009-00081	Dominion Virginia Power (Direct)	DSM Cost Recovery, Voltage Reduction Program
148	1/28/10	Washington Utilities and Trade Commission	UE-070725	Puget Sound Energy (Direct)	Ratemaking Treatment of REC Sale Proceeds
149	3/17/10	Oklahoma Corporation Commission	PUE 2009-00158	Public Service Company of Oklahoma (Direct)	Affiliate Energy Trading Costs
150	5/6/10	Texas Public Utility Commission	37162	Southwestern Electric Power Company (Direct)	Energy Trading Margin Refund

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
151	6/11/10	Oklahoma Corporation Commission	PUD 2010-00037	Oklahoma Gas & Electric Company (Direct)	Crossroads Wind Generation Project
152	7/6/10	Texas Public Utility Commission	38361	El Paso Electric Company (Direct)	Mine Reclamation Costs
153	7/12/10	Texas Public Utility Commission	37162	Southwestern Electric Power Company (Direct)	Affiliate Energy Trading Costs
154	7/20/10	Oklahoma Corporation Commission	PUE 2009-00158	Public Service Company of Oklahoma (Surrebuttal)	Affiliate Energy Trading Costs
155	9/10/10	Texas Public Utility Commission	38339	CenterPoint Energy Houston Electric, LLC (Direct)	Storm Hardening and Distribution O&M Expenses
156	10/05/10	Oklahoma Corporation Commission	PUE 2010-00092	Public Service Company of Oklahoma (Direct)	Wind Energy PPA, REC Treatment
157	10/26/10	Oklahoma Corporation Commission	PUE 2010-00050	Public Service Company of Oklahoma (Direct)	Base Rate Case
158	1/7/11	State Corporation Commission of Virginia	PUE-2010-00126	Northern Virginia Electric Cooperative (Direct)	Biomass Power Plant CPCN
159	1/14/11	Oklahoma Corporation Commission	PUD 2010-00146	Oklahoma Gas & Electric Company (Direct)	SPP Cost Tracker
160	3/11/11	Oklahoma Corporation Commission	PUD 2010-00175	Oklahoma Gas & Electric Company (Direct)	2009 Fuel Prudence Review
161	3/15/11	Arkansas Public Service Commission	10-067-U	Oklahoma Gas & Electric Company (Direct)	Coal Inventory, Production O&M, ECR Revisions
162	4/1/11	Oklahoma Corporation Commission	PUD 2010-00172	Public Service Company of Oklahoma (Direct)	Fuel Prudence Review
163	7/20/11	State Corporation Commission of Virginia	PUE-2011-00037	Appalachian Power Company (Direct)	Base rate case, capacity equalization charges
164	7/21/11	State Corporation Commission of Virginia	PUE-2011-00027	Dominion Virginia Power (Direct)	Performance Incentive Program
165	7/29/11	State Corporation Commission of Virginia	PUE-2011-00035	Appalachian Power Company (Direct)	Environmental Compliance Rate Adjustment Clause
166	8/23/11	State Corporation Commission of Virginia	PUE-2011-00034	Appalachian Power Company (Direct)	RPS Rate Adjustment Clause
167	9/12/11	Texas Public Utility Commission	39504	CenterPoint Energy Houston Electric, LLC (Direct)	Stranded Cost Remand
168	9/16/11	Oklahoma Corporation Commission	PUD 2011-00106	Public Service Company of Oklahoma (Direct)	SPP Transmission Cost Recovery Rider
169	11/22/11	State Corporation Commission of Virginia	PUE-2011-00073	Dominion Virginia Power (Direct)	Biomass Conversion Projects
170	12/7/11	Washington Utilities and Trade Commission	UE-111048	Puget Sound Energy (Direct)	Lower Snake River Wind Generation Project
171	1/17/12	State Corporation Commission of Virginia	PUE-2011-00093	Dominion Virginia Power (Direct)	DSM Program Evaluation and Cost Recovery
172	2/8/12	Oklahoma Corporation Commission	PUD 2011-00186	Oklahoma Gas & Electric Company (Direct)	OSU Special Contract
173	4/6/12	Oklahoma Corporation Commission	PUD 2011-00132	Oklahoma Gas & Electric Company (Direct)	2010 Fuel Prudence Review
174	4/30/12	Oklahoma Corporation Commission	PUD 2011-00129	Public Service Company of Oklahoma (Direct)	2010 Fuel Prudence Review
175	6/21/12	Texas Public Utility Commission	40020	Lone Star Transmission, LLC (Direct)	Transmission O&M Expenses

TESTIMONY OF DON SCOTT NORWOOD

NO.	FILING DATE	REGULATORY AGENCY/COURT	DOCKET/CASE	UTILITY APPLICANT	ISSUES
176	9/14/12	Oklahoma Corporation Commission	PUD 2011-00186	Oklahoma Gas & Electric Company (Direct)	SPP Cost Rider
177	12/10/12	Texas Public Utility Commission	40443	Southwestern Electric Power Company (Direct)	Turk Settlement Costs, Welsh 2 Retirement, Production O&M
178	1/8/13	Oklahoma Corporation Commission	PUD 2012-00054	Public Service Company of Oklahoma (Direct)	Environmental Compliance Plan
179	2/11/13	Oklahoma Corporation Commission	PUD 2012-00054	Public Service Company of Oklahoma (Rebuttal)	Environmental Compliance Plan
180	3/1/13	State Corporation Commission of Virginia	PUE-2012-00128	Dominion Virginia Power (Direct)	Brunswick CCCT CCN
181	3/22/13	Oklahoma Corporation Commission	PUD 2012-00054	Public Service Company of Oklahoma (Surrebuttal)	Environmental Compliance Plan
182	1/8/13	Oklahoma Corporation Commission	PUD 2012-00054	Public Service Company of Oklahoma (Direct)	Environmental Compliance Plan
183	4/23/13	State Corporation Commission of Virginia	PUE-2012-00141	Appalachian Power Company (Direct)	Coal-fired Generating Asset Transfers
184	7/31/13	State Corporation Commission of Virginia	PUE-2013-00020	Dominion Virginia Power (Direct)	Performance Incentive Program, Nuclear Outage Costs, Storm Expense
185	10/16/13	Florida Public Service Commission	130140-EI	Gulf Power Company (Direct)	Environmental Compliance Plan Analysis
186	11/8/13	Arkansas Public Service Commission	13-002-U	Statewide Entergy Efficiency Rulemaking	Consideration of Carbon Emissions Costs in EE Evaluations
187	11/25/13	State Corporation Commission of Virginia	PUE-2013-00052	Rappahannock Electric Cooperative (Direct)	Transition Rate Plan
188	12/11/13	Oklahoma Corporation Commission	PUD 2013-00188	Public Service Company of Oklahoma (Direct)	Reasonableness of Wind Energy Contracts
189	2/14/14	State Corporation Commission of Virginia	PUE-2013-00088	Dominion Virginia Power (Direct)	2013 Integrated Resource Plan Analysis
190	2/28/14	Texas Public Utility Commission	41852	El Paso Electric Company (Direct)	Mine Reclamation Costs, Coal Plant Feasibility, Off-System Sales
191	4/24/14	Texas Public Utility Commission	42042	Southwestern Public Service Company (Direct)	SPP Transmission Cost Recovery Factor
192	7/8/14	State Corporation Commission of Virginia	PUE-2014-00007	Appalachian Power Company (Direct)	RPS Rate Adjustment Clause
193	7/10/14	State Corporation Commission of Virginia	PUE-2014-00033	Dominion Virginia Power (Direct)	2014 Fuel Factor
194	7/24/14	Texas Public Utility Commission	42448	Southwestern Electric Power Company (Direct)	SPP Transmission Cost Recovery Factor
195	8/6/14	State Corporation Commission of Virginia	PUE-2014-00007	Appalachian Power Company (Direct)	Biennial Rate Review
196	10/31/14	Texas Public Utility Commission	42527	Southwestern Electric Power Company (Direct)	SPP Transmission Cost Recovery Factor

Oklahoma Estimated Customer Impacts for Environmental Revenue Requirements - Scrub/Convert Case with fuel

		1	2	3	4	5	6	7
		2015	2016	2017	2018	2019	2020	2021
	Rate Base				CAPITAL INVEST EXCL MUSTANG CTS:		$ 730,538,192	
1	Utility Plant	$185,215,516	$360,952,404	$642,244,154	$ 1,055,134,221	$ 1,144,539,597	$ 1,144,539,597	$ 1,144,539,597
2	Accumulated Provision for Depreciation	$ (1,818,260)	$ (7,284,024)	$ (13,351,964)	$ (37,626,782)	$ (84,897,302)	$ (134,286,245)	$ (183,675,187)
3	Regulatory Assets	$ -	$ -	$ -	$ -	$ 29,668,281	$ 23,734,625	$ 17,800,968
4	ADIT	$ (1,436,587)	$ (1,535,733)	$ (2,169,868)	$ (7,555,783)	$ (14,599,114)	$ (25,093,851)	$ (33,384,616)
5	**Total Rate Base**	$181,960,670	$352,132,648	$626,722,322	$ 1,009,951,656	$ 1,074,711,462	$ 1,008,894,126	$ 945,280,763
6								
7	**Return on Rate Base**	$ 13,795,450	$ 32,335,439	$ 59,095,247	$ 101,070,482	$ 127,363,618	$ 121,732,161	$ 114,161,128
		7.4%	9.0%	9.2%	9.6%			
	Expenses							
8	O&M Expense	$ -	$ 845,067	$ 860,447	$ 10,898,171	$ 23,612,653	$ 25,546,089	$ 26,150,186
9	Depreciation Expense	$ 1,053,325	$ 5,465,764	$ 6,067,941	$ 24,274,817	$ 47,270,520	$ 49,388,943	$ 49,388,943
10	Amortization of Regulatory Assets	$ -	$ -	$ -	$ -	$ 5,933,656	$ 5,933,656	$ 5,933,656
11	Property Taxes	$ 515,975	$ 1,852,155	$ 3,609,524	$ 6,422,442	$ 10,551,342	$ 11,445,396	$ 11,445,396
12	**Total Expenses**	$ 1,569,300	$ 8,162,986	$ 10,537,912	$ 41,595,430	$ 87,368,172	$ 92,314,083	$ 92,918,181
13	**Revenue Requirement @ 100%**	$ 15,364,751	$ 40,498,424	$ 69,633,159	$ 142,665,912	$ 214,731,789	$ 214,046,244	$ 207,079,309
					REV RQT EXCL MUSTANG CTS:		$ 140,208,612	

SOURCE: OG&E'S RESPONSE TO OIEC 10-1

Estimated Customer Impacts for New Mustang Plant CTs

		1 2015	2 2016	3 2017	4 2018	5 2019	6 2020	7 2021
	Rate Base							
1	Utility Plant	$ 21,692,070	$ 64,511,036	$241,387,569	$ 382,814,788	$ 414,001,405	**$ 414,001,405**	$ 414,001,405
2	Accumulated Provision for Depreciation	$ -	$ -	$ -	$ (6,379,430)	$ (18,732,376)	$ (32,477,223)	$ (46,222,069)
3	Regulatory Assets	$ -	$ -	$ -	$ -	$ -	$ -	$ -
4	ADIT	$ -	$ -	$ -	$ (1,706,320)	$ (6,780,372)	$ (12,397,251)	$ (17,196,302)
5	**Total Rate Base**	$ 21,692,070	$ 64,511,036	$241,387,569	$ 374,729,038	$ 388,488,656	$ 369,126,931	$ 350,583,033
6								
7	**Return on Rate Base**	$ 1,591,538	$ 5,258,447	$ 18,781,710	$ 39,689,283	$ 46,060,156	$ 44,283,580	$ 42,067,212
	Expenses							
8	O&M Expense	$ -	$ -	$ -	$ 5,217,838	$ 10,246,119	$ 11,669,192	$ 11,960,921
9	Depreciation Expense	$ -	$ -	$ -	$ 6,379,430	$ 12,352,946	$ 13,744,847	$ 13,744,847
10	Amortization of Regulatory Assets	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11	Property Taxes	$ 60,994	$ 216,921	$ 645,110	$ 2,413,876	$ 3,828,148	$ 4,140,014	$ 4,140,014
12	**Total Expenses**	$ 60,994	$ 216,921	$ 645,110	$ 14,011,144	$ 26,427,213	$ 29,554,052	$ 29,845,782
13	**Revenue Requirement @ 100%**	$ 1,652,533	$ 5,475,367	$ 19,426,820	$ 53,700,426	$ 72,487,370	**$ 73,837,632**	$ 71,912,994

SOURCE: OG&E'S RESPONSE TO OIEC 10-1

Oklahoma Industrial Energy Consumers
Data Request OIEC-5
Cause No. PUD 201400229

5-14 Provide estimated AQCS consumables that would be subject to recovery through OG&E's fuel adjustment clause for each of the next five calendar years under the Company's proposal.

Response*: See attached **OIEC 5-14_Att.**

Response provided by: Sheri Richard
Response provided on: October 2, 2014
Contact & Phone No: Sheri Richard 405-553-3747

*By responding to these Data Requests, OG&E is not indicating that the provided information is relevant or material and OG&E is not waiving any objection as to relevance or materiality or confidentiality of the information or documents provided or the admissibility of such information or documents in this or in any other proceeding.

OIEC 5-14_Attachment (Scrub/Convert Impacts)

Total Impact -FAC Costs (dollars in millions)	2016	2017	2018	2019	2020	2021
Fuel Cost Decrease Due to Less MWhs Produced	(58.9)	(56.1)	(30.3)	(136.7)	(167.0)	(161.7)
Increase Due to Additional Variable Costs	33.4	38.4	52.1	42.0	**47.3**	47.4
Reduction of O&M due to less MWhs Produced	(3.9)	(3.7)	(4.0)	(13.6)	(15.4)	(15.1)
SPP IM Sales and Purchases	66.4	64.1	34.3	263.0	299.3	300.0
Total Impact per IRP	37.1	42.6	52.2	154.8	164.2	170.6
Adjustments						
Less Flyash Sales	-	-	(0.4)	(0.4)	(0.4)	(0.4)
Less Costs included in EGP rider	-	-	(0.6)	(1.0)	(1.4)	(1.4)
Net Total Impact - Adjusted FCA Costs	37.1	42.6	51.19	153.41	162.41	168.80

SOURCE: OG&E'S RESPONSE TO OIEC 5-14

Estimated Base Rate Revenue Requirement for OG&E's 2020 Gas-fired CCCT Unit

	2020	Source
Capital Cost, 560 MW CCCT	$743,096,045	OIEC 3-12 ATT71
Estimated Rate Base	$693,961,586	
Return on Rate Base	$81,533,547	
Depreciation Expense	$21,231,316	OIEC 3-12 ATT71
Advalorem Tax	$7,430,960	
Fixed O&M	$10,930,119	OIEC 3-12 ATT71
Variable O&M	$8,597,525	OIEC 1-11
Total NF Rev Reqt	**$129,723,467**	
$/kW	$232	

Reduction in Coal Capacity Under OG&E's Proposed Environmental Compliance

Environmental Alternative: Scrub/Convert

Existing Capacity in MW

Unit Type	Unit Name	2015	2016	2017	2018	2019	2020	2021
Coal Fired Steam	Muskogee 4	492	492	492	492			
	Muskogee 5	506	506	506	506			
	Muskogee 6	500	500	500	500	500	500	500
	Sooner 1	520	520	520	520	520	520	520
	Sooner 2	522	522	522	522	522	522	522
Converted to Gas Fired Steam	Muskogee 4					492	492	492
	Muskogee 5					506	506	506
	Horseshoe Lake 6	169	169	169	169	169	169	169
	Horseshoe Lake 8	394	394	394	394	394	394	394
Gas Fired Steam	Mustang 1	50						
	Mustang 2	50	50	50				
	Mustang 3	121	121	121				
	Mustang 4	242	242	242				
Combined Cycle	Seminole 1	486	486	486	486	486	486	486
	Seminole 2	482	482	482	482	482	482	482
	Seminole 3	489	489	489	489	489	489	489
	Horseshoe Lake 7	193	193	193	193	193	193	193
	McClain	380	380	380	380	380	380	380
	Redbud	622	622	622	622	622	622	622
Quick Start Combustion Turbine	Horseshoe Lake 9	45	45	45	45	45	45	45
	Horseshoe Lake 10	45	45	45	45	45	45	45
	Mustang 5A	36	36	36	36	36	36	36
	Mustang 5B	34	34	34	34	34	34	34
	Seminole 1GT	16	16	16	16	16	16	16
Purchase Power - Thermal	AES Shady Point	320	320	320	320	320	320	320
	PowerSmith	120	120	120	120	120		
Purchase Power - Wind	FPL Wind	2	2	2	2			
	Keenan	5	5	5	5	5	5	5
	Taloga	4	4	4	4	4	4	4
	Blackwell	2	2	2	2	2	2	2
	Centennial	2	2	2	2	2	2	2
Owned Wind	OU Spirit	2	2	2	2	2	2	2
	Crossroads	7	7	7	7	7	7	7
Total Existing Net Capability		**6,858**	**6,808**	**6,808**	**6,395**	**6,393**	**6,273**	**6,273**
New Incremental Capacity (Cumulative)								
Spread CT Plan	**CT**				280	400	400	400
	CC						560	560
Total OG&E System Net Capability		**6,858**	**6,808**	**6,808**	**6,675**	**6,793**	**7,233**	**7,233**
Total Coal Capacity		2,540	2,540	2,540	2,540	1,542	1,542	1,542
Coal % of Total System Capability		**37.0%**	37.3%	37.3%	38.1%	22.7%	**21.3%**	21.3%

Coal Reduction: **39.3%**

SOURCE: OG&E'S RESPONSE TO OIEC 1-16, ATT 2.

Forecasted Revenue Requirement for Environmental Compliance Plans

Base Scenario

Portfolio: Spread CT

($Millions)	Scrub/ Convert				Scrub				Replace			
	Return on Rate Base	Expenses	Production Cost with Market Impact	Customer Cost	Return on Rate Base	Expenses	Production Cost with Market Impact	Customer Cost	Return on Rate Base	Expenses	Production Cost with Market Impact	Customer Cost
2015	17	282	864	1,163	21	283	864	1,168	32	284	864	1,180
2016	38	254	905	1,197	55	256	905	1,216	70	258	905	1,232
2017	76	263	947	1,286	105	265	947	1,317	175	275	947	1,397
2018	136	273	998	1,407	175	283	1,009	1,466	352	285	986	1,624
2019	193	272	1,156	1,622	242	322	1,080	1,643	463	284	1,120	1,866
2020	212	322	1,152	1,687	264	391	1,078	1,733	466	378	1,113	1,957
2021	210	352	1,194	1,757	258	424	1,115	1,797	452	397	1,155	2,003
2022	223	345	1,225	1,793	269	421	1,150	1,840	454	395	1,183	2,033
2023	254	344	1,262	1,860	297	428	1,188	1,913	475	392	1,224	2,090
2024	267	373	1,300	1,941	308	452	1,217	1,977	478	424	1,269	2,170
2025	259	406	1,356	2,020	297	490	1,269	2,056	460	450	1,325	2,235
2026	255	407	1,428	2,090	291	486	1,335	2,112	447	454	1,396	2,296
2027	268	467	1,480	2,216	302	539	1,382	2,223	451	489	1,462	2,402
2028	302	473	1,557	2,331	333	540	1,454	2,328	475	499	1,525	2,500
2029	313	463	1,602	2,378	342	543	1,483	2,368	478	489	1,578	2,544
2030	298	481	1,693	2,472	325	571	1,564	2,461	454	526	1,675	2,654
2031	287	510	1,836	2,633	311	577	1,708	2,597	433	525	1,812	2,770
2032	283	489	1,921	2,693	305	568	1,772	2,645	420	518	1,920	2,858
2033	302	517	2,043	2,862	322	592	1,882	2,796	431	529	2,044	3,003
2034	352	513	2,153	3,018	370	597	1,988	2,954	471	543	2,162	3,176
2035	401	526	2,237	3,164	416	628	2,056	3,100	511	560	2,272	3,342
2036	448	546	2,356	3,350	462	644	2,150	3,255	549	585	2,399	3,534
2037	495	596	2,417	3,507	506	705	2,215	3,426	586	624	2,447	3,658
2038	541	583	2,556	3,680	550	687	2,343	3,580	623	618	2,616	3,857
2039	589	646	2,625	3,861	596	743	2,411	3,750	665	656	2,694	4,015
2040	639	657	2,801	4,097	644	765	2,581	3,991	711	690	2,859	4,259
2041	691	690	2,905	4,287	695	803	2,654	4,153	759	720	2,998	4,477
2042	759	741	3,077	4,577	762	845	2,814	4,420	822	764	3,199	4,785
2043	824	770	3,262	4,856	826	846	3,134	4,805	883	809	3,380	5,072
2044	819	821	3,361	5,001	820	840	3,346	5,006	874	878	3,524	5,276
30 Yr NPVRR	2,596	4,216	15,540	22,351	2,919	4,821	14,683	22,423	4,282	4,515	15,439	24,237
NPVRR DIFF				NA	12.451%	14.344%	-5.512%	**0.320%**				**8.434%**
30YR NOM	10,751	14,381	55,672	80,805	11,469	16,535	52,094	80,097	14,922	15,295	56,049	86,266
%TOTAL	13.3%	17.8%	68.9%	100.0%	14.3%	20.6%	65.0%	100.0%	17.3%	17.7%	65.0%	100.0%
NOM DIFF				NA				**-0.875%**				**6.758%**

SOURCE: OG&E'S RESPONSE TO OIEC 3-12, ATT 86.

Forecasted Revenue Requirement for Environmental Compliance Plans

High Gas Sensitivity

Portfolio: Spread CT

($Millions)	Scrub/Convert				Scrub				Replace			
	Return on Rate Base	Expenses	Production Cost with Market Impact	Customer Cost	Return on Rate Base	Expenses	Production Cost with Market Impact	Customer Cost	Return on Rate Base	Expenses	Production Cost with Market Impact	Customer Cost
2015	17	282	931	1,231	21	283	931	1,235	32	284	931	1,247
2016	38	254	981	1,273	55	256	981	1,291	70	258	981	1,308
2017	76	263	1,031	1,370	105	265	1,031	1,401	175	275	1,031	1,481
2018	136	273	1,087	1,496	175	283	1,098	1,556	352	285	1,074	1,711
2019	193	272	1,345	1,810	242	322	1,189	1,753	463	284	1,388	2,134
2020	212	322	1,363	1,897	264	391	1,184	1,839	466	378	1,417	2,260
2021	210	352	1,423	1,986	258	424	1,235	1,917	452	397	1,475	2,324
2022	223	345	1,475	2,042	269	421	1,273	1,963	454	395	1,521	2,371
2023	254	344	1,575	2,172	297	428	1,362	2,087	475	392	1,630	2,496
2024	267	373	1,619	2,259	308	452	1,388	2,148	478	424	1,691	2,593
2025	259	406	1,684	2,348	297	490	1,454	2,241	460	450	1,760	2,670
2026	255	407	1,797	2,459	291	486	1,544	2,321	447	454	1,880	2,780
2027	268	467	1,848	2,584	302	539	1,597	2,438	451	489	1,972	2,912
2028	302	473	1,962	2,737	333	540	1,696	2,569	475	499	2,047	3,022
2029	313	463	2,021	2,797	342	543	1,721	2,606	478	489	2,140	3,107
2030	298	481	2,137	2,917	325	571	1,841	2,737	454	526	2,280	3,259
2031	287	510	2,327	3,124	311	577	2,038	2,926	433	525	2,451	3,409
2032	283	489	2,430	3,202	305	568	2,104	2,977	420	518	2,610	3,548
2033	302	517	2,599	3,418	322	592	2,254	3,169	431	529	2,794	3,753
2034	352	513	2,763	3,628	370	597	2,405	3,372	471	543	2,959	3,973
2035	401	526	2,876	3,803	416	628	2,493	3,537	511	560	3,133	4,204
2036	448	546	3,081	4,075	462	644	2,630	3,735	549	585	3,351	4,485
2037	495	596	3,180	4,271	506	705	2,712	3,924	586	624	3,393	4,604
2038	541	583	3,331	4,455	550	687	2,803	4,039	623	618	3,585	4,826
2039	589	646	3,409	4,644	596	743	2,874	4,213	665	656	3,682	5,004
2040	639	657	3,699	4,994	644	765	3,154	4,563	711	690	3,936	5,336
2041	691	690	3,801	5,182	695	803	3,201	4,700	759	720	4,118	5,597
2042	759	741	4,067	5,567	762	845	3,456	5,063	822	764	4,457	6,043
2043	824	770	4,342	5,937	826	846	4,067	5,738	883	809	4,706	6,398
2044	819	821	4,503	6,143	820	840	4,488	6,148	874	878	4,991	6,743
30 Yr NPVRR	2,596	4,216	19,010	25,822	2,919	4,821	16,936	24,676	4,282	4,515	19,934	28,731
NPVRR DIFF				NA	12.451%	14.344%	-10.908%	-4.437%				11.268%
30YR NOM	10,751	14,381	70,687	95,819	11,469	16,535	62,204	90,207	14,922	15,295	75,383	105,600
%TOTAL	11.2%	15.0%	73.8%	100.0%	12.7%	18.3%	69.0%	100.0%	14.1%	14.5%	71.4%	100.0%
NOM DIFF				NA				-5.857%				10.207%

SOURCE: OG&E'S RESPONSE TO OIEC 3-12, ATT 86.

Oklahoma Corporation Commission
Data Request OIEC-1
Cause No. PUD 201400229

1-6 Has OG&E evaluated the impacts of EPA's proposed carbon regulations on the results of OG&E's 2014 IRP? If so, how are the proposed and alternate carbon regulations expected to impact cost of the portfolios evaluated in the IRP? If not, explain why not?

Response*: OG&E analyzed the potential impact of EPA's proposed carbon regulations in two ways in its IRP. One way was through scenario analysis that assumed three different levels of coal units in the SPP would be converted to natural gas resulting in lower CO_2 output for the SPP region. The second way was through sensitivity analysis that assumed a tax on CO_2 emissions that also resulted in lower CO_2 output for the SPP region. **OG&E has not evaluated the specific impacts of the EPA's recently proposed carbon regulations on the results of OG&E's 2014 IRP. OG&E continues to review the proposed rule while actively participating in stakeholder meetings to gain a better understanding of the proposed rules with the goal of anticipating how the State will respond. Until the rule has been finalized, given the inherent complexity and uncertainty in the rule and the regulatory process at this time, it would be unproductive to perform a further impact analysis.**

Response provided by: Leon Howell
Response provided on: August 28, 2014
Contact & Phone No: Sheri Richard 405-553-3747

*By responding to these Data Requests, OG&E is not indicating that the provided information is relevant or material and OG&E is not waiving any objection as to relevance or materiality or confidentiality of the information or documents provided or the admissibility of such information or documents in this or in any other proceeding.

Capacity Expansion Plans Evaluated in OG&E's Environmental Compliance Analysis

2014 IRP Update - Figure 18: Expansion Plans

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2037	2039	2041	2043	2044
CC	560 MW CC					560 MW CC		560 MW CC						560 MW CC				560 MW CC	560 MW CC	560 MW CC	560 MW CC	560 MW CC	560 MW CC
CT	400 MW CTs		560 MW CC				560 MW CC					560 MW CC						560 MW CC	560 MW CC	560 MW CC	560 MW CC	560 MW CC	560 MW CC
Spread CT	280 MW CTs	120 MW CTs	560 MW CC				560 MW CC					560 MW CC						560 MW CC	560 MW CC	560 MW CC	560 MW CC	560 MW CC	560 MW CC

SOURCE: OG&E'S RESPONSE TO OIEC 10-6

Oklahoma Industrial Energy Consumers
Data Request OIEC-3
Cause No. PUD 201400229

3-18 Has OG&E evaluated short-term capacity purchases as an alternative to retirement and replacement of the Mustang CTs? If not, explain why not.

Response*: OG&E did not evaluate short-term capacity purchases as an alternative to the retirement and replacement of the existing Mustang units because short term capacity purchases is not a solution to the long term capacity needs of the Company starting in 2018. OG&E is preserving the Mustang plant location to maintain reliability and generation in the OG&E load center and utilize existing infrastructure, property and existing air permits. In addition, OG&E believes that quick start combustion turbines are needed in the SPP IM and such turbines support the development of renewables.

Response provided by: Leon Howell
Response provided on: September 29, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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Oklahoma Industrial Energy Consumers
Data Request OIEC-10
Cause No. PUD 201400229

10-12 Reference the response to OIEC 1-22, did OG&E evaluate deferral of the assumed retirement dates of the Mustang gas units? If not, explain why not. If so, provide the analysis.

Response*: OG&E did not evaluate deferral of the assumed retirement dates of the Mustang gas units. As stated in OG&E's response to OIEC 8-6 and the direct testimony of Robert Burch, "OG&E concluded that continuing to operate Mustang units 3 and 4 beyond 2018 would likely require an increased level of investment due to age and their current mode of operation, but even with needed investment in key areas, the units are at a greater risk of catastrophic failure as many key components are approaching or exceeding their design life."

Response provided by: Leon Howell
Response provided on: December 1, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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Oklahoma Industrial Energy Consumers
Data Request OIEC-10
Cause No. PUD 201400229

10-14 Reference the response to OIEC 1-22, did OG&E solicit bids for the acquisition or purchase of power from existing generating plants as an alternative to the proposed new Mustang CTs? If not, explain why not. If so, provide the analysis.

Response*: No. Please see page 15, lines 23 through page 16, line 8 of the Direct Testimony of Don Rowlett for an explanation of why OG&E did not conduct a competitive solicitation for the replacement of the existing Mustang units.

Response provided by: Leon Howell
Response provided on: December 1, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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THIS EXHIBIT IS CONFIDENTIAL

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Oklahoma Industrial Energy Consumers
Data Request OIEC-10
Cause No. PUD 201400229

10-8 Reference the response to OIEC 1-18; provide any updated analysis similar to the Burns & McDonnell study attached to this response which has been conducted to support the proposed new retirement dates of the Mustang gas units.

Response*: No updated analysis similar to the Burns & McDonnell study exists.

Response provided by: Robert Burch
Response provided on: December 1, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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Oklahoma Corporation Commission
Data Request OIEC-1
Cause No. PUD 201400229

1-20 Identify specific changes in the condition or operations of the Mustang gas units since OG&E's IRP that justify the decision presented in the 2014 IRP to retire and replace the units with combustion turbines?

Response*: Since the last IRP, OG&E's knowledge of SPP IM market rules and/or protocols has increased, our ability to generally model unit operation in the IM has improved and investment needs of the Mustang units have been more closely reviewed. Over the last several years, the age of the Mustang units have been having a more noticeable impact on reliability. The investments identified and needed in key areas (i.e. boiler Superheat and Reheat assembly's; turbine rotors) are significant. After reviewing the needed investments and considering the age of the units along with the anticipated role of these units in the SPP Integrated market, OG&E concluded that these units have become technically obsolete and it did not make sense to continue to invest in these very old units. Some units will be retired at the dates identified in the 2012 IRP and others will be retired close to these dates. In comparison, the age of our retired units are much greater than the average retirement age of other similar generation plants as published nationally.

Response provided by: Robert Burch
Response provided on: August 28, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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THIS EXHIBIT IS CONFIDENTIAL

Oklahoma Industrial Energy Consumers
Data Request OIEC-3
Cause No. PUD 201400229

3-25 Reference OG&E's response to OIEC 2-5, provide the monthly wind energy curtailed (MWh) by SPP for each OG&E wind PPA and owned wind resource for each month since the SPP IM was initiated.

Response*: Wind energy curtailment directives ordered by SPP are listed below. Actual curtailed (MWh) is not available due to an inability to know what the resource would have generated during the curtailment period.

Resource	Start	Stop	Curtailed Down to (MWh)
Crossroads Wind	9/1/2014 16:16	9/1/2014 23:05	0
Crossroads Wind	9/3/2014 16:03	9/3/2014 20:25	0
Centennial Wind	5/7/2014 13:58	5/7/2014 17:06	0
Centennial Wind	9/9/2014 20:13	9/9/2014 20:55	0
Centennial Wind	9/15/2014 11:48	9/15/2014 13:34	0
Keenan Wind	9/15/2014 9:30	9/15/2014 13:34	0
Spirit Wind	9/9/2014 20:13	9/9/2014 21:29	0
Taloga Wind	5/4/2014 20:54	5/4/2014 21:36	80
Taloga Wind	5/7/2014 12:05	5/8/2014 1:51	0

Response provided by: Robert Burch
Response provided on: September 29, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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Oklahoma Corporation Commission
Data Request OIEC-2
Cause No. PUD 201400229

2-5 Identify specific transmission constraints that are expected to limit additional OG&E wind energy purchases and provide any economic analysis of the annual total cost of wind energy ($/MWh) including these constraints.

Response*: Since the March 2014 implementation of the SPP IM, transmission constraints now result in congestion charges. Congestion charges in a constrained area are an off-set to the price that generators located in that area are paid for their energy output. In some cases, the congestion charges can exceed the offer price for the energy, resulting in a negative market price. An example of an unexpected transmission constraint that has caused high congestion charges for OG&E's wind energy sales into the IM is the flowgate identified as WDWFPLWDWTAT. The WDWFPLWDWTAT flowgate represents an overload of the Woodard to FPL Switch 138kV line due to an outage of the Woodward EHV to Tatonga 345kV line. Please see page 21 of the SPP State of the Market Spring Quarter report (http://www.spp.org/publications/QSOM_2014Spring.pdf); this section of the report shows the congestion by shadow price of the WDWFPLWDWTAT flowgate along with several others. Other transmission constraints or flowgates that may impact the IM price that wind generation will be paid are identified in Figure 2, page 4 of the SPP State of the Market Report Winter 2013–2014 (http://www.spp.org/publications/SPP_MSOM_Report_2013_14_Winter.pdf).

In addition, the SPP will initiate curtailments of certain generation when parts of the transmission system become overloaded in specific circumstances. For example, when there is a lot of wind generating in the Woodward area and there are lower levels of generation in the Oklahoma City metro area, the Windspeed line between Oklahoma City and Woodward could become constrained and lead to curtailments of wind in the Woodward area. This constraint (and others on the system) depends on the amount of wind energy being generated at any given moment and the condition of the transmission system.

Given that the SPP IM only began operation in March of 2014, OG&E has not performed an economic analysis of annual total cost of wind energy including these constraints. To perform an economic analysis of the annual total cost of wind OG&E will need data on congestion charges from each season of the year.

Response provided by: Leon Howell
Response provided on: September 3, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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Estimated OG&E Savings from Additional Wind Energy Purchases

YEAR	WIND	COAL	SPP IM	EST WIND SAVINGS
2015	$22.7	$24.0	$31.6	$26,773,883
2016	$23.0	$27.5	$30.5	$22,541,943
2017	$23.3	$28.1	$31.5	$24,451,044
2018	$23.7	$29.2	$34.4	$32,154,177
2019	$24.1	$29.8	$38.8	$44,099,625
2020	$24.4	$30.8	$40.1	**$46,993,924**
2021	$24.8	$31.7	$40.3	$46,519,338
2022	$25.2	$32.8	$42.3	$51,496,806
2023	$25.5	$33.9	$43.0	$52,309,634
2024	$25.9	$35.0	$44.2	$54,975,706
2025	$26.3	$36.2	$46.3	$59,992,479
2026	$26.7	$37.3	$48.7	$66,002,213
2027	$27.1	$38.5	$50.3	$69,654,372
2028	$27.5	$39.7	$52.3	$74,299,416
2029	$27.9	$40.9	$54.1	$78,476,264
2030	$28.3	$42.2	$57.0	$85,943,507
2031	$28.8	$43.5	$60.6	$95,429,487
2032	$29.2	$44.9	$62.7	$100,574,237
2033	$29.6	$46.2	$65.6	$107,972,802
2034	$30.1	$47.6	$68.5	$115,392,094
			NPV, 8%	**$506,795,607**
			Nominal	**$1,256,052,952**

SOURCE: OG&E'S RESPONSE TO OIEC 1-11

Oklahoma Industrial Energy Consumers
Data Request OIEC-5
Cause No. PUD 201400229

5-5 Reference OG&E's response to OIEC 2-7, provide the in-service date and transfer capability (MW) of the new TUCO-Woodward 345 kV line and indicate the extent to which this line has, or is expected to, alleviate transmission constraints and congestion charges on existing and future wind energy resources delivered to the OG&E system.

Response*: Please see **OIEC 2-7_Att** page 17 for the in service date of the new TUCO-Woodward 345kV line. Excel announced the line went into service the last week of September. OG&E has not calculated the extent to which this line will alleviate transmission constraints and congestion charges on existing and future wind energy resources delivered to OG&E. The extent to which new wind energy resources impact the transmission system is unknown because of a number of uncertainties such as quantity of new wind, location of new wind and availability of other market participants generation resources, to name a few.

Response provided by: Leon Howell
Response provided on: October 2, 2014
Contact & Phone No: Sheri Richard 405-553-3747

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