BEFORE THE
OKLAHOMA CORPORATION COMMISSION

IN THE MATTER OF THE APPLICATION OF	**)**	
OKLAHOMA GAS AND ELECTRIC COMPANY	**)**	
FOR COMMISSION APPROVAL OF THE COMPANY'S	**)**	**CAUSE NO. PUD 201600059**
PLAN TO INSTALL DRY SCRUBBERS AT THE SOONER	**)**	
GENERATING FACILITY	**)**	

Rebuttal Testimony of Tyler Comings

PUBLIC VERSION

On Behalf of
Sierra Club

March 23, 2016

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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 Have you previously filed testimony before this Commission?

A Yes. I filed responsive testimony in this case. I also filed responsive and rebuttal testimony in Cause Number PUD 201400229 ("the previous case").

Q What is the purpose of your rebuttal testimony?

A My rebuttal testimony responds to the following issues raised by Oklahoma Corporation Commission ("OCC") Staff Witness Jason C. Chaplin:

1. Natural gas price risk. I disagree with Mr. Chaplin's assertion that scrubbing Sooner is the best option for the Company in light of natural gas price risk. The Company's base case natural gas forecast—upon which the decision to scrub Sooner was based—is far too high and outdated. More recent base or reference forecasts are comparable to the Company's low natural gas price scenario. Under current natural gas price forecasts, it would cost ratepayers $600 million dollars more if OG&E were to scrub the Sooner units compared to converting them to natural gas. Therefore, before even accounting for the risk of future compliance costs such as carbon dioxide ("CO_2") or other environmental regulations, the scrubbers are highly uneconomic.

2. Fuel diversity. Mr. Chaplin discusses the benefits of fuel diversity afforded by scrubbing Sooner, but he has failed to quantify those benefits. Despite the Southwest Power Pool Integrated Marketplace ("SPP IM" or "SPP market") region nearly doubling in geographic size since OG&E submitted its application in the previous case, neither Staff nor the Company has conducted new modeling. Given the diverse fuel

mix in the SPP market, the risks of continuing to burn coal, and lower current natural gas price expectations (discussed above), scrubbing Sooner will not only cost ratepayers $600 million dollars more than natural gas conversion; it will also subject them to a number of additional risks that go beyond environmental compliance.

3. Proposed condition. If the scrubbers were unconditionally approved by the Commission then ratepayers would face significant market and environmental risks that the Company has ignored. Therefore, if the scrubbers were approved, one possible condition to protect ratepayers would be to allow the Company to bear the risk that the plant will not recover its costs in terms of energy and capacity value. If in the face of the increasing risks and poor economic performance of the plant, the Company is confident that scrubbing is the best option then it should readily assume those risks.

Q Are there any exhibits that accompany your testimony?

A Yes. Attached are Exhibits TFC-1 and TFC-2.

II. SCRUBBING SOONER IS UNECONOMIC UNDER CURRENT AND UPDATED NATURAL GAS PRICE FORECASTS

Q Does Staff witness Chaplin claim that converting the Sooner units to natural gas subjects the Company to too much risk compared to scrubbing the units?

A Yes. Mr. Chaplin claims that OG&E's Convert plan would leave the Company "exposed to a large amount of risk related to the future price of natural gas and fuel availability."[1]

Q Do you agree that scrubbing Sooner is the preferred option for the Company and its ratepayers?

A Absolutely not. I testified in the previous case that converting the Sooner units to natural gas was "likely less expensive and less risky over the long-term than

[1] Responsive Testimony of Jason C. Chaplin, p.16, lines 20-21.

retrofitting the units" given an assessment of the risks at that time.[2] Since then the economics of retrofitting the plant have gotten much worse—primarily due to low natural gas prices. Given a more realistic and current outlook of natural gas prices, scrubbing the Sooner units would not be the least-cost option by a large margin.

Q Did Staff offer any new analysis or evidence that scrubbing the Sooner units was the least cost option for ratepayers?

A No. Witness Chaplin does not present any new analysis or evidence to show that scrubbing Sooner would be the least cost-option. Staff relies on OG&E's original analysis, which was performed two years ago.

Q Did the Company offer any new analysis or evidence that scrubbing the Sooner units was the least cost option for ratepayers?

A No. The Company's choice to scrub Sooner was determined in its "Scrub/Convert" plan from its IRP analysis conducted in 2014. In the previous case, the Commission denied OG&E's request for preapproval of its Environmental Compliance Plan, which mainly consisted of OG&E's plan to scrub Sooner. The preapproval for this plan (including scrubbing Sooner). In this current case, the Company has offered no new analysis to support its plan to scrub Sooner.

Q Are forecasts of natural gas prices a key factor in determining if scrubbing Sooner is economic?

A Yes. Natural gas price assumptions are critical to the economic analysis of Sooner. Figure 1 shows the benefit (or cost) of scrubbing the Sooner units at each of the Company's three natural gas price forecasts. An NPVRR (net present value revenue requirement) difference below zero indicates that scrubbing Sooner is more costly than converting Sooner to natural gas up to and including the given year. The results from the Company's analysis show the following:

[2] See Responsive Testimony of Tyler Comings in Cause No. PUD201400229, page 53, lines 3-4, which was filed on December 16, 2014.

- Under the Base forecast, scrubbing Sooner carries a $133 million benefit
- Under the High Gas forecast, scrubbing Sooner carries a $1.4 billion benefit
- Under the Low Gas forecast, scrubbing Sooner carries a $548 million cost

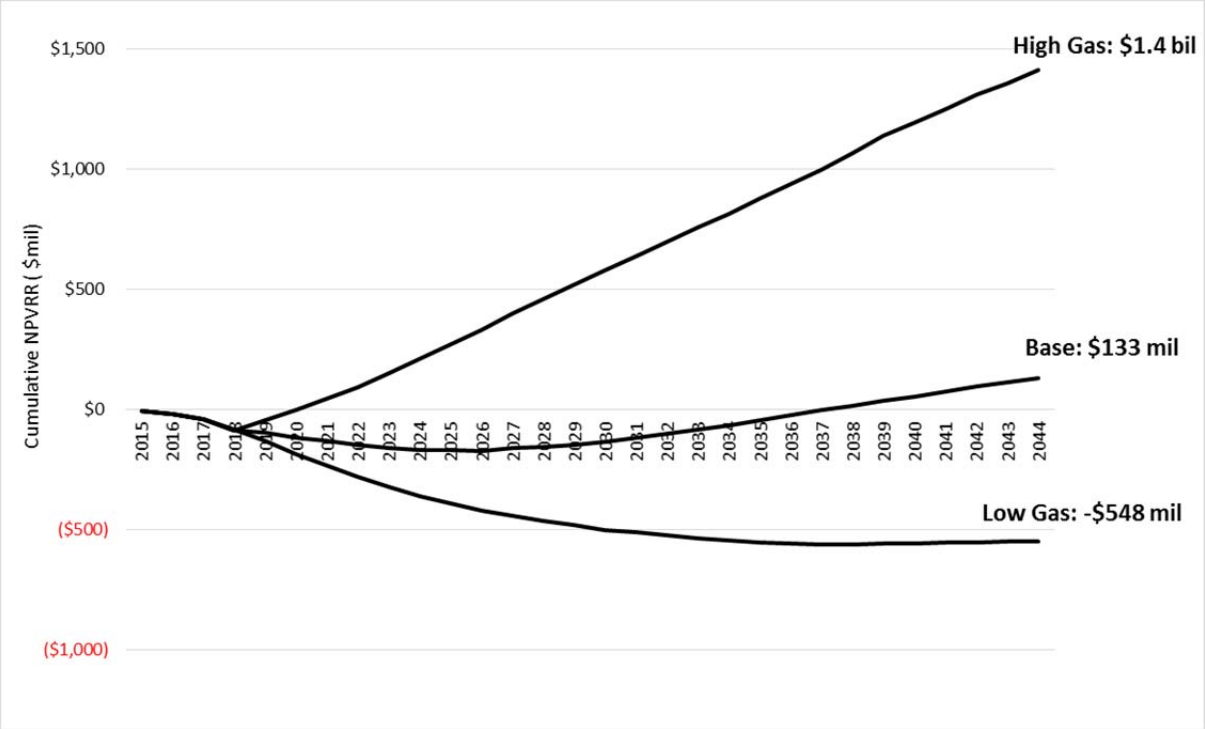

Figure 1: Benefit (Cost) of Scrubbing Sooner under OG&E's Natural Gas Price Forecasts ($2014 million, NPV)[3]

Q When does scrubbing the Sooner units "break even" compared to converting the units under the Company's natural gas price forecasts?

A Looking at the figure above, the "break even" point occurs when the costs to scrub or convert the Sooner units are equal (based on the Company's previous model runs). On the figure above, this point is where each line crosses the x-axis. The results from the Company's analysis show the following:

- Under the Base forecast, scrubbing Sooner breaks even in 2038;

[3] See Responsive Testimony of Tyler Comings in Cause No. PUD201400229, Figure 4 and Table 4

- Under the High Gas forecast, scrubbing Sooner breaks even in 2021; and
- Under the Low Gas forecast, scrubbing Sooner never breaks even

Q Why do changes in natural gas prices have such an effect on the economics of scrubbing Sooner?

A First, natural gas generation competes directly with coal generation. As prices for each of those fuels change, the order in which the plants are called upon to generate electricity (i.e. dispatched) by SPP can change.

Second, natural gas prices are highly correlated with energy prices, which then determine how often Sooner (and other plants) will operate and how much OG&E's ratepayers will pay and generators will receive for energy from the SPP market. According to SPP: "Workably competitive markets should experience highly correlated gas costs and energy prices in general."[4] SPP's latest *State of the Market Report* shows how decreasing natural gas prices have corresponded with decreasing electricity prices.

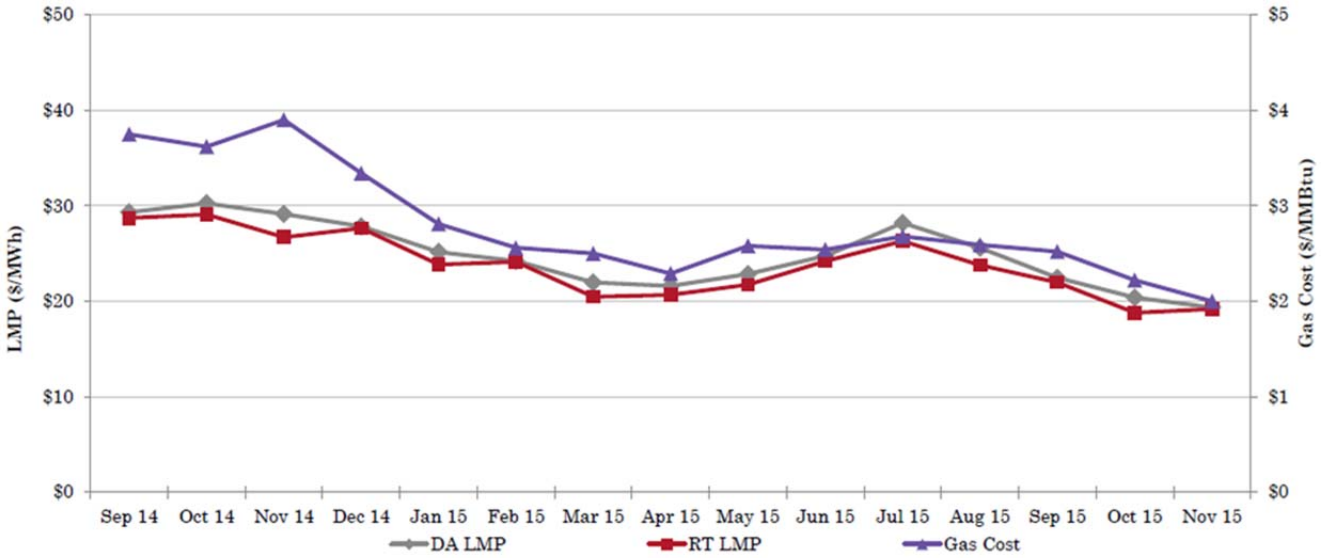

Figure 2: SPP Natural Gas and Electricity Price Correlation[5]

[4] SPP Market Monitoring Unit, *State of the Market Report: Fall 2015*, December 21, 2015.
[5] *Id.* DA LMP = Day Ahead Locational Marginal Price; RT LMP = Real Time Locational Marginal Price. Chart is directly from that report.

Q Is the economic value of scrubbing Sooner highly correlated with natural gas prices?

A Yes. The natural gas price projection and the NPVRR benefit of scrubbing Sooner are highly correlated. Figure 3 shows a plot of the NPVRR benefit or cost of scrubbing Sooner (previously shown in Figure 1) plotted against the nominal levelized natural gas price of each of the Company's three forecasts.[6]

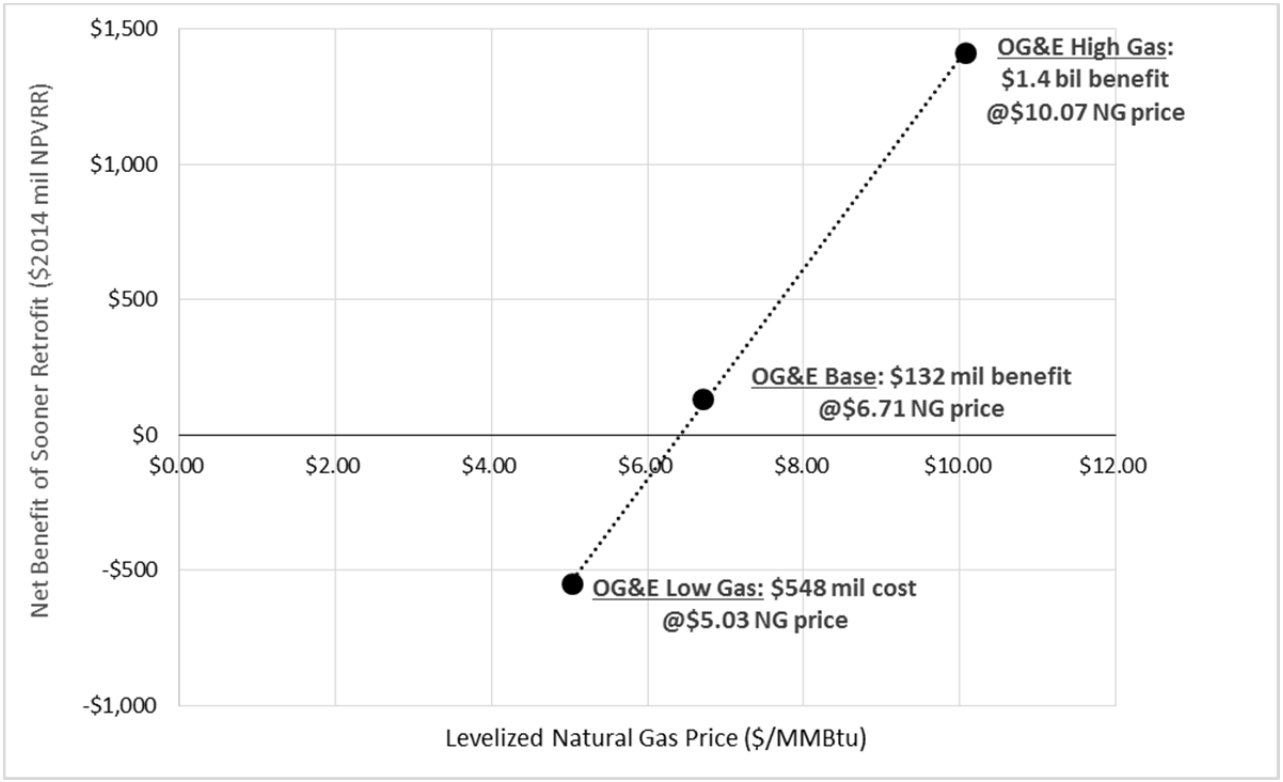

Figure 3: Net Benefit of Scrubbing Sooner at Company's Natural Gas Prices ($/MMBtu, levelized)[7]

[6] The levelized natural gas price is way of representing a multi-year projection in one number. It is calculated for each 30-year natural gas price forecast using the Company's discount rate of 8.32%.

[7] This methodology has been used by Pacificorp modeler Rick Link (see: http://www.utc.wa.gov/_layouts/CasesPublicWebsite/GetDocument.ashx?docID=92&year=2015&docketNumber=152253)

Q Does this analysis allow one to estimate the "break even" natural gas price at which scrubbing Sooner becomes economic?

A Yes. The "break even" nominal levelized price would occur where the trend line above crosses the x-axis, which is at the $6.41 per MMBtu price level. At this price level, the cost of scrubbing Sooner is the same as converting it.

Q Have natural gas prices and expectations changed since the previous case?

A Yes. Both recent natural gas prices and future expectations of natural gas prices have decreased markedly since the Company's analysis was conducted. The SPP monthly "gas cost" shown in Figure 2 was down to $2 per MMBtu for November 2015—the last month reported. Henry Hub natural gas prices averaged $2.63 per MMBtu in 2015. In January and February of this year, those prices were $2.28 and $1.96, respectively. More recently, on March 9th, Henry Hub prices reached "the lowest level in 20 years" at $1.57 per MMBtu.[8]

Future expectations for natural gas prices have changed as well. The NYMEX futures market expects prices remain below $3 per MMBtu for 2016, 2017, and 2018.[9]

Q Are all of the Company's natural gas price forecasts higher than actual 2015 prices and expected prices in the short-term?

A Yes. As shown in Figure 4, the Company's Base forecast predicted prices of around $4 per MMBtu in 2015 and assumes that prices rise to over $5 per MMBtu in 2018. Even the Company's Low Gas forecast is higher than actual and expected prices from 2015 through 2018.

[8] EIA Natural Gas Weekly Update, March 10, 2016. Available at: http://www.eia.gov/naturalgas/weekly/archive/2016/03_10/index.cfm

[9] Henry Hub Futures: http://www.cmegroup.com/trading/energy/natural-gas, pulled on March 2, 2016

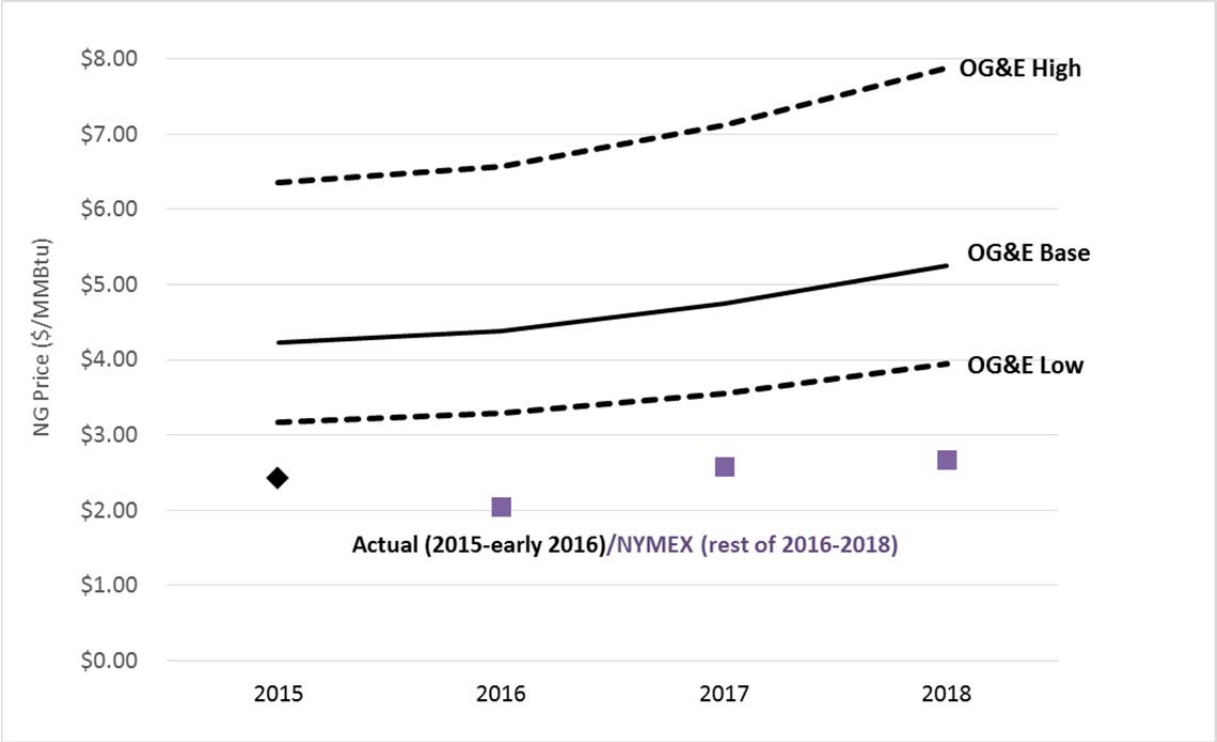

Figure 4: Company's Natural Gas Price Forecasts Compared to Actual and Futures Prices ($/MMBtu)[10]

Q The Company claims that current natural gas forecasts do not matter in this case. Is that correct?

A No. The Company claims that Sooner will not be scrubbed or converted until 2019, therefore natural gas price expectations through 2018 do not matter.[11] However, the changes in short-term natural gas price expectations also coincide with changes in long-term price expectations. This downward trend in long-term forecasts impacts the economics of the proposal to install scrubbers in two ways: (1) natural gas fired units competes directly with coal-fired units and will get dispatched more often; and (2) the locational marginal price paid to all generators will be lower when natural gas prices are lower. Under more recent natural gas price forecasts, the Sooner units would be dispatched far less and would receive a

[10] Henry Hub prices: https://www.eia.gov/dnav/ng/hist/rngwhhdm.htm. Henry Hub Futures: http://www.cmegroup.com/trading/energy/natural-gas, pulled on March 2, 2016.
[11] Company data response to SC 1-2.

lower energy price than OGE assumed in its analysis. This directly impacts the economics of the scrubber investment.

Q To better understand these two points, would it be helpful to understand how the SPP Integrated Marketplace works?

A Yes. SPP coordinates the movement of electricity in a large, multi-state region (see Figure 7). One of the many ways in which it performs this function is through scheduling of generators to meet load on a day-ahead and real-time basis in the Integrated Marketplace. In the day-ahead market, SPP looks at projected energy demand to occur the next day and dispatches generators to operate in order to serve that demand. In the real time market, generators are dispatched at five minute intervals in order to serve "real time" fluctuations.

Generators offer prices based on the marginal costs of the unit, i.e. the costs to produces one more megawatt hour. For coal and gas units, the marginal costs are primarily for fuel but also include other variable operations and maintenance (O&M) costs such as the cost of sorbents used in pollution controls. (Capital costs and fixed O&M costs are not typically included in an energy offer price.) SPP generally dispatches the least cost units first and works its way up the offers by price until demand is satisfied. The highest cost unit that clears the market in a given hour sets the energy price for that hour—subject to transmission constraints at a given location, this is called the locational marginal price ("LMP"). A unit is dispatched if the offer price is at or below the clearing price. Therefore, not all generators in SPP are necessary to serve load every hour of the year and, indeed, some may not be dispatched at all.

Q Why do natural gas price forecasts matter with regard to how well natural-gas fired units will compete with coal-fired units?

A Because the primary determinant of whether a unit is dispatched or not is the offer price (which primarily consists of fuel costs and other O&M costs) made by the generator's owner, natural gas generators make lower offerings into the SPP when natural gas prices are lower. Natural gas units can then displace coal units in

terms of when they are called upon by SPP. These lower-cost natural gas units are, therefore, better-placed in the SPP market than higher-cost coal units.

Q Why do natural gas price forecasts matter with regard to the energy price?

A When there is an abundance of low-cost offerings from natural gas generators due to low natural gas prices, the ultimate LMP paid to all generators is generally lower.

Q In its analysis, what capacity factor did OG&E assume that the Sooner plant would operate at after the installation of scrubbers?

A OG&E's analysis assumed that the average capacity factor over the expected life of Sooner 1 and 2 after the installation of scrubbers would be 72 percent and 75 percent, respectively.[12] The plant has not run at this level since 2011. Therefore, the Company is projecting that the plant will exceed how it has performed in recent years, despite increased competition from lower-cost generation.

Q Have we seen how these current and updated natural gas prices will impact the Sooner plant, specifically?

A Yes. In 2015, Sooner operated at just a 62 percent capacity factor.[13] From November 2015 through February 2016 (a four month period), Sooner unit 1 operated at a [redacted] percent capacity factor and Sooner unit 2 operated at a [redacted] percent capacity factor.[14] The Company explained that recently the plant has not been competitive in the SPP market:

> In 2015, Sooner 1 and Sooner 2 were self-committed beginning in January through the summer months, and were dispatched daily for economic reasons. With the dropping SPP IM energy prices, OG&E modified its offering philosophy and began market offering the Sooner Units into the SPP IM. This resulted in the Sooner Units being shut down and put in reserve standby on October 21, 2015 for Sooner 1 and October 30, 2015 for Sooner 2. The Units ran approximately 6 days in November

[12] Average annual capacity factor from 2019-2044 modeled by the Company's base case: See OIEC 1-11_Att01_2014_IRP_ProdCost_ScrubConvert_Base_CT_spread from Cause No. PUD201400229

[13] EIA net plant generation. Available at: http://www.eia.gov/electricity/data/browser/#/plant/6095/?freq=M&pin=

[14] Company data response to SC 1-9_Att CONFIDENTIAL

> of 2015, for the remainder of 2015 and into 2016, the units were operated to perform the required environmental and Activated Carbon Injection ("ACI") testing and not operated for any other reason.[15]

In sum, from November 2015 through February 2016, it appears that the Sooner plant has only been economically dispatched in the SPP market for **six** days.

Q Do you have concerns that the capacity factors the Sooner plant experienced at the latter part of 2015 are more representative capacity factors under the current natural gas prices?

A. Yes. As I noted, offer prices are normally based on the marginal costs of the unit, which are the costs that arise if the generator produces one more MWh of power. However, the Company apparently "self-committed" the units earlier in 2015—meaning that they would have operated regardless of the SPP energy price. Starting in late October 2015, OG&E stated that "[w]ith the dropping SPP IM energy prices," OG&E "modified its offering philosophy and began market offering the Sooner Units into the SPP IM." I think the Commission should focus on this response because it shows that the Sooner plant is clearly uneconomic in recent months and operating more like a peaking plant.

Q Compared to now, will the Sooner plant become more or less competitive after the installation of a scrubber?

A The plant will only become less competitive once scrubbers are installed since its operating costs are expected to increase by $2.72 per megawatt hour.[16] Therefore, SPP will dispatch these units less often. The Company assumed a 72 and 75 percent capacity factor after scrubbers are installed on Sooner. This is unreasonable for two reasons. First, the plant has not met that level in the past year, even without scrubbers and when it was "self-committed". Second, after OG&E changed its "offering philosophy and began market offering the Sooner Units," the Sooner units were "shut down and put in reserve standby." If these units are currently in standby reserve without scrubbers, it is highly improbable

[15] Company data response to SC 2-3
[16] Direct Testimony of Leon Howell in Cause No. PUD201400229, Exhibit LCH-1, page 56.

that these units will dispatch at a 72 and 75 percent capacity factor after scrubbers are installed on Sooner.

Q Should the Commission consider the Company's High Gas price scenario?

A No. In a recent data response, the Company selectively mentions the economics of Sooner under the High Gas cases but fails to mention the Low Gas case outcome.[17] This is because high gas prices make the Sooner scrubbers look more attractive. However, the Company's High Gas forecast is unreasonably high and extremely outdated; the Commission should give it no weight. Even in 2014, when OG&E developed the forecast, it was too high when compared to all scenarios run by the Energy Information Administration (EIA) in its 2014 Annual Energy Outlook (AEO).[18]

Q Has SPP developed a more current forecast that reflects long term natural gas price expectations?

A Yes. In December 2015, SPP met to discuss assumptions for its upcoming 2017 Integrated Transmission Plan (ITP).[19] In that meeting, SPP presented a base forecast that is very close to OG&E's Low Gas forecast in the short-term and long-term—as seen in Figure 5. SPP forecasts these <u>much</u> lower long-term natural gas prices even though there were extremely short-term situations over the past few years with higher gas prices as the result of anomalous weather. Like OG&E's Low Gas forecast, SPP forecast's is also much higher than what the market expects through 2018.

[17] Company data response to JCC 1-4
[18] See Rebuttal Testimony of Tyler Comings in Cause No. PUD201400229, Figure 2.
[19] SPP. 2017 ITP10 Overview Planning Summit. December 28, 2015. Attached as Exhibit TFC-2.

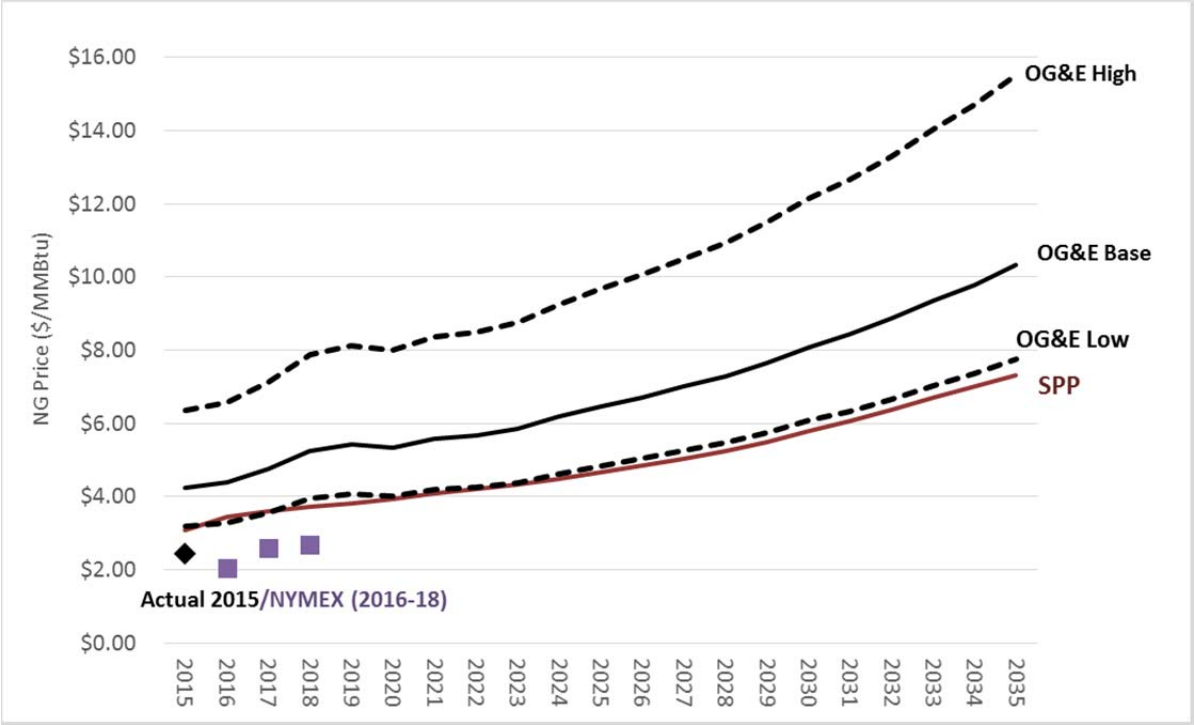

Figure 5: Company and SPP Natural Gas Price Forecasts ($/MMBtu)[20]

Q Is scrubbing Sooner economic using SPP's current and updated natural gas price forecast?

A No. Since the SPP natural gas price is similar to the OG&E Low Gas case—the economic outcome is similar. Under OG&E's Low Gas Scenario (which assumes $0 for CO_2 and other environmental regulations), scrubbing Sooner would cost ratepayers $548 million. Under the current SPP natural gas price forecast this outlook gets worse as scrubbing Sooner would cost ratepayers $604 million more than the alternative. Again, this cost does not account for the risk for future costs to comply with CO_2 or other environmental regulations.

Q Do you think there is a downside risk for natural gas prices even relative to the SPP forecast?

[20] Company prices (Cause No. PUD201400229, Data response to OIEC 1-25, Attachment 1); Actual Henry Hub prices (https://www.eia.gov/dnav/ng/hist/rngwhhdm.htm);
NYMEX Futures pulled on March 2, 2016 (http://www.cmegroup.com/trading/energy/natural-gas/natural-gas.html)

A Yes. Figure 6 shows the extension of the trendline seen in Figure 3 to include more recent natural gas price levels and the SPP forecast.[21] For illustrative purposes, I have also included actual 2014 and 2015 price level results. I am not claiming that these price levels will be sustained over the 30-year period. However, these data points show that there is downside risk for natural gas prices even relative to the SPP forecast.

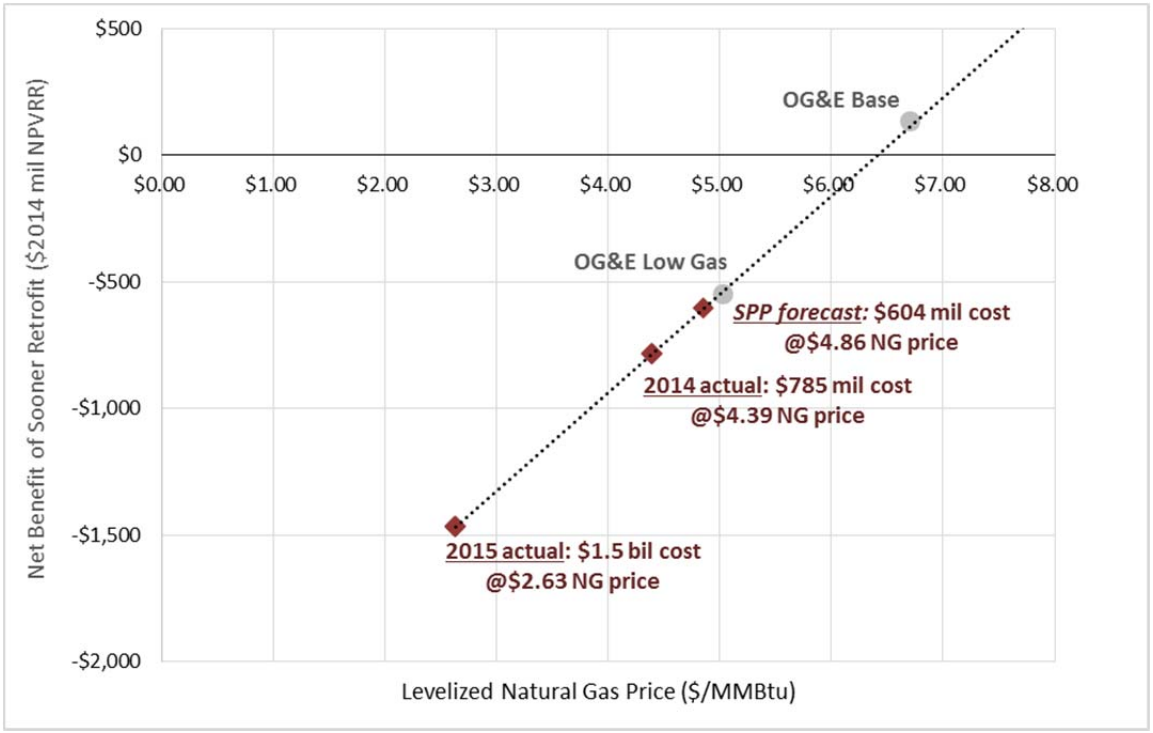

Figure 6: Net Benefit of Scrubbing Sooner at Select Natural Gas Prices ($/MMBtu, levelized)

Q Do the Company and Staff overvalue the proposal to scrub Sooner?

A Yes, significantly. The Company and Staff's assessment of the proposed scrubbing of Sooner is predicated on outdated, upwardly biased natural gas prices—primarily the Company's Base forecast. The Base forecast feeds the false belief that Sooner will be more competitive and generate more revenue than it actually will. The use of nearly two-year-old assumptions for natural gas prices

[21] The levelized natural gas price is way of representing a multi-year projection in one number. It is calculated for each 30-year forecast using the Company's discount rate of 8.32%.

inappropriately paints the retrofit as a good deal when it is anything but. It is unacceptable for the Company to move forward with a $500 million upfront investment without updating this key assumption.

Q Did Public Service Company of Oklahoma (PSO) recently submit testimony that natural gas prices would likely remain low?

Yes. Mr. Chaplin claims that converting the Sooner units to natural gas "could potentially saddle Oklahoma ratepayers with higher energy costs in the future."[22] However, the other major utility in the state does not agree. In PSO's latest rate case, witness Richard Smead testified on natural gas prices, claiming that Oklahoma "should become a major new demand center, with virtually no risk of high prices or shortage."[23] In looking at the long term, he also claimed that "the supply is there, prices can be expected to be low and stable, and that situation should stay in place for many decades."[24]

Q Did you previously discuss natural gas prices as well as other risks of scrubbing Sooner?

A Yes. The Company's chosen plan includes scrubbing Sooner Units 1 and 2 for approximately $500 million. My previous testimony discussed the many risks involved, in part, based on the Company's own scenarios and sensitivities. Under its own analysis, the conversion of the Sooner units to natural gas was more economic when there were either lower gas prices or lower load or a carbon price or low conversion of other SPP coal plants to natural gas.[25]

In my rebuttal testimony in the previous case (filed more than a year ago), I stated that "the Low Gas price forecast is reasonable given recent gas price expectations, while the High Gas price forecast is clearly not."[26]

[22] Responsive Testimony of Jason C. Chaplin, p.17, lines 2-3.
[23] Direct Testimony of Richard G. Smead in Cause No. PUD201500208, page 19, lines 16-17.
[24] *Id.* page 26, lines 10-12.
[25] See Responsive Testimony of Tyler Comings in Cause No. PUD201400229, Figure
[26] See Rebuttal Testimony of Tyler Comings in Cause No. PUD201400229, page 7, lines 23-24.

Q Has your assessment of natural gas price risk involved in scrubbing Sooner changed?

A Yes. The economics of scrubbing Sooner have become markedly worse. The Company's Base forecast—upon which the decision to scrub Sooner was based—is more reasonable as a high bound than as a base case forecast. At the time of my rebuttal testimony in the last case, the Company's Low Gas case was close to market price expectations. Since then, the Low Gas case has exceeded price expectations and mirrors a recent SPP forecast in the short and long term. Either of those two forecasts could be used as a conservative base case forecast. In those cases, scrubbing Sooner would cost ratepayers between $548 million and $604 million more than the alternative and this is without accounting for the risk of costs to comply with future environmental regulations.

Q Does incorporating the money spent so far on scrubbing Sooner make it a viable investment going forward, at this time?

A No. Despite not getting regulatory approval, the Company has already spent $130 million on the scrubber investment.[27] The Company should not be guaranteed recovery of spending that was made without the Commission's approval. However, even on a going forward basis, the investment would still be significantly uneconomic.

III. INVESTING FURTHER IN COAL ADDS MORE RISK THAN IT PREVENTS

Q Does Staff witness Chaplin claim that scrubbing the Sooner units would provide fuel diversity?

A Yes. Mr. Chaplin claims that scrubbing the Sooner units will "preserve fuel diversity in the face of uncertainties."[28]

[27] Company response to data request JCC-1
[28] Responsive Testimony of Jason C. Chaplin, p.17, lines 16-17

Q Has the Company conducted any new modeling to support their proposal to scrub Sooner in this case?

A No. The Company is not offering any new modeling in support of the scrubber investment. Instead, intervenors and the Commission are left with assumptions and modeling results that were produced in 2014. The natural gas price analysis in my testimony is based upon the Company's modeling from the previous case but also looks at what circumstances have changed since then.

Q Has the footprint of the SPP Integrated Marketplace changed recently?

A Yes. The SPP footprint has expanded significantly since the previous case. On October 1, 2015, the region added portions of six new states: Iowa, Minnesota, Montana, North Dakota, South Dakota, and Wyoming. Figure 7 shows both the old and expanded footprints of the SPP market.

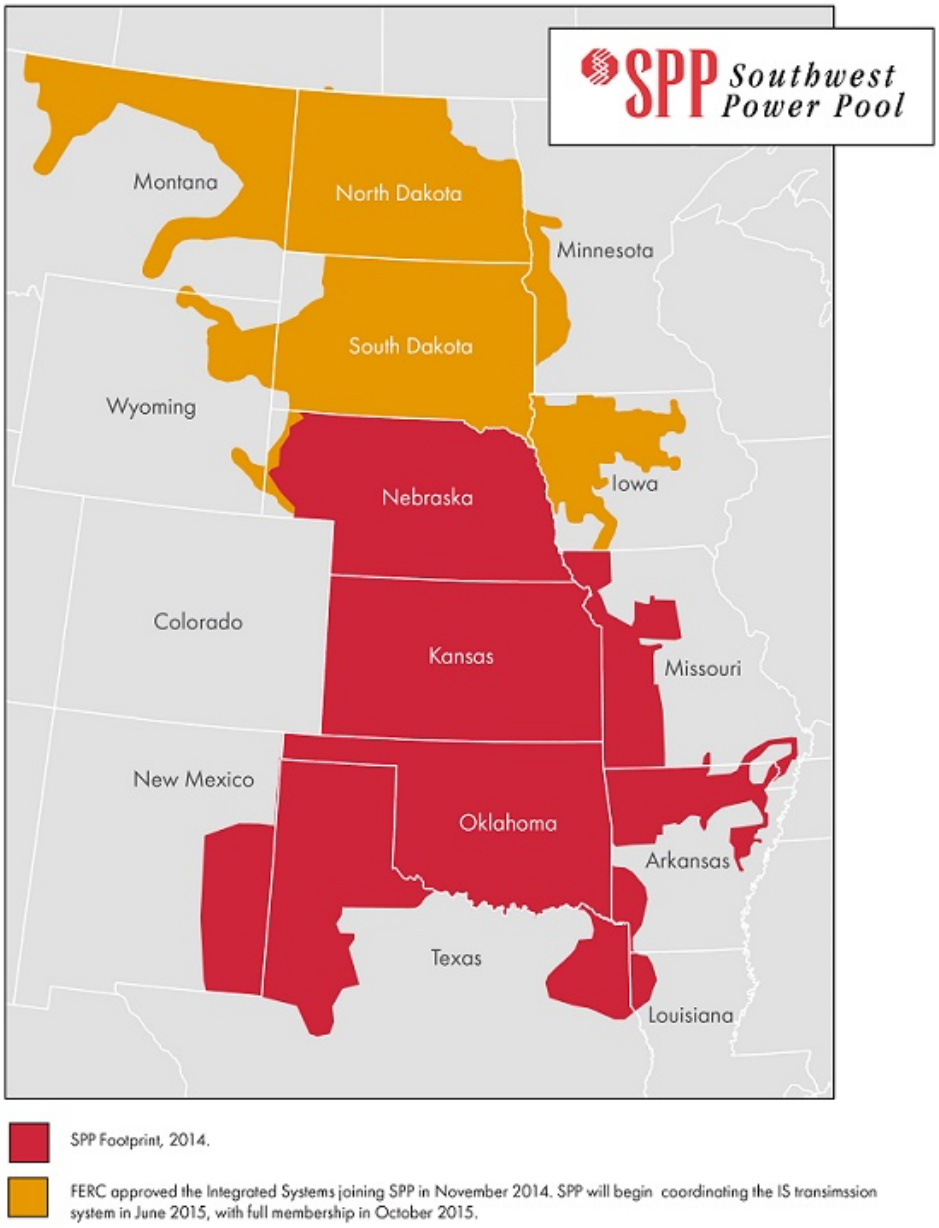

Figure 7: Change in SPP Footprint[29]

Q Has this expansion provided more low cost wind and lower prices throughout SPP?

A Yes. The latest *State of the Market* report from SPP states that:

[29] SPP. Available at: http://assets.fiercemarkets.net/public/sites/energy/SPP-WAPA_Footprint%20061120152.jpg

> Lower prices are prevalent in the north due to less expensive generation in the area, and the west-central part of the footprint due to abundant low-cost wind generation in that area.[30]

Q Has the Company recently lowered customers' bills due to natural gas prices and savings afforded by participating in the SPP market?

A Yes. An article in The Oklahoman from September 2015 entitled "Lower natural gas prices mean bill reduction for OG&E customers" quotes the Company:

> We are fortunate from an electricity perspective to be in an extended period of lower natural gas prices. These lower prices were compounded by the fuel saving benefits provided by the SPP (Southwest Power Pool) Integrated Market, which makes it possible to pass along these savings on monthly electric bills.[31]

Q Does the expansion of the SPP market add to resource diversity in the region?

A Yes. As stated in FERC's most recent national energy market assessment:

> The Integrated System will increase SPP's generating capacity by about 10 percent, about a third of which will come from hydro generation. The greater fuel diversity and increased infrastructure should enhance SPP's ability to serve customers and help manage price volatility.[32]

The generation mix in SPP (shown in Figure 8) after the expansion of SPP shows increased hydro and wind resources in November 2015. Note, however, that coal still provided a majority of the generation in that month because the region still has a significant amount of coal.

[30] SPP Market Monitoring Unit, *State of the Market Report: Fall 2015*, December 21, 2015.
[31] Monies, Paul, The Oklahoman, "Lower natural gas prices mean bill reduction for OG&E customers", September 2, 2015.
[32] Federal Energy Regulatory Commission (FERC), 2015-16 Winter Energy Market Assessment, October 15, 2015. Available at: https://www.ferc.gov/market-oversight/reports-analyses/mkt-views/2015/10-15-15-A-3.pdf

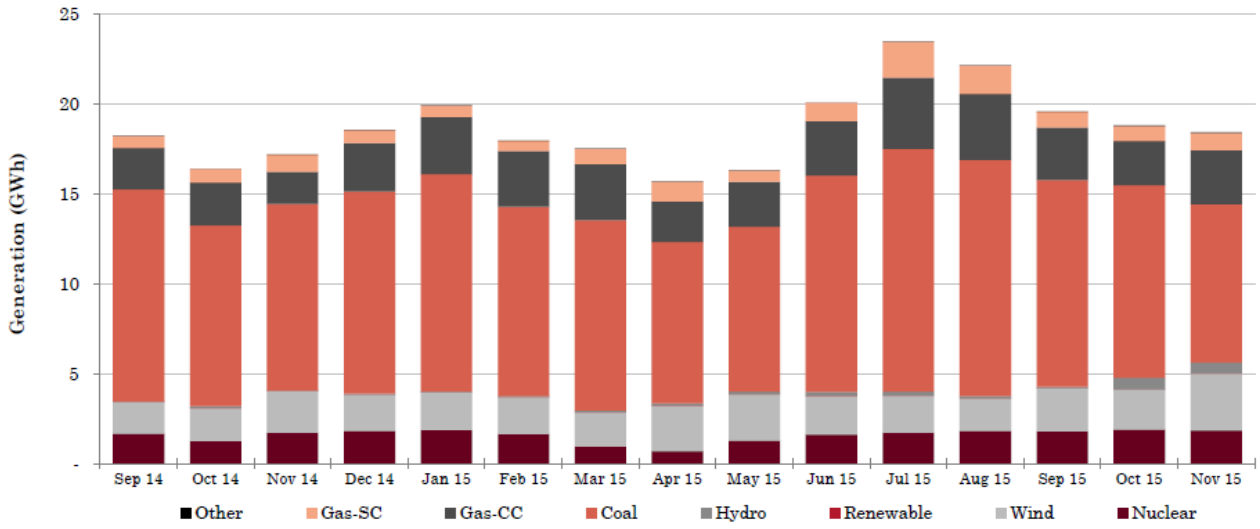

Figure 8: SPP Generation by Fuel Type (Day-Ahead)[33]

Q Do you believe fuel diversity should be considered in this case?

A Fuel diversity is a consideration and can be important. However, it also depends on how it is defined and measured. In this case, the Company and Staff discuss fuel diversity as continuing to operate coal to protect against natural gas risks. However, the Commission should consider fuel diversity in the more modern sense and include renewables, energy efficiency, demand response, and fuel option flexibility.[34]

It is also important to measure or quantify diversity. As with the previous case, the Company has not fully quantified the value of fuel diversity; nor has Staff done such an assessment. In order to justify scrubbing Sooner, the "fuel diversity" defined by the Company and Staff would need to carry a significant value in order to overcome the more dominant downside risk of natural gas prices, which show that installing scrubbers will cost ratepayers at least $604 million more than the alternative.

[33] SPP Market Monitoring Unit, *State of the Market Report: Fall 2015*, December 21, 2015. Chart is pulled directly from report.
[34] This view is also mentioned by PSO. See: Direct Testimony of Steven L. Fate in Cause No. PUD201500208, page 17, line 21-page 18, line 4

Q How should the Commission consider fuel diversity in this case?

A All else being equal, it is great to maintain diversity. In this case, all else is far from equal. When the Commission considers that a plan to achieve "fuel diversity" (as defined by OG&E) would have a significant upfront cost of $500 million, would make this investment on a plant that has recently been "shut down and put in reserve standby" because it cannot economically compete in the market, would cost ratepayers $600 million more than known alternatives (due to lower natural gas prices), and subject ratepayers to risks of future compliance costs, it would be imprudent to approve a proposed plan in the name of diversity without having fully quantified value of that diversity. Furthermore, future fuel optionality would be foreclosed if the Company imprudently invests in scrubbers that it would need three decades to pay off. Other options, such as conversion of Sooner, would provide the capacity needed for short periods of time and still allow for the Company to consider other generation options.

Q Would additional wind resources provide a low cost, low risk option for the Company?

A Yes. Fortunately, the SPP market contains some of the best wind resources in the United States. Ratepayers have benefitted from low prices in the region, in part due to wind generation. Wind does not carry fuel price risk or environmental compliance risk. Therefore, it should be a viable option if the Company and Staff wish to reduce risk and increase diversity.

Q Have other circumstances changed since the previous case that make investments in wind more attractive?

A Yes. First, the Production Tax Credit ("PTC") was recently extended by several years. Rather than being intermittently available from year to year, this extension provides some certainty to wind development in the near term.[35] Second, SPP's wind capacity credit is expected to increase in the future. The upcoming SPP

[35] See Department of Energy, Renewable Energy Production Tax Credit. Available at: http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc

transmission plan assumes an average capacity credit of 20 percent whereas the previous plan assumed only a 5 percent capacity credit.[36] This makes wind more attractive as a possible capacity resource, in addition to being a low cost, low risk energy resource.

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

A Yes. DSM is typically the lowest cost of any resource and protects against fuel price volatility and environmental compliance risk. In the previous case, I discussed the shortcomings of the Company's DSM assumptions.[37]

Q Does scrubbing Sooner add environmental compliance risk?

A Yes. In my testimony in the previous case, I discussed environmental cost risk at length.[38] Since then, the following changes to environmental regulations have occurred:

- On October 1, 2015, the U.S. Environmental Protection Agency ("EPA") made the National Ambient Air Quality Standard for 8-hour ozone more stringent by lowering it from 75 parts per billion ("ppb") to 70 ppb. This will require additional reductions of oxides of nitrogen ("NOx") at many fossil fuel-fired power plants around the country. If NOx emissions from the Sooner plant are found to be impacting an area's ability to comply with the new standard, the Company may be required to install selective catalytic reduction ("SCR") technology to reduce those emissions. Currently, there are no ozone monitors in Noble County, where the Sooner plant is located, but recent data show that ozone concentrations in

[36] SPP Economic Studies Working Group, 2017 ITP10 Resource Plan Phase 2, October 9, 2015. Available at: http://www.spp.org/documents/31728/eswg%20minutes%20&%20attachments%2020151009.pdf
[37] See Responsive Testimony of Tyler Comings in Cause No. PUD201400229, pages 48-51.
[38] See Responsive Testimony of Tyler Comings in Cause No. PUD201400229, pages 22-33.

neighboring Kay County exceed the new 70 ppb standard.[39] The same is true for Creek County, which has the next closest ozone monitor.

- On November 16, 2015, the EPA proposed an update to the Cross-State Air Pollution Rule ("CSAPR") ozone season program by issuing the CSAPR Update Rule. Starting in 2017, this proposal would reduce summertime emissions of NOx from power plants in 23 states in the eastern half of the U.S., including Oklahoma. This update could also drive the need for additional NOx reductions at Sooner.

- On September 30, 2015, EPA released its final steam-electric Effluent Limitation Guidelines ("ELG") to reduce or eliminate the release of toxic metals and other pollutants into U.S. waterways.[40] The rule sets new or additional limits for pollutants in wastewater streams, such as those coming from flue gas desulfurization, fly ash, bottom ash, and flue gas mercury controls, and include the first federal limits on the levels of toxic metals in wastewater that can be discharged from power plants. Under the final ELG, new requirements for pretreatment must be in place by November 2018 and best available technology requirements will be implemented between 2018 and 2023 through the five-year National Pollutant Discharge Elimination System permit cycle.[41] The final ELG may require additional controls on or elimination of any wastewater streams at the Sooner plant.

- On December 19, 2014, EPA issued its final rule regulating coal combustion residuals ("CCR") under Subtitle D of the Resource Conservation and Recovery Act. The rule applies to new and existing

[39] See U.S. Environmental Protection Agency website. Accessed March 21, 2016. Available at: https://ozoneairqualitystandards.epa.gov/OAR_OAQPS/OzoneSliderApp/index.html#

[40] See U.S. Environmental Protection Agency website. Accessed March 21, 2016. Available at: http://www.epa.gov/eg/steam-electric-power-generating-effluent-guidelines-2015-final-rule.

[41] See U.S. Environmental Protection Agency website. Final Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Industry Factsheet. Accessed March 21, 2016. Available at: http://www.epa.gov/sites/production/files/2015-10/documents/steam-electric-final-rule-factsheet_10-01-2015.pdf.

landfills and ash ponds and establishes minimum siting and construction standards for new CCR facilities, requires existing ash ponds at operating coal plants to either install liners and ground water monitoring or permanently retire, and sets standards for long-term stability and closure care. The rule also establishes a number of requirements for facilities to make monitoring data and compliance information available to the public online and enforcement is largely expected to be achieved through citizen suits under the Solid Waste Disposal Act. It appears that the coal ash produced at the Sooner plant is disposed of offsite. Any ash that is sold for beneficial reuse could be negatively affected by the introduction of material from the new scrubbers. If new landfills are required to deal with some or all of this coal ash, this would impose costs on the Company.

As these rules are designed primarily to reduce pollution from coal-fired power plants, OG&E's units that continue to burn coal face these risks.

Q Does investing in the scrubber at Sooner reduce risk to ratepayers?

A No. The Company's own fleet is a hedge against the SPP market where ratepayers get their energy needs. Investing in coal as a hedge is a risky bet given the current low cost landscape of SPP, projections of continued low natural gas prices, and pending environmental risk. Under the Company's outdated and biased base case—natural gas prices are high, energy prices climb, and future environmental costs do not occur. This outlook is far removed from the world in which the Company is currently operating and will likely operate in the future.

Q Do you have any new other concerns that have arisen since the previous case?

A Yes. I am very concerned that the Sooner plant is likely to become a stranded asset. The Sooner units are currently "shut down and put in reserve standby." Yet even though this plant is not currently economic in the SPP Marketplace, OG&E wants to invest half a billion dollars into it, which would take three decades to pay off. These facts make it quite likely that the Commission would have to deal with

the Sooner plant as a stranded asset in the near future—putting them in a "no win" situation.

Scrubbing Sooner exacerbates the significant risk that the plants' operations will not cover its fixed and capital costs. Figure 9 shows the annual capital and fixed costs of both scrubbing and converting the plant. Sooner with a scrubber would cost between $130 million and $140 million annually just to be available (i.e. excluding fuel and other variable costs). This results in a net present value of capital and fixed costs of $1.3 billion through 2044. If Sooner is converted, the total capital and fixed costs would be about one-third of the scrubbed Sooner costs ($444 million). Thus the risks of stranded investment is much lower when the plant is converted.

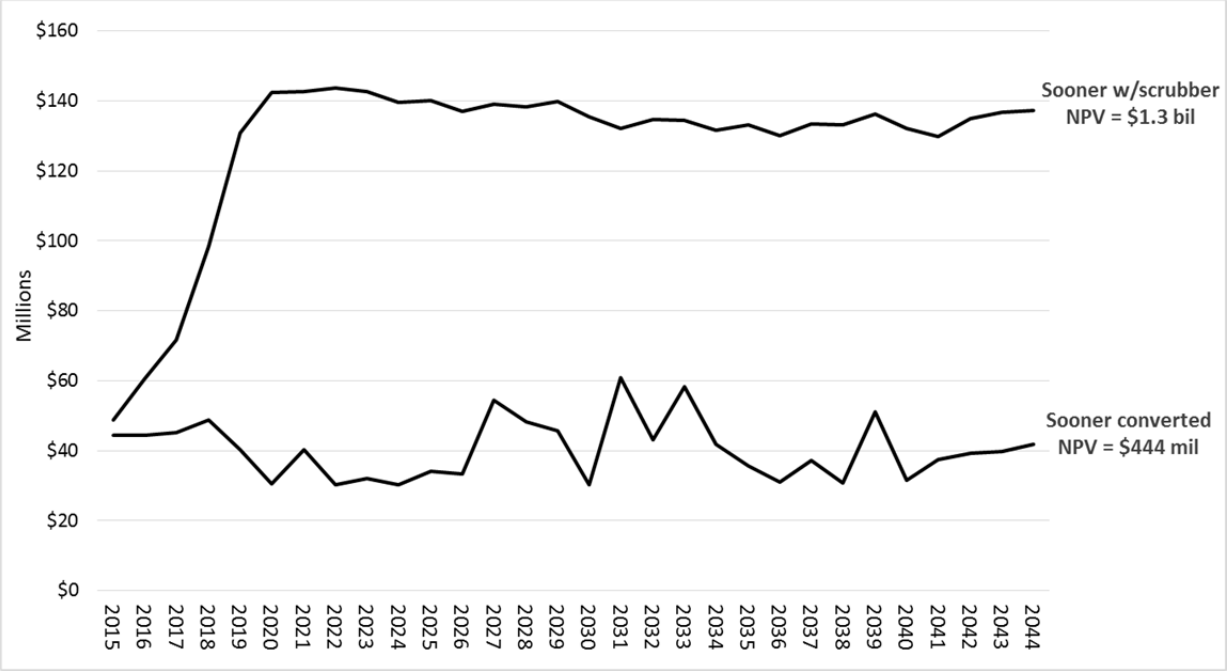

Figure 9: Annual Capital and Fixed Costs of Sooner with a Scrubber or Converted to Natural Gas

Q Staff focuses on OG&E's assumed capacity factors for Sooner with scrubbers compared to Sooner converted to natural gas and favors scrubbers.[42] Does this comparison justify the scrubber investment?

A No. One cannot just compare assumed capacity factors in isolation and conclude that the one plant with a higher capacity factor is the best option for ratepayers. The Company has an obligation to provide capacity for its service territory. The costs of the plant existing and being made available for capacity include its fixed and capital costs. When the generator bids energy into the SPP market, it will also receive revenue for that energy. If the clearing price (LMP) is higher than its actual marginal cost of production then those margins help offset its fixed and capital costs. If a unit has extremely high fixed and capital costs, it needs to make up for that with higher energy revenues in order to cover those costs. The real value to ratepayers is when the revenue a plant generates is sufficient to at least offset all of its costs. So the Commission should not focus on capacity factors in isolation but rather look at the total costs (both fixed and variable) and revenues of each option to determine which has a greater value to ratepayers with an acceptable amount of risk.

IV. FINDINGS AND RECOMMENDATIONS

Q What are your findings?

A Staff's recommendations are predicated on outdated and biased assumptions. It is even more apparent than in the previous case that scrubbing Sooner is not the least cost option. Using the more reasonable OG&E Low Gas forecast or a current, updated SPP forecast results in a cost of scrubbing Sooner of between $548 million and $604 million more than the alternative. This range is based on the outdated modeling conducted by the Company which included a much smaller SPP market than exists today. Given the increased access to low cost generation in the expanded SPP footprint and pending environmental risks, the scrubber investment is likely worth even less. Despite these significant factors, the

[42] Responsive Testimony of Jason C. Chaplin at pg. 12, line 12 – pg. 13, line 15.

Company has failed to update (or for that matter, improve upon) its analysis from the previous case. OG&E's failure to update its modeling based on current information is especially egregious given that the Sooner units have recently been "shut down and put in reserve standby."

Q What is your recommendation to the Commission?

A I strongly recommend that Commission deny the proposal to install scrubbers on Sooner. However, if the Commission decides to approve the plan, I recommend that it do so subject to conditions that protect ratepayers.

Q What is one type of condition that the Commission could include with approval of the scrubbers?

A In proposing the scrubber investment, the Company is acting like a risk-seeking merchant generator but, unfortunately, they are betting with ratepayers' money. The Company has shown that recently the Sooner plant has not been competitive in the SPP market—even without the additional costs of the scrubbers which would render the plant even less competitive. I have shown that under more current, reasonable forecasts, the scrubber investment would be far from the best option. If the Commission approves this plan, it must include a condition that insulates ratepayers from this large risk they are being asked to bear. Below is an example of proposed condition that would shift this risk to OG&E rather than the ratepayers, which involves creating a rider involving all of the following steps:[43]

1. For the scrubbed Sooner plant, the Company recovers, from ratepayers, operating costs, annual amortized capital costs (including scrubbers and any future capital projects), and all other fixed costs, as well as a rate of return on capital investments.

2. The Company offers the plant into the SPP market on an economic basis only, i.e. it does not "self-commit."

[43] This is not the only way to structure a condition to protect ratepayers but serves as a model example.

3. The Commission starts an annual docket in order to review the energy and capacity value generated by the plant as defined below:

    a. The "energy value" for the scrubbed Sooner plant, equal to the total annual energy revenue collected by bidding the plant into the SPP Market.

    b. The "capacity value" for the scrubbed Sooner plant, equal to the annual fixed costs and amortized capital costs that would have been collected from ratepayers if the Sooner units had been converted to natural gas in 2019.

4. Ratepayers either receive a credit or refund from the Company which reflects the difference between the sum of the energy value and capacity value minus the total annual costs of Sooner. A credit is provided to ratepayers if the costs of the plant exceed the energy and capacity value. Conversely, ratepayers refund the Company in the unlikely event that energy and capacity value exceed the costs.

This process has advantages for both ratepayers and the Company:

- Ratepayers are insulated from the significant market and environmental compliance risks of maintaining Sooner as a coal-fired plant;
- It is consistent with the Company's assumption that the units remain economic when coal-fired;
- In no circumstance would ratepayers pay more than the market value of the plant.

If in the face of the increasing risks and poor economic performance of the Sooner plant, the Company is confident that it is choosing the best option then it should be willing to bear those market risks.

Q Does this conclude your testimony?

A It does.