

BEFORE THE CORPORATION COMMISSION OF OKLAHOMA

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

Direct Testimony

of

John J. Reed

on behalf of

Oklahoma Gas and Electric Company

August 6, 2014

John J. Reed
Direct Testimony

I. INTRODUCTION

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Q. Please state your name and business address.

A. My name is John J. Reed. My business address is 293 Boston Post Road West, Suite 500, Marlborough, Massachusetts, 01752.

Q. By whom are you employed and what is your position?

A. I am the Chairman and Chief Executive Officer of Concentric Energy Advisors, Inc. and CE Capital Advisors, Inc. (together “Concentric”).

Q. On whose behalf are you appearing in this proceeding?

A. I am appearing on behalf of Oklahoma Gas and Electric Company (“OG&E” or “Company”).

Q. Please describe Concentric.

A. Concentric is an economic advisory and management consulting firm, headquartered in Marlborough, Massachusetts, which provides consulting services related to energy industry transactions, energy market analysis, litigation, and regulatory support. Our regulatory economic and market analysis services include utility ratemaking and regulatory advisory services, energy market assessments, market entry and exit analysis, corporate and business unit strategy development, demand forecasting, resource planning, and energy contract negotiations. Our financial advisory activities include both buy and sell side merger, acquisition and divestiture assignments, due diligence and valuation assignments, project and corporate finance services, and transaction support services. In addition, we provide litigation support services on a wide range of financial and economic issues on behalf of clients throughout North America.

1 Q. **Please describe your educational background and professional experience.**

2 A. I have more than 35 years of experience in the energy industry, having served as an
3 executive in energy consulting firms, including the position of Co-Chief Executive
4 Officer of the largest publicly-traded management consulting firm in the United States
5 and as Chief Economist for the largest gas utility in the United States. I have provided
6 expert testimony on a wide variety of economic and financial issues related to the energy
7 and utility industry on numerous occasions before administrative agencies, utility
8 commissions, courts, arbitration panels and elected bodies across North America.

9 I have provided regulatory policy and regulatory economics support to more than
10 100 energy and utility clients and have provided expert testimony on regulatory,
11 economic and financial matters on more than 150 occasions before the Federal Energy
12 Regulatory Commission (“FERC”), Canadian regulatory agencies, state utility regulatory
13 agencies, various state and federal courts, and arbitration panels in the United States and
14 Canada. A copy of my Curriculum Vitae is included as Exhibit JJR-1. A list of prior
15 proceedings in which I have provided testimony is included as Exhibit JJR-2.

16

17 Q. **What is the purpose of your testimony in this proceeding?**

18 A. The purpose of my testimony is to provide my assessment of the process the Company
19 relied upon to prepare its 2014 Integrated Resource Plan Update (“2014 IRP Update” or
20 “OG&E’s IRP”). OG&E’s filing and accompanying 2014 IRP Update support its
21 proposed environmental compliance plan. I also review and comment on the Company’s
22 proposed Mustang plant modernization. I will discuss the current environmental
23 compliance challenges facing electric utilities that own generation, and address them
24 within the broader context of evolving wholesale markets. I will review OG&E’s
25 integrated resource planning process and objectives, with reference to how integrated
26 resource planning is currently being applied by other utilities throughout the country. I
27 will assess the development of OG&E’s 2014 IRP Update, including key assumptions,
28 modeling analyses and OG&E’s efforts to evaluate uncertainties about the future and the
29 risk they pose to OG&E and its customers. Finally, I will assess the Company’s decision
30 to scrub 2 coal-fired units at the Sooner Plant and convert 2 units at the Muskogee Plant
31 from coal to natural gas (OG&E’s “Scrub/Convert” environmental compliance plan) and

1 whether this decision represents a reasonable solution to comply with the Regional Haze
2 requirements of the Clean Air Act (“CAA”).

3
4 **Q. What experience have you and your firm had regarding electric utility integrated
5 resource planning issues?**

6 A. I and others at the firm have assisted Florida Power and Light, Xcel Energy, Alliant
7 Energy, Black Hills Power, Consumers Energy Company, ISO-New England, Northern
8 Indiana Public Service, Public Service Company of New Hampshire, Public Service
9 Company of New Mexico, OG&E, Wisconsin Energy and others on electric resource
10 planning, procurement, contracting and implementation issues, including compliance
11 with environmental regulations. In these matters, we have served as independent
12 evaluators in all-source power supply procurement processes, evaluated numerous
13 alternative resource options, and offered testimony on the advantages and disadvantages
14 of several specific resources.

15
16 **Q. Have you testified previously before the Oklahoma Corporation Commission
17 ("Commission")?**

18 A. Yes. I have testified before the Commission on two occasions. In 2005, I submitted
19 testimony in OG&E’s application to acquire the McClain generating facility (Cause No.
20 200500151). In 2008, I submitted testimony in OG&E’s application to acquire a 51%
21 interest in the Redbud generating facility (Cause No. 200800086).

22
23 **Q. How is your testimony organized?**

24 A. In Section II, which follows, I will provide a summary of my review of OG&E’s IRP
25 process and its 2014 IRP Update and also provide a summary of my principal findings
26 and conclusions. Section III presents an overview of current challenges facing electric
27 utilities like OG&E, focusing more attention on environmental compliance challenges.
28 In Section IV, I narrow my focus to OG&E, beginning with an assessment of the
29 Company’s IRP process and the objectives that it considers when evaluating resource
30 alternatives. In Section V, I dive more deeply into the specific modeling analyses that
31 have been performed by OG&E, starting with the assumptions that drive the analyses,

1 and then reviewing the Base Case analysis and subsequent assessment of uncertainty and
2 risk through sensitivity and scenario analyses. Section VI presents my assessment of
3 OG&E's proposed environmental compliance plan, based on the application of the
4 Company's IRP objectives to the detailed modeling results. Finally, I present findings
5 and conclusions in Section VII.

6 7 **II. SUMMARY**

8
9 **Q. Please provide a brief summary of your review of OG&E's 2014 IRP Update,**
10 **including OG&E's proposed environmental compliance plan.**

11 A. OG&E's 2014 IRP Update concludes that the Scrub/Convert is the best environmental
12 compliance alternative. My testimony deconstructs OG&E's decision-making process,
13 step by step. I begin my review by examining the regulatory and market environment
14 facing the Company because the reasonableness of any resource planning decision must
15 be considered in context of the business environment facing the utility at the time that the
16 decision is made. Market and regulatory (including environmental regulation)
17 circumstances are constantly changing and it is important when conducting this type of
18 review to consider, understand and document prevailing conditions at the time the
19 analysis is being conducted.

20 The future is always uncertain, particularly with respect to market and regulatory
21 policy drivers, and thus it is also important to evaluate whether the utility's assumptions
22 regarding future market and regulatory considerations are reasonable with respect to any
23 "base case" set of assumptions. This includes fuel prices, carbon prices, and
24 environmental policies and regulations. Analyses that are intended to capture the bounds
25 of uncertainties should also reflect reasonable assumptions regarding the variation in
26 potential outcomes.

27 The next step in my review was to examine the methodology that OG&E used to
28 develop its IRP with respect to the process and the modeling approach. OG&E employs
29 a multi-step process to develop its IRP over a number of months. This process includes
30 considerable modeling based on industry tools that are designed for resource planning
31 analyses.

1 The final step in my review was to examine OG&E’s environmental compliance
2 plan. This includes a review of OG&E’s IRP objectives. I considered the application of
3 these objectives to the analyses that were performed by the Company to assess whether
4 the environmental compliance plan is reasonable. Finally, I took a step back based on my
5 experience in resource decisions as a strategic advisor, transactions leader, and reviewer
6 of numerous resource plans and specific resource decisions and considered whether the
7 major decision – to scrub two coal-fired units and convert two units from coal to natural
8 gas - is a reasonable decision in light of the current and potential future business and
9 regulatory environment faced by OG&E.

10
11 **Q. Has this Commission established a set of IRP guidelines?**

12 **A.** Yes. Chapter 165:35-37 of the OCC Electric Utility Rules establish guidelines for
13 integrated resource planning. In addressing the purpose of the IRP rules, the preamble
14 notes the decision-making complexity and the potential rate impacts on customers:

15 Recognizing the significance of the costs incurred based on resource
16 plans, the Commission believes it is in the best interest of retail ratepayers
17 and the utilities providing regulated retail electric supply to establish
18 regular review of the utilities resource plans to ensure that the utilities’
19 resource planning and resulting investment are reasonably and prudently
20 conducted and that the overall cost of power supply to retail ratepayers is
21 fair, just, and reasonable.

22
23 The purpose section of the subchapter notes that the rules apply to plans for
24 capital expenditures to comply with the CAA and other “federal, state, local or tribal”
25 environmental requirements. The IRPs are to be provided on a three-year cycle but must
26 be updated on a more frequent bases when “material changes in planning assumptions
27 occur.” Several schedules are required to document assumptions and analysis including
28 “an analysis of the proposed resource plan and any alternative scenarios necessary to
29 demonstrate how the preferred path best meets the planning criteria” with appropriate
30 documentation (Schedule L). The IRP rules also call for a facilitated meeting to gather
31 stakeholder input on a proposed plan.

1 **Q. How would you express the criteria that you believe are appropriate for**
2 **commissions to consider when evaluating the reasonableness of an IRP?**

3 A. There are several broadly applicable criteria that a regulator can use to evaluate the merits
4 of a proposed IRP. These are:

5 1) Are the assumptions and forecasts underlying the IRP reasonable? Do the
6 assumptions adequately and accurately reflect expectations and uncertainty
7 regarding key drivers of the forecast, such as fuel prices, future environmental
8 regulation, macroeconomic trends, financial conditions, demographic trends,
9 technological innovation, etc.? Are the forecast methodologies statistically
10 and structurally sound?

11 2) Does the IRP adequately consider alternatives, both in terms of alternative
12 future states, and resource alternatives (both supply-side and demand-side)?

13 3) Are the IRP's evaluation criteria broad enough and detailed enough to capture
14 all of the important considerations for the multiple stakeholders that are
15 affected by the IRP? For example, does it adequately capture customer
16 impacts, economic impacts, safety and reliability impacts, financial and
17 operating risks, externalities, etc.?

18 4) Is the plan sufficiently robust? Does the proposed solution represent a
19 reasonable choice under a range of alternative outcomes? Does it provide
20 flexibility and robustness if the future states turn out to be different than
21 expected? Does it minimize the potential for stranded costs and uneconomic
22 results?

23 5) Are the actions called for under the IRP feasible, are the risks sufficiently
24 mitigated and/or managed, and is it likely to produce the expected results?

25 These are the standards by which I have conducted my review of OG&E's IRP,
26 and which reflect sound planning practices.

27
28 **Q. Please summarize your principal findings and conclusions regarding OG&E's IRP.**

29 A. As discussed throughout my testimony, the current regulatory and policy environment is
30 particularly challenging for resource planners due to environmental policies and
31 wholesale market rules that are constantly evolving and due to fuel price uncertainties.

1 OG&E has developed an IRP that is designed to address these uncertainties and that is
2 consistent with industry practices. The OG&E 2014 IRP Update is based on a reasonable
3 set of assumptions and includes the explicit assessment of risk and uncertainty through
4 sensitivity and scenario analyses. OG&E applied an appropriate set of objectives or
5 decision-making criteria to the modeling results to derive an environmental compliance
6 plan that is reasonable and appears to be the best course of action based on the current
7 circumstances faced by OG&E. The decision is adequately supported by the modeling
8 results. In fact, it is difficult to make a case that another option would be clearly superior
9 to the Scrub/Convert decision as the viable alternatives introduce higher levels of risk to
10 OG&E's customers.

11 In summary, with respect to the primary focus of the 2014 IRP Update and this
12 cause, I conclude that Scrub/Convert represents the best option to comply with OG&E's
13 Regional Haze obligations.

14
15 **III. CURRENT INDUSTRY CHALLENGES AND THE ROLE OF**
16 **INTEGRATED RESOURCE PLANNING**

17
18 **Q. In your view, what are the major challenges currently facing owners of electric**
19 **generation?**

20 **A.** The challenges currently faced by owners of electric generation are as great as they have
21 ever been, particularly for generation that competes in regional wholesale markets. These
22 challenges are faced by both regulated and unregulated owners of generation. First, and
23 foremost, is the challenge of addressing environmental regulations. Not only are the
24 regulations themselves subject to extraordinary uncertainty, but the process of
25 developing, implementing, and applying the regulations is a long, drawn-out process that
26 routinely involves litigation. This makes it very difficult to decide whether to make
27 capital investments in existing facilities and to evaluate whether and when to retire a
28 plant. Regulated utilities that own generation maintain an obligation to serve and can't
29 simply walk away from their capacity obligations, adding an additional challenge.

30 A second major source of uncertainty relates to the regulation of regional
31 wholesale markets by the Federal Energy Regulatory Commission ("FERC"). The rules

1 governing operation of energy markets are subject to continuing change and constant
2 litigation. Wholesale markets have proven to be complex and subject to frequent rules
3 changes as regulators struggle to find the right balance between reliance on market forces
4 and the need for regulation. Capacity markets, in particular, are constantly being
5 reworked. The Southwest Power Pool (“SPP”) elected not to include a capacity market
6 as part of its initial Integrated Marketplace (“IM”) design.

7 A third major challenge is the uncertainty over the future roles of natural gas and
8 coal as fuels for electric generation. Natural gas prices are currently at historically low
9 levels as a result of shale production. Consumers are benefitting to an extraordinary
10 degree in most regions of the country from these prices. However, the low prices are also
11 making it difficult for other electric generation resources to compete, including renewable
12 generation. There is also a segment of stakeholders that is promoting the view that
13 natural gas should be considered to be a “dirty fuel”, a view unheard of a decade ago. On
14 the other hand, while coal has been subject to extensive environmental regulation, policy
15 makers are beginning to understand its importance in providing fuel diversity and price
16 stability.

17 A fourth major challenge is the integration of large amounts of intermittent
18 renewable energy, and in particular wind and solar energy into regional grids and
19 regional markets.

20 The combined effect of these uncertainties has led to a resurgence in the
21 importance of integrated resource planning. In fact, several states that restructured their
22 electricity markets and ordered their electric utilities to divest of generation have decided
23 that they need resource planning, after having elected to rely instead on market forces to
24 make capacity decisions.

25
26 **Q. Is it possible to trace the origins of integrated resource planning?**

27 **A.** Yes. Up until the mid-1970s, electric resource planning in the utility industry was
28 relatively straightforward and noncontroversial. Growth in the demand for electricity was
29 consistently positive, and planning consisted primarily of determining the schedule for
30 adding large, bulk-power generators of various fuel types and technologies to the system
31 to meet increasing loads. All of this changed dramatically in the 1970s as many factors

1 produced significant volatility in the electric power industry's cost structure. These
2 included the Arab oil embargo, rampant inflation, natural gas shortages and the eventual
3 deregulation of natural gas, the regulatory consequences of the Three Mile Island
4 incident, and air emission controls on power plants. As a result of these events, electric
5 rates began to increase significantly, load growth slowed, and the future became far less
6 predictable. In addition, competitive wholesale generation markets began to emerge as a
7 result of the Public Utilities Regulatory Policy Act of 1978. By the 1980s, energy
8 conservation evolved into the concept of demand-side management, focusing on the long-
9 term efficient use of resources. Taken together, these issues required new planning
10 approaches and techniques to help utilities integrate these changes into their planning
11 process. A few states with relatively high prices introduced integrated resource planning
12 rules, requiring utilities to consider demand side resources on an equal footing with
13 generation.

14 The Energy Policy Act of 1992 ("EPAAct") extended the concept of integrated
15 resource planning to a national scale in an attempt to address these complex and
16 challenging issues. The EPAAct set goals, created mandates, and amended utility laws to
17 increase clean energy use and improve overall energy efficiency in the United States. It
18 also required states to consider new regulatory standards that would require utilities to
19 undertake integrated resource planning. As a result, several states either implemented or
20 expanded their IRP requirements to reflect the multiple, and occasionally conflicting
21 objectives of an IRP to arrive at the best resource mix after due consideration of all
22 potential supply side resources and energy efficiency/demand response measures.

23
24 **Q. What have IRP analyses historically shown to be the major driver of the need for
25 additional capacity?**

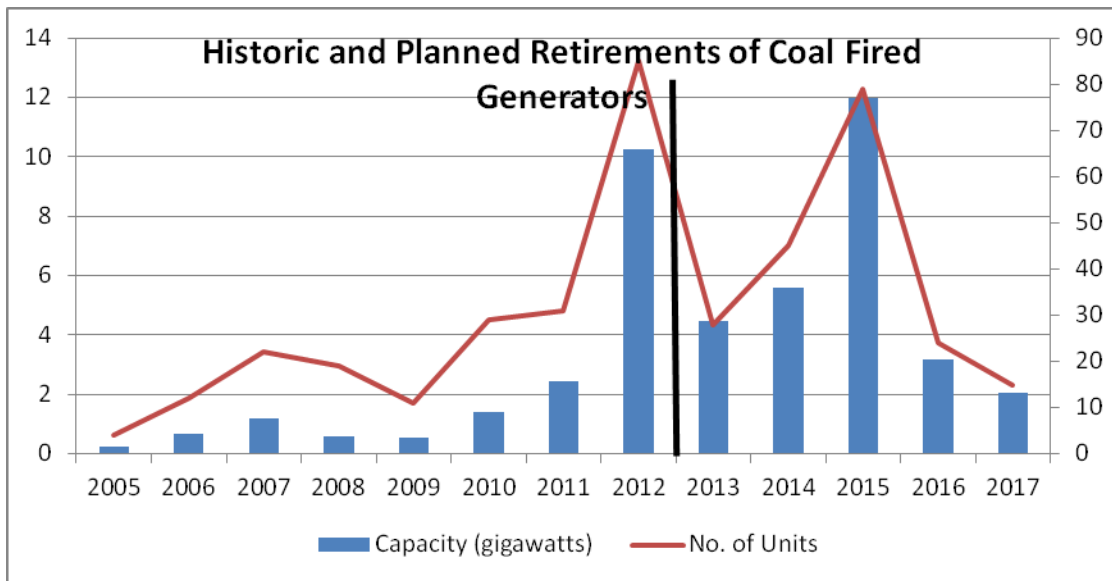
26 **A.** Over the last several decades or at least up to the past ten years or so, growth of customer
27 electricity demand has historically been the primary driver of investment in new electric
28 generating capacity, as supported through the underlying analysis contained in IRPs.
29 Because growth in demand occurs in relatively small and predictable increments, and
30 regulatory and operational regimes were reasonably consistent, utilities have been able to
31 plan investments in new electric generating capacity well in advance of the actual need

1 for those investments. In addition, retirements were driven primarily by operational
2 factors and age rather than market conditions which allowed utilities to adequate time to
3 plan replacement generating capacity.
4

5 **Q. Is demand growth still the primary driver of need for capacity?**

6 **A.** In many jurisdictions, demand growth continues to play a role in the need for incremental
7 capacity. However, investment in new generation capacity is being increasingly driven
8 by the retirement of thousands of megawatts of generation capacity due to the combined
9 effects of (a) the cost of compliance with evolving environmental regulations, (b) the
10 revolutionary changes that have accompanied the development of shale gas reserves, and
11 (c) the consequences of having electric prices determined in regional wholesale markets.
12 Looking across the country, the primary need for new electric generating capacity is
13 being driven by the retirement of a significant amount of older coal-fired generating
14 capacity due to obsolescence and changing environmental requirements that make these
15 coal plants uneconomic to continue to operate. Not surprisingly, there has been a wave of
16 announced and completed retirements of older coal-fired electric generating stations, as
17 shown in Figure 1.

FIGURE 1: HISTORIC AND PLANNED RETIREMENTS OF COAL-FIRED GENERATORS



Source: U.S. Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

1 Q. **What challenges do these industry changes present to IRPs?**

2 A. IRPs provide a means to perform rigorous analyses to support difficult resource
3 decisions. This is clearly appropriate. However, the availability of sophisticated
4 analytical tools does not address the challenges by itself. It is still necessary to apply
5 these tools in an appropriate and robust manner to adequately analyze each challenge and
6 to evaluate alternative solutions. Some of these challenges are more difficult than others
7 to analyze.

8 Starting with the easiest challenge, demand-side resources remain a relatively
9 economical resource in many parts of the country. However, as a general statement, we
10 have not yet reached a point where demand resources are at the margin and need to be
11 integrated into the IRP methodology in a sophisticated manner. The common approach
12 of evaluating demand-side resources outside of the IRP and then incorporating them as an
13 input into the load forecast remains appropriate.

14 Renewables can be and should be incorporated into IRP modeling, with
15 recognition of the value of environmental attributes of various resources. Renewables do
16 present some challenges including how to value environmental attributes such as lower
17 carbon emissions that are still subject to vigorous policy debate. Wind energy can be
18 accommodated by an IRP although it often requires transmission investments to deliver it
19 to market areas. Finally, while renewables can be modeled by the IRP, the decision to
20 commit to a renewable resource may be driven by factors that are outside of the modeling
21 framework, including a requirement to comply with a state Renewables Portfolio
22 Standard (“RPS”) or make progress toward a Renewable Portfolio Goal for states like
23 Oklahoma that have taken this policy route.

24 However, the challenges to owners of electric generation that I discussed above
25 (environmental, wholesale market, natural gas, and intermittency of renewables) also
26 present challenges to the development of an IRP, not necessarily with respect to whether
27 they can be modeled but with respect to how they should be modeled. Thus, the
28 challenges relate primarily to the specification of base case assumptions and the design of
29 sensitivity and scenario cases.

1 Q. **What is the current status of environmental regulation?**

2 A. I will focus on the status of environmental regulation that has a potential bearing on
3 OG&E's resource plan. OG&E has firmly established compliance obligations with
4 respect to two EPA rules: the Mercury and Air Toxics Standards Rule ("MATS") by
5 April 16, 2016, and the Regional Haze Rule by January 4, 2019. OG&E is already taking
6 action to comply with the Regional Haze SIP by installing low NOx burners on seven of
7 its coal and natural gas-fired steam units. How best to comply with the Regional Haze
8 FIP is the focus of OG&E's 2014 IRP Update. OG&E is also already taking steps to
9 comply with the mercury emissions limits contained in the MATS rule. The Company
10 will install activated carbon injection ("ACI") technology on its five coal fired units.

11 In addition, there are several proposed rules in various stages of development that
12 could have an impact on OG&E and other electric utilities if they are implemented.
13 Among these, the Cross-State Air Pollution Rule ("CSAPR") has advanced the furthest
14 before it was subject to a 2011 Court action (a frequent occurrence for proposed EPA
15 rules). CSAPR would require twenty-seven states to take actions to reduce power plant
16 emissions that contribute to ozone and particulate matter pollution. Fortunately for
17 OG&E and its customers, actions taken to address Regional Haze will help address the
18 requirements of CSAPR, should it be implemented, although the final form of the rule is
19 not known at this time. While the Supreme Court upheld CSAPR on April 29, 2014, the
20 decision was remanded to the D.C. Circuit and additional challenges are still pending.

21 Most recently, the EPA issued proposed rules under Section 111(d) of the CAA
22 that would regulate the emissions of greenhouse gases from existing generating
23 resources. It is reasonable to expect that the process of developing a final rule will be
24 lengthy and subject to litigation.

25 Chapter II, Section C.2 of OG&E's IRP identified several other potential
26 environmental requirements including a proposed Coal Combustion Residual Rule, a rule
27 that would affect the design and operation of cooling water intake structures at power
28 plants, and proposed National Ambient Air Quality Standards ("NAAQS"). These rules
29 all present potential future environmental risks to power plants that are owned by OG&E
30 and by all generation owners. The history of environmental regulation indicates that
31 major new rules tend to be lengthy and politically charged processes that are likely to be

1 challenged in the Courts either by advocates (for not having gone far enough) or skeptics
2 (for having gone too far). This presents a unique challenge to resource planners that need
3 to have a sense of the potential timing and form of a proposed environmental regulation
4 in order to model it with an reasonable degree of reliability in an effort to quantify the
5 impacts. Notwithstanding the fact that future environmental regulation is so difficult to
6 predict, the combination of OG&E's current actions to address Regional Haze and MATS
7 and the proposed conversion of the two Muskogee units help mitigate the risks of these
8 future regulations.
9

10 **Q. How is the industry addressing the need for capacity driven by retirements?**

11 A. In states that have not restructured where utilities continue to own generation, there has
12 been a renewed interest in highly structured and rigorous IRP processes and analysis to
13 support decision-making. These IRP analyses must consider not only supply and demand
14 resources to meet projected demand growth, but must once again consider larger baseload
15 capacity options to meet the capacity need created by the retirement of large coal-fired
16 units. The most frequent response to these retirements has been the acquisition or
17 development of gas-fueled generating facilities, supplemented by greater reliance on
18 renewable resources (primarily for energy, not capacity) when they are available on
19 economic terms.
20

21 **Q. How do these industry trends relate to the circumstances faced by OG&E?**

22 A. In OG&E's case, as a result of its ongoing 2020 goal initiative, the current need for
23 capacity is being driven by the need to comply with its Regional Haze obligations, while
24 continuing to meet its SPP capacity margin requirements. This is a much different
25 circumstance than OG&E and most companies have faced in the past. Rather than
26 having its capacity need grow each year by 50 to 150 MWs, OG&E must now make a
27 decision regarding 2,000 MW of capacity in a single resource planning decision. The
28 relatively near-term compliance deadline, when considered against the time required to
29 develop a base load resource, further distinguishes OG&E's circumstances from the
30 scenario of relatively modest and consistent increases in capacity needs that I discussed
31 above. The Company must also replace up to 460 MW of capacity at the Mustang plant

1 that will be retired by 2017. Thus, OG&E must contend with addressing a large capacity
2 need over a relatively short period of time. In that way, the Company's situation differs
3 significantly from the historical long-term supply-planning model.
4

5 **Q. Are there any other circumstances that will be particularly relevant as the**
6 **Commission reviews OG&E's IRP?**

7 A. Yes. The SPP implemented its IM earlier this year. The SPP did not create a capacity
8 market and each utility member remains responsible for maintaining a portfolio of
9 owned-generation and power purchase agreements with capacity credits that will be
10 greater than or equal to the SPP's capacity margin requirement (currently 12%). The
11 capacity credit for a specific resource is established by the SPP.
12

13 **Q. What impact does the SPP IM have on the role and conduct of an IRP?**

14 A. The SPP IM does not change the purpose or role of an IRP in any fundamental way.
15 However, it does change the "objective function" calculation as the costs to be
16 minimized, i.e., those that will ultimately be borne by customers, must be revised to
17 accurately reflect the way that revenues and costs flow from the SPP to OG&E and other
18 utilities. Under the IM, all generation is paid an SPP market price and all load acquires
19 its energy at an SPP market price. The impact on OG&E's customers is the net of the
20 two completely distinct market transactions. This needs to be reflected in the calculation
21 of customer costs.

22 A second major impact on an IRP is that it requires OG&E to forecast SPP market
23 prices. OG&E is a "price-taker" for both purchases and generation sales and the market
24 price forecast is a key assumption. Finally, as a key assumption that is beyond the
25 control of OG&E and subject to significant uncertainty, it is appropriate to evaluate this
26 source of uncertainty in the design of sensitivity and scenario cases.

27 A third major impact on an IRP is the fact that the calculation of the net present
28 value of customer costs or "NPVCC", the calculation relied upon to compare alternative
29 resource portfolios, now depends on how much the SPP dispatches OG&E's units to meet
30 SPP-wide load. This element of the NPVCC calculation is referred to by Witness Howell
31 as "production costs with market impact" and is comprised of the fuel and other variable

1 costs to run OG&E's units plus energy purchases from the SPP IM to serve OG&E load,
2 less the sales revenue generated by the dispatch of OG&E's units.

3
4 **IV. OG&E's IRP OBJECTIVES AND PROCESS**

5
6 **Q. What is your understanding of the principles that guided the approach taken by the**
7 **Company in the development of the 2014 IRP Update?**

8 **A.** The primary objective of any IRP is to meet load requirements, measured in OG&E's
9 case by its obligation to continually satisfy SPP's capacity margin requirements. This is
10 an absolute requirement of the Company's IRP. My understanding is that OG&E does
11 not need capacity to meet load growth at this time and that meeting the current challenge
12 has benefited directly from a series of aggressive actions that it has taken over the past
13 several years to expand its demand-side resources, develop wind energy and associated
14 transmission capacity, terminate significant wholesale requirements contracts and acquire
15 the Redbud plant. The 2020 goal provided a "stake in the ground" in 2007 as a target and
16 the Company has been implementing that goal. I should note that the addition of wind
17 energy has limited capacity value but does act as a hedge against natural gas price
18 increases and the potential for carbon regulation.

19 Thus, the current 2014 IRP Update focuses relatively narrowly on: the course of
20 action OG&E should take with respect to the two Sooner Plant units and two Muskogee
21 Plant units that are subject to the Regional Haze FIP requirements; and the appropriate
22 replacement capacity for the retiring Mustang units. Given the magnitude of the
23 Regional Haze compliance decision, the Company appropriately updated all of its IRP
24 assumptions and essentially developed a complete new IRP. The Company's approach to
25 the 2014 IRP Update therefore focused on identifying the alternatives for maintaining this
26 capacity and applying an IRP methodology that it has refined over the past decade
27 through the preparation of several IRPs that have been shared with stakeholders and
28 submitted to the OCC. This approach appropriately places primary, but not exclusive
29 emphasis, on the net present value of expected customer costs over the planning horizon.
30 OG&E's IRP approach explicitly models uncertainty and risk through sensitivity and
31 scenario cases that are defined around the Base Case. This is entirely appropriate. The

1 one methodological change involved accommodating the new SPP IM. In most other
2 respects, the 2014 IRP Update objectives and process are similar to the approach taken in
3 prior IRPs. There has been some effort in this IRP to expand and refine the set of
4 “objectives” that are relied upon to identify the best course of action. The Company has
5 nine objectives, several of which address uncertainty and risk.

6 Turning to the specific decision itself, I understand that the Company was
7 particularly focused on the competing risks associated with future environmental
8 regulation and the uncertainty associated with future natural gas prices.

9
10 **Q. What is your view of OG&E’s approach to developing this IRP?**

11 A. This approach is reasonable and addresses the issues that I have raised earlier. The
12 approach maintains an aggressive posture with respect to the pursuit of demand-side
13 resources, programs that benefit customers, the Company, and the environment. By
14 definition, it will yield a capacity decision that maintains OG&E’s capacity obligation.
15 The approach places primary emphasis on the objective of controlling customer costs
16 over the planning horizon but also explicitly considers the risks associated with the major
17 sources of uncertainty. One of these uncertainties is future environmental regulation, and
18 carbon regulation in particular. The recommended environmental compliance plan
19 maintains OG&E’s fuel diversity and does not risk an over dependence on one fuel as the
20 Company switches its existing use of coal to natural gas. This strikes me as an
21 appropriately measured response for assets that are likely to remain in service for
22 decades.

23 In summary, OG&E’s approach is robust and reflects multiple objectives. As I
24 will discuss in greater detail later in my testimony, it evaluates the range of reasonably
25 plausible capacity solutions to meet its Regional Haze requirements. The multiple
26 sources of risk are first subject to quantitative analysis and then considered in identifying
27 the recommended strategy.

28
29 **Q. How does the Company’s approach compare to the industry?**

30 A. The Company’s approach, which is premised on the need for balance and diversity, is
31 similar to the approach taken by other electric utilities. For example, Minnesota Power

1 describes the strategy of “creating a more flexible and diverse fleet” in its most recent
2 IRP: a long-term balance of renewable, natural gas, and coal resources will “provide
3 Minnesota Power the capability to meet customers’ needs reliably and cost-effectively
4 while still managing the inherent variability of large industrial customer business
5 cycles.”¹ Similarly, Southwestern Electric Power Company asserts that diversification of
6 resources “improves reliability in the event of fuel interruptions,” lowers energy costs by
7 “leveraging fuel mix in the event of fuel price spikes and market volatility,” and
8 “improves competition in the fuels market.”² Carolina Power & Light Company also
9 plans for diversified resources in order to “insulate customers from price volatility,”³
10 while PacifiCorp adds that diversification reduces “customer exposure to fuel, power
11 market and emissions risk.”⁴ Public Service Company of New Mexico noted that, “fuel
12 diversity is important in minimizing the risk that some unanticipated event may adversely
13 impact the price or supply of any one fuel thereby adding more potential volatility to
14 customers’ electric bills.”⁵

15
16 **Q. Have you reviewed OG&E’s set of nine objectives?**

17 **A.** Yes. These objectives are listed in Chapter III of the 2014 IRP Update and are also
18 discussed in the testimony of Witness Leon Howell. In my view, each of the objectives is
19 important enough to be explicitly identified and the list taken as a whole is
20 comprehensive. It places reliability and customer costs at the top of the list, which is also
21 appropriate. These two objectives are explicitly incorporated into the objective function
22 of the modeling methodology. Several of the remaining objectives address the risk of the
23 portfolio including fuel diversity, exposure to future fuel and emissions prices, and the
24 potential exposure to future environmental regulations.

¹ Minnesota Power, 2013 Resource Plan, at 8.

² Southwestern Electric Power Company, 2012 Integrated Resource Plan, at 65.

³ Progress Energy Carolinas, 2012 Integrated Resource Plan, at 5.

⁴ PacifiCorp, 2013 Integrated Resource Plan, Volume I, at 276.

⁵ Direct testimony of Gerard T. Ortiz, NMPRC Case No. 13-00390-UT, at 21.

1 Q. **What comments do you have on OG&E’s overall IRP process?**

2 A. As I noted above, OG&E has refined its process over the years, but the basic steps are
3 common to most IRP processes and are adequate to produce a well-considered IRP and a
4 robust assessment of resource alternatives.

5

6 **V. OG&E’s ASSUMPTIONS AND ANALYSIS**

7

8 Q. **What was the first step in OG&E’s development of the 2014 IRP Update?**

9 A. The first step was to update every assumption in the analysis, including those that are
10 reflected in the sophisticated market model. I understand that OG&E’s review of
11 assumptions was comprehensive and complete. The categories of assumptions included
12 the following:

- 13 • **OG&E load forecast:** OG&E’s Resource Planning Department prepared a
14 comprehensive load forecast in September 2013, in advance of the IRP
15 modeling effort. It produces energy and peak demand forecasts based on a
16 methodology that has been in place for over a decade and relies on an
17 independent forecast of the regional economy. It also reflects an electricity
18 price forecast for OG&E’s service territory.
- 19 • **Demand-side resources:** the forecast is based on a continuation of OG&E’s
20 existing programs with increased penetration over the remainder of the
21 decade. No incremental demand-side resources are assumed to be added after
22 2020.
- 23 • **Fuel prices:** natural gas and coal prices are based on the 2014 EIA forecast
24 and reflect the appropriate pricing points for all plants across the SPP.
- 25 • **Emissions prices:** assumes a zero carbon price in the Base Case.
- 26 • **Cost and operating characteristics of OG&E’s existing generation assets:**
27 based on the most recent data available.
- 28 • **Costs and other attributes of OG&E’s Power Purchase Agreements:**
29 based on the terms of each agreement.

- 1 • **Capital and operating costs and operating characteristics of each**
2 **environmental compliance plan option:** as specified in the 2014 IRP
3 Update, based on input provided by Sargent & Lundy.
- 4 • **Capital and operating costs and operating characteristics of each option**
5 **to serve future capacity needs:** as specified in the 2014 IRP Update, based
6 on input provided by Sargent & Lundy.
- 7 • **Planned additions to the regional transmission network:** based on SPP's
8 transmission expansion plan.

9
10 Q. **Are OG&E's assumptions and forecasts reasonable?**

11 A. Yes. Perhaps the only controversial assumption is OG&E's assumption for purposes of
12 the Base Case that there will not be any explicit carbon pricing through 2020 and beyond.
13 While this assumption is certainly one of many plausible assumptions for carbon
14 regulation, there are many that would argue a national consensus will eventually develop
15 to support regulation of carbon. As I described earlier, the EPA has recently proposed to
16 regulate sources of greenhouse gas emissions under Section 111 of the CAA. Many
17 would argue that the process of developing these regulations, specifically the
18 involvement of states, increases the likelihood that carbon regulations will be adopted
19 within some reasonable timeframe. I would not want the "no carbon regulation" scenario
20 to be the only one that OG&E considered, but it is certainly one that should be included
21 in the planning process. I also view this assumption as one that state regulators and
22 policy makers should evaluate in terms of the best current assumption for that state.
23 There is no "best" means of forecasting the outcome of this potential new environmental
24 regulation.

25
26 Q. **Do you have any comments on OG&E's assumption that demand-side resources will**
27 **stop growing after 2020?**

28 A. Yes. I understand that OG&E updates its DSM programs on a three-year cycle and that it
29 does not have a new forecast to insert in the IRP analyses. I understand further that
30 OG&E's environmental compliance plan decisions are unlikely to be significantly
31 affected by this assumption. Therefore, I recommend that OG&E include some modest

1 increase in DSM beyond the 2020 period in its next IRP, which I understand will be filed
2 in 2015. This recommendation acknowledges the attention that OG&E has already
3 devoted to its SmartHours and other DSM programs. Together, these programs have
4 reduced OG&E requirements by approximately 1% per year.
5

6 **Q. Please provide an overview of the modeling analysis that OG&E relied upon.**

7 A. The models begin with the requirement that OG&E must meet SPP's 12% capacity
8 margin throughout the forecast period based on its own load requirements and is allowed
9 to apply its own generation and PPAs to satisfy this requirement. The modeling
10 generates an estimate of the NPV of customer costs over a 30-year period for each
11 portfolio. The calculations of customer costs have been updated to reflect the operation
12 of the SPP IM. OG&E performed both sensitivity and scenario analyses to supplement
13 the analyses that are performed by varying the Base Case set of assumptions. Finally,
14 OG&E applied the nine objectives (and its judgment for the difficult to quantify
15 objectives) to the full range of modeling results before reaching a conclusion as to which
16 environmental compliance plan represented the best option for customers.
17

18 **Q. What electric price forecast model did OG&E use in preparing its 2014 IRP
19 Update?**

20 A. OG&E utilizes Ventyx PROMOD IV[®], a model developed by Ventyx that is widely used
21 throughout the industry to forecast electricity prices and analyze the likely performance
22 of generating units in regional wholesale markets. It essentially simulates the dispatch of
23 units to meet hourly regional needs over the specified planning horizon based on a large
24 data set that incorporates generating unit operating characteristics, transmission grid
25 topology and constraints. The entire Eastern Interconnect is represented in the model
26 specification used by OG&E to forecast market prices.
27

28 **Q. How did OG&E determine the capacity options to subject to detailed modeling
29 analyses?**

30 A. It is not possible as a practical matter to rely on any electricity market simulation model
31 to evaluate every possible technology. It is therefore common in the industry to perform

1 an initial screen that is intended to identify only the technologies that are viable from
2 both a technology and cost perspective. Thus, while it is technically possible to construct
3 an integrated gasification combined cycle (“IGCC”) unit, the current cost to construct
4 such a unit is prohibitive. While there is renewed interest in nuclear power, these plants
5 are also cost prohibitive for many regions of the U.S. that do not have strong growth in
6 demand or a heavy reliance on natural gas. Based on this screening analysis, OG&E
7 determined that various natural gas-fired combustion turbine (“CT”) and combined-cycle
8 (“CC”) technologies passed both screens, along with wind energy. I should note that
9 while OG&E relied on EIA’s generic estimates of capital costs to perform this screening
10 analysis, the more detailed electric price modeling analyses were based on cost and
11 performance parameters that were developed at OG&E’s request by Sargent & Lundy.
12

13 **Q. Do these capture the range of viable generation options to meet capacity needs at**
14 **this time?**

15 A. Yes. CTs and CCs, along with wind energy are the most viable new generation options at
16 the current time. It should be noted however, that wind energy receives modest capacity
17 credit in most regions. The SPP, for example, discounts the nameplate capacity of wind
18 energy to 5% based on its assessment of whether wind energy can be counted on to
19 produce energy at the time of the system peak.
20

21 **Q. How did OG&E evaluate options to meet future capacity needs, when it gets to the**
22 **point where the load forecast indicates that new capacity is needed?**

23 A. OG&E specified three “expansion portfolios”. As described by Witness Howell, the
24 three expansion portfolios rely on new CCs in 2020 and beyond. One of the portfolios
25 relies exclusively on new CCs (the “CC” expansion plan). The other two expansion
26 portfolios incorporate CTs in either 2018 (the “CT” expansion plan), 2019, or both years
27 (the “Spread CT” expansion plan).

1 Q. **How did OG&E determine the alternatives to meeting its environmental compliance**
2 **obligations under Regional Haze?**

3 A. As described in the testimonies of Witness Howell and Witness Robert Burch, OG&E has
4 three basic technology alternatives to address the requirements of the Regional Haze FIP:
5 scrub the existing units, convert the existing boilers to burn natural gas, and retire and
6 replace the units with new gas-fired combined cycle units. Since there are four units that
7 need to be addressed, there are multiple combinations of these options that can be defined
8 and OG&E has modeled five potential environmental compliance plans. For modeling
9 purposes, OG&E evaluated options that involved applying an option to all four coal units
10 and combining options in a 2+2 alternative. For example, scrub two units and convert the
11 other two units to natural gas was evaluated, but 3+1 combinations were not subjected to
12 modeling analyses based on the assumption that the results would fall between the 4+0
13 and 2+2 alternatives. I have not tested this assumption but it does appear to be based on
14 sound logic based on how these models operate.

15 As with the expansion options, the costs for each environmental compliance plan
16 are based on inputs provided by Sargent & Lundy.

17
18 Q. **In summary, did OG&E fairly consider all of the reasonable alternatives either to**
19 **meet its environmental compliance obligations or to meet future capacity needs?**

20 A. Yes. The Company undertook a rigorous and comprehensive analysis to review the
21 options available to meet the Company's projected capacity shortfalls, including
22 replacement of the capacity currently being provided by Sooner, Muskogee and Mustang
23 and adding new capacity after 2020 to meet load growth and other future capacity needs.
24 The Company's IRP process looked across the spectrum of supply-side resources and
25 technologies, wholesale market opportunities, and demand reduction alternatives in order
26 to determine the preferred mix of resource options to meet the forecasted resource
27 requirement. OG&E's screening analysis is reasonable and an appropriate approach to
28 limit the analyses to those model runs that would be useful for purposes of making the
29 immediate decisions that OG&E is facing.

30 Further, given the timing and size of OG&E's capacity need, it cannot be fully
31 met by wind energy, distributed generation, energy efficiency or incremental demand-

1 side resources or any combination of the above. Certain other options, such as biomass,
2 nuclear, and IGCC are not viable from an economic standpoint or cannot be developed
3 within the acceptable timeframe (e.g., nuclear and IGCC).
4

5 **Q. Was the evaluation methodology used to evaluate alternatives in the IRP process**
6 **appropriate?**

7 A. Yes. The Ventyx PROMOD IV[®] electric simulation model is certainly up to the task of
8 forecasting SPP market prices and is widely used throughout the industry. The SPP
9 market prices are then input into PCI GenTrader[®] production cost model to calculate the
10 production cost of each of OG&E's units along with the revenue OG&E will be paid for
11 energy produced and sold into the SPP IM. OG&E calculated the customer cost of each
12 portfolio by adding the rate base and fixed O&M costs of each alternative (a relatively
13 straightforward spreadsheet exercise) to the production cost plus market impacts of
14 buying and selling all energy through the SPP IM.
15

16 **Q. Did the Base Case analysis lead to any conclusions?**

17 A. Yes. The Base Case analysis reveals that the environmental compliance portfolios that
18 include "replace" options are more expensive than the options that include either "scrub"
19 or "convert" options.
20

21 **Q. What process did the Company apply to incorporate the effects of uncertainty into**
22 **its IRP analysis?**

23 A. As discussed by Witness Howell, the Company first defined an expected or Base Case
24 scenario.

25 OG&E ran three "market price" scenario cases that were designed to capture the
26 impact of actions that may be taken by other SPP utility members to meet environmental
27 regulations. The scenarios evaluated in the Company's IRP were:

- 28 1) The **Base Case** assumes that all announced plans to control emissions on SPP
29 coal units are included in the models and that all coal plants that are smaller
30 than 200 MW and were placed in service before 1977 are converted to natural
31 gas.

1 2) The **High Conversion Case** starts with the Base Case and assumes that all
2 other coal units in SPP that have not yet installed SO₂ emission controls or
3 have not announced plans to control SO₂ emissions are assumed to be
4 converted to natural gas (excluding OG&E’s Sooner 1 and 2 and Muskogee 6
5 units).

6 3) The **Low Conversion Case** assumes that only announced plans to control
7 emissions are modeled. All other coal plants are assumed to operate as they
8 do today.

9 OG&E refers to these as “market price” scenarios because their purpose is to
10 evaluate the impact of a major source of uncertainty that will impact SPP market prices,
11 which, as I have noted, is a major determinant of the value of OG&E’s generation units
12 and the cost of serving OG&E’s load.

13 In addition, OG&E’s IRP ran six sensitivity cases that evaluated higher and/or
14 lower sets of assumptions with respect to natural gas prices (high and low cases), carbon
15 prices (one case), capital costs of environmental compliance plan solutions (high and low
16 cases), and one SPP load growth case. The sensitivity cases were defined as follows:

- 17 • **Natural gas prices:** increased by 50% on the high side and reduced by 25%
18 on the low side.
- 19 • **Carbon prices:** OG&E assumed that there would be a market-based carbon
20 price beginning in 2020 and that the equilibrium carbon price would yield
21 parity between the marginal cost of generation from a natural gas combined
22 cycle power plant and a scrubbed coal-fired power plant, reflecting their
23 relative CO₂ emission rates.
- 24 • **Environmental investment capital costs:** 30% higher or 30% lower.
- 25 • **SPP load growth:** ramps down over a decade until the load forecast is lower
26 by 10%.

27
28 Q. **In your experience, is this a sound approach to reflect the effects of uncertainty in**
29 **an IRP process?**

30 A. Yes. The sensitivity cases scenarios focus on the two key sources of uncertainty that are
31 relevant for the environmental compliance decision that is the focus of the 2014 IRP

1 Update: natural gas prices and carbon prices. This focus also contributed to the inclusion
2 of a capital cost sensitivity. I understand that the low SPP load forecast is intended to
3 represent a case in which distributed generation becomes a major source of capacity.
4 While this appears to be further off in the non-restructured SPP states than it may be in
5 other parts of the country, it is certainly a reasonable scenario to run.

6 My own view is that the upside risk on natural gas prices exceeds the downside
7 risk at the present time. Specifying the upside risk at 50% of the projected Base Case
8 prices is reasonable.

9 The parity-based methodology used by OG&E to calculate carbon prices under a
10 market-based system of regulation is also credible and reasonable.

11
12 **Q. What comments do you have on OG&E's market price scenarios?**

13 A. First, scenario-based analysis is the most common approach to IRP development in a time
14 of significant uncertainty. The scenarios developed by the Company address the most
15 significant source of uncertainty in regional wholesale markets, including SPP. The
16 conversion case decisions are clearly beyond the control of OG&E and will have a major
17 impact on market prices and, by extension, on the Company's environmental compliance
18 plan decision. Finally, as I shall discuss later, OG&E appropriately considered all of the
19 sensitivity and scenario cases in deciding upon a proposed environmental compliance
20 plan.

21
22 **Q. Please describe the results of the market price scenarios.**

23 A. The market price scenario analyses are certainly interesting. They indicate that, if all
24 other SPP generation owners convert their coal-fired units to natural gas and OG&E goes
25 against the trend, then the "scrub" options look best. In fact, the Scrub case produces the
26 lowest NPV of customer costs because OG&E's units are dispatched and the SPP market
27 price is being set by gas-fired plants. This scenario probably overestimates the benefits
28 of the Scrub 4 case, because the market conditions that would produce full coal
29 conversion are likely to include very low gas prices and high carbon prices, which are
30 treated independently in OG&E's analysis. The other noteworthy result is that the

1 Scrub/Convert plan produces results within a narrow range irrespective of the market
2 price scenario.

3 **Q. What do these analyses imply for the lowest reasonable cost environmental**
4 **compliance plan?**

5 A. Based solely on the modeling results, and before the application of other important
6 objectives, the Scrub/Convert environmental compliance plan would appear to be the best
7 environmental compliance plan. This may be because it provides a partial hedge against
8 two important sources of risk: high natural gas prices and carbon regulation as compared
9 to the separate Scrub and Convert alternatives.

10

11 **Q. What do you conclude with respect to OG&E’s modeling of uncertainty and risk?**

12 A. OG&E is appropriately focused on risk as it considers its environmental compliance plan
13 options. As I noted above, the Base Case analysis reveals that the environmental
14 compliance portfolios that include either “scrub” or “convert” options are clearly
15 preferred to the “replace” options. Further, these two viable options are very close both
16 to each other and when any of the expansion plans are applied to meet post-2020 new
17 capacity needs. Thus, the ultimate decision will be driven as much by risk and
18 uncertainty as by any other factor, and more specifically by the uncertainties attributable
19 to natural gas prices and carbon prices. The market price scenarios produce interesting
20 results as described by Witness Howell, but I would urge caution in relying on them as
21 the sole basis of the decision at this point due to the relative newness of the SPP IM.
22 Projections of SPP market prices depend on the actions of every single SPP generation
23 owner and an implicit assumption that the market design will not change in the future. In
24 my mind, this is even more speculative than trying to project natural gas prices and the
25 timing, form and market impacts of future carbon regulation. I add this caution knowing
26 full well that the market price scenario results also support OG&E’s recommended
27 decision to pursue the Scrub/Convert option.

1 Q. **What do you conclude with respect to OG&E’s overall modeling approach?**

2 A. I conclude that OG&E’s approach is reasonable, from assumptions through the evaluation
3 of risk. Any concerns that I have raised are directed to future enhancements to the
4 approach, and do not reflect a severe criticism of the approach. The overall approach is
5 certainly reasonable and provides results that can be relied upon to determine an
6 appropriate environmental compliance plan.

7

8 **VI. OG&E’s PROPOSED ACTION PLAN**

9

10 Q. **What did OG&E conclude was the best environmental compliance plan?**

11 A. OG&E concluded that the Scrub/Convert plan was the best plan based on its application
12 of the nine objectives, informed by extensive modeling results.

13

14 Q. **Do you agree with this conclusion and recommendation?**

15 A. Yes. Given the uncertainties facing OG&E and the rest of the industry, I believe that this
16 is the best course of action for OG&E and its customers. While either the Scrub or
17 Convert alternatives might prove to be lower cost alternatives under a certain set of
18 assumptions, they each present substantial risk to OG&E’s customers. In contrast, the
19 Scrub 2/Convert 2 option outperforms each of these alternatives under a wide range of
20 assumptions, and is reasonably close to the NPV results of either option even under
21 assumptions that favor that alternative. In other words, OG&E and its customers are
22 effectively acquiring a hedge against either natural gas prices or carbon prices at a
23 reasonable cost. This strikes me as a good outcome that is certainly reasonable. The
24 Scrub/Convert option also maintains a reasonable balance in OG&E’s portfolio among
25 natural gas, coal and wind energy.

26

27 Q. **Should OG&E wait until there is less uncertainty regarding future environmental
28 regulation, including the regulation of greenhouse gases?**

29 A. OG&E does not have that option. The Regional Haze FIP compliance clock is ticking and
30 history suggests that predicting when a new environmental regulation will be “on the
31 books” and implemented is almost impossible. The Scrub/Convert portfolio provides a

1 reasonable balance to address the many sources of uncertainty, including the uncertainty
2 concerning future environmental regulations.

3
4 **Q. Should OG&E consider acquiring another plant or purchasing capacity and energy
5 from an existing plant as an alternative to the “convert” options?**

6 A. Ideally, OG&E should determine if there is an existing plant or other option that can meet
7 the compliance obligations in a timely and more affordable manner. I understand that
8 OG&E has been approached by at least one plant owner but that the price offered was
9 considerably in excess of the implied cost of the convert option. Unfortunately, there is
10 very little time under the EPA compliance deadlines to consider, much less execute on a
11 competitive solicitation. In addition, deferring development activities on the conversions
12 could be detrimental and threaten the ability to meet firm compliance deadlines and may
13 drive up the costs of the environmental compliance plan. For example, it may make
14 sense to begin lining up the gas supply at Muskogee if new pipeline capacity is required.
15 In general, alternatives that make use of an existing third-party plant are reasonable and I
16 would have recommended further consideration of these options if OG&E did not face
17 such constrained timing.

18
19 **Q. How does OG&E’s environmental compliance plan perform relative to the OG&E’s
20 IRP objectives?**

21 A. The Scrub/Convert environmental compliance plan addresses each of OG&E’s IRP
22 objectives. By definition, it will continue to ensure compliance with the SPP capacity
23 margin requirements. From a cost perspective, the Scrub/Convert plan performs well
24 under almost all cases, including the sensitivity and market price scenario cases. It
25 preserves OG&E’s relatively (compared to many utilities) fuel diverse portfolio,
26 addressing the risks of natural gas prices and future carbon regulation in a reasonable
27 manner. Finally, the IRP maintains OG&E’s commitment to demand-side resources
28 which helps achieve all objectives.

1 Q. **In your opinion, is OG&E’s proposed environmental compliance plan sufficiently**
2 **robust?**

3 A. Yes. The Scrub/Convert plan performs the best under a wide range of future outcomes, as
4 represented by the sensitivity and scenario results. It provides some meaningful
5 protection against worst case outcomes: spiking and sustained high natural gas prices,
6 and aggressive carbon regulation. There is no perfect plan that can adequately mitigate
7 all risks but this particular environmental compliance plan is certainly a reasonable
8 strategy against these uncertainties.
9

10 Q. **Do you have any comments on the Company’s decision to defer adding more wind**
11 **energy at this time?**

12 A. Yes. The decision to take a pause on OG&E’s aggressive wind energy additions for a
13 year or two seems reasonable at this time given the uncertainties associated with the
14 relatively new SPP wholesale market and the impacts of transmission congestion on those
15 prices. In addition, there is considerable uncertainty regarding the future of tax credits
16 for these units and their impact on locational marginal prices in the SPPIM. Finally,
17 given the very small capacity credit that wind provides, these resources cannot play a
18 significant role in meeting OG&E’s need to address the Regional Haze FIP. OG&E has
19 indicated that it will issue a Request for Information (“RFI”) to gather market
20 information with respect to wind, energy and fossil fuel generation to inform the
21 preparation of its 2015 IRP.
22

23 Q. **The 2014 IRP Update addressed one other significant issue, the proposed retirement**
24 **of the Mustang plant and decision to replace it with capacity on the same site. Do**
25 **you have any comments on this decision?**

26 A. While I have not performed any independent assessment of the facts presented by several
27 OG&E witnesses, including witness Robert J. Burch, the decision to utilize CTs as the
28 replacement option strikes me as an eminently reasonable decision. As Mr. Burch has
29 testified, replacing a unit that was designed over 60 years ago for base load purposes with
30 a modern CT that can be cycled and maintained efficiently to correspond to its dispatch
31 under the new SPP IM will significantly enhance the economics, environmental footprint,

1 and contribution to reliability of the units. While the retirement decision is appropriately
2 driven by operational concerns, the replacement of this capacity with CTs maintains
3 OG&E's SPP capacity obligation and is supported by the results of the "Spread CT"
4 expansion case in the IRP modeling. I would expect CTs to perform well as an
5 expansion option given the increase in reliance on wind energy across the SPP.
6

7 **Q. Why is the site and specific location of the Mustang plant relevant for resource**
8 **planning purposes?**

9 A. First, it is extremely rare these days to locate a site that is both favorably situated near a
10 load center and has many of the necessary attributes that are required to connect to
11 facilities necessary to bring in natural gas and transmit the electricity that is produced.

12 Second, while electric utilities have transferred the operation of the regional
13 transmission network to regional entities such as SPP, there is no question that the local
14 utility bears some ongoing responsibility to ensure that reliability within its load area is
15 maintained, including the contribution of generation and transmission assets. Given the
16 newness of the SPP market and the significant reliance on intermittent wind energy that is
17 located far from OG&E's load center, there is no question in my mind that OG&E and its
18 customers are best served from a reliability standpoint by continuing to use the Mustang
19 site for generation. CTs, in particular, are ideal for this purpose given their operational
20 flexibility and the anticipated low dispatch of these units. Local reliability issues will
21 always be a concern to OG&E, its customers, and to the State of Oklahoma.
22

23 VII. CONCLUSION

24
25 **Q. Please summarize your principal findings and conclusions.**

26 A. My principal findings and conclusions are:

- 27 1) The current regulatory and policy environment is particularly challenging
28 because of the lack of national consensus on the regulation of greenhouse
29 gases.

- 1 2) Having exhausted the litigation route, OG&E cannot defer its compliance
2 with Regional Haze regulations any longer and must be in compliance by the
3 January 4, 2019 deadline;
- 4 3) The recent implementation of the SPP IM provides a reliable foundation for
5 IRP modeling. While wholesale markets, including SPP, will continue to
6 evolve, it is reasonable to assume that there will be no major changes to SPP
7 markets over the next few years. It is not possible to reliably forecast at this
8 time whether SPP will implement a capacity market. Therefore, OG&E
9 should base its resource planning decisions on the current market design.
- 10 4) OG&E’s process for developing its IRP is consistent with industry practices
11 and is reasonable.
- 12 5) OG&E’s assumptions regarding future fuel prices and new generation
13 technologies are reasonable.
- 14 6) OG&E’s Base Case assumption with regard to the modeling of carbon prices
15 is reasonable given the politicization of environmental policy in the United
16 States.
- 17 7) OG&E’s sensitivity case assumptions are reasonable.
- 18 8) OG&E’s market price scenario cases produce a reasonable range of potential
19 market prices although there are other sets of scenario assumptions that could
20 also have been used to develop the market price scenarios. The failure to
21 align potential natural gas price impacts with the coal plant retirement
22 assumptions that OG&E relied on to define the scenarios produces an
23 inconsistency that should be addressed by OG&E. However, the resulting
24 market price range is reasonable, although somewhat narrow.
- 25 9) OG&E’s set of IRP objectives is entirely appropriate and reasonable.
- 26 10) OG&E has applied these IRP objectives in a reasonable manner.
- 27 11) The decision to pursue the “Scrub/Convert” environmental compliance plan
28 is reasonable and is the best course of action based on the current
29 circumstances faced by OG&E. The decision is adequately supported by the
30 modeling results.

1 12) It is difficult to make a case that another option would be superior to the
2 Scrub/Convert decision as the viable alternatives introduce higher levels of
3 risk to OG&E's customers.

4 13) The decision to defer acquiring wind energy in 2014 is reasonable, based on
5 OG&E's prior demonstrated commitment to wind, pledge to continue to add
6 wind energy to its portfolio when transmission challenges are resolved, and
7 plan to issue a RFI for fossil fuel and renewable generation to help inform the
8 preparation of its 2015 IRP.

9 14) The decision to re-utilize the Mustang Plant site and replace its capacity with
10 combustion turbine capacity is reasonable and appropriate given all of the
11 unique site advantages, the site's expiring environmental emissions rights,
12 and the reliability benefits of locating CTs close to OG&E's load center.

13 In summary, with respect to the primary focus of the 2014 IRP Update and this cause, I
14 conclude that Scrub/Convert represents the best option to comply with OG&E's Regional
15 Haze obligations.

16
17 **Q. Does this conclude your prepared direct testimony?**

18 **A. Yes, it does.**