BEFORE THE
OKLAHOMA CORPORATION COMMISSION

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

Rebuttal Testimony of Tyler Comings

On Behalf of Sierra Club

January 26, 2014

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I. INTRODUCTION AND PURPOSE OF TESTIMONY

Q Please state your name, business address, and position.

A My name is Tyler Comings. I am a Senior Associate with Synapse Energy Economics, Inc. ("Synapse"), which is located at 485 Massachusetts Avenue, Suite 2, Cambridge, Massachusetts.

Q Are you the same Tyler Comings who filed testimony in this matter on December 16, 2014?

A Yes.

Q What is the purpose of your rebuttal testimony?

A My rebuttal testimony responds to the following issues raised by Oklahoma Industrial Energy Consumers ("OIEC") Witness Scott Norwood and Oklahoma Corporation Commission ("OCC") Staff Witness Craig Roach:

1. Mr. Norwood's recommendation of the Company's scrub compliance plan ("Scrub Plan") carries even more risks than Oklahoma Gas and Electric Company's ("OGE" or "the Company") chosen scrub/convert compliance plan ("Scrub/Convert Plan"). I will lay out the potentially high costs associated with retrofitting Muskogee units 4 and 5. I will also explain why Mr. Norwood's use of nominal dollars instead of net present value is an incorrect and unorthodox methodology for comparing investment options.

2. Mr. Roach's and Mr. Norwood's use of resource diversity in order to advocate for the Scrub/Convert and Scrub Plans, respectively.

In his rebuttal testimony, my colleague Dr. Fisher separately addresses Mr. Norwood's concerns regarding carbon dioxide ("CO_2") price risk.

Q Are there any exhibits that accompany your testimony?

A Yes. I have attached data responses referred to as Rebuttal Exhibits TFC-1, TFC-2, and TFC-3.

II. OIEC'S ARGUMENTS IN SUPPORT OF THE SCRUB PLAN ARE FLAWED.

A. THE COMMISSION SHOULD IGNORE OIEC'S USE OF NOMINAL DOLLARS TO COMPARE ALTERNATIVES OVER A 30-YEAR PERIOD AS IT DOES NOT COMPLY WITH ACCEPTED ACCOUNTING PRINCIPLES.

Q What are Mr. Norwood's recommendations regarding the Company's choice of a compliance plan?

A Mr. Norwood recommends that the Company "reconsider the Scrub compliance plan as an alternative to the Scrub/Convert plan."[1]

Q Please describe how Mr. Norwood compares the costs of the Company's compliance options in his testimony.

A Mr. Norwood compares the Company's selected Scrub/Convert Plan to the Scrub Plan based on a summation of nominal dollar revenue requirements over the 30-year analysis period.[2] Mr. Norwood advocates for selecting the Scrub Plan (i.e., retrofitting Sooner 1 and 2 and Muskogee 4 and 5 with scrubbers) on the basis that, under the Company's Base scenario, the plan is "approximately $700 lower on a nominal basis than the Company's proposed Scrub/Convert plan" (i.e., retrofitting Sooner 1 and 2 with scrubbers and converting Muskogee 4 and 5 to natural gas).[3] After comparing these nominal dollar figures, he recommends that the Company "reconsider the Scrub compliance plan" in part because it "provides a lower total nominal cost in the base case analysis, [and] only modestly higher costs in the CO_2 sensitivity analysis case."[4]

[1] Responsive Testimony of Scott Norwood, p. 48, lines 20-21.
[2] *Id.* p. 6, lines 6-7.
[3] *Id.*
[4] *Id.* p. 8, lines 1-4.

Q What is a nominal cost?

A Nominal dollars are sometimes referred to as "current year dollars" since they refer to the dollar value in the year being presented. As we all know, prices of goods and services change over time.

Q Is it appropriate to compare nominal dollars over a 30-year period?

A No. Comparing the summation of nominal dollars is not meaningful since it ignores both inflation and the time-value of money which, for a utility, is typically the weighted average cost of capital ("WACC")—that is, the weighted average of the cost of debt and equity to the company making that investment. In this proceeding, OG&E discounts the nominal streams of dollars using its own WACC since costs and revenues which occur further in the future are typically less meaningful for decisions made today.

Discounting takes into account the fact that OG&E shareholders have alternate avenues to invest capital – in the debt and equities markets. Those investments would be expected to yield shareholders a return at the weighted average cost of capital (WACC). Failing to discount implies that the Company has no preference for spending (or receiving monies) today or thirty years from now. I assume that the Company's shareholders and ratepayers would not be amenable to deferring a return on their investments for 30 years.

Q Please explain how the summation of nominal dollars ignores inflation.

A If dollar values from different years are combined, they must be adjusted for an assumed inflation rate in order to arrive at "real" or "constant" dollars. Otherwise, changes in price over time are lumped together.

Q Please explain how the summation of nominal dollars ignores the time value of money.

A Investment decisions that bear costs and benefits over multiple years are typically evaluated using a "discount rate" which places a value on foregoing benefits or

costs for each additional year.[5] The summation of the discounted benefits minus the discounted costs is equal to the "net present value." This metric allows for comparison of different options that bear differing benefits and costs over a given time period. Unfortunately, Mr. Norwood's presentation of the summation of nominal dollar costs and net present value alongside each other implies that these methodologies are equally useful valuation tools. Because the summation of nominal dollars ignores the time-value of money, however, this method is not applied to long-term investment decisions.

As an example, Figure 1 shows the difference between nominal, real (i.e. adjusted for inflation) and present value (i.e. discounted) dollars for an investment that costs $1 million per year in each year's dollars. This is similar to the structure of a mortgage payment on a house which typically stays the same over the 30-year term of the loan. As the owner's income increases over time (as the cost of everything increases) but the mortgage payment stays the same, that payment becomes "easier" to pay since it decreases in "real" terms.

[5] A discount rate can be in nominal or real terms. If the stream of dollars being discounted is in nominal dollars then a nominal discount rate is appropriate. If the stream of dollars being discounted is in real or constant dollars then a real discount rate is appropriate.

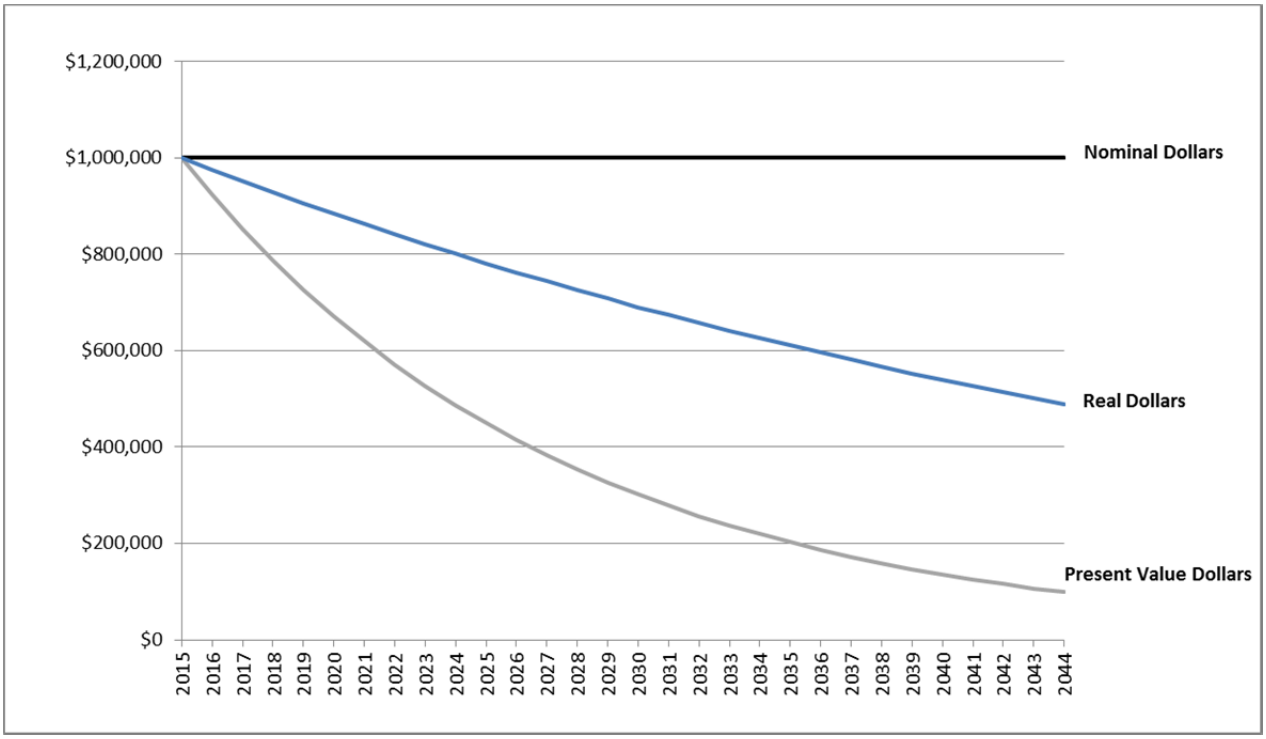

Figure 1: Comparison of Nominal, Real and Present Value Dollars[6]

In this proceeding, the difference in the total nominal dollars for the Convert Plan is $2.4 billion higher than for the Scrub Plan, in the Company's Base scenario.[7] However, the nominal costs for the Convert Plan only become higher than the Scrub Plan starting in 2027; between 2015 and 2026, the nominal costs for the Convert plan are lower in the Company's Base scenario. After proper discounting performed by the Company, the Convert Plan is only $61 million higher cost than the Scrub Plan in terms of net present value (see Table 1). I will discuss later how the net present value results from the Company's Base scenario are unreasonable, given the underlying assumptions. However, the comparison of portfolio costs on a net present value basis is reasonable, while Mr. Norwood's comparison of nominal dollar results is unreasonable.

[6] This example uses the Company's inflation rate to derive real dollars and its WACC to derive present value.
[7] See Responsive Testimony of Scott Norwood, p. 27, Table 7.

Q Was Mr. Norwood able to provide support for comparing the summation of undiscounted, nominal dollars?

A No. Mr. Norwood acknowledges that there are no textbook examples or accounting principles that advocate summing undiscounted, nominal dollars.[8] The only support Mr. Norwood offers is that these costs "represent costs that ratepayers would actually pay over time" and that "electricity prices are not generally billed on a present value basis."[9] While it is true that electricity is billed in terms of the dollar year in which they are billed (for instance, a bill today would be in 2015 dollars), this does not mean that ratepayers would value the cost of their electricity bill today the same way they would value a bill they are paying in 30 years (in 2045 dollars). Consumers, like utilities, value dollars more in the near-term than in the long-term. Also, consumers' purchasing power changes over time as their income and price of goods changes through inflation. As I have discussed, Mr. Norwood's lumping of nominal dollars over time ignores both time-value of money and inflation.

Q Should the Commission give any weight to the summation of nominal dollars over a 30-year period as a valuation methodology in this proceeding?

A Absolutely not. The Company has correctly compared compliance plans on a net present value basis. I know of no utility, or any other entity for that matter, that makes investment decisions by comparing the summation of undiscounted, nominal dollars over a long-term period.

B. THE SCRUB PLAN CARRIES MORE RISK THAN THE SCRUB/CONVERT AND CONVERT PLANS.

Q Does Mr. Norwood assert that the Company's chosen Scrub/Convert Plan is the best choice?

A No. Mr. Norwood states that the Company should "reconsider the Scrub compliance plan as an alternative to the proposed Scrub/Convert plan." His reasons include that the Scrub Plan is "$700 million lower on a nominal basis" in

[8] OIEC Data Response to Sierra Club's DR 1-1(a), attached as Rebuttal Exhibit TFC-1.
[9] OIEC Data Response to Sierra Club's DR 1-1(aii), attached as Rebuttal Exhibit TFC-1.

the Base Scenario case than the Scrub/Convert Plan, and "$5.6 billion lower under the high gas price scenario."[10] In addition, he refers to lost fuel diversity with the Scrub/Convert Plan – a point I address later in this testimony.

Q Is the $5.6 billion cited based on the summation of nominal dollars?

A Yes. This number cited in Mr. Norwood's conclusions refers to the nominal cost difference between the Scrub and Scrub/Convert Plans under the high gas price scenario. As I have discussed, this nominal value comparison is not a meaningful method for making long-term investment decisions and the Commission should ignore it. The proper methodology is comparing net present value, as presented by the Company and in my testimony.

Q Is the Company's High Gas scenario a reasonable high bound for natural gas price risk?

A No. As I explained in my direct testimony, OG&E inflates its base natural gas price prices by 50% to arrive at the High Gas price forecast. This forecast is asymmetric to the Low Gas forecast, which is only 25% lower than the base natural gas prices. As shown in Figure 2, below, the Company's High Gas forecast is higher than the highest of the price scenarios run by the EIA in its 2014 Annual Energy Outlook. This suggests that OG&E's High Gas price forecast is too high and so biases the analysis towards continued coal operations.

Interestingly, OG&E's Low Gas price forecast—which is 25% lower than the base forecast – closely matches recent NYMEX natural gas forward prices for 2015 and 2016. I am not suggesting that the Company's Low Gas price forecast be adopted as the base-case – merely that the Low Gas price forecast is reasonable given recent gas price expectations, while the High Gas price forecast is clearly not. Aside from the fact that it is well above the EIA bounds that form the basis of the Company's projections, the High Gas forecast assumes extremely high gas prices as soon as today, which is clearly not the case. In early January 2015, gas

[10] Responsive Testimony of Scott Norwood, p. 48, lines 17-21.

prices at Henry Hub are around $3/MMBtu; throughout 2014, prices hovered at around $3-$4.50/MMBtu.[11]

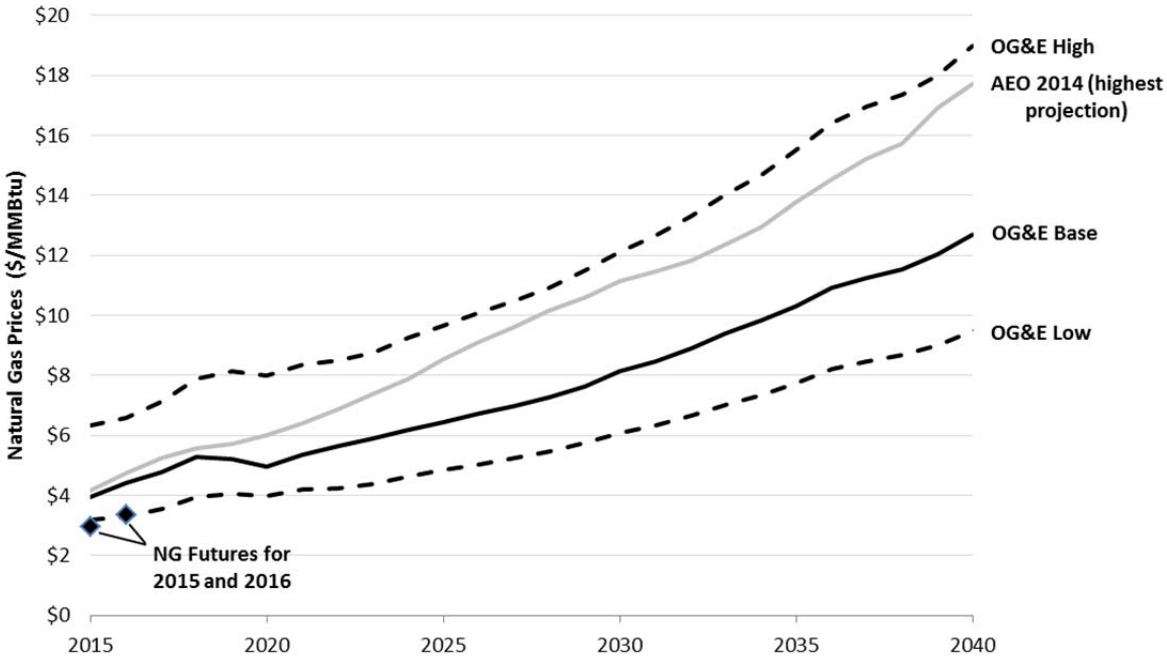

Figure 2: Gas Forward Prices (OG&E Base, High and Low Gas Prices, AEO, and NYMEX) ($/MMbtu)[12]

Q Have you compared the value of the Scrub Plan to that of Convert Plan?

Yes. In my direct testimony, I compared the net benefits (on a net present value basis) of the Scrub/Convert Plan to the Convert Plan. I have used this analytical method again here to compare the Scrub Plan to the Convert plan. Figure 3 and Table 1, below, demonstrate the risks associated with Mr. Norwood's suggested Scrub portfolio. Figure 3 illustrates the difference between the cumulative net

[11] http://www.eia.gov/naturalgas/weekly/archive/2015/01_15/index.cfm

[12] OIEC 1-25_Att1, attached as Rebuttal Exhibit TFC-2, and EIA AEO 2014 data, available here: http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2014&subject=0-AEO2014&table=62-AEO2014&region=3-18&cases=ref2014-d102413a
NYMEX Futures were pulled on January 20, 2015 from: http://www.cmegroup.com/trading/energy/natural-gas/natural-gas.html

benefit of the Scrub Plan and the Convert Plan, for each price sensitivity run by the Company. A Net Present Value Revenue Requirement ("NPVRR") difference below zero indicates that Scrub Plan is more costly than the Convert Plan, up to and including the given year. Table 1 also presents the "breakeven" year. This represents the year in which the cumulative net present value of the Scrub Plan becomes favorable in comparison to the Convert Plan. These results show that Scrub Plan does not become the less expensive alternative in the base-case scenario until 2042—around the time the units are expected to end their useful lives. In my original analysis, the breakeven year for retrofitting Sooner 1 and 2 alone (Scrub/Convert Plan) was 2038, as shown in the right column in Table 1. In other words, it takes even longer for the Scrub Plan to break even than it does the Scrub/Convert Plan.

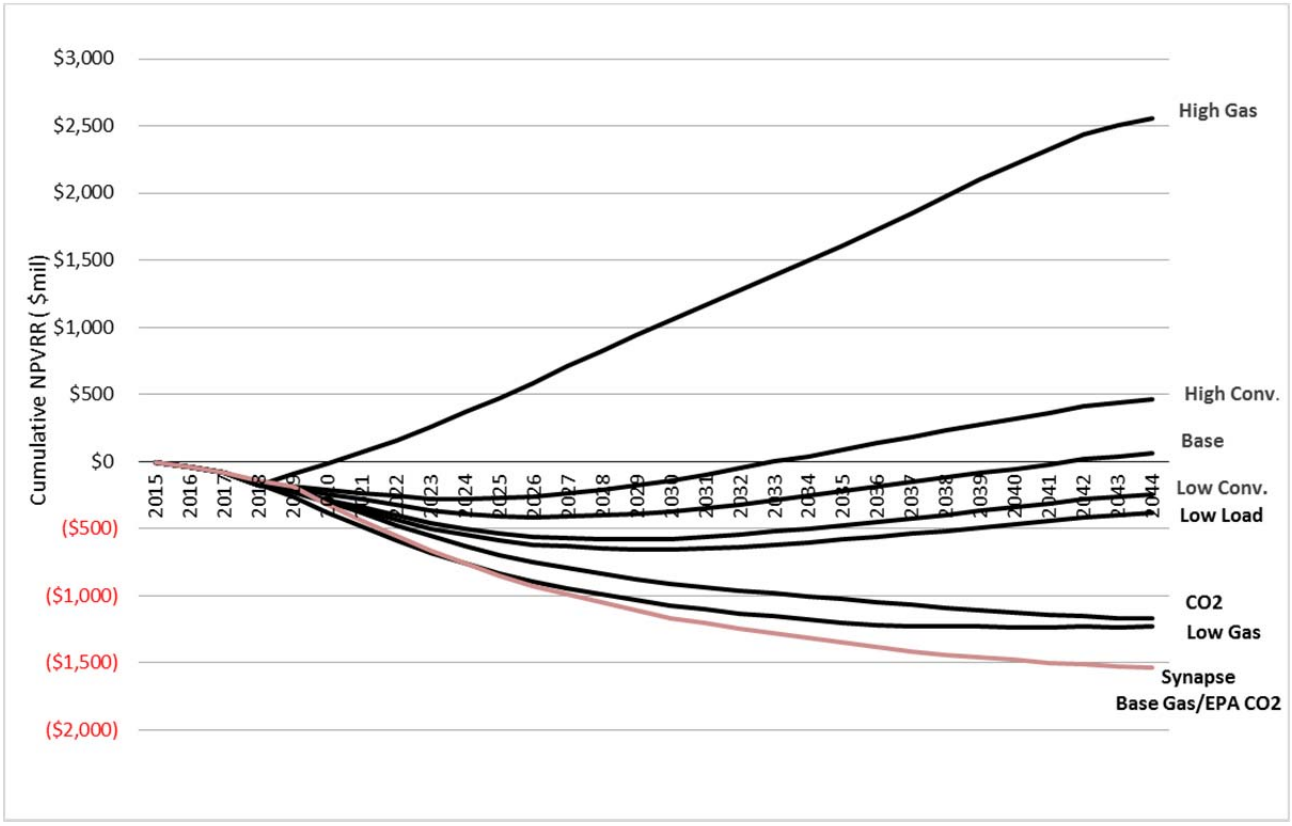

Figure 3: Cumulative Net Benefit (Cost) of the Scrub Plan Compared to the Convert Plan (NPVRR, $2014 mil)

Table 1: Cumulative Net Benefit (Cost) of the Scrub Plan Compared to the Convert Plan[13]

Scenario	Benefit of Scrub ($2014, NPVRR)	Scrub Breakeven Year	Scrub/Convert Breakeven Year
Base	$61	2042	2038
CO_2	-$1,170	None	None
High Conversion	$465	2033	2031
Low Conversion	-$247	None	None
High Gas	$2,560	2021	2021
Low Gas	-$1,229	None	None
Low Load	-$382	None	None
Synapse Base Gas/EPA CO_2	-$1,532	None	None

Q For those scenarios where converting Sooner 1 and 2 and Muskogee 4 and 5 to natural gas is lower cost than retrofitting those units, how long does it take for conversion to become cheaper?

A As in my original comparison to the Scrub/Convert Plan, the Convert Plan is always cheaper than retrofitting all four units in the Synapse Base Gas/High CO_2, the Company's CO_2, Low Gas, Low Conversion and Low Load scenarios. This means that converting Sooner 1 and 2 and Muskogee 4 and 5 bears lower risk than retrofitting all four units in most scenarios.

Q You say that retrofitting Sooner 1 and 2 and Muskogee 4 and 5 was lower cost in the Company's Base-case scenario. Is that scenario reasonable?

A No. As I discussed at length in my direct testimony, the Company's base-case ignores any costs associated with emitting carbon dioxide—implicitly valuing carbon emissions at a zero dollar cost. This assumption is unreasonable over the 30-year valuation period presented by the Company.

The Company's CO_2 price scenario is a reasonable carbon price forecast as a base-case, not as a sensitivity. The failure to include a carbon price in the base-case leads to overvaluation of continued operation of the coal-fired units. (In his

[13] Id.

rebuttal testimony, my colleague, Dr. Fisher, addresses Mr. Norwood's concerns that the Company's carbon price forecast overstates this risk.)

Q Did any of the Company's scenarios adequately account for all future environmental risks?

A No. As I explained in my direct testimony, the Company's entire coal fleet faces significant future environmental compliance obligations due to a number of current and pending environmental regulations, as well as ongoing Clean Air Act New Source Review ("NSR") litigation. These regulations include the recently-proposed National Ambient Air Quality Standard ("NAAQS") for ozone, the reinstatement of the Cross State Air Pollution Rule ("CSAPR"), the final Cooling Water Intake Structures Rule ("316b"), the final Coal Combustion Residuals rule, the proposed Effluent Limitations Guidelines for Steam Electric Power Generators, and future "reasonable further progress" requirements during the second planning period of the Regional Haze Rule. As these rules are designed primarily to reduce pollution from coal-fired power plants, all of OG&E's units that continue to burn coal face these risks.

Q Did Mr. Norwood account for these risks in his analysis?

A No. Mr. Norwood mentions "some concerns regarding future environmental cost exposure under the Scrub plan."[14] However, he claims to be more concerned with fuel diversity.[15] When asked, Mr. Norwood agreed with the assertion that "OG&E has adequately accounted for future environmental compliance costs."[16] Although Mr. Norwood suggests reconsidering the Scrub Plan, he recommends that the Scrub/Convert plan be adopted "in the event the Commission remains concerned that future environmental regulations are likely significant."[17]

[14] Responsive Testimony of Scott Norwood, p. 31, lines 19-22.
[15] *Id.*
[16] OIEC Response to Sierra Club's Data Request 1-7(d), attached as Rebuttal Exhibit TFC-3.
[17] Responsive Testimony of Scott Norwood, p. 32, lines 3-5.

Q Do you agree with his statement that the Scrub/Convert Plan is the appropriate way for the Commission to address its concerns about future environmental regulations?

A Absolutely not. While the Scrub Plan would subject the Company to more risk the Scrub/Convert Plan (discussed below), the base case of the Scrub/Convert Plan assumes zero costs to comply with most future environmental regulations, including carbon dioxide costs. This fact, along with an analysis of the environmental compliance cost risk facing the Murkogee and Sooner units, means the Commission should put no weight on Mr. Norwood's conclusory statement.

Q What is the largest environmental compliance cost risk of retrofitting Muskogee 4 and 5 (in addition to Sooner 1 and 2)?

As with Sooner 1 and 2, Muskogee 4 and 5 will also likely need significant reductions in emissions of nitrogen oxides, or NOx, in order to continue operating. NOx is best controlled using post-combustion controls such as selective catalytic reduction ("SCR") technology. If the Company were to pursue the Scrub Plan and continue to burn coal at Muskogee 4 and 5, these units would likely also require SCRs in the near future in order to comply with a new ozone standard. This is because, as I pointed out in my direct testimony, there are a number of areas in Oklahoma that exceed the 2008 ozone standard of 75 ppb. While there is no ozone monitor in Muskogee County (where the Muskogee plant is located), Cherokee and Sequoyah counties, which border Muskogee County, are currently exceeding 70 ppb and would likely be designated as nonattainment areas even under the least stringent standard EPA has proposed. Further, if the Company does not prevail in the NSR litigation, it will likely have to install SCRs on all of its coal-fired units.

SCRs on Muskogee 4 and 5 would cost $196 million per unit, according to the Company's estimates.[18] This is similar to the estimates for SCR's on Sooner 1 and 2 referred to in my direct testimony.[19]

Q Did you incorporate costs associated with SCRs at Muskogee 4 and 5 in your updated analysis?

A Yes. Figure 4 and Table 2, below, present the effect of adding the original SCR installation costs from my direct testimony on Sooner 1 and 2, with the additional SCR costs at Muskogee 4 and 5 in 2020. Therefore, the NPVRR results are based on the likely event that additional NOx reductions will be required at these units. I incorporated the Company's previous estimates for Sooner and Muskogee SCR capital costs and annual fixed operations and maintenance ("O&M") into the Company's estimate of fixed costs. The results do not include the variable costs of SCRs or the changes to dispatch that could occur given this incremental variable cost.

Q How do the net present value results change when incorporating the costs of SCR at Sooner 1 and 2 and Muskogee 4 and 5?

A When SCR costs are added to Muskogee and Sooner, the cost of the Scrub Plan increases by an additional $915 million in every scenario compared to the Convert Plan.[20] The results in Figure 4 and

A

A Table 2 show that, when SCR costs are added, the Scrub Plan is more costly than Convert in every price scenario except for the High Gas scenario. The net cost of the Scrub Plan becomes over $854 million in the Company's base-case scenario

[18] OG&E Response to AG Data Request1-5, OG&E Muskogee BART Determination (implied cost of SCR inflated from 2008 to 2014 dollars).
[19] SCR costs for Sooner are also referenced in the Direct Testimony of Robert Burch, p. 7, Table 1. The implied cost of SCR from the table ($178 million per unit) was adjusted for inflation from 2008 dollars.
[20] Synapse also ran the Company's CO_2 scenario with the addition of SCR variable operating costs. However, the results showed a minimal change in NPVRR based on variable costs alone (approximately $20 million or less than 0.1% of NPVRR difference). Therefore, in the interest of time, we did not run the increased variable costs due to the SCR in the results presented in Figure 4.

(compared to a net benefit of $61 million without the SCR), over $2 billion under the Company's CO_2 sensitivity, and $2.4 billion in the Synapse EPA CO_2 scenario.

Recall that the Company's original base-case scenario analysis found that the Scrub Plan without an SCR did not breakeven with the Convert Plan until 2042. When SCRs are added at Sooner 1 and 2 and Muskogee 4 and 5, the Scrub Plan *never* breaks even, except in the High Gas sensitivity – a sensitivity which, as discussed above, has limited value.

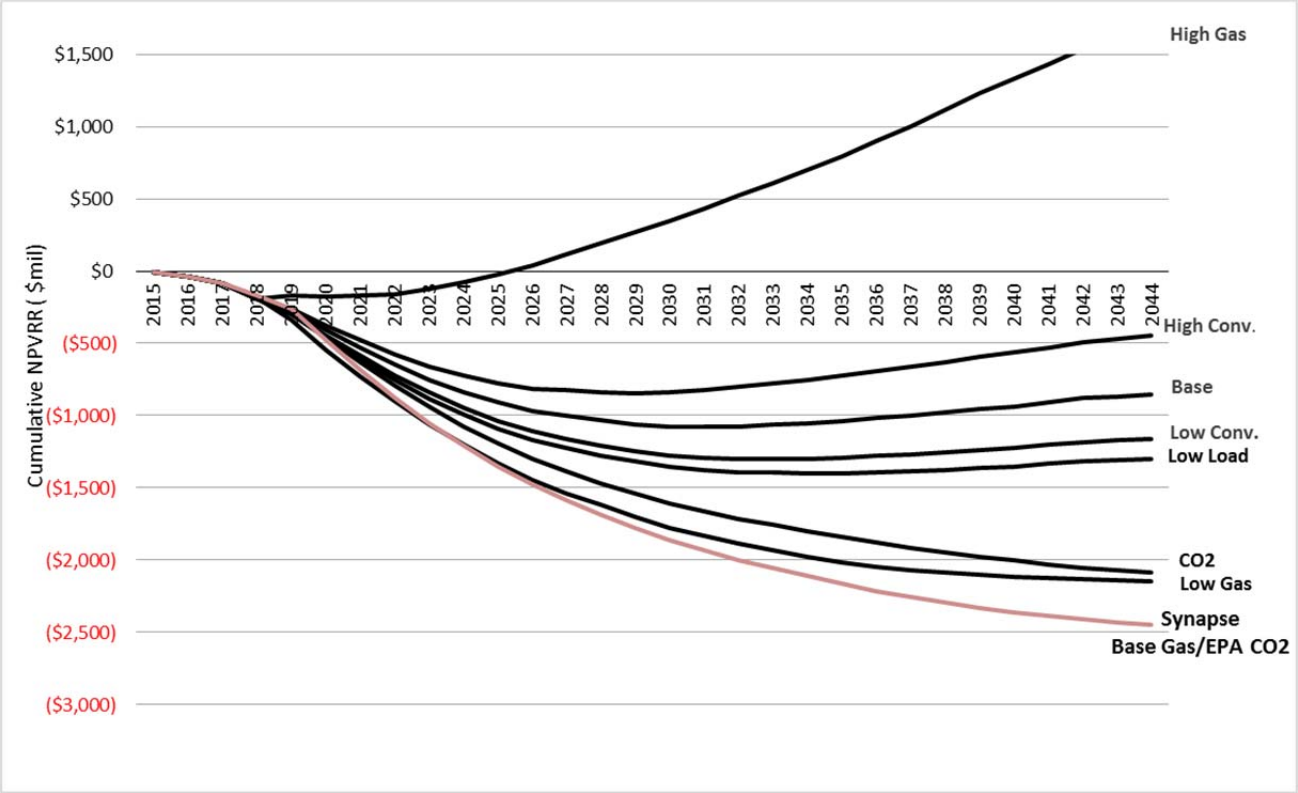

Figure 4: Cumulative Net Benefit (Cost) of Scrub Plan with SCR Costs Added, Compared to Convert Plan) (NPVRR, $2014 mil)[21]

[21] OG&E Response to OIEC Data Request 3-12_Att86. SCR costs are from Direct Testimony of Robert Burch, p. 7, Table 1.

Table 2: Cumulative Net Benefit (Cost) of Scrub Plan with SCR, Compared to Convert Plan [22]

	NPVRR without SCR ($2014, mil)		NPVRR with SCR ($2014, mil)	
Scenario	Benefit of Scrub	Scrub Breakeven Year	Benefit of Scrub	Scrub Breakeven Year
Base	$61	2042	-$854	None
CO_2	-$1,170	None	-$2,084	None
High Conversion	$465	2033	-$450	None
Low Conversion	-$247	None	-$1,162	None
High Gas	$2,560	2021	$1,645	2026
Low Gas	-$1,229	None	-$2,144	None
Low Load	-$382	None	-$1,297	None
Synapse Base Gas/ EPA CO_2	-$1,532	None	-$2,447	None

Q Did the Company adequately assess future regulatory risks involved in the Scrub portfolio?

A No. As I discussed previously, the Company only included a carbon cost as a sensitivity and excludes most future environmental compliance costs entirely. These are gross omissions of future risk in the Company's analysis. Moreover, even under the Company's base-case scenario—where no carbon costs or other future environmental compliance costs are considered—choosing to retrofit Sooner and Muskogee does not become economic until 2042. The retrofit of Sooner 1 and 2 alone did not break even in the Company's overly optimistic base-case scenario until 2038. In both cases, this is too long for ratepayers to wait for returns to materialize and, given the many risks that the Company has not accounted for, it is likely that the benefits of retrofit will never materialize.

[22] Id.

III. RESOURCE DIVERSITY IS IMPORTANT BUT DOES NOT JUSTIFY SELECTION OF THE SCRUB/CONVERT OR SCRUB PLAN

Q How does Staff Witness Roach characterize the Company's choice of the Scrub/Convert Plan?

A Mr. Roach mentions many deficiencies in the Company's analysis, including failure to account for future environmental compliance costs. However, citing concern for "resource diversity," he nevertheless advocates for approval of the Scrub/Convert Plan, with conditions.[23]

Q Does Mr. Norwood use fuel diversity in order to justify his recommendation that the Company reconsider the Scrub Plan?

A Yes. Mr. Norwood claims that the impact on fuel diversity "should be carefully considered by the Commission."[24] He also states that both the Scrub and Scrub/Convert Plans "would produce additional fuel diversity and operational flexibility" in order to "better respond to future market changes."[25]

Q Is resource diversity enough to justify selection of either the Scrub or Scrub/Convert Plans?

A No. While I agree that the Convert Plan adds more natural gas capacity and removes coal capacity, the Company is still procuring all of its energy to serve ratepayers from the SPP integrated marketplace while selling all of its generation onto that same marketplace. Effectively, this means that the Company's generating assets act as a hedge against the SPP energy market.

While I agree with Mr. Roach and Mr. Norwood that fuel diversity is generally a consideration, further investments in coal generation would not serve as an effective hedge against the market given that, as I have shown, required retrofits in coal do not break even for more than two decades even under the Company's overly optimistic base-case. When accounting for future environmental cost risks, coal investments never break even in the 30-year period.

[23] *See* Responsive Testimony of Craig Roach, p. 11, lines 2-18.
[24] Responsive Testimony of Scott Norwood, p. 23, lines 13-14.
[25] Responsive Testimony of Scott Norwood, p. 30, lines 10-11.

Q Has fuel diversity been quantified sufficiently in this case?

A No. If fuel diversity is to be used as a key argument for selection of a portfolio, it should be explored and quantified. Modeling fuel diversity could be done by running a stochastic analysis (sometimes referred to as "Monte Carlo simulation") that would allow for multiple variables to fluctuate based on ranges of values and probabilities of those values occurring. This type of analysis runs many simulations (or "futures") incorporating key risks such as (but not limited to) natural gas prices, coal prices, carbon prices, and market prices. The result can provide average NPVRR costs, as well as low and high-tailed risks based on the many simulations modeled. Fuel diversity could be indicated by a wide distribution of results from this modeling.

For instance, a low-diversity portfolio may offer the lowest cost <u>average</u> NPVRR result but have a large enough high-tailed risk that it may be too risky an option to pursue due to lack of diversity. Mr. Norwood implies that Scrub/Convert Plan is risky from a fuel diversity perspective. However, neither the Company nor Mr. Norwood has conducted an analysis to quantify this diversity. Mr. Norwood's conclusions are based on the Company's modeling of select, individual sensitivities such as natural gas price and carbon price in isolation. The Company has not accounted for coal price risk or most future regulatory risks (as I have discussed). Without a more rigorous analysis that properly accounts for <u>all</u> key risk factors, fuel diversity cannot be properly quantified or used as sufficient justification for any of the Company's compliance plans.

Q Do you agree with Mr. Norwood that wind energy would be a "low-cost hedge" against energy market prices?[26]

A Yes. I agree with Mr. Norwood's statement that:

> 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

[26] Responsive Testimony of Scott Norwood, p. 22, line 22.

regardless of the environmental compliance plan which is ultimately selected.[27]

As I discussed in my direct testimony, wind is also not subject to fuel price volatility, nor is it subject to high environmental compliance cost risk. For these reasons, significant additions of wind should be considered by the Company.

Q Would additional demand-side management ("DSM") also insulate the Company and its ratepayers from fuel price and environmental cost risks?

A Yes. In my direct testimony, I outlined reasons that the Company has not sufficiently modeled further investments in DSM. DSM would provide further insulation from fuel prices and environmental costs by reducing the demand for fossil-generation on OG&E's system.

IV. FINDINGS AND RECOMMENDATIONS

Q What are your findings?

A My conclusions have not changed from those stated in my direct testimony. The Company has not provided sufficient justification for the retrofit of Sooner units 1 and 2. I also find that, based on the Company's own NPVRR analysis and when other environmental compliance risks are considered, the additional retrofits of Muskogee units 4 and 5 would not be prudent.

Q What is your recommendation to the Commission?

A I continue to recommend that the Commission deny the Company's application for approval to retrofit Sooner units 1 and 2, given the inherent risks I discussed in my direct testimony. I disagree with OIEC that the Scrub Plan should be reconsidered, given that it likely carries even higher risks and costs than the Scrub/Convert Plan. I also recommend that the Commission ignore Mr. Norwood's presentation of the summation of nominal dollars over a 30-year period in comparing the Company's compliance plans.

[27] Responsive Testimony of Scott Norwood, p. 23, lines 2-5.

Q Does this conclude your testimony?

A It does.

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

OKLAHOMA INDUSTRIAL ENERGY CONSUMERS' RESPONSE TO SIERRA CLUB'S FIRST SET OF DATA REQUESTS AND INTERROGATORIES

1.1. Refer to Responsive Testimony of Scott Norwood, Tables 6, 7, 8, and 9.

a. Is Mr. Norwood aware of any general accounting principle or textbook that recommends reporting the summation of nominal dollars that occur in different years?

i. If so, please provide such a citation.

ii. If not, please explain why Mr. Norwood provided these summations.

OIEC's Response:

a. No.

i. Not applicable.

ii. The nominal amounts provided represent costs that ratepayers would actually pay over time for electricity under the forecasted compliance scenarios. Electricity prices are not generally billed on a present value basis.

Response Prepared by: Scott Norwood

Date: 1/14/15

By responding to these Data Requests, OIEC is not indicating that the provided information is relevant or material and OIEC 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.

CAUSE NO. PUD 201400229

Data Request

OIEC 1-25_Att1

Base Forecast is used unless otherwise specified

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Coal ($/MMBTU)	$2.14	$2.18	$2.24	$2.33	$2.41	$2.49	$2.57	$2.66	$2.76	$2.85	$2.95	$3.05	$3.15	$3.25	$3.35	$3.47	$3.58
NG ($/MMBTU)	$4.23	$4.38	$4.74	$5.26	$5.42	$5.33	$5.58	$5.66	$5.84	$6.17	$6.45	$6.71	$6.99	$7.28	$7.66	$8.09	$8.43

Prices are from EIA's Annual Energy Outlook 2014

The source file is located: http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2014&subject=0-AEO2014&table=62-AEO2014

Near bottom of chart under Fuel Prices (nominal dollars per million Btu)

For High Gas Sensitivity 1.5

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
NG ($/MMBTU)	$6.35	$6.57	$7.12	$7.88	$8.13	$7.99	$8.36	$8.48	$8.77	$9.26	$9.67	$10.07	$10.49	$10.92	$11.49	$12.13	$12.65

For Low Gas Sensitivity 0.75

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
NG ($/MMBTU)	$3.17	$3.29	$3.56	$3.94	$4.07	$4.00	$4.18	$4.24	$4.38	$4.63	$4.84	$5.04	$5.25	$5.46	$5.75	$6.07	$6.33

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Base Forecast is used unl

	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Coal ($/MMBTU)	$3.69	$3.81	$3.92	$4.05	$4.18	$4.31	$4.45	$4.60	$4.75	$4.90	$5.06	$5.22	$5.38
NG ($/MMBTU)	$8.86	$9.35	$9.79	$10.34	$10.95	$11.30	$11.56	$12.01	$12.65	$13.32	$14.04	$14.78	$15.57

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For High Gas Sensitivity

	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
NG ($/MMBTU)	$13.29	$14.02	$14.69	$15.51	$16.42	$16.95	$17.34	$18.02	$18.97	$19.99	$21.05	$22.18	$23.36

For Low Gas Sensitivity

	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
NG ($/MMBTU)	$6.65	$7.01	$7.35	$7.76	$8.21	$8.47	$8.67	$9.01	$9.49	$9.99	$10.53	$11.09	$11.68

1.7 Refer to Responsive Testimony of Scott Norwood, page 31, lines 19-20.

a. Please explain Mr. Norwood's "concerns regarding future environmental cost exposure under the Scrub plan," including supporting analyses and documentation for these concerns.

b. Please describe Mr. Norwood's understanding of potential environmental compliance costs to which OG&E could be exposed under the Scrub plan.

c. Please describe Mr. Norwood's understanding of environmental regulations that OG&E could be subject to under the Scrub plan.

d. Does Mr. Norwood assert that OG&E has adequately accounted for future environmental compliance costs that would be incurred at Sooner 1&2 and Muskogee 4&5?

   i. If so, please provide the supporting analyses and documentation for this assertion.

   ii. If not, please explain what future costs should have been incorporated in OG&E's analysis.

OIEC's Response:

a. The referenced testimony simply reflects the fact that future EPA regulations could increase the cost of coal-fired power plant operations beyond the levels presently assumed and thereby diminish the significant advantages of OG&E's existing coal-fired generating units as low-cost and relatively stable energy resources.

b. OG&E could potentially be exposed to more stringent than currently proposed carbon regulations, as well as proposed and future increased regulation of other emissions such as SO2, NOx, mercury and particulates, as well as increased regulation of coal combustion residuals and cooling water intake systems.

c. OG&E's proposed environmental compliance plan is intended to address requirements of the EPA's Regional Haze Rule ("RHR") and Mercury and Air Toxics Standards ("MATS") Rule. The Company could also be subject to increased regulation of NOx emissions under the Cross State Air Pollution Rule; increased regulation of SO2 and NO2 under the National Ambient Air Quality Standards ("NAAQS") for Ozone; increased regulation under the Coal Combustion Residuals rule ("CCR"); increased regulation of carbon emissions under EPA's proposed regulations for carbon emissions from existing generating units (111.d); increased regulation of cooling water intake structures under Section 316(b) of the Clean Water Act; and increased regulation of emissions related to Sierra Club's claims of New Source Review ("NSR") violations. See Section II.C. Of the Company's 2014 IRP and the direct testimony of OG&E witness Turner for further discussion of environmental regulations that OG&E could be subject to under the Scrub plan.

d. Yes.

   i. See the discussion of environmental risks presented in direct testimonies of OG&E witnesses Turner and Howell in this proceeding and Section II.C of OG&E's 2014 IRP report.

ii. Not applicable.

Response Prepared by: Scott Norwood

Date: 1/15/15

By responding to these Data Requests, OIEC is not indicating that the provided information is relevant or material and OIEC 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.