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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) CAUSE NO. PUD 201400229
AIR ACT AND COST RECOVERY; AND FOR)
APPROVAL OF THE MUSTANG MODERNIZATION)
AND COST RECOVERY)

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CORPORATION COMMISSION
OF OKLAHOMA

REBUTTAL TESTIMONY
OF
CRAIG R. ROACH, Ph.D.
ON BEHALF OF
OKLAHOMA CORPORATION COMMISSION
PUBLIC UTILITY DIVISION

JANUARY 26, 2015

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1 **I. PURPOSE AND SUMMARY**

2

3 **Q. What is your name, business position, and business address?**

4 A. My name is Craig R. Roach, Ph.D. I am the Founder and President of Boston Pacific
5 Company, Inc. My business address is 1100 New York Avenue NW, Washington, DC
6 20005.

7

8 **Q. Are you the same Craig R. Roach who previously submitted Responsive Testimony**
9 **in this proceeding?**

10 A. Yes.

11

12 **Q. What is the purpose of this Rebuttal Testimony?**

13 A. The purpose of my Rebuttal Testimony is to respond to three of the intervenors who
14 recommended in their December 16, 2014 submissions in this proceeding that wind
15 power be evaluated in the context of OG&E's proposed environmental compliance plan.
16 The three intervenors are Oklahoma Energy Results, LLC (OER), Oklahoma Industrial
17 Energy Consumers (OIEC), and Sierra Club. I will also supplement my
18 recommendations from my Responsive Testimony to include OG&E conducting a
19 competitive procurement for new wind power development subject to an appropriate
20 concern about system limitations and risk.

21

22 **Q. Did OG&E evaluate wind as a component of their environmental compliance plan?**

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1 A. No. OG&E did not include wind power in its evaluation of alternatives. OG&E stated
2 that it is very possible, if not likely, that OG&E will increase its reliance on wind energy
3 over the coming decade, and planned on issuing a request for information in the spring of
4 2015, but it did not assess the option of adding wind as part of its proposed compliance
5 plan in this proceeding.¹ OG&E listed multiple reasons for pausing its efforts with wind
6 power.²

7

8 **Q. How did the intervenors respond to OG&E?**

9 A. The intervenors argued in response that the failure to consider wind power was one more
10 way in which the OG&E filing was deficient or not justified.³

11

12 **Q. How do the environmental compliance plans recommended by intervenors differ
13 from that proposed by OG&E?**

14 A. Recall that OG&E recommended what it called the Scrub/Convert alternative. The heart
15 of the Scrub/Convert plan was that (a) two large coal units at the Sooner facility would be

¹ Direct Testimony of Leon Howell on Behalf of Oklahoma Gas and Electric Company, Oklahoma Corporation Commission Cause No. PUD 201400229, filed August 6, 2014 ("Howell Direct Testimony"), page 5, Figure 1.

² For example, OG&E Witness Howell stated that "wind generation does not serve as an effective resource to address the planning capacity needs in OG&E's environmental compliance plan." Howell Direct Testimony, page 20, lines 2 to 3. Howell also stated that "we have concerns about the low SPP [market] prices in areas where the addition of wind generation has caused those prices to be depressed due to congestion charges." Howell Direct Testimony, page 20, lines 13 to 15. Howell continues that "[i]t is very possible, if not likely, that OG&E will increase its reliance on wind energy over the coming decade, if the transmission constraints are addressed and if the cost of wind offers our customers savings." Howell Direct Testimony, page 20, lines 23 to 25.

³ See, for example: Responsive Testimony of Judah L. Rose, Managing Director, ICF International, on behalf of Oklahoma Energy Results, LLC, December 16, 2014 ("Rose Responsive Testimony"), page 82, lines 3 to 4; Direct Testimony of Tyler Comings, on Behalf of Sierra Club, December 16, 2014 ("Comings Direct Testimony"), page 4, lines 22 to 24; Direct Testimony of Jennifer B. Tripp, on behalf of Sierra Club, December 16, 2014 ("Tripp Direct Testimony"), page 7, lines 2 to 5; Pre-filed Responsive Testimony and Exhibits of Scott Norwood, on behalf of Oklahoma Industrial Energy Consumers, December 16, 2014 ("Norwood Responsive Testimony"), page 7, lines 14 to 19.

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1 retrofitted with environmental controls (scrubbers and other equipment) so coal can
2 continue to be used and (b) two large coal units at the Muskogee facility would be
3 converted to burn natural gas.⁴

4
5 To illustrate the difference in compliance plans recommended by intervenors let me first
6 point to the Responsive Testimony of Mr. Judah Rose on behalf of OER. Mr. Rose
7 developed a new alternative which, in OG&E's lexicon, might be termed the
8 Replace/Wind alternative. Mr. Rose runs variations on his Replace/Wind option, but one
9 of them – Case 1 – gives a clear sense of what he is suggesting. In his Case 1: (a) the
10 four Sooner and Muskogee coal-fired units that OG&E would retrofit or convert would
11 be retired instead; (b) substantial existing and new natural gas-fired combined cycle
12 capacity would be acquired or contracted for by OG&E – [REDACTED]
13 [REDACTED] and 700 MW of new combined cycle
14 capacity; and (c) OG&E would acquire or contract with new wind power facilities by
15 2020 with nameplate capacity of 1,900 MW.⁵

16
17 **Q. Does he conclude that his Replace/Wind alternative would result in cost savings as**
18 **compared to OG&E's Scrub/Convert alternative?**

19 **A.** Yes. Mr. Rose concludes that his Replace/Wind alternative offers substantial cost
20 savings as compared to OG&E's proposed Scrub/Convert alternative. For his Cases 1
21 and 2, the cost savings range from \$3 billion to \$3.3 billion in present value terms for the

⁴ Responsive Testimony of Craig R. Roach, Ph.D., on behalf of Oklahoma Corporation Commission Public Utility Division, December 16, 2014 ("Roach Responsive Testimony"), page 6, lines 6 to 11.

⁵ Rose Responsive Testimony, page 70, lines 3 to 16.

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1 30-year time period analyzed;⁶ this is a range of approximately 9 to 10 percent savings as
2 compared to his estimate of total costs for OG&E's Scrub/Convert alternative.⁷

3

4 **Q. Is Mr. Rose recommending that the Commission order his Replace/Wind alternate
5 be substituted for OG&E's Scrub/Convert alternative?**

6 A. No. My understanding is that Mr. Rose recommends that the Commission's decision on
7 OG&E's proposed environmental compliance plan be delayed until the completion of
8 competitive procurements for (a) the existing and new combined cycle capacity he
9 identifies and (b) up to 1,900 MW of wind power.⁸

10

11 **Q. In your view should OG&E evaluate wind power as part of its resource planning?**

12 A. Yes, of course. Oklahoma is a unique location because it is home to some of the best
13 wind resources in America – as documented by capacity factors well above 40%.⁹ This
14 also is a unique moment because of the significant tax subsidy for the development of
15 wind power. The Federal Production Tax Credit (PTC) provides a tax subsidy of 2.3
16 cents per kWh after tax.¹⁰ Before tax, on a revenue equivalent basis, the incentive is 3.54
17 cents per kWh.¹¹ The PTC has been extended through 2014 so that wind developers who

⁶ Rose Responsive Testimony, page 76, Exhibit ICF-19.

⁷ Rose Responsive Testimony, page 75, lines 3 to 8.

⁸ Rose Responsive Testimony, page 80 line 21 to page 81 line 8 and page 84, lines 1 to 8.

⁹ "Analysis of Wind Farm Energy Produced in the United States," Brian D. Vick & R. Nolan Clark, USDA-Agricultural Research Service, page 9.

¹⁰ "Renewable Electricity Production Tax Credit," Database of State Incentives for Renewables & Efficiency, available at http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13E.

¹¹ To convert the PTC to a pre-tax basis, divide the after-tax PTC (2.3 cents per kWh) by one minus the corporate tax rate of 35%.

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1 started their efforts in 2014 may still qualify to receive the PTC for capacity they bring on
2 line in the near term.¹²

3
4 In addition, the Southwest Power Pool Regional Transmission Organization (SPP) has
5 accommodated wind power development in substantial ways with its policies and
6 practices. One key policy is its Highway/Byway transmission cost allocation policy in
7 which two-thirds of the cost of some new transmission facilities below 300 kV may be
8 allocated to the SPP system as a whole rather than to the local utility if they are
9 associated with wind.

10
11 Like them or not, the tax subsidy and SPP accommodations must be taken as a given and,
12 therefore, I support taking further advantage of this unique place and moment in time by
13 encouraging the development of additional wind power to the extent it lowers energy
14 costs for Oklahoma ratepayers and does not harm reliability.

15
16 **Q. Did you criticize OG&E for excluding wind from its evaluation?**

17 A. No. I did not criticize OG&E in my Responsive Testimony for excluding wind power
18 from its evaluation for two reasons. One, I see the environmental compliance plan as a
19 capacity issue – how does OG&E maintain or replace capacity affected by compliance
20 with the Regional Haze Rule (“RHR”) and the Mercury Air Toxics Standards (“MATS”).

21 Wind does not add substantially to capacity. Two, based on my experience with the PSO

¹² “Legislation Extends Wind Production Tax Credit (“PTC”) Eligibility to Projects for which Construction Began Prior to January 1, 2015,” Arthur Hazlitt, Mark A. Caterini, Junaid Chida, and Alexander Roberts, O’Melveny & Myers LLP, December 22, 2014, available at <http://www.omm.com/legislation-extends-wind-production-tax-credit-ptc-eligibility-to-projects-for-which-construction-began-prior-to-january-1-2015-12-22-2014/>.

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1 environmental compliance plan – including PSO conducting a wind RFP at its own
2 initiative – my expectation was that wind power could be pursued separately from the
3 decision on compliance. I expected wind power procurements would be conducted as a
4 matter of course because wind is a low cost option that can replace more expensive
5 market purchases.

6
7 **Q. Do you oppose the intervenor proposal to order OG&E to conduct a competitive**
8 **procurement for wind?**

9 A. No. I have no problem adding to my recommendations a requirement for OG&E to
10 conduct a separate wind power procurement. However, it must be done right in terms of
11 the way bids are evaluated, the terms of the contracts, and the amount of wind power
12 solicited. Intervenors did not include such essential details in their recommendations. To
13 that end, I suggest eleven guidelines for the procurement of wind resources in section IV
14 below.

15
16 **Q. What is your chief concern?**

17 A. Again, obviously, the PTC is a huge subsidy that can lower the ratepayer cost of wind
18 power at the wind farm. Intervenors are attracted to wind by the large difference, or
19 margin, between the low cost of wind and forecasted SPP market prices. They see this as
20 a buy low, sell high opportunity. However, the predicted margin cannot be realized
21 unless the wind power is fully deliverable on the SPP system and does not cause
22 offsetting system costs – now and in the future. These are the risks of increased reliance
23 on wind power and “doing it right” requires assessing and mitigating these risks.

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2 **Q. What do you recommend to that end?**

3 A. My recommendations are detailed in section IV of my testimony below. In general, I
4 recommend that (a) wind power be contracted for under pay-for-performance contracts
5 rather than acquired by OG&E – ratepayer protections are better this way; (b) SPP vet all
6 bids to assess possible system limitations; and (c) rather than specifying a level of wind
7 resources to be procured, specify only a minimum procurement target (200 MW) and
8 allow the market to ultimately dictate how much wind is contracted to benefit Oklahoma
9 ratepayers.

10

11 **Q. What is the primary motive for you adding this recommendation?**

12 A. The primary motive for recommending the wind procurement is to add to the diversity of
13 OG&E's resource portfolio in the face of substantial uncertainty. With my full set of
14 recommendations, OG&E would have a diversified mix of coal, natural gas, and wind
15 resources.

16

17 **II. INTERVENOR RECOMMENDATIONS THAT WIND POWER BE PART**
18 **OF OG&E'S ENVIRONMENTAL COMPLIANCE PLAN**

19

20 **A. OER's ANALYSIS AND RECOMMENDATIONS**

21

22 **Q. Who testified on behalf of OER?**

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1 A. Mr. Judah L. Rose from ICF International submitted Responsive Testimony on behalf of
2 OER.

3

4 **Q. Please briefly summarize your understanding of his conclusions that are relevant to**
5 **your testimony.**

6 A. His stated focus was on compliance with the Regional Haze rules.¹³ His first and primary
7 conclusion was that OG&E failed to conduct competitive procurements for either PTC-
8 qualified wind power or for existing natural-gas fired power.¹⁴ Further, his own
9 modeling showed that a portfolio with added wind resources and gas generation had costs
10 significantly lower than that for OG&E's proposed compliance plan – what OG&E calls
11 its Scrub/Convert alternative. The cost savings were in the range of \$3 billion to \$3.3
12 billion on a present value basis.¹⁵

13

14 **Q. What did he suggest OG&E do to achieve this costs savings?**

15 To achieve that level of cost savings, Mr. Rose proposed that, among other steps, OG&E
16 procure 1,900 MW of wind power.¹⁶

17

18 **Q. How did he select 1,900 MW?**

19 In a footnote he explains that 2,400 MW of wind power would produce energy in the
20 same range as that produced by the Sooner and Muskogee power plants.¹⁷ Given this, I

¹³ Rose Responsive Testimony, page 4, lines 15 to 16.

¹⁴ Rose Responsive Testimony, page 4, lines 17 to 18.

¹⁵ Rose Responsive Testimony, page 5, lines 1 to 3 and page 76, Figure ICF-19.

¹⁶ Rose Responsive Testimony, page 7, lines 1 to 5.

¹⁷ Rose Responsive Testimony, page 7, footnote 5.

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1 presume that the 1,900 MW of wind was chosen with the general goal of producing an
2 amount of energy in the same ballpark as the Sooner and/or Muskogee coal units.

3
4 **Q. Did Mr. Rose suggest other actions beyond the competitive procurement for wind?**

5 A. Yes. For example, to round out his proposal to achieve the approximately \$3 billion in
6 cost savings, Mr. Rose also proposed, in addition to the 1,900 MW of wind, that (a) both
7 Sooner coal-fired units would be retired in the 2018 to 2020 period, (b) two coal-fired
8 units at Muskogee would also be retired in 2020, (c) [REDACTED]
9 [REDACTED], and (d) 700
10 MW of new gas-fired combined cycle capacity would be added in 2020.¹⁸ Again, in
11 OG&E's lexicon, Mr. Rose's environmental compliance plan might be termed the
12 "Replace/Wind" alternative.

13
14 **Q. What does Mr. Rose say creates these cost savings?**

15 A. My understanding is that he would point primarily to the federal PTC for wind power and
16 to the great wind resources in Oklahoma. For example, Mr. Rose states that the PTC
17 "creates very significant customer cost savings opportunities, especially when combined
18 with high capacity factor wind."¹⁹

19
20 **Q. Do you agree the PTC can lead to ratepayer cost savings?**

21 A. Yes. The PTC can substantially cut the ratepayer cost of wind power. I say "ratepayer
22 cost" since the American taxpayer covers the rest of wind's costs. Earlier I noted that the

¹⁸ Rose Responsive Testimony, page 70 lines 3 to 16 and footnote 53.

¹⁹ Rose Responsive Testimony, page 7, lines 7 to 10.

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1 before-tax PTC subsidy is 3.54 cents per kWh, or \$35.40 per MWh. To appreciate the
2 size of this incentive, one can compare it to average SPP market prices. In 2012, for
3 example, the average spot price for on-peak energy in SPP was \$28.75 per MWh and the
4 average off-peak price was \$18.73 per MWh.²⁰ If both the SPP spot energy price and the
5 before-tax PTC are considered sources of revenue, then, the PTC accounts for well over
6 half of the revenue for wind power.

7
8 **Q. Are there uncertainties about whether these cost savings will be realized?**

9 A. Yes. There are no facts about the future. Every resource faces uncertainties.

10
11 **Q. What are the most important uncertainties for the wind resource?**

12 A. The most important uncertainties are about “system limits.” That is, how much wind
13 power can the SPP system cost-effectively and reliably use? I discuss this in detail in
14 section III of my testimony.

15
16 **Q. Has anyone in this proceeding estimated the SPP system limit?**

17 A. No. Mr. Rose quotes OG&E’s answer to a data request in which it states that “OG&E
18 has not conducted analysis that estimates the maximum level of wind that can be reliably
19 or economically used by OG&E in the SPP [market].”²¹ OG&E goes on to opine that,
20 because there is so much uncertainty across SPP, OG&E did “not believe such an

²⁰ “Electric Market Overview: Regional Spot Prices,” Federal Energy Regulatory Commission, updated January 22, 2013, available at <http://www.ferc.gov/market-oversight/mkt-electric/overview/2013/10-2013-elec-ovr-archive.pdf>. SPP prices are taken from the SPP North hub.

²¹ Rose Responsive Testimony, page 37, lines 1 to 2.

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1 estimate would be informative at this time.”²² In his own data response, Mr. Rose reports
2 that he also did not perform any analysis related to estimating the maximum level of wind
3 that could be reliably used by the OG&E system.²³
4

5 **Q. What is the concern with SPP system limitations here?**

6 A. The concern with system limitations is that the impacts – more transmission congestion
7 and curtailments, etc. – apply to all wind producers not just the wind project that
8 ultimately breached the limit. So, what matters is how much wind in total is assumed to
9 be in place over time.
10

11 **Q. What does Mr. Rose assume in terms of the total wind power in SPP?**

12 A. In terms of the amount of wind he assumed SPP-wide, Mr. Rose reports it is in the 11,000
13 MW to 12,000 MW range. He notes that there were 7,142 MW of wind online in SPP as
14 of the end of 2013. With his proposed 1,900 MW by OG&E and another 2,242 MW
15 “likely” in the 2014-2018 time frame, the total wind in SPP would be 11,284 MW.²⁴
16

17 **Q. Does Mr. Rose discuss system limits beyond the data requests you cited above?**

18 A. Yes. Appropriately, Mr. Rose does raise the issue of transmission constraints. He
19 highlights “two flowgates to the west and northwest of the OG&E load center.”²⁵
20

²² Rose Responsive Testimony, page 37, lines 9 to 10.

²³ OER’s response to OIEC data request OER-1-17.

²⁴ Rose Responsive Testimony, page 22, lines 3 to 7 and footnote 22.

²⁵ Rose Responsive Testimony, page 32, lines 15 to 16.

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Q. Does Mr. Rose test the full range of uncertainty here?

10

A. Mr. Rose does a credible job on the issue, but I do not think he tested the full range of possible wind development. Compare his 11,000 MW to 12,000 MW range²⁹ to the SPP scenarios in one of two SPP studies I discuss later in which there are 15,000 MW to over 25,000 MW of wind development.³⁰

11

12

13

14

15

Q. Did Mr. Rose address other uncertainties?

16

A. Yes. Mr. Rose conducted other sensitivities including those related to the uncertainty over future natural gas prices. Again, he found his “results not very sensitive to the gas price assumptions.”³¹

17

18

19

20

Q. Are you convinced about this point?

²⁶ Rose Responsive Testimony, page 33, lines 7 to 8.

²⁷ Rose Responsive Testimony, page 77, lines 11 to 13.

²⁸ Rose Responsive Testimony, page 77 line 21 to page 78 line 2.

²⁹ Rose Responsive Testimony, page 22, footnote 22.

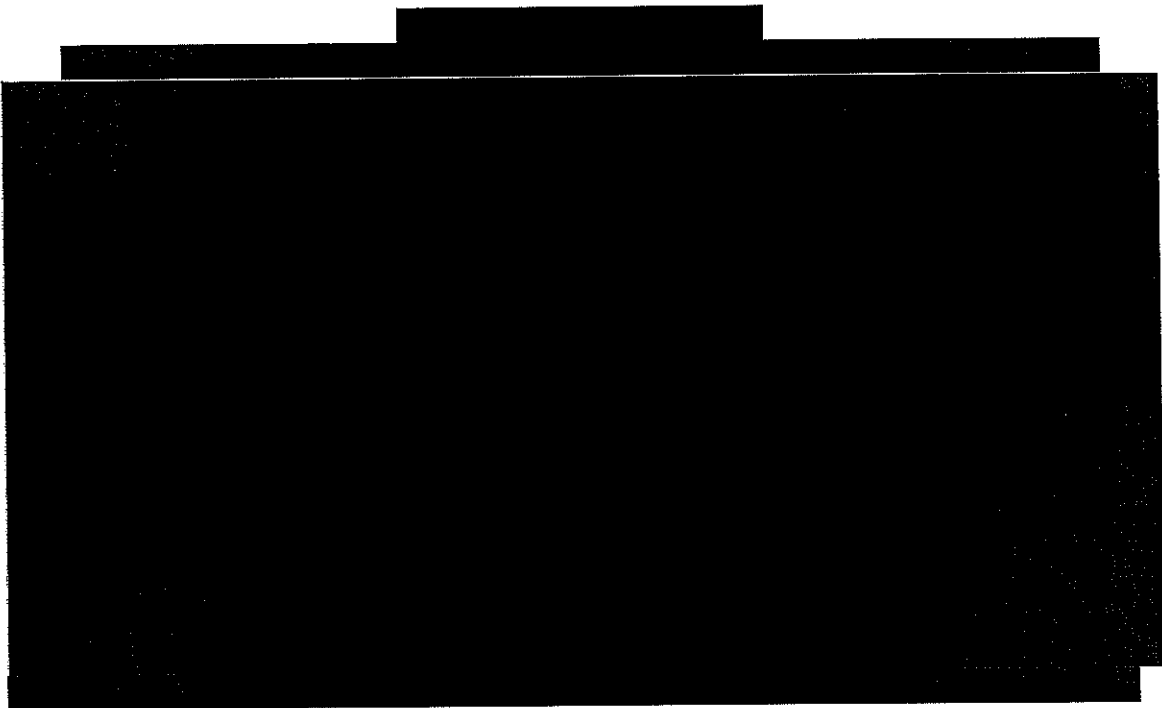
³⁰ “2013 Integrated Transmission Plan 20-Year Assessment Report,” Southwest Power Pool, July 30, 2013 (“SPP 2013 ITP”), pages 34 to 35.

³¹ Rose Responsive Testimony, page 78, lines 5 to 6.

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1 A. No. It is good that Mr. Rose openly discusses uncertainties – as did OG&E – but neither
2 Mr. Rose nor OG&E did the full range of analysis necessary. Specifically, Mr. Rose
3 used too narrow of a range of natural gas prices in his sensitivity. Higher natural gas
4 prices would be likely to increase the cost savings for the wind power he suggested be
5 procured, but it also would increase the cost for the substantial natural gas-fired resource
6 that he suggested be added. To make the point that Mr. Rose’s range of natural gas
7 prices is too narrow, I developed Figure One.

8
9
10



11
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13

14 Figure One compares the natural gas price forecast of Mr. Rose to the price, at different
15 dates, of natural gas futures on the NYMEX exchange. The purpose of this comparison
16 is to see whether the low, base, and high range of natural gas price forecasts used by Mr.
17 Rose are in line with the historical variability in natural gas futures prices. A simple
18 visual inspection of the data suggests that Mr. Rose’s high case is below expectations of

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1 natural gas prices in both 2010 and 2011. To the extent that the natural gas price should
2 reflect the full range of recent expectations, Mr. Rose's high case is too low.

3

4 **Q. Does Mr. Rose suggest that he is capturing the full range of uncertainty?**

5 A. No. In fact Mr. Rose does not argue that his high or low natural gas forecasts reflect a
6 reasonable range of uncertainty about future natural gas prices. These sensitivities were
7 created by adding and subtracting, respectively, \$1 from his base case forecast.³² In
8 particular, when asked whether the high case reasonably reflects potential upside risk of
9 future natural gas prices, Mr. Rose admits that he "did not perform an analysis which
10 demonstrates that the \$1/MMBtu increase for the high gas price sensitivity reasonably
11 reflects the potential upside risk of future natural gas prices."³³

12

13 **Q. Are there any other uncertainties that Mr. Rose should have assessed?**

14 A. Yes. I criticized OG&E for not assessing the full range of reasonable compliance
15 alternatives, and I would say the same about Mr. Rose's analysis. He should have
16 presented an analysis of what OG&E might term a Scrub/Wind alternative. That is, he
17 could have assessed a compliance plan in which the Sooner units are retrofitted to allow
18 continued coal use and then a wind procurement of some sort is used to include wind. If
19 the Commission wants the full diversity I recommend, that scenario would have been
20 informative.

21

³² Rose Responsive Testimony, page 78, lines 4 to 5.

³³ OER response to OIEC data request OER-1-18.

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1 Moreover, analysis of the Scrub/Wind alternative I suggest would likely reveal another
2 central point: the \$3 billion to \$3.3 billion cost savings are mostly about accessing cheap
3 wind energy. That is, Mr. Rose's analysis simply shows that PTC-subsidized wind
4 energy is cheap. Had he added the same amount of wind to Scrub/Convert, it could have
5 meant that Scrub/Convert was the lowest cost alternative.
6

7 **Q. What does Mr. Rose recommend?**

8 A. As to recommendations, when asked if he was proposing a specific resource plan, Mr.
9 Rose said, no, that is OG&E's responsibility. He said his suggestion was that "more
10 planning needs to be done, and a greater number of alternatives need to be considered."³⁴
11 More tellingly, he suggested that OG&E must complete this assessment "before
12 proceeding under this or any proposed IRP"³⁵ and that "OG&E's decision not to analyze
13 the wind options and associated transmission issues is a serious deficiency."³⁶
14

15 **B. SIERRA CLUB'S ANALYSIS AND RECOMMENDATIONS**

16
17 **Q. Who testified on behalf of Sierra Club?**

18 A. Sierra Club submitted responsive testimony from four individuals: Mr. Tyler Comings,
19 Mr. Jeremy Fisher, Ms. Jennifer Tripp, and Ms. Rachel Wilson.
20

³⁴ Rose Responsive Testimony, page 80, lines 8 to 12.

³⁵ Rose Responsive Testimony, page 81, lines 1 to 2.

³⁶ Rose Responsive Testimony, page 82, lines 3 to 4.

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1 **Q. Would you briefly summarize your understanding of their recommendation**
2 **relevant to your testimony?**

3 A. Yes. Sierra Club's overall recommendation is that: (a) the Commission should deny
4 OG&E's application for approval to retrofit Sooner units 1 and 2 in favor of the
5 "Convert" scenario, and (b) that OG&E should increase its wind generation by 300 MW
6 in 2015, and an additional 100 MW in 2021. Further increases would be made in 2031
7 and later.³⁷

8
9 I focus here on the second recommendation. Sierra Club states that "the pursuit of
10 additional wind generation would lower the customers' costs across all scenarios and
11 sensitivities due to its favorability relative to the SPP energy market prices."³⁸ Sierra
12 Club witnesses discuss OG&E increasing the MW of wind generation it owns or controls
13 from 14%³⁹ to at least 20% of its peak load.⁴⁰ This percentage is what leads to the
14 recommendation to add about 300 MW in 2015, an additional 100 MW in 2021, and then
15 no more until 2031. The actual wind proposal is reflected in Figure Two below.

16

³⁷ Comings Direct Testimony, page 43, Figure 11.

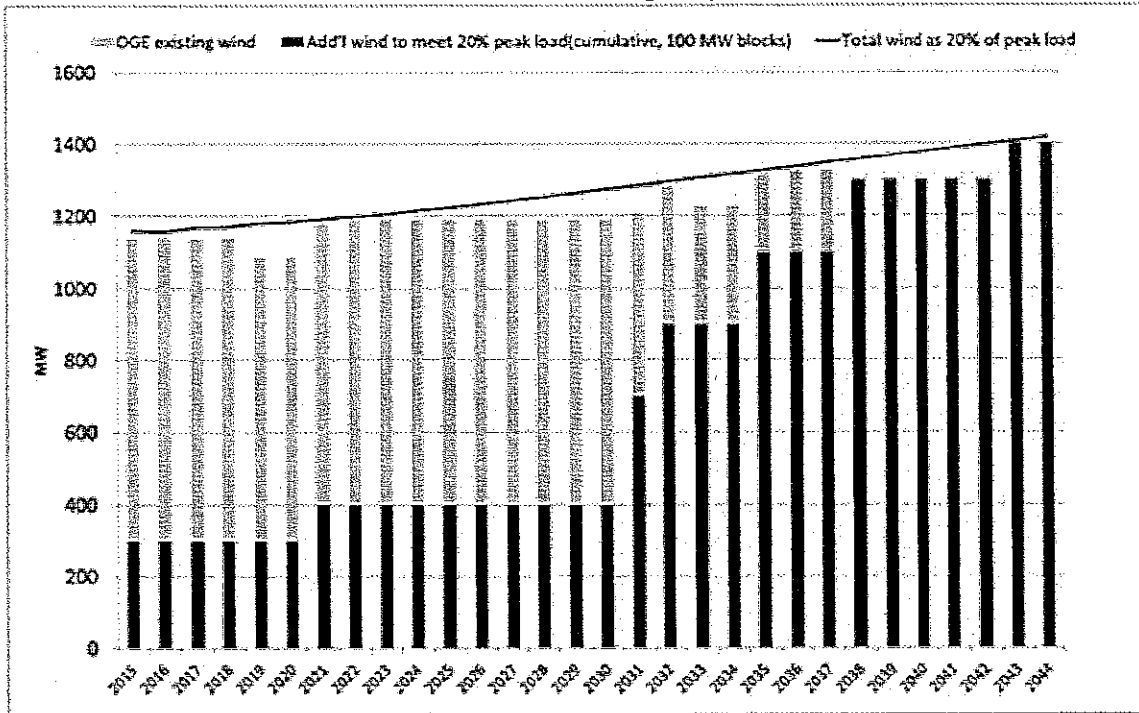
³⁸ Comings Direct Testimony, page 53, lines 4 to 6.

³⁹ Tripp Direct Testimony, page 27, lines 14 to 16.

⁴⁰ Tripp Direct Testimony, page 30, lines 7 to 8 and Comings Direct Testimony, page 42, lines 19 to 25.

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Figure Two
OG&E Wind Capacity



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4
5

Source: Comings Direct Testimony, page 43

6

Q. What lines of argument are used by Sierra Club in support of its wind recommendation?

7

8

A. Sierra Club witnesses offer several reasons why OG&E should consider adding wind to its portfolio, including: (a) wind energy is cheaper than market energy, (b) OG&E's concerns about transmission congestion can be addressed, (c) OG&E is incorrect in saying that it did not receive attractive offers for wind in response to its 2013 Request for Information, and (d) OG&E understates the capacity value of wind.

9

10

11

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[REDACTED]

[REDACTED]

[REDACTED]

REDACTED

1 [REDACTED] As a result, Mr. Comings argues that adding wind reduces the modeled net
2 present value revenue requirement for any compliance plan, under any forecast of market
3 prices.⁴²

4
5 Second, as to the idea that OG&E's concerns about transmission congestion can be
6 addressed, Ms. Tripp explains in detail how the SPP transmission system functions,
7 including how locational marginal prices are set and affected by congestion.⁴³ She then
8 explains tools and processes that SPP uses related to transmission congestion, including
9 transmission congestion rights (TCRs) as well as curtailment and transmission planning
10 processes.⁴⁴

11
12 A specific example of Ms. Tripp's response to OG&E is her discussion of TCRs as a tool
13 to use to mitigate the risk of congestion. Ms. Tripp goes into some detail about the
14 purpose and function of TCRs, including stating that "[a] TCR entitles its owner to be
15 charged or receive compensation when there is congestion between specific points on
16 SPP's transmission grid in the day-ahead market."⁴⁵ She does not analyze, however, how
17 TCRs specifically relate to OG&E's congestion risk or to congestion caused by wind
18 farms, and she does not discuss how TCRs affect the amount of wind that she
19 recommends OG&E should acquire.

20

⁴¹ Comings Direct Testimony, page 41, lines 5 to 8.

⁴² Comings Direct Testimony, page 8, lines 1 to 6.

⁴³ Tripp Direct Testimony, page 8 line 1 to page 12 line 9.

⁴⁴ Tripp Direct Testimony, page 12 line 10 to page 25 line 5.

⁴⁵ Tripp Direct Testimony, page 13, lines 15 to 17.

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1 Third, Ms. Tripp responds to OG&E's assertion that respondents to its 2013 wind
2 Request For Information failed to take on all congestion and curtailment risk. She says
3 that this is an unreasonable expectation, but that wind farms in Oklahoma are probably
4 willing to accept a reasonable amount of this risk. She bases this conclusion on her own
5 experience⁴⁶ and two examples of recent wind power purchase agreements (PPAs). Two
6 wind PPAs approved by the New Mexico Commission on October 30, 2013, had
7 contracts wherein the wind farms agreed to let the utility curtail them for any reason,
8 without compensation, for up to about 2.9 to 3.6 percent per year, for the first six years of
9 the PPA.⁴⁷

10
11 Fourth, Ms. Tripp responds to OG&E's rejection of wind due to its limited capacity
12 value. She suggests that SPP will now accredit each wind farm's capacity on a project-
13 by-project basis. She references a presentation from a SPP stakeholder committee as
14 evidence that the resulting average capacity value for wind will increase to 10%. The
15 capacity values that were calculated from different wind farms ranged from 2.2% to
16 26.9%, but did average 10%.⁴⁸

17
18 **Q. Does she detail how the higher capacity value affects OG&E's proposals?**

19 **A.** No. Ms. Tripp does not suggest how this change in SPP's calculation of capacity values
20 makes wind resources a viable capacity alternative to any significant portion of the

⁴⁶ Tripp Direct Testimony, page 34, lines 1 to 4.

⁴⁷ Tripp Direct Testimony, page 33, lines 1 to 15.

⁴⁸ Tripp Direct Testimony, page 35, lines 1 to 9 and OG&E's response to data request Sierra-1-29_At2.

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1 roughly 2,000 MW of OG&E's coal plants that must comply with environmental
2 regulations.

3

4 **Q. What is the basis for Sierra Club's proposed amount of wind power?**

5 A. Sierra Club's analysis of the specific amount of wind energy that OG&E should purchase
6 is based on how much wind neighboring utilities have. Ms. Tripp suggests that OG&E
7 could reliably and economically supply 20% of its peak capacity from wind, since its
8 neighboring utilities Southwestern Public Service and Public Service of Oklahoma both
9 control nominal wind capacity equal to approximately 25% of their peak load.⁴⁹

10

11 **Q. What do you think about the use of the utility comparisons?**

12 A. It is useful, but not complete. The amount of wind energy that OG&E could or should
13 add to its portfolio is generally driven by locational marginal prices and localized
14 transmission congestion, not simply by peak load.

15

16 **C. OIEC's ANALYSIS AND RECOMMENDATIONS**

17

18 **Q. Who testified on behalf of the OIEC?**

19 A. OIEC submitted responsive testimony from two witnesses: Mr. Mark Garrett and Mr.
20 Scott Norwood.

21

⁴⁹ Tripp Direct Testimony, page 29 line 26 to page 30 line 8.

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1 **Q. Please summarize your understanding of their recommendations relevant to your**
2 **testimony.**

3 A. Mr. Norwood's recommendations include: (a) OG&E should reconsider recommending
4 its Scrub option, which would keep all four coal units at Sooner and Muskogee operating;
5 (b) the exception to this recommendation is that, if the Commission wants to have less
6 coal generation in light of future environmental risks, it should choose OG&E's
7 Scrub/Convert option;⁵⁰ (c) "the Commission [should] reject OG&E's Mustang
8 Modernization plan."⁵¹ (d) "OG&E [should] be encouraged to solicit bids to acquire
9 additional wind energy as soon as possible."⁵²

10

11 **Q. Does OIEC recommend a specific amount of new wind power?**

12 A. With respect to wind resources, Mr. Norwood notes that OG&E currently purchases 841
13 MW of wind energy, which supplied about 3 million MWh of wind in 2013, or about
14 10% of OG&E's total energy system requirements.⁵³ Mr. Norwood's testimony
15 discusses OG&E "at least" doubling its wind energy purchases from its current level of
16 841 MW.⁵⁴

17

18 Mr. Norwood goes on to say that OG&E was wrong to not consider additional wind as
19 part of its compliance plan. He says that wind's limited capacity value is not a valid
20 reason to ignore it because there are "significant energy savings that would be produced

⁵⁰ Norwood Responsive Testimony, page 8, lines 1 to 11.

⁵¹ Norwood Responsive Testimony, page 8, lines 18 to 19.

⁵² Norwood Responsive Testimony, page 8, lines 21 to 22.

⁵³ Norwood Responsive Testimony, page 41, lines 18 to 20.

⁵⁴ Norwood Responsive Testimony, page 44, lines 18 to 21.

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1 from additional wind energy” and wind would increase fuel diversity.⁵⁵ He also points
2 out that PSO approximately doubled its wind capacity when it recently obtained
3 Commission approval for 600 MW of wind energy contracts. This brought PSO’s total
4 wind energy to 1,288 MW, which Mr. Norwood expects will supply about 20% of PSO’s
5 energy needs by 2016.⁵⁶

6

7 **Q. Does Mr. Norwood estimate the cost savings achieved with more wind?**

8 A. Yes. If OG&E did double its wind generation, Mr. Norwood calculates that the potential
9 energy savings would be over \$500 million on a net present value basis as compared to
10 OG&E’s base case forecast of market prices.⁵⁷

11

12 **Q. Does Mr. Norwood offer other reasons to add wind?**

13 A. Yes. One other benefit of additional wind that Mr. Norwood cites is easier compliance
14 with potential future regulations to reduce carbon emissions from existing power plants.⁵⁸
15 Mr. Norwood says that another reason that OG&E should act now to acquire additional
16 wind is that the cost of purchasing wind energy may be higher in the future for two
17 reasons. First, the PTC may not be extended. Second, future carbon regulations are
18 likely to increase the demand for wind, increasing wind prices.⁵⁹

19

20 **Q. Does Mr. Norwood address the concern about SPP system limitations?**

⁵⁵ Norwood Responsive Testimony, page 42 line 18 to page 43 line 11.

⁵⁶ Norwood Responsive Testimony, page 47, lines 4 to 11.

⁵⁷ Norwood Responsive Testimony, Exhibit SN-17.

⁵⁸ Norwood Responsive Testimony, page 46, lines 8 to 10.

⁵⁹ Norwood Responsive Testimony, page 46, lines 15 to 22.

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1 A. Yes. Mr. Norwood argues that OG&E's stated concerns about transmission constraints
2 significantly limiting wind delivery over the next 20 years are unlikely to occur. As
3 evidence, he points to SPP's historical commitment to high voltage transmission lines,
4 the relatively few and minor instances to date of curtailments of wind deliveries to
5 OG&E, and the fact that wind is growing in importance as a source of carbon
6 mitigation.⁶⁰

7

8 **Q. What issues does Mr. Garrett address?**

9 A. Mr. Garrett's testimony focuses on OG&E's cost recovery proposal and the rate impacts
10 of OG&E's application. He recommends that any rate changes should be made
11 separately in OG&E's next rate case, and that changes to OG&E's proposal can
12 "significantly reduce" the proposed rate increase.⁶¹

13

14 **III. POSSIBLE SYSTEM LIMITATIONS TO TAKING ADVANTAGE OF**
15 **THE LOW, SUBSIDIZED PRICE FOR WIND POWER**

16

17 **A. SPP's 2010 WIND INTEGRATION STUDY**

18

19 **Q. Earlier herein you said you would discuss two detailed SPP studies. What is the**
20 **first of those SPP studies?**

21 A. On January 4, 2010, Charles River Associates (CRA), a consulting firm, issued a final
22 report on behalf of SPP's Wind Integration Task Force to determine the operational and

⁶⁰ Norwood Responsive Testimony, page 45 line 11 to page 46 line 2.

⁶¹ Garrett Responsive Testimony, page 6.

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1 reliability impact of integrating wind generation into the SPP transmission system and
2 energy markets.⁶² That study is useful here because it was the first major study of wind
3 integration for SPP and its major findings and recommendations document the possible
4 system limits for wind integration. The findings focus on two possible levels of wind
5 integration – 10% and 20%. By 10% or 20% integration, CRA means that percentage of
6 the annual energy generation in SPP would come from wind.⁶³

7
8 **Q. What was the study's overall conclusion?**

9 A. After noting that most of the wind is in the western part of SPP and most of the load is in
10 the east, the first major finding is that either level of integration would require significant
11 additions to and investment in the transmission system.⁶⁴ The study concluded that
12 “major transmission reinforcements are needed to accommodate increased wind
13 penetration levels, starting as low as 10%.”⁶⁵ For 10% integration, the estimate was that
14 1,260 miles of 345 kV lines and 40 miles of 230 kV lines would be needed.⁶⁶ For 20%
15 integration the estimated need was for 485 miles of 765 kV lines, 766 miles of 345 kV
16 lines and 205 miles of 230 kV lines.⁶⁷ For perspective, in 2010, SPP reported that it had
17 10,959 miles of lines with voltage at 230kV or higher.⁶⁸

18
19 **Q. What was the payoff to this new transmission investment?**

⁶² “SPP WITF Wind Integration Study,” Charles River Associates, January 4, 2010 (“SPP Wind Integration Study”), page 1-1.

⁶³ SPP Wind Integration Study, page 3-1.

⁶⁴ SPP Wind Integration Study, page 1-2.

⁶⁵ SPP Wind Integration Study, page 1-3.

⁶⁶ SPP Wind Integration Study, page 1-2.

⁶⁷ SPP Wind Integration Study, page 1-2.

⁶⁸ “2010 Annual Report,” Southwest Power Pool.

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1 A. The payoff was in terms of increased transfer capability and it was significant in certain
2 areas; for the 20% case, for example, the transfer capability between Southwestern Public
3 Service Company and SPP was increased from 529 MW to 3,090 MW.⁶⁹
4

5 **Q. Did the study opine on whether 10% and 20% integration was possible?**

6 A. Yes. The study concluded that, if the needed transmission investments were made, the
7 10% and 20% penetration levels could be achieved “without adversely impacting SPP
8 system reliability.”⁷⁰
9

10 **Q. Did the study mention other possible system limitations?**

11 A. Yes. The report noted that “more startups and cycling of units” will be required,⁷¹ and
12 that increased wind might create a “need for increased regulation capability.”⁷² Forecast
13 errors for wind could also be a problem.⁷³ And curtailment of wind could be caused by
14 (a) minimum generation levels for fossil plants, (b) the need to call on units capable of
15 providing reserves, and (c) transmission congestion.⁷⁴ One final concern was that wind
16 integration might lead to a different way to determine the right contingency reserve and
17 the needed reserve might increase.⁷⁵ The study did note, however, that the move to a
18 single balancing authority – as is now in place with the SPP Integrated Market – should
19 greatly facilitate the integration of wind.⁷⁶

⁶⁹ SPP Wind Integration Study, page 1-2.

⁷⁰ SPP Wind Integration Study, page 1-3.

⁷¹ SPP Wind Integration Study, page 1-3.

⁷² SPP Wind Integration Study, page 1-3.

⁷³ SPP Wind Integration Study, page 1-4.

⁷⁴ SPP Wind Integration Study, page 1-4.

⁷⁵ SPP Wind Integration Study, page 5-43.

⁷⁶ SPP Wind Integration Study, page 1-4.

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2

B. SPP's 2013 20-YEAR INTEGRATED TRANSMISSION PLAN

3

4

Q. What is the second SPP study you wanted to discuss?

5

A. SPP conducts a transmission planning process it calls the Integrated Transmission Planning (ITP) process. The ITP process includes assessments over three time frames: 20-year, 10-year, and near term.⁷⁷ Here I focus on the latest 20-year assessment which is dated July 30, 2013.

9

10

Q. What is your primary point in citing this ITP process report?

11

A. My point here is to show that accommodating wind power development is one of the major elements driving the ITP process. And, further, that the alternative assumptions about the level and nature of wind development can cause significant increases in transmission investment by SPP.

15

16

Q. Please summarize the study's more detailed findings.

17

A. SPP defined five distinct "futures" and, in each, the level of assumed wind power development is highlighted. Table One below summarizes the five futures in terms of the assumed level of wind development, the policy driving that level, the investment needed because of that policy – the "Policy Cost," and the total investment – the "Total Cost."

21

⁷⁷ SPP 2013 ITP, page 9.

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TABLE ONE
SUMMARY OF SPP's FIVE FUTURES

Future	Level of Wind Power ^a (in Megawatts)	Policy Driver ^b	Policy Cost ^c (in billions)	Total Cost ^d (in billions)
F 1	9,189	State Mandate	\$0.00	\$0.56
F 2	16,374	20% Federal RES	\$1.80	\$2.50
F 3	25,604	F2 Plus 10 GW Exports	\$8.05	\$9.00
F 4	15,437	F2 Plus Other Policies	\$0.54	\$0.926
F 5	9,189	F1 With MISO Input	\$0.00	\$0.429

Source: SPP 2013 ITP

a – SPP 2013 ITP, page 31, Table 5.1.

b – SPP 2013 ITP, page 9.

c – SPP 2013 ITP, pages 90, 92, 94, 101, 103.

d – SPP 2013 ITP, pages 90, 92, 94, 101, 103.

The Policy Driver designation is not meant to imply that assumptions about factors other than wind do not drive transmission needs – they surely do. And this table is not meant to suggest that such policies are the only way wind development increases transmission cost or that every penny of Policy Cost is tied to wind development. However, based on this ITP process report, wind development matters a great deal to transmission investment in SPP.

Q. Please provide some examples from the ITP study on the impact of wind.

A. For example, SPP discusses the impact of wind on Future 2 and reports that \$1.7 billion of the total Policy Costs can be traced to wind. SPP states:

Future 2 had a similar number of reliability projects as Futures 1 and 3. However, Future 2 had significantly more policy projects than Future 1, with over 1,300 miles of policy project upgrades at a cost of \$1.7B. These upgrades are needed to deliver the 16 GW of projected Future 2 wind within the SPP system to load centers.⁷⁸

⁷⁸ SPP 2013 ITP, page 92.

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1 Similarly, SPP discusses Future 3 and says the policy projects are driven by wind
2 development. SPP states:

3 While this Future resulted in a similar number of reliability needs and projects as
4 Futures 1 and 2, it has significantly more policy projects than any other Future.
5 These projects are required to mitigate significant curtailment of the 25 GW of
6 installed wind, and to enable the export of 10 GW of that installed wind.⁷⁹
7

8 At the same time, SPP points out that the impact of high levels of wind development can
9 be mitigated by other polices such as demand-side and energy efficiency programs. SPP
10 states:

11 Future 4 has 15 GW of wind installed in SPP, very similar to Future 2. As a
12 result, there are more policy projects in this future than there are in the Business
13 as Usual future. However, Future 4 has fewer policy projects than Futures 2 and
14 3, and has fewer reliability projects than Futures 1, 2, and 3. The driver behind
15 fewer needs and projects in Future 4 is the more aggressive demand response and
16 energy efficiency programs assumed in this future, resulting in decreases in peak
17 load and energy. With decreased load and decreased generation running in Future
18 4, there is less congestion.⁸⁰
19

20 **Q. Please sum up your concerns.**

21 A. My concern is that the analysis must assess more than just the addition of, say, Mr. Rose's
22 1,900 MW. It must anticipate all additions in the future so it can assess the likelihood of
23 wind performing as expected. For example, obstacles to good performance could include
24 SPP members pushing back on substantial transmission investment. Thus transmission
25 congestion and curtailments could become the norm.

26

27 **IV. ADDED CONCLUSIONS AND RECOMMENDATIONS**

28

⁷⁹ SPP 2013 ITP, page 96.

⁸⁰ SPP 2013 ITP, page 101.

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1 **Q. Based on your rebuttal testimony, what do you recommend?**

2 A. First, I maintain all the conclusions and recommendation in my Responsive Testimony.
3 Second, I add one recommendation based on this Rebuttal Testimony: OG&E should
4 conduct a competitive procurement for new wind power development with an appropriate
5 concern about system limitations and risks.

6

7 **Q. Do you offer any more detailed guidance on the procurement for new wind?**

8 A. Yes. OG&E's procurement should be consistent with the following eleven guidelines:

9

10 **Guideline 1:** The procurement should be completed within six months of the final ruling
11 by the Commission in this proceeding. This is to assure an opportunity for current PTC-
12 qualified projects.

13

14 **Guideline 2:** To ensure fairness, all stages of the procurement should be monitored by an
15 Independent Evaluator chosen by the Commission.

16

17 **Guideline 3:** Bids should be for new wind power projects capable of qualifying for the
18 PTC. This is to maximize the potential cost savings and to ensure that bidders assume
19 the risk of qualifying for the PTC.

20

21 **Guideline 4:** The wind project should be sited in the state of Oklahoma. This is because
22 Oklahoma consumers are taking responsibility for the wind contracts.

23

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1 **Guideline 5:** Bids should include a completed SPP system impact study for the wind
2 facility.

3
4 **Guideline 6:** Bids should be capable of serving as Dispatchable Variable Energy
5 Resources as defined by SPP. We understand that this is a requirement for all new wind
6 resources in SPP going forward.

7
8 **Guideline 7:** All bidders – including OG&E if an OG&E affiliate chooses to bid – should
9 be evaluated in the same manner and will sign the same pay-for-performance PPA. The
10 PPA should feature a single annual price for bundled energy, capacity and environmental
11 attributes and should have a 20-year term. This ensures the same degree of ratepayer
12 protection across all bids and provides for a more transparent evaluation.

13
14 **Guideline 8:** The RFP should solicit a minimum of 200 MW of wind, but the actual level
15 of nameplate capacity chosen should depend on the cost-effectiveness of the bids as
16 judged in the evaluation process.

17
18 **Guideline 9:** The PPA should make it clear that the seller will not be compensated in any
19 way for its loss of the opportunity to sell power during reliability curtailments by SPP.
20 This lowers ratepayer risk.

21
22 **Guideline 10:** Each bid or group of bids should be evaluated by SPP to estimate the
23 system upgrades needed to achieve Network Resource status. If system upgrades are

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1 needed, OG&E should reflect in the bid evaluation the share of that cost allocated to
2 OG&E.

3

4 **Guideline 11:** OG&E, with assistance from SPP, should evaluate for each bid, or group
5 of bids, possible system limitations including, but not limited to, increases in the level of
6 regulation service needed, the level of contingency reserves needed, and curtailment
7 caused by minimum load conditions or other operational concerns such as ramp rates.

CERTIFICATE OF ELECTRONIC SERVICE

I, the undersigned, do hereby certify that on the 26th day of January, 2014, a true and correct copy of the above and foregoing was sent electronically, addressed to the following:

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