

**BEFORE THE CORPORATION COMMISSION OF THE STATE OF OKLAHOMA**

IN THE MATTER OF THE APPLICATION OF  
OKLAHOMA GAS AND ELECTRIC COMPANY  
FOR COMMISSION PREAPPROVAL PURSUANT  
TO 17 O.S. SECTION 286(C) FOR ACQUISITION  
OF CAPACITY THROUGH ASSET PURCHASE

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Cause No. PUD 2018 **800159**

Direct Testimony

of

Leon Howell

on behalf of

Oklahoma Gas and Electric Company

**FILED**  
DEC 28 2018  
COURT CLERK'S OFFICE - OKC  
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OF OKLAHOMA

December 28, 2018

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**I. INTRODUCTION**

Q. **Please state your name, your employer, and your business address.**

A. My name is Leon Howell. I am employed by Oklahoma Gas and Electric Company ("OG&E" or "Company") and my business address is 321 N. Harvey, Oklahoma City, Oklahoma 73102.

Q. **What position do you hold with OG&E?**

A. I hold the position of Director, Resource Planning & Investment. I am responsible for OG&E's resource planning group and for all of its activities including the preparation of integrated resource plan submittals and frequent resource planning analyses that are performed on an ongoing basis as needs arise.

Q. **Please summarize your professional experience and educational background.**

A. I have been employed by OG&E since 1996. I earned a Bachelor of Science Degree in Electrical Engineering from the University of Oklahoma (1985) and a Masters Degree in Business Administration (2000) from Oklahoma City University. Prior to joining OG&E in 1996, I was employed by Western Farmers Electric Cooperative as a Senior Transmission Planning Engineer. Since joining OG&E, I have held various operations and engineering positions. I have been responsible for leading OG&E's resource planning efforts since 2003.

Q. **Have you previously testified or appeared before the Oklahoma Corporation Commission ("Commission")?**

A. Yes. I have filed testimony at the Commission on several occasions and have appeared before the Commission for numerous IRP public meetings. In 2008, I submitted testimony in OG&E's application to acquire a 51% interest in Redbud (Cause No. 200800086). Later that same year, I submitted testimony in OG&E's application to construct the Windspeed transmission line to deliver wind resources from western Oklahoma to OG&E's load centers (Cause No. PUD 200800148). I also filed testimony in Cause Nos. PUD 201400229 and PUD 201700496.

1  
2 **Q. What is the purpose of your testimony in this proceeding?**

3 A. In this proceeding, the Company is seeking pre-approval for the acquisition of two  
4 existing generating facilities in Oklahoma: the AES Shady Point facility in Panama,  
5 Oklahoma and the Oklahoma Cogeneration facility in Oklahoma City, OK. The purpose  
6 of my testimony is to support both the need for this additional generating capacity and the  
7 Company's decision to purchase these two generating facilities after evaluating the  
8 various bids in a competitive bidding process. First, I will discuss OG&E's integrated  
9 resource planning ("IRP") process that established the need for generating capacity  
10 facing the Company. The most recent IRP was submitted to the Commission on  
11 September 18, 2018. Once the capacity need was identified in the IRP, the Company  
12 decided to undertake a competitive bidding process to assess the availability of  
13 generation in the marketplace. I will discuss the capacity needs outlined in the IRP and  
14 why the Company decided to investigate potential generating capacity options through a  
15 competitive bidding process.

16 Second, I will discuss the competitive bidding process (the "2018 Request for  
17 Proposals for Capacity" or "2018 RFP") initiated by the Company in October 2018 to  
18 determine market opportunities for existing or new generating capacity. I will describe  
19 the 2018 RFP and how the Company evaluated bids received in the 2018 RFP, including  
20 how the Company considered various quantitative and qualitative factors. OG&E  
21 Witness Judah Rose, Executive Director with ICF Consulting, will provide testimony  
22 about his independent review of the 2018 RFP, how the 2018 RFP and the evaluation of  
23 bids was reasonable, how the Company weighed the various components of the  
24 qualitative and quantitative analysis, and why the purchase of AES Shady Point and  
25 Oklahoma Cogeneration facilities represents the most reasonable option for the  
26 Company.

27  
28 **II. INTEGRATED RESOURCE PLAN**

29 **Q. Please briefly describe the Company's approach to the 2018 IRP.**

30 A. The 2018 IRP identifies the resource plan that will allow OG&E to meet its capacity  
31 obligations at the lowest reasonable cost. OG&E submitted the 2018 IRP in compliance

1 with requirements established pursuant to the Commission's Electric Utility Rules (OAC  
2 165:35-37). This 2018 IRP was submitted according to a triennial schedule after the last  
3 IRP was submitted in 2015.

4 The objective of this IRP is to explore options to maintain OG&E's generation  
5 capability in accordance with the Southwest Power Pool ("SPP") planning reserve margin  
6 requirement of 12% in a manner that achieves the lowest reasonable costs to customers,  
7 and improves reliability.<sup>1</sup> OG&E believes the best way to accomplish this is by  
8 considering a range of capacity options with varying degrees of scalability and timelines.  
9 As stated in previous IRPs, the Company continues to pursue fuel diversity by  
10 maintaining a reasonable balance among gas, coal and renewable generation resources,  
11 while adding advancing technologies as they become cost effective.  
12

13 **Q. What was one of the key drivers of the immediate capacity need facing the**  
14 **Company in the next few years?**

15 A. A key driver for the capacity needs facing the Company in the next few years is the  
16 expiration of the Company's existing power purchase agreements with AES Shady Point  
17 (360 MW, nameplate) and Oklahoma Cogeneration (146 MW, nameplate). The AES  
18 Shady Point contract will end in January 2019 and the Oklahoma Cogeneration contract  
19 will end in August 2019.  
20

21 **Q. Why are these contracts ending?**

22 A. The Oklahoma Cogeneration contract will come to term as the contract reaches the end of  
23 its 15 year term. The AES Shady Point contract contained an original term of 17 years  
24 and provisions that allowed OG&E to extend the contract beyond the original term.  
25 OG&E exercised its option to decline to further extend the contract because it believed  
26 exiting the contract could reduce customer costs by finding lower cost generating  
27 capacity in the market.

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<sup>1</sup> It is important to note that OG&E's minimum planning reserve margin is established in Section 4.1.9 of the SPP Criteria. The SPP planning reserve margin requirement was lowered in 2017 from the previous level of 13.6% to 12%. This change resulted in OG&E having reduced capacity requirements of approximately 100 MW. That reduction was fully factored into the 2018 IRP. Without the reduction in SPP planning reserve margin, the capacity needs facing the Company would have been 100 MW greater.

1  
2 Q. **What is the immediate capacity need facing the Company from the expiration of**  
3 **these two PPAs?**

4 A. After considering existing generating capacity, demand forecasts with OG&E demand  
5 side management programs and the SPP planning reserve margin requirements, OG&E  
6 determined that the expiration of the AES Shady Point contract created needs for 168  
7 MW of rated capacity in 2019 and 305 MW of rated capacity in 2020. The total capacity  
8 need by 2023 totals 438 MW. Below is a table from the IRP that shows the capacity  
9 needs by year:

10 Table 1: Capacity Needs

	2019	2020	2021	2022	2023
<b>Total Capacity</b>	6,479	6,359	6,359	6,359	6,359
<b>Net Demand</b>	5,934	5,949	6,001	6,031	6,069
<b>Reserve Margin</b>	9%	7%	6%	5%	5%
<b>Needed Capacity*</b>	168	305	362	396	438
<i>*Indicates the potential capacity needed to restore the reserve margin to 12%.</i>					

11  
12 Q. **Can OG&E rely on the SPP IM to cover its capacity needs?**

13 A. No. The SPP IM is an energy market only and not a capacity market. Thus, OG&E  
14 cannot rely on the SPP IM to cover its capacity needs should it fall short in any year.  
15 OG&E remains responsible for ensuring that it has adequate capacity either from OG&E  
16 units or from firm contracts for capacity to meet its projected peak load requirements,  
17 including a planning reserve margin of 12%.

18  
19 Q. **Did the 2018 IRP model various portfolios around how to meet the Company's**  
20 **future capacity needs?**

21 A. Yes. OG&E considered more than 300,000 portfolios that meet the capacity needs  
22 utilizing a combination of potential future resources of various technology types, sizes  
23 and availability. However, the common denominator of all portfolios shows that meeting  
24 the immediate capacity need would be done through available resources identified in the  
25 market through a competitive bidding process. To assess available generation that is

1 available in the next few years, OG&E decided to issue a Request for Proposals ("RFP")  
2 to solicit bids for available resources to satisfy the capacity needs beginning in 2019.  
3

4 **Q. What did OG&E conclude from the IRP analyses?**

5 A. OG&E will have capacity needs beginning in 2019 due to not extending the AES Shady  
6 Point power purchase agreement. Future capacity needs will increase due to the  
7 expiration of the Oklahoma Cogeneration contract and load growth. OG&E decided to  
8 replace the capacity currently provided by the AES Shady Point contract and provide  
9 customer savings by conducting an RFP process and identifying the lowest reasonable  
10 cost market opportunity.

11 The RFP would allow OG&E to identify potential new resources to meet its  
12 future capacity needs beyond 2019. The RFP was therefore designed to identify the best  
13 resources to meet the immediate capacity needs facing the Company. The 2018 IRP is  
14 attached to my testimony as Direct Exhibit LCH-1.  
15

### 16 **III. 2018 RFP**

17 **Q. Please describe the 2018 RFP.**

18 A. On October 8, 2018, the Company issued the 2018 RFP, attached to my testimony as  
19 Direct Exhibit LCH-2, seeking bids from third parties to meet OG&E's generating  
20 capacity needs identified in the IRP and discussed above. Proposals were required to be a  
21 minimum of 50 MW and a maximum of 500 MW. OG&E required that any bid would  
22 have to be for capacity available to satisfy OG&E's resource adequacy obligations  
23 beginning as early as June 1, 2019 but no later than June 1, 2021. The RFP also specified  
24 that proposals must be for single generation facilities, or co-located generation facilities,  
25 that are located in and interconnected to SPP's transmission network. OG&E also was  
26 focused on long-term (30 year) capacity that met SPP-accredited capacity requirements.  
27

28 **Q. What flexibility did OG&E allow in the amount and type of generating capacity it**  
29 **could select in the 2018 RFP?**

30 A. As discussed above, the Company showed a capacity need of 438 MW through 2023.  
31 Therefore, OG&E stated in the 2018 RFP that it would consider procuring up to

1 approximately 500 MW of qualified capacity if the procurement alternatives available are  
2 shown to benefit the Company's system. OG&E also retained the optionality to contract  
3 with one or multiple bidders to procure capacity resources. The 2018 RFP was drafted  
4 broadly so that OG&E could receive bids from a wide variety of utility scale electric  
5 generation sources. OG&E invited proposals from all potential suppliers capable of  
6 meeting the requirements of this RFP, including other utilities, independent power  
7 producers, wholesale generators, and qualifying facilities under the Public Utility  
8 Regulatory Policies Act ("PURPA"). OG&E also sought both proposals for the transfer  
9 of ownership of existing or to-be-constructed generation facilities and also proposals for  
10 power purchase agreements ("PPAs") for sale of only capacity (and not energy) with a  
11 thirty (30) year term following commercial operation. Finally, OG&E did not limit the  
12 RFP to any specific technology, fuel source or type of generation.

13  
14 **Q. Please describe the 2018 RFP process.**

15 **A.** This RFP was administered in a fair, just, and reasonable manner consistent with  
16 Commission rules for competitive procurements Oklahoma Administrative Code  
17 ("OAC") 165:35-34 ("Commission Rules"). All communications were required to be  
18 directed to a special email address and unsolicited direct contact between bidders and  
19 employees or personnel at OG&E was prohibited.

20 OG&E provided a draft RFP to interested stakeholders and thereafter held a  
21 technical conference to allow interested parties to provide comments and feedback  
22 regarding the draft RFP. After receiving comments and feedback on the draft RFP,  
23 OG&E issued the final 2018 RFP, but bidders were allowed to submit questions to  
24 OG&E on the final RFP via email. Bidders submitted sealed bids to OG&E on October  
25 22, 2018, and bids were opened at OG&E headquarters at 9:00am on October 23, 2018 in  
26 front of members of the Public Utility Division of the Oklahoma Corporation  
27 Commission, the Office of the Attorney General, and other interested stakeholders.  
28 OG&E then performed a detailed evaluation of bids and identified Bidder(s) selected for  
29 negotiation. Throughout November 2018, the Company engaged in both bid evaluation  
30 and due diligence.

1 Q. **Was there a lot of participation in the 2018 RFP?**

2 A. Yes. I would say that participation in the 2018 RFP was quite robust. There were  
3 nineteen (19) bidders submitting ninety-four (94) distinct proposals. Of these 94  
4 proposals, forty-one (41) were for the acquisition of generating assets and fifty-three (53)  
5 were for PPAs. These proposals constituted more than 6,400 MW from existing and new  
6 generating facilities utilizing many types of fuels, including coal, natural gas, wind, solar,  
7 and batteries. The proposals also came from twenty-six (26) different locations within a  
8 350-mile radius of Oklahoma City, Oklahoma.  
9

10 Q. **How did OG&E evaluate the bids received in the 2018 RFP?**

11 A. Once all bids were received, OG&E, in conjunction with its consultant Judah Rose and  
12 his team from ICF Consulting, reviewed the bids to determine which ones provided the  
13 most economical, reliable and viable alternatives for OG&E and its customers. There  
14 were three parts to OG&E's evaluation process. Initially, each proposal was subjected to  
15 a threshold review process to determine whether the proposal was complete and  
16 technically viable and whether the bidder had the financial viability and capability to  
17 deliver the project. OG&E Witnesses Keith Mitchell and Judah Rose explain how the  
18 threshold evaluation was conducted and why some bids were deemed non-conforming.  
19 After the threshold evaluation, there were twenty-one (21) projects that remained in the  
20 process. These projects included a number of existing asset acquisition proposals, utility-  
21 scale solar build/own/transfer projects, and power purchase agreements.  
22

23 Q. **Please explain the bid review process that occurred after the threshold evaluation.**

24 A. Proposals that passed the threshold review were then evaluated based on identified  
25 qualitative and quantitative criteria. These criteria were determined based on  
26 recommendations of Judah Rose and ICF Consulting, who also determined that the  
27 qualitative and quantitative evaluations should each be provided equal weight in the final  
28 evaluation and decision. That is, a proposal would receive a score out of 50 points on  
29 both the qualitative and quantitative side. Witness Rose addresses why it selected each of  
30 the criteria used for both the qualitative and quantitative analyses and why a 50% weight



1 was given to each. Mr. Rose also explains the results of ICF Consulting's qualitative  
2 scoring.

3  
4 **Q. Please describe the quantitative analysis of the 2018 RFP bids.**

5 A. The quantitative analysis consisted of two separate criteria. First, proposals were  
6 evaluated on price and operational performance factors through a simulation of the  
7 impact of the proposal on the costs paid by OG&E's customers. That is, OG&E  
8 calculated the expected 30-year Net Present Value Customer Cost ("NPVCC") for each  
9 proposal through detailed resource planning simulation modeling and sensitivity analysis.  
10 This analysis accounted for initial capital costs, on-going fixed O&M costs, future capital  
11 expenditures and production cost with market impact. For PPAs, the analysis was the  
12 same with the customer costs reflecting the contract costs over the PPA term. For  
13 modeling purposes, the Company projected dispatch and/or curtailment of resources in  
14 the SPP Integrated Marketplace over a 30-year time horizon beginning in 2019. The  
15 modeling application was consistent with the analysis and tools described in OG&E's  
16 2018 IRP, including analyzing proposals under base case assumptions as well as three  
17 sensitivities. This expected customer cost analysis constituted 80% of the overall  
18 quantitative analysis and was worth 40 out of 100 points for each bid's overall score in  
19 the 2018 RFP.

20  
21 **Q. How did OG&E determine a score for this part of the quantitative analysis?**

22 A. As stated above, OG&E analyzed each proposal under a "Base Case" and three  
23 sensitivities (Low Gas, High Gas and CO<sub>2</sub>). The Low Gas sensitivity assumed natural  
24 gas price forecasts were half of the gas price forecasts used in the Base Case and the High  
25 Gas sensitivity assumed natural gas price forecasts were 1.5 times higher than the gas  
26 price forecasts used in the Base Case. The CO<sub>2</sub> sensitivity studied the NPVCC if a cost  
27 of \$20 per ton of CO<sub>2</sub> was applied to electric generation plants starting in 2025 and  
28 escalated by 2.5% each year thereafter. The Company then calculated a weighted  
29 NPVCC by assigning weights to the Base Case (45% weight) and the Low Gas (35%  
30 weight), High Gas (10% weight) and CO<sub>2</sub> (10% weight) sensitivities. This created a  
31 weighted NPVCC for each proposal that was designed to capture the quantitative risks

1 for each proposal over long-term. The proposal with the lowest weighted NPVCC  
2 received 40 points. Points were then awarded to the other proposals based on the ratio  
3 between the weighted NPVCC for each proposal and the lowest weighted NPVCC.  
4

5 **Q. What was the second criteria used in the quantitative analysis?**

6 A. For any PPA proposal in the 2018 RFP, OG&E also considered the projected costs of  
7 direct or inferred debt associated with the proposal. Inferred debt results when credit  
8 rating agencies infer an amount of debt associated with a power supply contract and, as a  
9 result, take the added debt into account when reviewing OG&E's credit standing. Factors  
10 which may additionally be considered include balance sheet impact, cash flow impact,  
11 and bond rating impact. ICF Consulting performed this second part of the economic  
12 analysis and is addressing both the results of this analysis and how it was weighed in the  
13 overall quantitative evaluation.  
14

15 **Q. How was the final quantitative score developed from the two separate quantitative**  
16 **analyses?**

17 A. The score from the weighted NPVCC analysis was added to the inferred debt score to  
18 calculate a total quantitative score.  
19

20 **Q. What did the overall quantitative analysis reveal regarding the various proposals?**

21 A. Although the AES Shady Point and Oklahoma Cogeneration proposals did not have the  
22 lowest NPVCC scores, those facilities represent extraordinarily cheap capacity. The  
23 purchase of the AES Shady Point and Oklahoma Cogeneration facilities will cost  
24 approximately \$53.5 million and OG&E will receive over 500 MW of nameplate  
25 capacity. This equates to adding capacity for approximately \$106/kW. Not only that, the  
26 acquisition of these facilities at these low capital investment costs introduces less market  
27 risk compared to some of the high capital cost proposals that rely on SPP IM revenues to  
28 offset revenue requirements over a 30-year period.

29 The acquisition of the AES Shady Point and Oklahoma Cogeneration facilities  
30 represents the lowest amount of capital investment and relies less on future market  
31 revenues to create benefits for customers. OG&E believes that for meeting the

1 immediate capacity needs facing the Company, selecting the cheapest options that are not  
2 necessarily reliant on future market prices to reduce customer costs, was the correct  
3 decision.  
4

5 Q. **From your perspective, was the acquisition of the AES Shady Point and Oklahoma**  
6 **Cogeneration facilities a reasonable decision based on the quantitative analysis**  
7 **performed by your group?**

8 A. Yes. The AES Shady Point and Oklahoma Cogeneration facilities represent  
9 extraordinarily cheap capacity. Moreover, the purchase of the AES Shady Point and  
10 Oklahoma Cogeneration facilities is cheaper for customers compared to continuing to  
11 purchase capacity and energy from AES Shady Point for the next five years. This  
12 confirms that OG&E's decision to not extend the contract for the 360 MW AES Shady  
13 Point facility for another 5 years was the correct decision because the Company was able  
14 to find a cheaper alternative and to add over 500 MW of nameplate capacity at an  
15 extremely favorable cost.  
16

17 Q. **When the quantitative and qualitative analysis was combined to determine an**  
18 **overall scoring of the proposals, what did that scoring reveal?**

19 A. The overall analysis showed that the acquisition of the AES Shady Point and Oklahoma  
20 Cogeneration generating facilities were the top two proposals with the highest total scores  
21 after considering all economic and non-economic criteria.  
22

23 Q. **Does this conclude your prepared direct testimony?**

24 A. Yes, it does.





## EXECUTIVE SUMMARY

OG&E submits this Integrated Resource Plan (IRP) in compliance with requirements established pursuant to the Oklahoma Corporation Commission's (OCC) Electric Utility Rules OAC 165:35-37 and the Arkansas Public Service Commission's (APSC) Resource Planning Guidelines for Electric Utilities. This IRP is submitted according to the triennial schedule established by the OCC and APSC.

OG&E's minimum planning reserve margin is established in Section 4.1.9 of the SPP Criteria. The SPP planning reserve margin requirement was lowered in 2017 from the previous level of 13.6% to 12%. This change results in OG&E having reduced capacity requirements of approximately 100 MW.

The objective of this IRP is to explore options to maintain OG&E's generation capability in accordance with the SPP planning reserve margin requirement of 12% in a manner that achieves the lowest reasonable costs to customers, improves reliability and maintains environmental balance. OG&E believes the best way to accomplish this is by considering a range of capacity options with varying degrees of scalability and timelines. The company desires fuel diversity by maintaining a reasonable balance among gas, coal and renewable generation resources while adding advancing technologies as they become cost effective and environmentally sound. System resiliency, especially near critical load centers, is also an important consideration for locational benefits realized by customers.

OG&E's resource planning process includes collecting information regarding material assumptions used in the modeling and analysis of potential resource additions. A key assumption in this IRP is the removal of the company's existing power purchase agreement with AES Shady Point and subsequent replacement of an equal amount of capacity. The company believes this step may reduce customers' costs. Capacity needs, beginning in 2019, are shown in the table below:

**OG&E Planning Reserve Margin and Needed Capacity (MW unless noted)**

	2019	2020	2021	2022	2023
<b>Total Capacity</b>	6,479	6,359	6,359	6,359	6,359
<b>Net Demand</b>	5,934	5,949	6,001	6,031	6,069
<b>Reserve Margin</b>	9%	7%	6%	5%	5%
<b>Needed Capacity*</b>	168	305	362	396	438
<i>*Indicates the capacity needed to restore the reserve margin to 12%.</i>					

OG&E considered more than 300,000 portfolios that meet the capacity needs utilizing a combination of potential future resources of various technology types, sizes and availability. Although dependent on the value to OG&E customers of existing capacity available in the market versus new-build cost, the portfolio analysis shows that adding capacity through a market opportunity, adding solar resources and implementing

improvements to OG&E's existing combined cycle units result in the lowest customer cost under the base case assumptions. OG&E plans to issue a Request for Proposal (RFP) to solicit bids for available resources to satisfy the capacity needs in 2019, 2020 and 2021 and, if needed, upgrade OG&E's existing combined cycle plants to increase their capacity by 2023. This plan addresses OG&E's future requirements in a manner which produces the lowest reasonable cost and provides the opportunity to mitigate risks.

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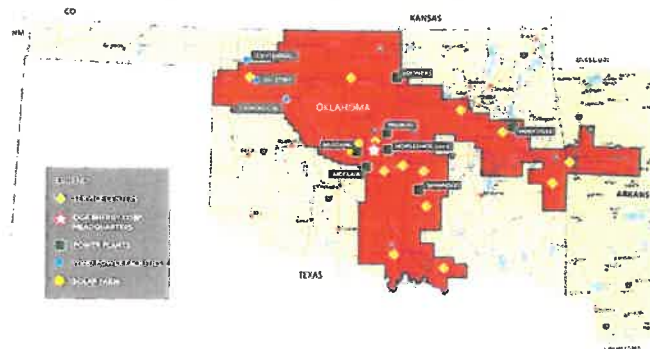
## List of Acronyms

Acronym	Phrase Represented	Reference
<b>AGP</b>	Advanced Gas Path	Technology
<b>APSC</b>	Arkansas Public Service Commission	Agency
<b>CO2</b>	Carbon Dioxide	Chemical
<b>CC</b>	Combined Cycle electricity generating unit	Technology
<b>CT</b>	Combustion Turbine electricity generating unit	Technology
<b>DSM</b>	Demand Side Management	Industry
<b>EE</b>	Energy Efficiency	OG&E
<b>EIA</b>	Energy Information Administration	Agency
<b>EPA</b>	Environmental Protection Agency	Agency
<b>FERC</b>	Federal Energy Regulatory Commission	Agency
<b>FIP</b>	Federal Implementation Plan	EPA
<b>HSL</b>	Horseshoe Lake	OG&E
<b>IM</b>	Integrated Marketplace	SPP
<b>ITP</b>	Integrated Transmission Plan	SPP
<b>ITP10</b>	ITP 10 Year Assessment	SPP
<b>ITP20</b>	ITP Long Term 20 Year Assessment	SPP
<b>ITPNT</b>	ITP Near Term Assessment	SPP
<b>IVVC</b>	Integrated Volt Var Control	OG&E
<b>IRP</b>	Integrated Resource Plan	Industry
<b>LMP</b>	Locational Marginal Price	SPP
<b>LRP</b>	Load Reduction Program	OG&E
<b>MATS</b>	Mercury and Air Toxics Standards Rule	EPA
<b>NERC</b>	North American Electric Reliability	Agency
<b>NPVCC</b>	Net Present Value of Customer Cost	OG&E
<b>NTC</b>	Notice to Construct	SPP
<b>NREL</b>	National Renewable Energy Laboratory	Agency
<b>O&amp;M</b>	Operations & Maintenance	General
<b>OCC</b>	Oklahoma Corporation Commission	Agency
<b>OG&amp;E</b>	Oklahoma Gas & Electric	Agency
<b>PCI</b>	Power Costs Inc.	Agency
<b>PI</b>	Plant Improvements	Technology
<b>PPA</b>	Power Purchase Agreement	Industry
<b>RFP</b>	Request for Proposal	General
<b>SPP</b>	Southwest Power Pool	SPP
<b>STEP</b>	SPP Transmission Expansion Plan	SPP

## I. Introduction

OG&E was formed in 1902 and is Oklahoma's oldest and largest investor-owned electric utility. OG&E serves more than 842,000 customers in 276 towns and cities in a 30,000 square mile area of Oklahoma and western Arkansas. OG&E's service area is shown in Figure 1.

**Figure 1 – OG&E Service Area**



This IRP Report and Appendices have been completed following the OCC Electric Utility Rules and APSC Resource Planning Guidelines for Electric Utilities. Sections II - V present the IRP objectives and process, assumptions, resource planning modeling and analysis, and five-year action plan. Section VI concludes the report with the following schedules as prescribed by Oklahoma Corporation Commission rule OAC 165:35-37-4(c):

- A. Electric demand and energy forecast
- B. Forecast of capacity and energy contributions from existing and committed supply- and demand-side resources
- C. Description of transmission capabilities and needs covering the forecast period
- D. Assessment of the need for additional resources
- E. Description of the supply, demand-side and transmission options available to the utility to address the identified needs
- F. Fuel procurement plan, purchased power procurement plan, and risk management plan
- G. Action plan identifying the near-term (i.e., across the first five (5) years) actions
- H. Proposed RFP(s) documentation, and evaluation
- I. Technical appendix for the data, assumptions and descriptions of models
- J. Description and analysis of the adequacy of its existing transmission system
- K. Assessment of the need for additional resources to meet reliability, cost and price, environmental or other criteria
- L. An analysis of the utility's proposed resource plan
- M. Description and analysis of the utility's consideration of physical and financial hedging to determine the utility's ability to mitigate price volatility

## II. IRP Objectives and Process

OG&E strives to develop a resource plan that will allow it to meet its capacity obligations over the planning horizon at the lowest reasonable cost with due consideration of the uncertainties attributable to many of the planning assumptions and other items of value to OG&E customers. The objectives below are relied upon to identify the best future portfolio.

1. Capacity Obligation: satisfy SPP's planning reserve margin requirements
2. Operational Flexibility: maintain or increase the ability of OG&E's portfolio to respond at SPP's direction to localized reliability issues
3. Expected Cost to Consumers: lowest reasonable Net Present Value of Customer Cost (NPVCC) subject to satisfying other IRP objectives
4. Exposure to Risks: consider the sensitivity of NPVCC related to risks that affect customer cost and benefits, including uncertain future prices of fuel and emissions, as well as other potential risks
5. Agility: Consider a range of capacity options with varying degrees of scalability and differing implementation timelines
6. Fuel Diversity: maintain a reasonable balance among natural gas, coal and economically viable renewable, energy storage and demand-side resources
7. Portfolio Age: maintain a reasonable balance of resources as measured by expected remaining asset life
8. Locational Advantage: increase the reliability and resiliency of OG&E's distribution system
9. Resiliency Benefits: maintain generation capability to minimize disruptions

OG&E's seven-step Integrated Resource Planning process remains largely unchanged from previous IRPs and is illustrated in Figure 2.

**Figure 2 – Integrated Resource Planning Seven Step Process**



### III. Assumptions

OG&E's resource planning process includes collecting information regarding material assumptions used in the modeling and analysis of potential resource additions.

#### A. Load Forecast

The retail energy forecast is based on retail sector-level econometric models representing weather, growth and economic conditions in OG&E's Oklahoma and Arkansas service territories. The peak demand forecast relies on an hourly econometric model. Historical and forecast weather-adjusted retail energy sales are the main driver for the peak demand forecast projections. The peak demand forecast is reduced by planned OG&E Demand Side Management (DSM) programs to determine the net demand used for planning purposes. Peak demand and energy forecasts are provided in Section VI under Schedule A.

**Table 1 – Energy Forecast (GWh)**

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Energy Forecast<sup>1,2</sup></b>	29,528	29,799	30,090	30,396	30,744	31,096	31,407	31,719	32,036	32,368
<b>OG&amp;E DSM<sup>3,4</sup></b>	497	658	825	944	1,055	1,169	1,280	1,387	1,482	1,513
<b>Net Energy</b>	29,032	29,141	29,264	29,452	29,689	29,927	30,127	30,332	30,555	30,855

**Table 2 – Demand Forecast (MW)**

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Demand Forecast<sup>1,2</sup></b>	6,237	6,283	6,366	6,423	6,484	6,519	6,595	6,661	6,723	6,785
<b>OG&amp;E DSM<sup>3,4</sup></b>	303	334	366	391	416	442	466	489	511	518
<b>Net Demand</b>	5,934	5,949	6,001	6,031	6,069	6,077	6,129	6,172	6,212	6,266

#### B. Generation Resources

OG&E remains obligated to comply with SPP Planning Reserve Margin requirements by maintaining capacity sufficient to serve its peak load requirements and a planning reserve. This is accomplished through OG&E-owned generation, existing power purchase agreements or, if necessary, potential new resources.

##### 1. Existing Resources

OG&E's existing portfolio of electric generating facilities consists of owned thermal generation, owned renewable resources and several power purchase contracts as presented in the following three tables.

<sup>1</sup> SmartHours, Historical Demand Program Rider programs, installed IVVC and the Mustang Solar facility are already included in the Energy and Demand forecasts.

<sup>2</sup> Competitive new load larger than 1 MW outside of OG&E service territory is included.

<sup>3</sup> Represents estimates for incremental energy efficiency programs in Oklahoma and Arkansas, incremental IVVC and the Load Reduction Program.

<sup>4</sup> DSM incorporates the proposed 2019-2021 Oklahoma Demand Program Rider Portfolio.



Table 3 – OG&amp;E Existing Thermal Resources

Unit Type	Unit Name	First Year In Service	Summer Capacity (MW)
<b>Coal Fired Steam (1,528 MW)</b>	Muskogee 6	1984	518
	Sooner 1	1979	505
	Sooner 2	1980	505
<b>Gas Fired Steam (3,195 MW)</b>	Muskogee 4	1977	490
	Muskogee 5	1978	490
	Horseshoe Lake 6	1958	167
	Horseshoe Lake 7	1963	214
	Horseshoe Lake 8	1969	397
	Seminole 1	1971	475
	Seminole 2	1973	480
	Seminole 3	1975	482
<b>Combined Cycle<sup>5</sup> (994 MW)</b>	McClain	2001	380
	Redbud	2002	614
<b>Combustion Turbine (551 MW)</b>	Horseshoe Lake 9	2000	44
	Horseshoe Lake 10	2000	43
	Tinker (Mustang 5A)	1971	33
	Tinker (Mustang 5B)	1971	32
	Mustang 6	2018	57
	Mustang 7	2018	57
	Mustang 8	2018	57
	Mustang 9	2018	57
	Mustang 10	2018	57
	Mustang 11	2018	57
	Mustang 12	2018	57

Table 4 – OG&amp;E Existing Renewable Resources

Unit Type	Unit Name	First Year In Service	Nameplate Capacity (MW)	Summer Capacity (MW)
<b>Wind (56 MW)</b>	Centennial	2006	120	16
	OU Spirit	2009	101	9
	Crossroads	2012	228	31
<b>Solar (12 MW)<sup>6</sup></b>	Mustang	2015	3	3
	Covington	2018	9	9

Table 5 – Existing Power Purchase Contracts

	Unit Name	First Year In Service	Nameplate Capacity (MW)	Summer Capacity (MW)
<b>Power Purchase (155 MW)</b>	Keenan	2010	152	18
	Taloga	2011	130	7
	Blackwell	2012	60	10
	Oklahoma Cogen	1989	120	120

<sup>5</sup> Represents OG&E owned interest: 77% of McClain and 51% of Redbud.<sup>6</sup> Solar is connected to distribution and is embedded in the Net Demand Forecast.

OG&E has exercised its option on its purchase power agreement with AES Shady Point, effective January 2019. OG&E believes it may reduce customers' costs by replacing it with an equal amount of capacity.

## 2. Future Resource Options

OG&E contracted with Burns & McDonnell to provide cost and performance estimates for combined cycle (CC) and simple cycle technologies like combustion turbines (CT) and reciprocating engines (Recip). This also included an option to add the necessary components to OG&E's existing Horseshoe Lake units 9 & 10 to convert them to a combined cycle unit. Additionally, there are plant improvements that can be made at the Redbud and McClain combined cycle plants. The cost estimates for Wind and Solar are from the National Renewable Energy Lab's (NREL) and the estimate for batteries is from U.S. Energy Information Administration's (EIA) 2018 Annual Energy Outlook<sup>7</sup>. The potential additional resource options are shown in Table 6.

**Table 6 – Resource Options in 2018\$**

Technology	Description	Nameplate Capacity (MW)	Nameplate Overnight Capital Cost (\$/kW)	Summer Peak Capacity (MW)	Fixed O&M Cost (\$/kW)	Variable O&M Cost (\$/MWh)
Wind <sup>8</sup>		250	\$1,640	50	\$33.50	N/A
Batteries	Lithium Ion	100	\$2,190	100	\$36.30	N/A
Solar <sup>9</sup>	Photovoltaic Single Axis	100	\$1,460	80	\$20.50	N/A
Conversion	Horseshoe Lake CC	80	\$2,510	80	\$8.40	-\$1.10
Plant Improvement (PI)	McClain	42	\$880	42	\$1.70	N/A
	Redbud	60	\$800	60	\$1.80	N/A
Reciprocating Engine	Recip Engine Single	6	\$2,130	6	\$18.10	\$5.30
	Recip Engine Multiple	49	\$1,540	49	\$17.30	\$4.10
CT Aero	LMS100	105	\$1,400	93	\$2.90	\$1.80
	Trent 60 SCGT	66	\$780	57	\$4.50	\$1.10
CT Frame	5000F SCGT	245	\$560	222	\$3.00	\$0.90
	G/H Class	268	\$730	244	\$3.50	\$1.50
	7EA	96	\$1,060	78	\$6.60	\$0.90
Combined Cycle (CC)	2x1 8000H	1,066	\$680	989	\$2.50	\$1.90
	1x1 HA.02 Fired	610	\$840	571	\$3.80	\$2.00
	1x1 HA.02	497	\$950	462	\$3.80	\$2.00
	2X1 GE 7FA.05 Fired	885	\$740	845	\$2.40	\$1.90
	2X1 GE 7FA.05	714	\$850	684	\$2.40	\$1.90

OG&E has been monitoring the prices for solar and wind resources over the last few years and relies on the NREL<sup>10</sup> estimates which show both solar and wind costs will continue to decrease over the next decade. NREL's mid-range price projections for utility scale solar and wind are shown in Table 7.

<sup>7</sup> <https://www.eia.gov/outlooks/aeo/>

<sup>8</sup> Wind accredited peak capacity is assumed to be 20% of nameplate capacity

<sup>9</sup> Solar accredited peak capacity is assumed to be 80% of nameplate capacity

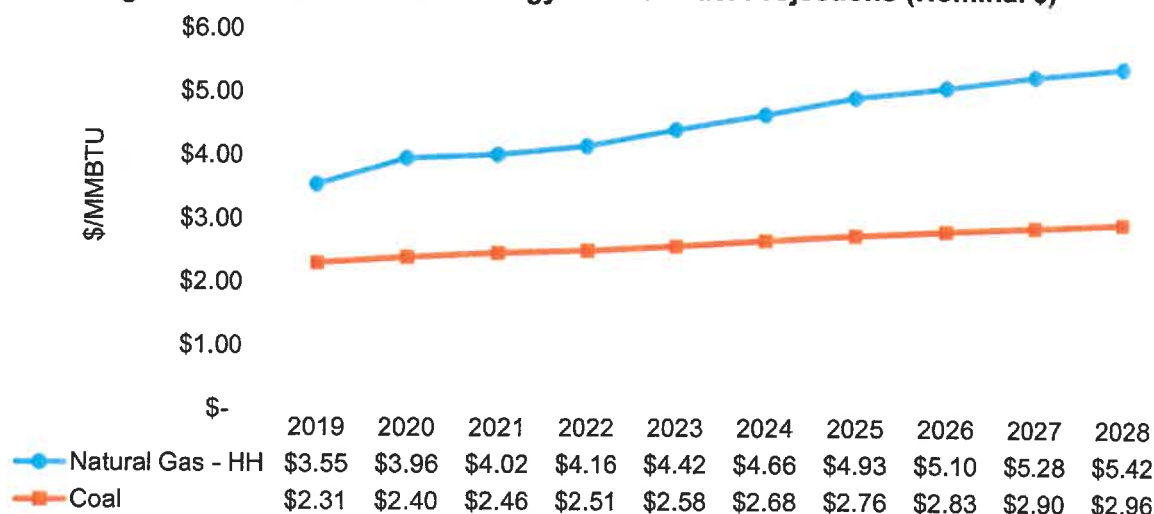
<sup>10</sup> <https://atb.nrel.gov/electricity/2017/index.html?t=su>, <https://atb.nrel.gov/electricity/2017/index.html?t=lw>

**Table 7 – Renewables Nameplate Overnight Cost Projections in 2018\$ (\$/kW<sub>AC</sub>)**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Solar	\$1,460	\$1,410	\$1,330	\$1,320	\$1,300	\$1,280	\$1,270	\$1,250	\$1,240	\$1,220	\$1,200
Wind	\$1,640	\$1,620	\$1,610	\$1,600	\$1,590	\$1,580	\$1,560	\$1,550	\$1,540	\$1,520	\$1,510

### C. Fuel Price Projections

OG&E utilizes the fuel price projections provided in the EIA 2018 Annual Energy Outlook (AEO)<sup>11</sup>. EIA's models consider macroeconomic growth, world oil prices, technological progress, and energy policies to provide price projections for the U.S. The AEO "Reference Case" reflects current market conditions, laws and regulations and is the foundation for OG&E's Base Case in this IRP. Figure 3 provides the 2018 Annual Energy Outlook's Henry Hub Natural Gas price assumption and the U.S. average coal price for the next ten years.

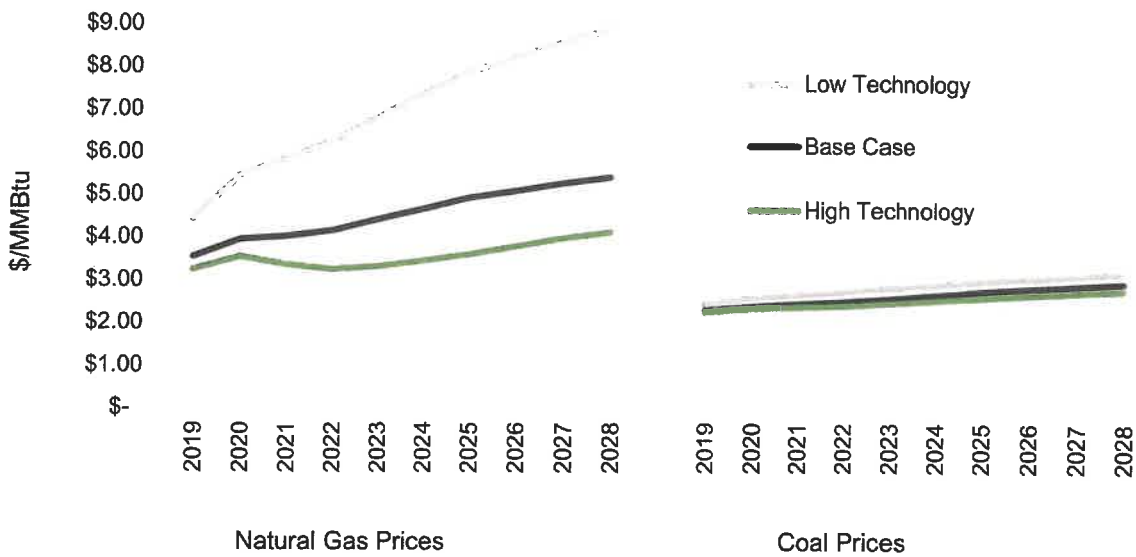
**Figure 3 – EIA 2018 Annual Energy Outlook Fuel Projections (Nominal \$)**

#### 1. Scenarios

The 2018 Annual Energy Outlook provides several scenarios to account for uncertainties around trends in technology improvements, economic performance, commodity prices, legislation, regulation or energy policies. The Low and High Oil and Gas Resource and Technology cases provide the largest variation in commodity prices while also changing load projections. The commodity prices for these scenarios are provided in Figure 4.

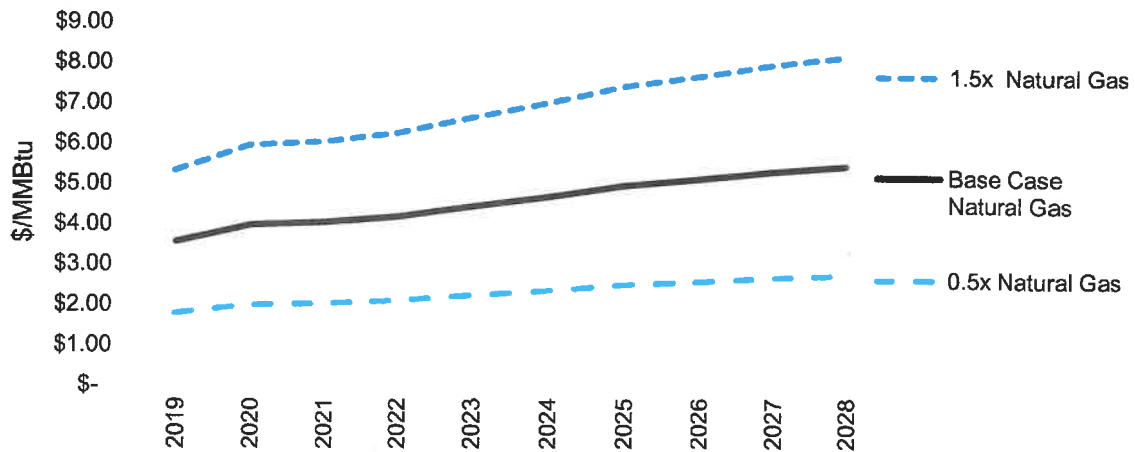
<sup>11</sup> <https://www.eia.gov/outlooks/aeo/>



**Figure 4 – Scenario Fuel Projections**

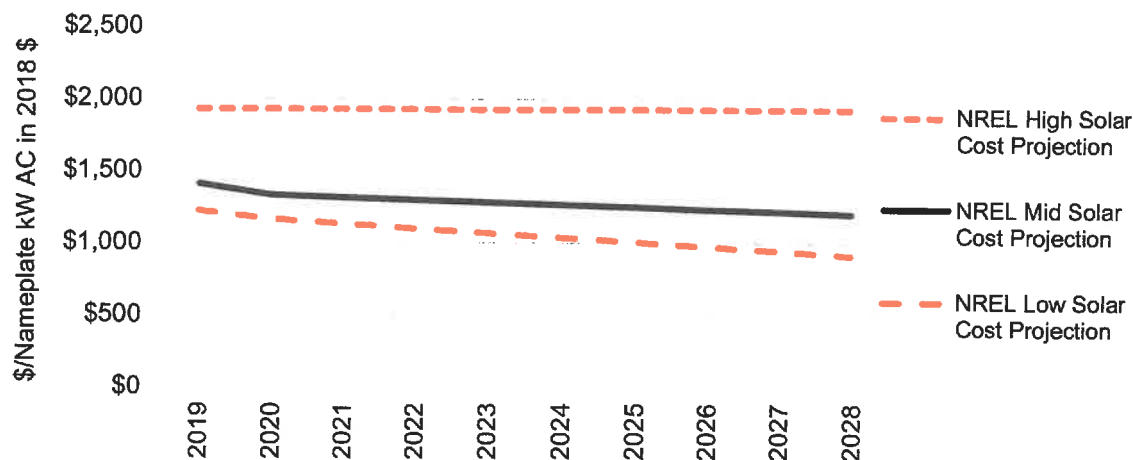
## 2. Sensitivities

Sensitivity analysis involves changing a single input variable of the Base Case and measures the impact of the change in that specific variable. Sensitivity analysis was conducted that contemplates changes to natural gas prices, solar capital costs and adding a CO<sub>2</sub> tax. Two sensitivity cases measure the impact of changing natural gas prices and are shown in Figure 5.

**Figure 5 – Natural Gas Sensitivities**

Solar prices have declined markedly in recent years. Projections of solar capital costs going forward will impact the viability of solar resources in any generation portfolio. A range of potential future solar capital costs from NREL is shown in Figure 6.

Figure 6 – Solar Capital Cost Sensitivities



A third sensitivity added a cost of \$20 per ton of CO<sub>2</sub> to electric generation plants starting in 2025 and escalating by 2.5% each year afterward.

#### D. Integrated Marketplace Locational Marginal Prices

Hourly Locational Marginal Prices (LMPs) for both generation and load are established through the Integrated Marketplace (IM). As a result, in order to evaluate new generation resources in the IRP, it is necessary to project the market prices for the region that will apply to electricity generated by OG&E units and to purchases from the market to serve OG&E's load. OG&E utilizes ABB PROMOD IV, an electric market simulation tool which incorporates generating unit operating characteristics, transmission grid topology and constraints, to estimate future nodal energy prices in the SPP IM. Market conditions such as availability of diverse generation resources, fuel pricing and emission costs impact market pricing. The resulting average annual OG&E Load LMPs for all scenarios and sensitivities are provided in Figure 7.

Figure 7 – Average Annual OG&amp;E Load LMP by Scenario and Sensitivity

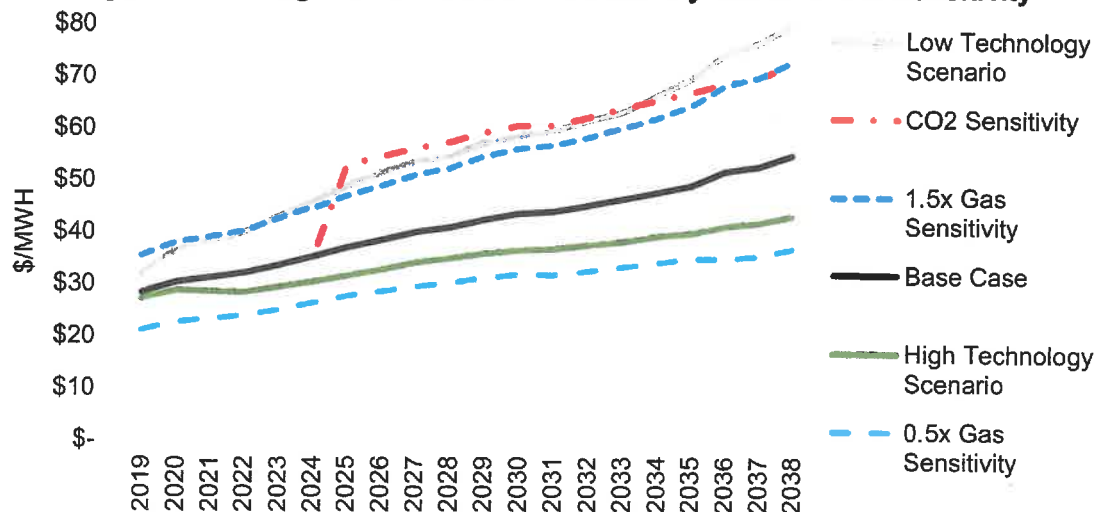


Figure 8 shows the seasonality and variability of hourly LMPs throughout a year assuming base case gas prices.

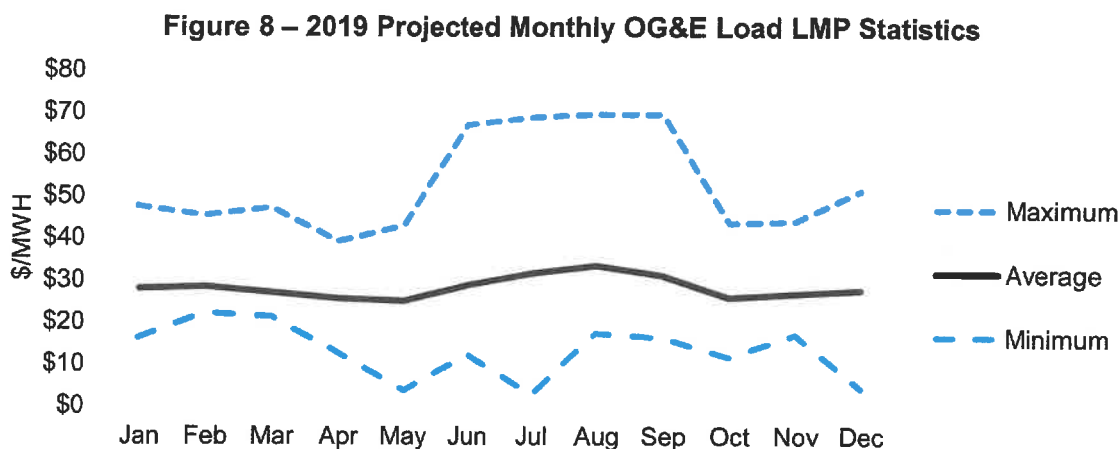
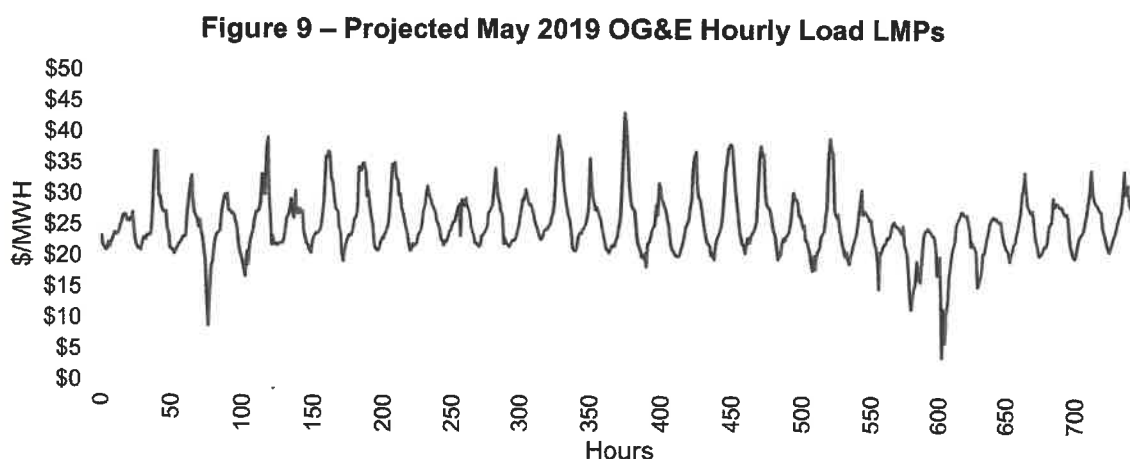


Figure 9 below shows the volatility in projected hourly LMPs for the month of May 2019 assuming base case gas prices.



## E. Environmental Considerations

The activities of the Company are subject to numerous complex federal, state and local laws and regulations relating to environmental protection, such as air quality, water quality, waste management, wildlife conservation, and natural resources. Previous resource plans identified OG&E's actions to comply with EPA's Mercury and Air Toxics Standards (MATS) rule and Regional Haze Rule Federal Implementation Plan (FIP).

While environmental laws and regulations have the potential to change, the ultimate scope, timing and impact of potential changes on OG&E's resources cannot be determined with certainty at this time. OG&E continues to monitor developments in environmental policy, legislation and regulation, however only known and measurable regulations are included in its base assumptions for this resource plan.

## IV. Resource Planning Modeling and Analysis

This section explains the amount and timing of OG&E's future incremental capacity needs, the modeling and analysis steps utilized to identify the lowest reasonable customer cost plan for satisfying those needs and the risks considered.

### A. Planning Reserve Margin

The SPP IM does not operate a capacity market in contrast to certain other regions. OG&E continues to have responsibility for ensuring that it has planning capacity sufficient to serve its peak load requirements and a planning reserve margin. OG&E's minimum 12% planning reserve margin is established in Section 4.1.9 of the SPP Planning Criteria. OG&E's annual projection of the planning reserve margin is shown in Table 8.

**Table 8 – Planning Reserve Margin (MW unless noted)**

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Capacity</b>	Owned Capacity	6,324	6,324	6,324	6,324	6,324	6,157	6,157	6,092	6,092	6,092
	Purchase Contracts	155	35	35	35	35	35	35	35	35	35
	Total Capacity	6,479	6,359	6,359	6,359	6,359	6,192	6,192	6,127	6,127	6,127
<b>Demand</b>	Demand Forecast	6,237	6,283	6,366	6,423	6,484	6,519	6,595	6,661	6,723	6,785
	OG&E DSM	303	334	366	391	416	442	466	489	511	518
	Net Demand	5,934	5,949	6,001	6,031	6,069	6,077	6,129	6,172	6,212	6,266
<b>Margin</b>	Reserve Margin <sup>12</sup>	9%	7%	6%	5%	5%	2%	1%	-1%	-1%	-2%
<b>Needs</b>	Needed Capacity	168	305	362	396	438	615	673	786	831	892

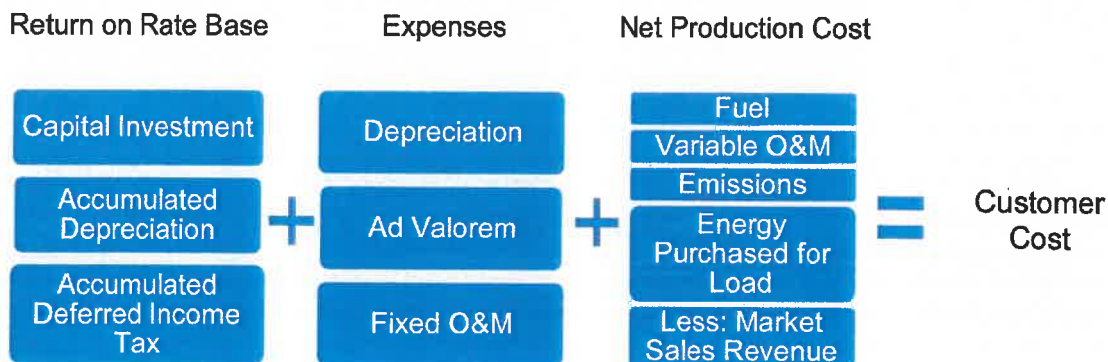
  

<b>Planned Capacity Reductions</b>	↑	↑		↑	↑
	AES Contract (320 MW)	OK Cogen Contract (120 MW)		HSL 6 Retirement (167 MW)	Tinker Units Retirement (65 MW)

### B. Modeling Methodology

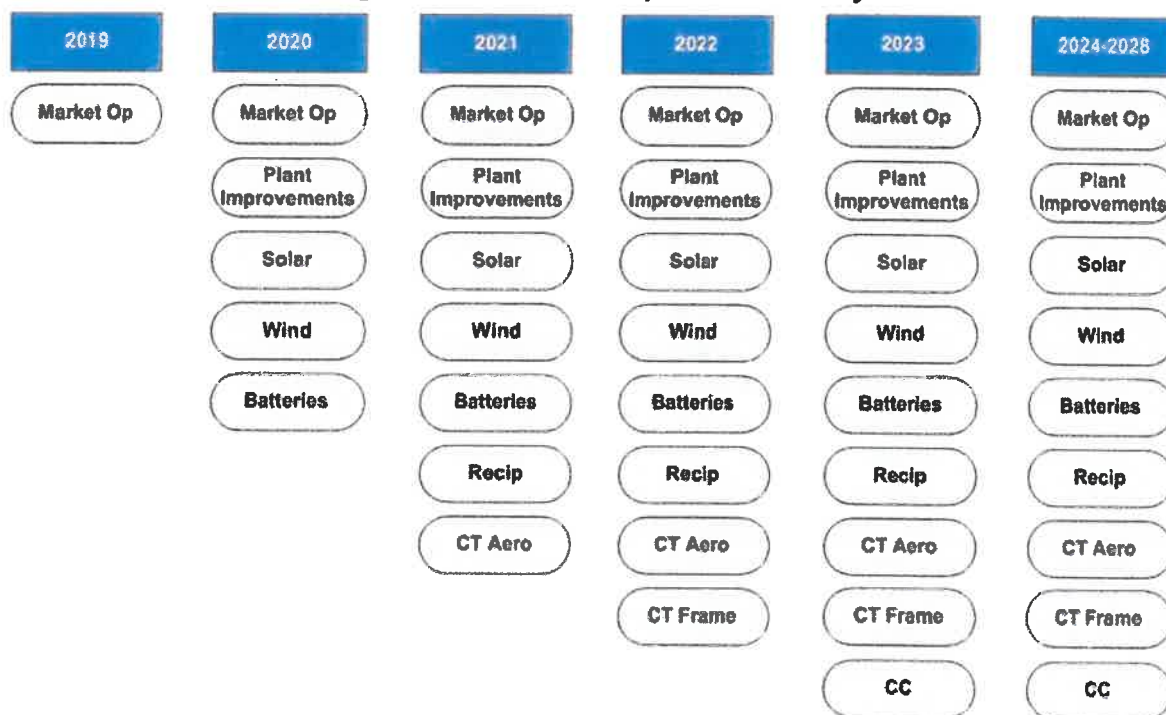
OG&E relies on the ABB PROMOD IV software to model hourly nodal LMPs. The PCI GenTrader® software then uses these LMPs to determine production costs and market revenues for the generators. A revenue requirement model combines all the cost components into the estimated 30-year net present value of customer costs (NPVCC), as illustrated in Figure 10.

<sup>12</sup> Reserve Margin % = ((Total Net Capacity) - (Net System Demand)) / Net System Demand

**Figure 10 – Customer Cost Components**

### C. Portfolio Development

Developing portfolios considers the construction time of the resource options to determine the earliest possible in-service date for each resource type. Figure 11 reflects the resource availability schedule.

**Figure 11 – Resource Option Availability**

These resources are then arranged into portfolios to meet the needed capacity per the SPP planning reserve requirements. OG&E analyzed more than 300,000 portfolios. Table 9 shows the overall least cost portfolio along with the least cost portfolio for each



of the resource options. The table also provides the incremental 30-year NPVCC of each portfolio under the base case assumptions. OG&E's 2019 capacity need can likely only be met by a market opportunity. OG&E plans to explore and analyze market opportunities<sup>13</sup> through an RFP process. For analysis purposes, the market opportunity in all portfolios includes 320 MW of replacement capacity at zero cost.

**Table 9 – Portfolios with Base Case NPVCC in Million \$**

Portfolio Name	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	NPVCC
Solar, PI	Market Op. 320 MW		Solar 80 MW		PI 44 MW	Solar 240 MW		Solar 160 MW		Solar 80 MW	\$261
Solar	Market Op. 320 MW		Solar 80 MW		Solar 80 MW	Solar 160 MW	Solar 80 MW	Solar 80 MW	Solar 80 MW	Solar 80 MW	\$270
Solar, CT Aero	Market Op. 320 MW		Solar 80 MW		CT Aero 57 MW	Solar 160 MW	Solar 80 MW	Solar 160 MW		Solar 80 MW	\$278
Solar, CT Frame	Market Op. 320 MW		Solar 80 MW		CT Frame 222 MW		Solar 80 MW	Solar 160 MW		Solar 80 MW	\$292
Solar, Recip	Market Op. 320 MW		Solar 80 MW		Recip 49 MW	Solar 240 MW		Solar 160 MW		Solar 80 MW	\$317
PI, CT Aero, CT Frame	Market Op. 320 MW		PI 44 MW	CT Aero 57 MW	PI 28 MW	CT Frame 222 MW	CT Frame 222 MW				\$339
PI, CT Frame	Market Op. 320 MW		PI 44 MW	PI 42 MW	CT Frame 222 MW		CT Frame 222 MW			CT Frame 78 MW	\$387
Solar, CC	Market Op. 320 MW		Solar 80 MW		CC 571 MW						\$434
Solar, Battery (Bat)	Market Op. 320 MW		Solar 80 MW		Bat 100 MW	Solar 160 MW	Solar 80 MW	Solar 80 MW	Solar 80 MW	Solar 80 MW	\$457
Solar, Wind	Market Op. 320 MW		Solar 80 MW		Wind 50 MW	Solar 240 MW		Solar 160 MW		Solar 80 MW	\$466

#### D. Portfolio Analysis

Each portfolio is assessed under the base case assumptions and projections while also considering the sensitivity of NPVCC related to uncertain future fuel, emissions prices and solar prices. Scenario analysis changes multiple assumptions in the base case. OG&E used the 2018 Annual Energy Outlook's Low and High Oil and Gas Resource and Technology cases which adjusted commodity prices along with load projections. Testing

<sup>13</sup> Market opportunity could include any capacity resource type: coal, natural gas, wind, solar etc.

the performance of each portfolio in these scenarios offers insights to which technologies respond to various conditions and the value of portfolio diversity.

**Table 10 – Scenario 30-year NPVCC in Million \$**

Portfolio Name	Base	High Tech	Low Tech
Solar, PI	\$261	\$378	-\$8
Solar	\$270	\$406	-\$35
Solar, CT Aero	\$278	\$396	\$12
Solar, CT Frame	\$292	\$374	\$105
Solar, Recip	\$317	\$436	\$47
PI, CT Aero, CT Frame	\$339	\$334	\$333
PI, CT Frame	\$387	\$382	\$380
Solar, CC	\$434	\$409	\$367
Solar, Battery (Bat)	\$457	\$585	\$166
Solar, Wind	\$466	\$627	\$113

Sensitivity analysis involves changing a single input variable of the base case and measures the impact on the NPVCC. The variables changed in the sensitivity analyses are the natural gas prices, adding a CO<sub>2</sub> price and solar capital cost.

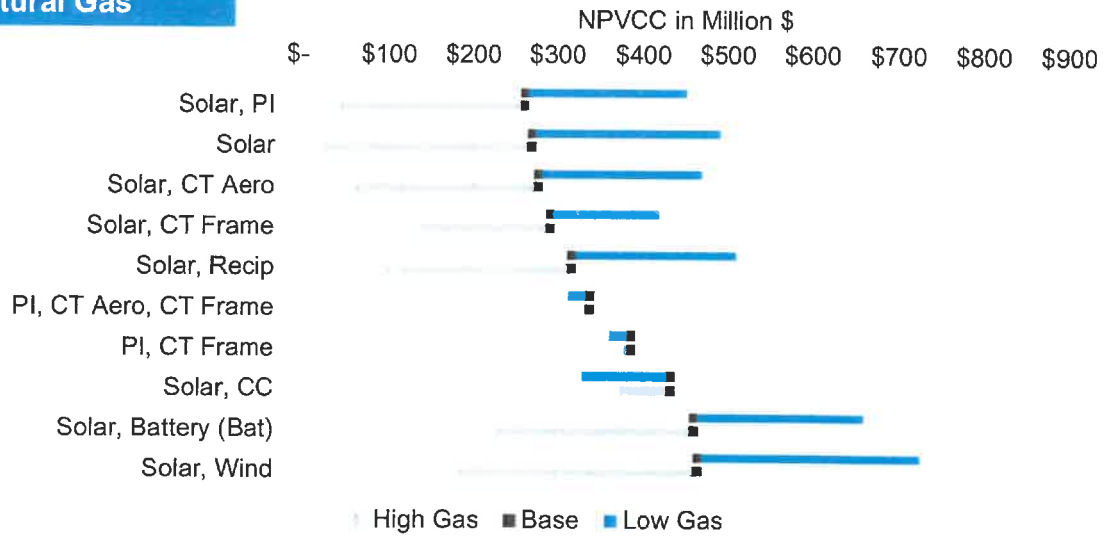
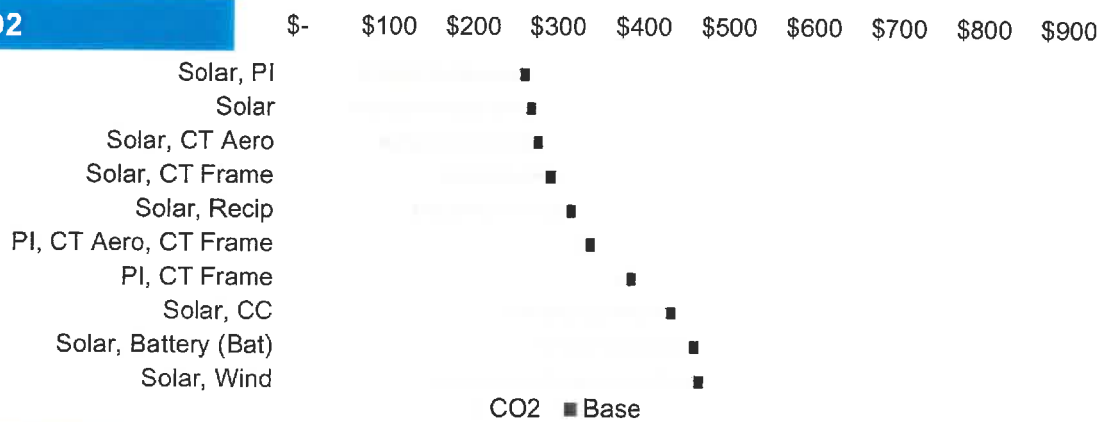
**Table 11 – Sensitivity 30-year NPVCC in Million \$**

Portfolio Name	Base	Low Gas	High Gas	CO2	Low Solar Cost	High Solar Cost
Solar, PI	\$261	\$451	\$42	\$65	\$130	\$629
Solar	\$270	\$492	\$22	\$58	\$119	\$690
Solar, CT Aero	\$278	\$469	\$61	\$91	\$146	\$644
Solar, CT Frame	\$292	\$419	\$139	\$162	\$199	\$548
Solar, Recip	\$317	\$511	\$98	\$130	\$185	\$684
PI, CT Aero, CT Frame	\$339	\$313	\$331	\$323	\$339	\$339
PI, CT Frame	\$387	\$362	\$378	\$368	\$387	\$387
Solar, CC	\$434	\$330	\$374	\$241	\$417	\$489
Solar, Battery (Bat)	\$457	\$662	\$219	\$280	\$326	\$821
Solar, Wind	\$466	\$730	\$186	\$151	\$334	\$833

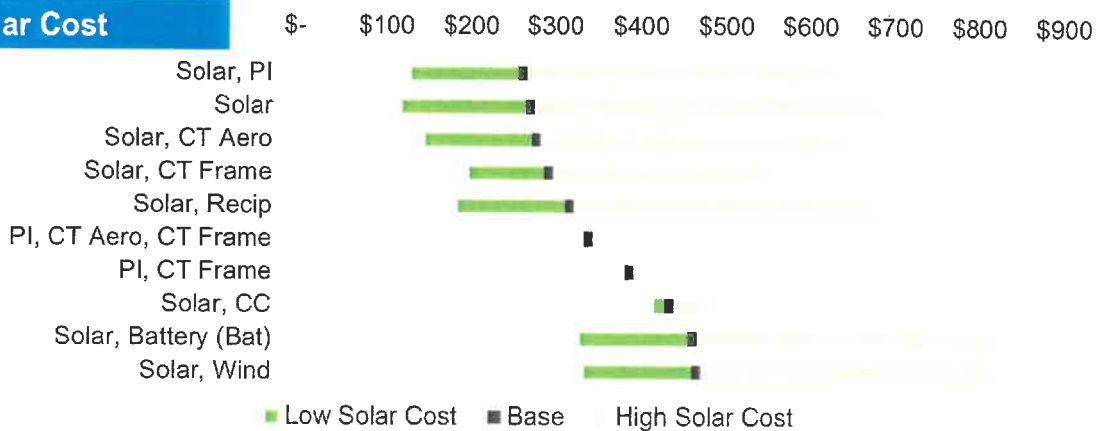
As shown in the Fuel Projections and LMP Assumptions sections, LMPs are largely influenced by changes in natural gas prices. Risks related to changes in natural gas prices and therefore, LMPs, are more pronounced for portfolios with a high level of renewable resources as compared to portfolios primarily consisting of natural gas-fired resources. Customers realize a benefit from renewable resources through LMPs and a large difference in LMPs in the sensitivity analysis produces a large risk range due to these prices. The risk range of the capital cost of solar only impacts the portfolios with solar. The risk ranges from Table 11 are presented in Figure 12.

Figure 12 – Sensitivity Analysis NPVCC

## Natural Gas

CO<sub>2</sub>

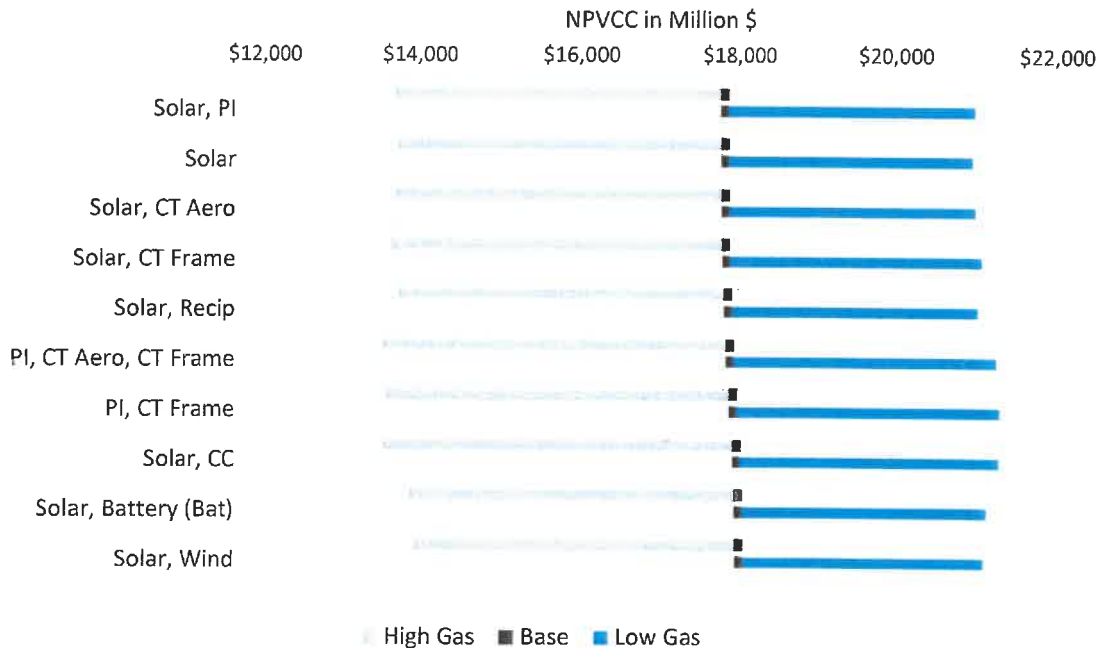
## Solar Cost





Risks related to changes in natural gas prices are less pronounced when the NPVCC of each portfolio is combined with the NPVCC of OG&E's existing generation units as shown in Figure 13.

**Figure 13 – Natural Gas Sensitivity NPVCC with Existing Assets**



## E. Conclusion

OG&E will have capacity needs beginning in 2019 due to exercising its option on the AES Shady Point power purchase agreement. OG&E plans to replace the capacity and provide customer savings by conducting an RFP process. After OG&E replaces the capacity through a market opportunity the next capacity need will be in 2021.

To determine the best portfolio of assets OG&E analyzed a wide variety of potential new resources to meet its future capacity needs and plans to issue an RFP for new or existing resources. The portfolio analysis shows that the most likely new resource providing the lowest cost would be solar resources and implementing improvements to OG&E's existing combined cycle units result in the lowest customer cost under the base case assumptions. The risk analysis presented in this 2018 IRP indicates that certain future market conditions related to fuel prices, electricity prices and resource capital costs have the potential to impact customer costs. This plan addresses OG&E's future requirements in the lowest reasonable cost manner and provides the opportunity to mitigate customer risks by further diversifying OG&E's portfolio.

## V. Action Plan

The Five-Year Action Plan outlined below identifies the steps OG&E will take to address its capacity needs from 2019-2023.

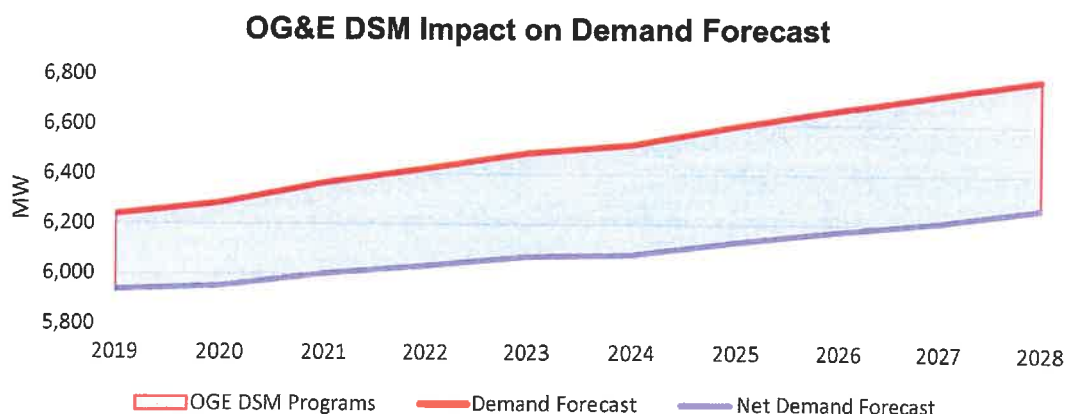
- 1) OG&E will issue an RFP for capacity resources, including fossil fuel-fired resources, solar resources and energy storage resources with a delivery date beginning in 2019, 2020 and/or 2021.
- 2) Complete the RFP analysis, select capacity and satisfy the capacity need.

## VI. Schedules

This section is intended to provide a summary of each section as described in the OCC's Electric Utility Rules, Subchapter 37 of Chapter 35, section 4 (c).

### A. Electric Demand and Energy Forecast

The retail energy forecast is based on retail sector-level econometric models representing weather, growth and economic conditions in OG&E's Oklahoma and Arkansas service territories. The peak demand forecast relies on an hourly econometric model. Historical and forecast weather-adjusted retail energy sales are the main driver for the peak demand forecast projections. The peak demand forecast is reduced by planned OG&E DSM programs to determine the net demand used for planning purposes as shown in the figure below.



### Energy Sales Forecast (GWh)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Energy Forecast<sup>14,15</sup></b>	29,528	29,799	30,090	30,396	30,744	31,096	31,407	31,719	32,036	32,368
<b>OG&amp;E DSM<sup>16,17</sup></b>	497	658	825	944	1,055	1,169	1,280	1,387	1,482	1,513
<b>Net Energy</b>	29,032	29,141	29,264	29,452	29,689	29,927	30,127	30,332	30,555	30,855

### Peak Demand Forecast (MW)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Demand Forecast<sup>14,15</sup></b>	6,237	6,283	6,366	6,423	6,484	6,519	6,595	6,661	6,723	6,785
<b>OG&amp;E DSM<sup>16,17</sup></b>	303	334	366	391	416	442	466	489	511	518
<b>Net Demand</b>	5,934	5,949	6,001	6,031	6,069	6,077	6,129	6,172	6,212	6,266

<sup>14</sup> SmartHours, Historical Demand Program Rider programs, installed IVVC and the Mustang Solar facility are already included in the Energy and Demand forecasts.

<sup>15</sup> Competitive new load larger than 1 MW outside of OG&E service territory is included.

<sup>16</sup> Represents estimates for incremental energy efficiency programs in Oklahoma and Arkansas, incremental IVVC and the Load Reduction Program.

<sup>17</sup> DSM incorporates the proposed 2019-2021 Demand Program Rider Portfolio

## B. Existing Generation Resources

This schedule provides a summary of existing resources.

### OG&E Existing Thermal Resources

Unit Type	Unit Name	First Year In Service	Summer Capacity (MW)
<b>Coal Fired Steam (1,528 MW)</b>	Muskogee 6	1984	518
	Sooner 1	1979	505
	Sooner 2	1980	505
<b>Gas Fired Steam (3,195 MW)</b>	Muskogee 4	1977	490
	Muskogee 5	1978	490
	Horseshoe Lake 6	1958	167
	Horseshoe Lake 7	1963	214
	Horseshoe Lake 8	1969	397
	Seminole 1	1971	475
	Seminole 2	1973	480
	Seminole 3	1975	482
<b>Combined Cycle<sup>18</sup> (994 MW)</b>	McClain	2001	380
	Redbud	2002	614
<b>Combustion Turbine (551 MW)</b>	Horseshoe Lake 9	2000	44
	Horseshoe Lake 10	2000	43
	Tinker (Mustang 5A)	1971	33
	Tinker (Mustang 5B)	1971	32
	Mustang 6	2018	57
	Mustang 7	2018	57
	Mustang 8	2018	57
	Mustang 9	2018	57
	Mustang 10	2018	57
	Mustang 11	2018	57
	Mustang 12	2018	57

### OG&E Existing Renewable Resources

Unit Type	Unit Name	First Year In Service	Nameplate Capacity (MW)	Summer Capacity (MW)
<b>Wind (56 MW)</b>	Centennial	2006	120	16
	OU Spirit	2009	101	9
	Crossroads	2012	228	31
<b>Solar (12 MW)<sup>19</sup></b>	Mustang	2015	3	3
	Covington	2018	9	9

<sup>18</sup> Represents OG&E owned interest: 77% of McClain and 51% of Redbud.

<sup>19</sup> Solar is connected to distribution and is embedded in the Net Demand Forecast.

**OG&E Existing Power Purchase Contracts**

	Unit Name	First Year In Service	Nameplate Capacity (MW)	Summer Capacity (MW)
<b>Power Purchase (155 MW)</b>	Keenan	2010	152	18
	Taloga	2011	130	7
	Blackwell	2012	60	10
	Oklahoma Cogen	1989	120	120

### C. Transmission Capability and Needs

OG&E's transmission system is directly interconnected to seven other utilities' transmission systems at over 50 interconnection points. Indirectly, OG&E is connected to the entire Eastern interconnection through the SPP regional transmission organization. The SPP footprint covers 546,000 square miles, serves over 18 million customers and has members in 14 states across all of Kansas and Oklahoma and parts of Arkansas, Iowa, Louisiana, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, South Dakota, Texas and Wyoming. In compliance with FERC Order 890 for transmission planning, SPP performs annual expansion planning for the entire SPP footprint. OG&E provides input to the SPP planning process, and SPP is ultimately responsible for the planning of the OG&E system.

The 2018 SPP Transmission Expansion Plan<sup>20</sup> (STEP) summarizes Integrated Transmission Planning (ITP) efforts including regional reliability, local reliability, generation interconnection, and long-term tariff studies due to transmission service requests. The purpose of the ITP process is to maintain reliability, provide economic benefits and meet public policy needs in both the near and long-term to create a cost-effective, flexible and robust transmission grid with improved access to the SPP region's diverse resources. The ITP is a three-phase iterative three-year process that includes a long-term 20-year assessment, ITP20, a 10-year assessment, ITP10 and a near-term assessment, ITPNT. The future major 345 kV projects embedded in these plans that will be owned by OG&E are shown in the next table.

<sup>20</sup> 2018 STEP [http://www.spp.org/publications/2018\\_STEP\\_Report.pdf](http://www.spp.org/publications/2018_STEP_Report.pdf)



## Major 345 kV Transmission Projects

Project Type	Description	Year	Facility Owner
Regional Reliability	Build new Degrasse 345 kV Substation on Woodward District EHV to Thistle (ITC) 345 kV double-circuit line	2019	OGE
Transmission Service	8 miles of 345 kV line from Arcadia to Redbud (3rd line) in central Oklahoma	2019	OGE
Generation Interconnection	New Windfarm at Border – 345 kV line terminal including one 345 kV circuit breaker, line relaying, disconnect switches and associated equipment for GEN-2011-049 Addition	2020	OGE
Generation Interconnection	New Windfarm at Beaver County – 345 kV line terminal including one 345 kV circuit breaker, line relaying, disconnect switches and associated equipment for GEN-2013-030	2020	OGE

## D. Needs Assessment

This schedule provides the needs assessment for new generating resources for the next 10 years assuming OG&E exercises any portion of its existing power purchase agreement options.

## Planning Margin (MW unless noted)

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Capacity	Owned Capacity	6,324	6,324	6,324	6,324	6,324	6,157	6,157	6,092	6,092	6,092
	Purchase Contracts	155	35	35	35	35	35	35	35	35	35
	Total Capacity	6,479	6,359	6,359	6,359	6,359	6,192	6,192	6,127	6,127	6,127
Demand	Demand Forecast	6,237	6,283	6,366	6,423	6,484	6,519	6,595	6,661	6,723	6,785
	OG&E DSM	303	334	366	391	416	442	466	489	511	518
	Net Demand	5,934	5,949	6,001	6,031	6,069	6,077	6,129	6,172	6,212	6,266
Margin	Reserve Margin <sup>21</sup>	9%	7%	6%	5%	5%	2%	1%	-1%	-1%	-2%
Needs	Needed Capacity	168	305	362	396	438	615	673	786	831	892

Planned Capacity Reductions	↑	↑	↑	↑
	AES Contract (320 MW)	OK Cogen Contract (120 MW)	HSL 6 Retirement (167 MW)	Tinker Units Retirement (65 MW)

<sup>21</sup> Reserve Margin % = ((Total Net Capacity) - (Net System Demand)) / Net System Demand

### E. Resource Options

This schedule provides a description of the resource options available to OG&E to address the needs identified in Schedule D.

#### New Generation Resources (2018 Dollars)

Technology	Description	Nameplate Capacity (MW)	Nameplate Overnight Capital Cost (\$/kW)	Summer Peak Capacity (MW)	Fixed O&M Cost (\$/kW)	Variable O&M Cost (\$/MWh)
Wind <sup>22</sup>		250	\$1,640	50	\$33.50	N/A
Batteries	Lithium Ion	100	\$2,190	100	\$36.30	N/A
Solar <sup>23</sup>	Photovoltaic Single Axis	100	\$1,460	80	\$20.50	N/A
Conversion	Horseshoe Lake CC	80	\$2,510	80	\$8.40	-\$1.10
Plant Improvement (PI)	McClain	42	\$880	42	\$1.70	N/A
	Redbud	60	\$800	60	\$1.80	N/A
Reciprocating Engine	Recip Engine Single	6	\$2,130	6	\$18.10	\$5.30
	Recip Engine Multiple	49	\$1,540	49	\$17.30	\$4.10
CT Aero	LMS100	105	\$1,400	93	\$2.90	\$1.80
	Trent 60 SCGT	66	\$780	57	\$4.50	\$1.10
CT Frame	5000F SCGT	245	\$560	222	\$3.00	\$0.90
	G/H Class	268	\$730	244	\$3.50	\$1.50
	7EA	96	\$1,060	78	\$6.60	\$0.90
Combined Cycle (CC)	2x1 8000H	1,066	\$680	989	\$2.50	\$1.90
	1x1 HA.02 Fired	610	\$840	571	\$3.80	\$2.00
	1x1 HA.02	497	\$950	462	\$3.80	\$2.00
	2X1 GE 7FA.05 Fired	885	\$740	845	\$2.40	\$1.90
	2X1 GE 7FA.05	714	\$850	684	\$2.40	\$1.90

### F. Fuel Procurement and Risk Management Plan

On May 15, 2018, OG&E filed its annual Fuel Supply Portfolio and Risk Management Plan with the OCC as part of Cause No. PUD 200100095. The filed document can be found at the OCC.

### G. Action Plan

- 1) OG&E will issue an RFP for capacity resources, including fossil fuel-fired resources, solar resources and energy storage resources with a delivery date beginning in 2019, 2020 and/or 2021.
- 2) Complete the RFP analysis, select capacity and satisfy the capacity need.

<sup>22</sup> Wind accredited peak capacity is assumed to be 20% of nameplate capacity

<sup>23</sup> Solar accredited peak capacity is assumed to be 80% of nameplate capacity

## H. Requests for Proposals

As noted in the Action plan, OG&E will prepare an RFP for capacity in 2019, 2020 and 2021. The RFP will be issued subsequent to the final IRP, pursuant to the Oklahoma Corporation Commission's (OCC) Electric Utility Rules OAC 165:35-37.

## I. Modeling Methodology and Assumptions

This schedule is a technical appendix for the data, assumptions, and descriptions of models needed to understand the derivation of the resource plan. The table below explains the source of each assumption and provides a reference for where this information is found in the IRP.

Assumption	Source	Reference
<b>Electric Demand and Energy Forecast</b>	OG&E	Page 3
<b>Existing Generation Resources</b>	OG&E	Page 4
<b>New Generation Resource Options</b>	Burns & McDonnell, NREL, EIA	Page 5
<b>Natural Gas Price Projections</b>	EIA	Page 6
<b>Coal Price Projections</b>	EIA	Page 6
<b>CO<sub>2</sub> Price Sensitivity</b>	OG&E	Page 8
<b>Market Prices</b>	OG&E	Page 8

OG&E utilizes two software programs for production cost modeling:

1. PROMOD IV® - Fundamental Electric Market Simulation software from ABB that incorporates generating unit operating characteristics, transmission grid topology and constraints, unit commitment/operating conditions, and market system operations. PROMOD IV® is used to model the SPP Integrated Marketplace.
2. GenTrader® - Power Costs, Inc. software designed to model complex portfolios of power and fuel resources, including generators, contracts, options, and ancillary services in great detail. Some of the functionalities include: multiple and concurrent fuel and emission limits, multi-stage combined-cycle modeling, ancillary services like regulations and spinning reserve as well as energy limited contracts. GenTrader® is used to simulate OG&E's net production costs within the SPP IM.

## J. Transmission System Adequacy

This schedule is a description of the transmission system adequacy over the next 10 years. SPP evaluates system adequacy and develops a transmission expansion plan to determine what improvements are necessary to ensure reliable transmission service. The 2018 SPP Transmission Expansion Plan<sup>24</sup> describes improvements necessary for regional reliability, local reliability, generation interconnection, long-term tariff studies due to transmission service requests and transmission owner sponsored improvements. Included in the table below is a subset of the 2018 STEP, which OG&E has committed to construct.

<sup>24</sup> 2018 STEP [http://www.spp.org/publications/2018\\_STEP\\_Report.pdf](http://www.spp.org/publications/2018_STEP_Report.pdf)



**Estimated Capital Expenditures for OG&E Committed Projects**

Year	Description	Type of Upgrade	Cost Allocation	Cost (\$M)	NTC ID
2019	DeGrasse 345 kV Substation	New Substation	Regional Reliability	\$7.70	200418
2019	DeGrasse 138 kV Substation	New Substation	Regional Reliability	\$3.60	200418
2019	Knob Hill to DeGrasse 138 kV	New Line	Regional Reliability	\$8.38	200418
2019	DeGrasse to WFEC Mooreland 138 kV	New Line	Regional Reliability	\$7.72	200418
2019	Redbud to Arcadia Line 3 345 kV	New Line	Transmission Service	\$18.00	20110
2019	Stillwater Substation	Install New 138/69 kV Transformer	Regional Reliability	\$2.79	200319
2019	Stillwater Substation	Substation Upgrade	Regional Reliability	\$0.61	200319
2020	Lula 138 kV Substation	Substation Upgrade	Economic	\$0.02	200434
2020	New Windfarm at Border 345 kV Substation for GEN-2011-049 Addition	Substation Upgrade	Generation Interconnection	\$3.65	
2020	New Windfarm at Beaver County 345 kV Substation for GEN-2013-030	Substation Upgrade	Generation Interconnection	\$5.05	
2021	Muskogee 161 kV Substation	Substation Upgrade	Regional Reliability	\$0.04	200423

Transmission system expansion provides benefits to members throughout the SPP; therefore, the costs of all projects constructed in the SPP are shared through various cost allocation methods, depending on the type of project.

**K. Resource Plan Assessment**

This IRP assessed the need for additional resources to meet reliability, cost and price, environmental, and other criteria established by the OCC, the State of Oklahoma, the APSC, SPP, NERC, and FERC. All criteria were met by all portfolios considered in this IRP, in the base line condition. These criteria were also met in scenarios and uncertainties which included variations in load growth, fuel prices, emissions prices, environmental regulations, technology improvements, demand side resources, and fuel supply, among others. This plan provides a comprehensive analysis of the proposed options.

**L. Proposed Resource Plan Analysis**

This IRP demonstrates that all proposed alternatives meet all planning criteria as outlined in Schedules D and K. The proposed action plan outlined in Schedule G best meets these criteria. Documentation of the planning analysis and assumptions used in preparing this analysis are described in Schedule I.

#### M. Physical and Financial Hedging

OG&E's Fuel Cost Adjustment tariff and OG&E's diverse mix of generation assets provide OG&E customers' effective protection against fuel price volatility. Section IV illustrates the advantages of generation diversity and the impact of the fuel volatility.

Financial Hedging of a commodity such as power plant fuel is aimed at reducing the volatility in price. Financial hedging comes at a cost in the form of transaction costs, margin calls and premiums required to lock in pricing. OG&E's customers have been protected to a large extent from the historic volatility in natural gas prices by OG&E's portfolio approach to fuel and purchased power. As a result, the Company does not believe it to be prudent at this time to incur the additional costs associated with financial hedging.

On May 15, 2018, OG&E filed its annual Fuel Supply Portfolio and Risk Management Plan with the OCC as part of Cause No. PUD 200100095. The filed document can be found at the OCC

## VII. Appendices

## Appendix A – Demand Forecast Range and Energy by Class

## **PEAK DEMAND FORECAST**

OG&E's load forecasting framework relies on independently produced forecasts of service area economic and population growth, actual and normal weather data, and projections of OG&E electricity prices for price-sensitive customer classes. The peak demand forecast is based on an hourly econometric model of weather and economic effects on OG&E's hourly load responsibility series. A probabilistic range of outcomes is produced to show how often peak demands could reach each level. The *1 out of 2 years* or "expected" forecast shows the peak demand level given the 50<sup>th</sup> percentile of the load forecast distribution, using all available historical weather data. In this case, there is a 50% probability the peak load will reach this load level or higher. OG&E is required by SPP to plan for this 50% probability in the reserve margin calculation.

**Peak Demand (MW) Forecasts by Weather Probability before OG&E DSM**

Event of Occurrence	Occurrence Probability	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1 out of 30 Years	3%	6,947	6,990	7,076	7,129	7,191	7,223	7,304	7,369	7,429	7,497
1 out of 10 Years	10%	6,617	6,665	6,747	6,802	6,865	6,900	6,977	7,041	7,106	7,171
1 out of 4 Years	25%	6,403	6,451	6,536	6,595	6,659	6,694	6,773	6,843	6,905	6,968
<b>1 out of 2 Years</b>	<b>50%</b>	<b>6,237</b>	<b>6,283</b>	<b>6,366</b>	<b>6,423</b>	<b>6,484</b>	<b>6,519</b>	<b>6,595</b>	<b>6,661</b>	<b>6,723</b>	<b>6,785</b>
3 out of 4 Years	75%	6,101	6,151	6,231	6,288	6,351	6,388	6,462	6,526	6,592	6,653
9 out of 10 Years	90%	5,990	6,040	6,120	6,177	6,240	6,277	6,350	6,415	6,481	6,540
29 out of 30 Years	97%	5,928	5,976	6,057	6,114	6,176	6,212	6,286	6,354	6,415	6,474

## **ENERGY FORECAST**

The energy forecast is generated from a regression analysis of historical energy, economic growth patterns and annual weather. OG&E's energy is divided into six market segments (Residential, Commercial, Industrial, Oil Field, Street Lighting and Public Authority). Within each segment, a variety of different models is prepared and tested against actual historical sales to determine which model provides the highest quality forecast for that market segment.

**Energy Forecast by Customer Revenue Class before OG&E DSM**

GWH	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Residential	9,199	9,238	9,337	9,464	9,623	9,807	9,975	10,148	10,329	10,432
Commercial	7,886	7,985	8,070	8,156	8,234	8,305	8,378	8,478	8,571	8,656
Industrial	3,672	3,690	3,666	3,641	3,615	3,586	3,556	3,526	3,494	3,529
Petroleum	3,671	3,753	3,843	3,922	4,016	4,102	4,167	4,205	4,248	4,290
Street Lighting	56	53	50	47	43	40	37	34	31	31
Public Authority	3,125	3,143	3,168	3,192	3,214	3,235	3,253	3,268	3,282	3,314
Total Retail Sales	27,609	27,863	28,134	28,421	28,746	29,076	29,366	29,658	29,954	30,253
Losses	1,919	1,936	1,955	1,975	1,998	2,021	2,041	2,061	2,082	2,115
<b>Energy Forecast</b>	<b>29,528</b>	<b>29,799</b>	<b>30,090</b>	<b>30,396</b>	<b>30,744</b>	<b>31,096</b>	<b>31,407</b>	<b>31,719</b>	<b>32,036</b>	<b>32,368</b>

## Appendix B – Portfolio Annual Cost Components

## Portfolio Annual Cost Components

	Solar, PI			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	-	-	-	-
2020	13	-	-	13
2021	10	8	(8)	10
2022	12	8	(9)	12
2023	52	10	(10)	52
2024	43	34	(39)	38
2025	68	35	(41)	61
2026	61	52	(63)	50
2027	71	52	(65)	58
2028	64	61	(77)	47
2029	63	62	(79)	45
2030	57	62	(81)	38
2031	55	63	(81)	37
2032	51	63	(83)	31
2033	48	64	(84)	28
2034	45	64	(86)	23
2035	41	65	(88)	19
2036	38	65	(93)	10
2037	36	66	(94)	7
2038	33	66	(98)	2
2039	31	67	(99)	(1)
2040	28	68	(101)	(6)
2041	26	68	(103)	(10)
2042	23	69	(106)	(15)
2043	21	69	(109)	(19)
2044	18	70	(112)	(24)
2045	16	71	(115)	(29)
2046	13	71	(118)	(34)
2047	11	72	(122)	(39)
2048	8	73	(126)	(45)
30 Yr NPV	423	460	(621)	261

	Solar			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	-	-	-	-
2020	13	-	-	13
2021	9	8	(8)	9
2022	22	8	(9)	21
2023	46	16	(18)	44
2024	53	32	(38)	47
2025	61	41	(50)	52
2026	70	50	(61)	59
2027	78	59	(74)	62
2028	71	68	(87)	52
2029	68	68	(89)	47
2030	64	69	(91)	41
2031	60	69	(91)	38
2032	56	70	(93)	33
2033	53	70	(94)	29
2034	49	71	(97)	24
2035	46	72	(99)	19
2036	43	72	(105)	10
2037	39	73	(106)	6
2038	37	74	(110)	0
2039	34	74	(111)	(3)
2040	31	75	(114)	(8)
2041	29	76	(116)	(12)
2042	26	76	(120)	(18)
2043	23	77	(123)	(23)
2044	20	78	(127)	(28)
2045	18	79	(130)	(34)
2046	15	79	(133)	(39)
2047	12	80	(137)	(45)
2048	10	81	(142)	(52)
30 Yr NPV	460	506	(696)	270

	Solar, CT Aero			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	-	-	-	-
2020	14	-	-	14
2021	12	8	(8)	11
2022	14	8	(9)	13
2023	40	10	(10)	40
2024	47	27	(29)	45
2025	70	35	(41)	64
2026	63	52	(62)	53
2027	73	53	(65)	61
2028	66	62	(77)	50
2029	63	62	(79)	46
2030	59	63	(81)	41
2031	57	63	(81)	39
2032	52	64	(82)	34
2033	50	64	(84)	30
2034	46	65	(86)	25
2035	43	65	(88)	21
2036	40	66	(93)	13
2037	37	66	(94)	9
2038	34	67	(97)	4
2039	32	67	(98)	1
2040	29	68	(101)	(3)
2041	27	69	(103)	(7)
2042	24	69	(106)	(12)
2043	22	70	(108)	(17)
2044	19	71	(112)	(22)
2045	17	71	(115)	(26)
2046	14	72	(118)	(31)
2047	12	73	(121)	(36)
2048	9	74	(125)	(42)
30 Yr NPV	432	459	(612)	278

## Portfolio Annual Cost Components

	Solar, CT Frame			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	-	-	-	-
2020	15	-	-	15
2021	16	8	(8)	16
2022	23	8	(9)	22
2023	20	14	(10)	24
2024	33	14	(10)	36
2025	57	22	(21)	58
2026	51	39	(42)	48
2027	62	40	(44)	58
2028	57	49	(56)	50
2029	52	49	(57)	44
2030	49	49	(59)	40
2031	48	50	(58)	40
2032	44	50	(59)	35
2033	43	51	(60)	33
2034	40	51	(62)	29
2035	36	51	(63)	25
2036	34	52	(67)	19
2037	31	52	(67)	16
2038	29	53	(70)	12
2039	27	53	(70)	10
2040	25	53	(72)	7
2041	23	54	(74)	4
2042	21	54	(76)	(0)
2043	19	55	(78)	(3)
2044	17	55	(80)	(7)
2045	15	56	(82)	(11)
2046	13	56	(84)	(14)
2047	11	57	(86)	(18)
2048	9	58	(89)	(23)
30 Yr NPV	365	358	(431)	292

	Solar, Recip			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	-	-	-	-
2020	14	-	-	14
2021	15	8	(8)	15
2022	16	8	(9)	16
2023	55	12	(9)	58
2024	46	36	(38)	44
2025	71	37	(40)	67
2026	64	54	(62)	56
2027	74	54	(64)	64
2028	67	63	(76)	54
2029	66	64	(79)	51
2030	60	64	(80)	44
2031	58	65	(80)	43
2032	53	65	(82)	37
2033	51	66	(83)	33
2034	47	66	(85)	28
2035	44	67	(87)	24
2036	41	67	(92)	16
2037	38	68	(93)	12
2038	35	69	(97)	7
2039	32	69	(98)	4
2040	30	70	(100)	(0)
2041	27	71	(102)	(4)
2042	25	71	(105)	(9)
2043	22	72	(108)	(14)
2044	20	73	(111)	(19)
2045	17	73	(114)	(23)
2046	15	74	(117)	(28)
2047	12	75	(120)	(33)
2048	10	76	(125)	(39)
30 Yr NPV	453	478	(614)	317

	PI, CT Aero, CT Frame			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	1	-	-	1
2020	6	-	-	6
2021	10	2	(1)	10
2022	18	4	(2)	20
2023	31	5	(2)	33
2024	36	11	(4)	44
2025	33	18	(6)	45
2026	32	18	(6)	44
2027	31	18	(6)	43
2028	30	18	(5)	42
2029	30	18	(6)	42
2030	29	18	(6)	42
2031	27	18	(5)	41
2032	25	18	(4)	39
2033	24	18	(5)	37
2034	22	18	(5)	36
2035	21	18	(5)	35
2036	20	18	(4)	34
2037	18	19	(3)	33
2038	17	19	(4)	32
2039	16	19	(4)	30
2040	14	19	(4)	29
2041	14	19	(4)	28
2042	13	19	(4)	27
2043	12	19	(4)	27
2044	11	19	(4)	26
2045	10	19	(4)	25
2046	9	19	(4)	24
2047	8	18	(2)	25
2048	7	18	(1)	24
30 Yr NPV	237	142	(39)	339



## Portfolio Annual Cost Components

	PI, CT Frame			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	1	-	-	1
2020	6	-	-	6
2021	14	2	(1)	14
2022	22	4	(2)	23
2023	25	10	(3)	32
2024	32	10	(3)	38
2025	30	16	(5)	41
2026	34	16	(5)	45
2027	39	16	(5)	50
2028	38	21	(5)	54
2029	35	22	(5)	52
2030	35	22	(5)	51
2031	33	22	(4)	50
2032	31	22	(4)	48
2033	30	22	(5)	47
2034	28	22	(5)	45
2035	27	22	(5)	44
2036	25	22	(4)	43
2037	23	22	(3)	42
2038	21	22	(4)	40
2039	20	22	(4)	38
2040	18	22	(4)	37
2041	17	22	(4)	35
2042	16	23	(4)	34
2043	15	23	(4)	33
2044	14	23	(4)	32
2045	13	22	(3)	32
2046	12	21	(3)	29
2047	11	21	(1)	31
2048	10	21	(0)	30
30 Yr NPV	265	159	(38)	387

	Solar, CC			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	2	-	-	2
2020	21	-	-	21
2021	42	8	(8)	41
2022	61	8	(9)	60
2023	53	27	(22)	58
2024	52	27	(25)	53
2025	50	27	(25)	51
2026	50	27	(26)	50
2027	48	27	(26)	49
2028	51	27	(28)	50
2029	48	27	(29)	46
2030	46	27	(30)	43
2031	43	28	(25)	45
2032	41	28	(28)	40
2033	39	28	(29)	37
2034	37	28	(31)	34
2035	35	28	(29)	34
2036	34	28	(31)	31
2037	32	28	(28)	32
2038	30	29	(31)	28
2039	28	29	(29)	28
2040	26	29	(29)	26
2041	25	29	(30)	23
2042	23	29	(32)	21
2043	21	30	(33)	18
2044	20	30	(34)	16
2045	19	30	(35)	14
2046	18	30	(36)	12
2047	17	30	(38)	9
2048	15	31	(40)	6
30 Yr NPV	438	241	(246)	434

	Solar, Battery			
(\$Millions)	Return on Rate Base	Expenses	Production Cost	Customer Cost
2019	-	-	-	-
2020	13	-	-	13
2021	9	8	(8)	9
2022	31	8	(9)	31
2023	57	22	(12)	67
2024	63	38	(31)	70
2025	70	47	(43)	75
2026	79	56	(54)	81
2027	86	65	(67)	84
2028	78	74	(79)	72
2029	74	74	(81)	67
2030	70	75	(83)	62
2031	65	76	(83)	58
2032	61	76	(84)	53
2033	58	77	(86)	50
2034	54	77	(87)	44
2035	50	78	(89)	39
2036	47	79	(94)	31
2037	44	80	(95)	28
2038	41	80	(99)	22
2039	38	81	(99)	19
2040	35	82	(101)	15
2041	32	83	(104)	11
2042	29	83	(106)	6
2043	26	84	(109)	1
2044	23	85	(112)	(4)
2045	20	86	(115)	(9)
2046	17	87	(118)	(14)
2047	14	88	(121)	(19)
2048	11	88	(125)	(25)
30 Yr NPV	519	558	(620)	457

## Portfolio Annual Cost Components

	Solar, Wind			
	Return on Rate Base	Expenses	Production Cost	Customer Cost
(\$Millions)				
2019	-	-	-	-
2020	13	-	-	13
2021	9	8	(8)	9
2022	50	8	(9)	49
2023	83	35	(24)	94
2024	72	60	(54)	78
2025	95	60	(58)	97
2026	86	78	(81)	83
2027	95	78	(84)	89
2028	90	88	(97)	81
2029	87	88	(100)	75
2030	80	89	(103)	66
2031	76	90	(103)	62
2032	69	91	(106)	54
2033	66	91	(108)	48
2034	61	92	(111)	42
2035	57	93	(114)	36
2036	53	94	(124)	23
2037	50	95	(125)	19
2038	46	96	(131)	11
2039	43	97	(144)	(5)
2040	39	98	(147)	(11)
2041	36	99	(151)	(17)
2042	33	100	(156)	(24)
2043	29	101	(160)	(30)
2044	26	102	(165)	(38)
2045	22	103	(170)	(45)
2046	19	104	(175)	(52)
2047	16	105	(180)	(59)
2048	12	106	(187)	(69)
30 Yr NPV	619	687	(840)	466

## Appendix C – OG&E 2018 IRP Oklahoma Technical Conference

**OG&E 2018 IRP Update  
Oklahoma Technical Conference  
August 29, 2018, Oklahoma City  
Attendee List**

<b>In-Person Attendee</b>	<b>Organization</b>
Jim Beers	OKCogen
Jack Clark	Clark Stakem Wood & Patten PC
Eric Davis	Phillips Murrah
Jared Haines	Oklahoma Attorney General
Lundy Kiger	AES
Nicole King	OCC
M. Mullins	OCC
Kiran Patel	OCC
Geoffrey Rush	OCC
Tom Schroedter	OIEC
Natasha Scott	OCC
Kimber Shoop	Crooks Stanford
Ron Stakem	Clark Stakem Wood & Patten PC
Hayley Thompson	Public Service Company of Oklahoma
Kyle Vazquez	OCC
Aaron Pupa	LS Power
Hugh Bereman	OK Cogen
Kendall Parrish	AES
Jon Laasch	OER
Lindsey Pever	A New Energy
Zachary Quintero	OCC
Andrew Scribner	OCC
Isaac Stroup	OCC
McKlein Aguirre	OCC
Chris Bertus	OCC
Mary Doris Casey	OCC
Nancy Abraham	OCC
Jason Lawter	OCC
David Melvin	OCC
Linh Pham	OCC
Todd Bohemann	Oklahoma Attorney General

**Online Participants**

<b>Online Participants</b>	<b>Organization</b>
Montelle Clark	Oklahoma Sustainability Network
Deborah Thompson	OK Energy Firm, PLLC
Alex B	
Mark Becker	AEP
Rick Chamberlain	Wal-Mart

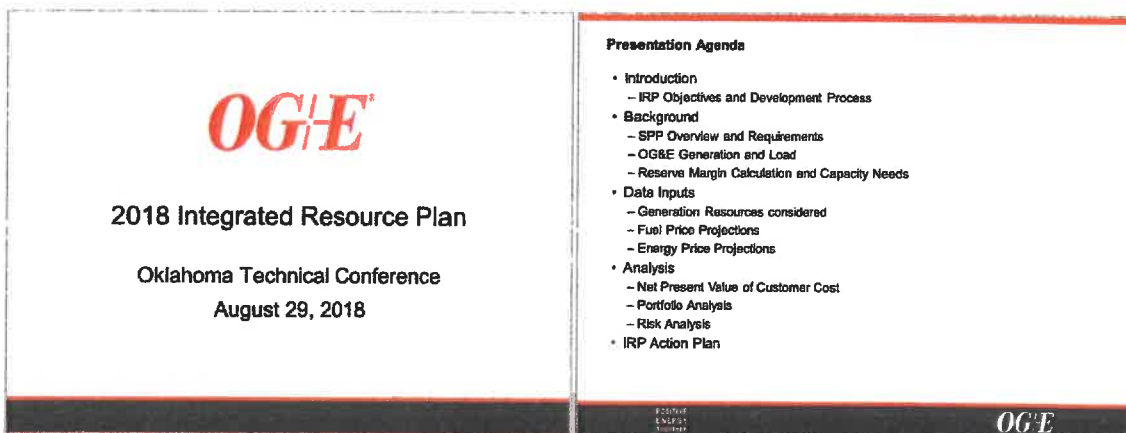
**OG&E 2018 IRP Update  
Oklahoma Technical Conference  
August 29, 2018, Oklahoma City  
Meeting Minutes**

The OG&E 2018 Integrated Resource Plan (IRP) Technical Conference was held on August 29, 2018 in OG&E's offices from 9:15 AM to 11:00 AM. A list of participants is presented in Attachment A. The meeting began with an introduction by Leon Howell, OG&E's Director of Resource Planning and Investment. Mr. Howell served as facilitator for the IRP technical conference and announced that the IRP public meeting would take place on September 18, 2018 at 10:00am at the Oklahoma Corporation Commission building.

The majority of the meeting was organized around a slide presentation regarding the Draft IRP document and was presented by three members of OG&E's Resource Planning team (Kelly Riley, Aaron Castleberry and Zac Hager). Stakeholders asked clarifying questions throughout the presentation. Stakeholders also provided feedback on OG&E's draft IRP. The slides and minutes are provided below.

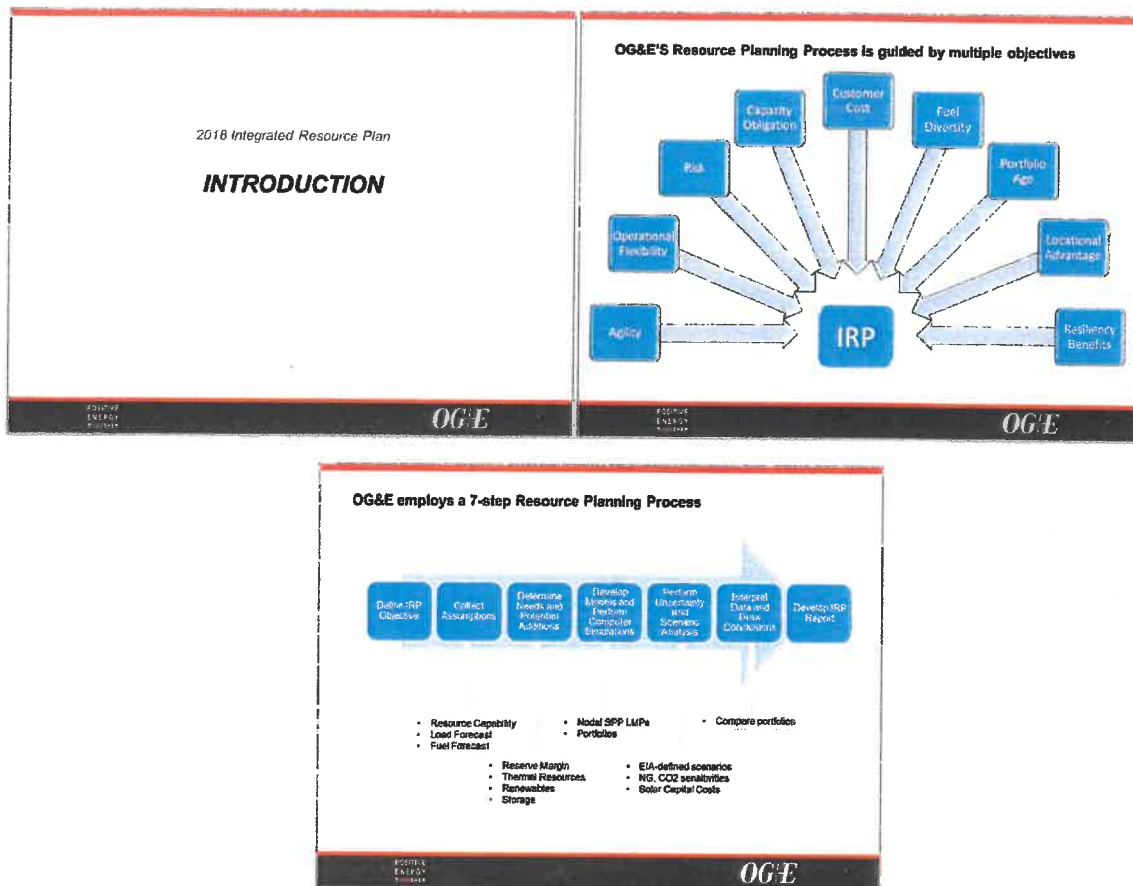
#### OG&E Presentation and Stakeholder Questions

Leon Howell opened the meeting by welcoming the attendees, providing safety information and discussing the agenda.

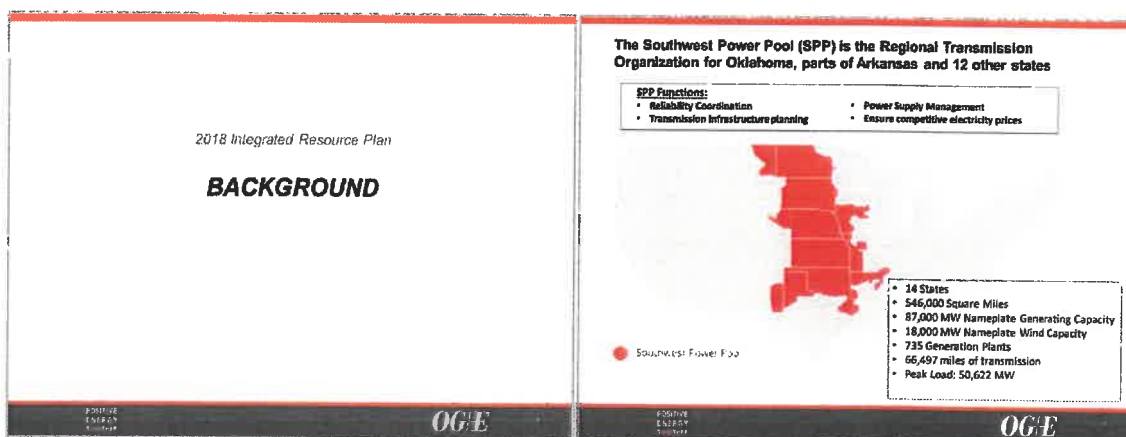


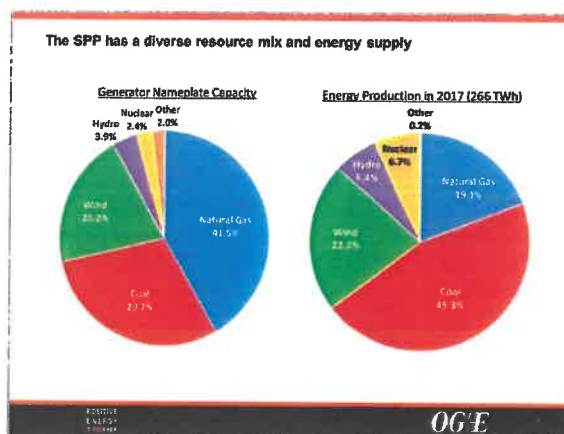


Kelly Riley explained OG&E's 2018 IRP Objectives and Resource Planning Process, as displayed in the following slides:

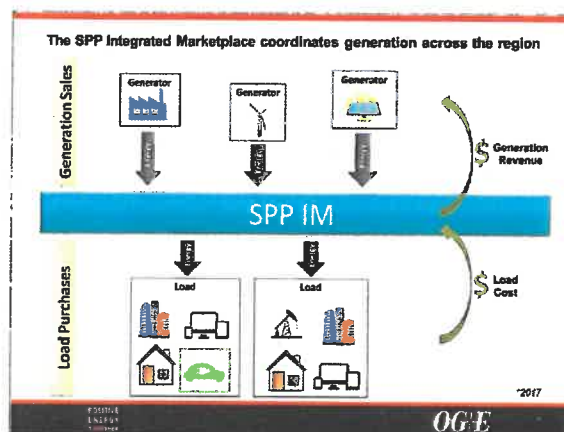


The presentation then provided general background information about the Southwest Power Pool (SPP).

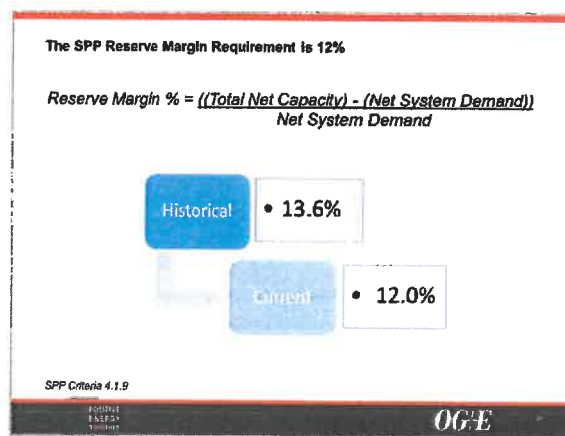




The slide shown below was presented as a basic representation of the SPP Integrated Marketplace (SPP IM) operations. OG&E noted that it returns 100% of the generation revenue to its customers. It was also noted that the SPP IM is an energy-only market. There is no capacity market available in the SPP.

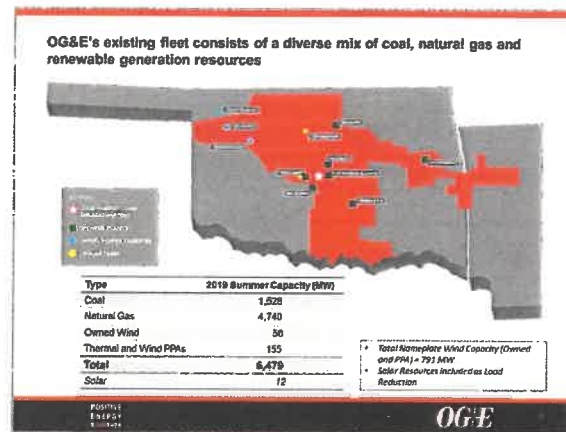


OG&E discussed the SPP capacity reserve margin requirements and how the planning reserve margin had been reduced from 13.6% to 12.0%.



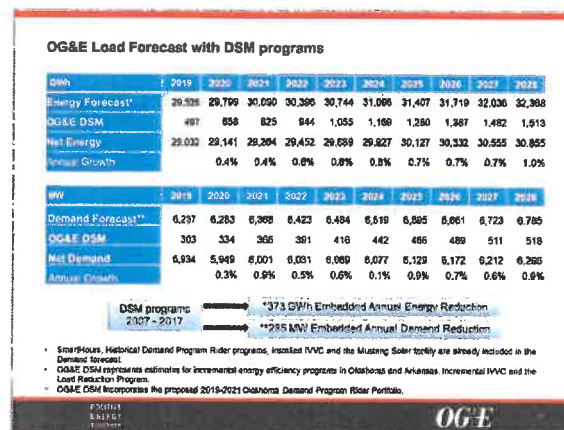
Tom Schroedter from the OIEC asked whether there has been any discussion at the SPP about lowering the reserve margin further. Mr. Schroedter also asked about the reserve margins of MISO and other RTOs. Mr. Howell stated that SPP has a working group that consistently looks at the appropriate reserve margin on a biennial basis. He stated that the SPP believed that the 12% level was appropriate given recent transmission development and that SPP will continue to study the appropriate levels in the future. Mr. Howell stated that he was not aware of the MISO reserve margin requirement, but that he believed that the group of utilities in the southeast have a reserve margin somewhere in the 17% range.

Next, OG&E presented its generation resources and SPP-accredited capacity. OG&E highlighted their 91 MW of accredited wind capacity compared to the 791 MW of nameplate wind capacity. OG&E also noted the existing solar resources are counted as load reduction instead of generation.



Mr. Schroedter asked whether the amount of coal in the 2019 Summer Capacity chart on slide 11 included Muskogee 4 and 5. OG&E responded that Muskogee 4 and 5 are assumed to be converted to natural gas and therefore are not included in the coal generation listed in the chart. OG&E further explained that the 1528 MW of coal capacity listed on slide 11 included the two Sooner units and Muskogee Unit 6.

OG&E then presented its load forecast, pointing out the 0.5% average growth rate over the 10-year horizon and the historical and future demand-side management (DSM) program reductions in energy and demand.



OG&E combined their capacity projections and load forecast to calculate the reserve margin for each of the next 10 years. OG&E pointed out the termination of the AES Shady Point contract gives rise to capacity needs starting in 2019 and additional retirements and contract expirations as well as load growth impact capacity needs going forward.

**Capacity needs increase due to demand growth, contract expirations and unit retirements**

	MW unless noted	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Capacity	Total Owned Capacity	6,324	6,324	6,324	6,324	6,324	6,157	6,157	6,092	6,092	6,092
	Purchase Contracts	155	35	35	35	35	35	35	35	35	35
	Total Capacity	6,479	6,359	6,359	6,359	6,359	6,192	6,192	6,127	6,127	6,127
Demand	Demand Forecast	5,934	5,949	6,001	6,031	6,069	6,077	6,129	6,172	6,212	6,266
Margin	Reserve Margin	9%	7%	6%	5%	5%	2%	1%	-1%	-1%	-3%
Needs	Needed Capacity	168	305	362	396	438	615	673	786	831	892
<div> <div>Planned Capacity Reductions</div> <div> <div>AES Contract Termination (310 MW)</div> <div>CH Cooper Contract Expiration (120 MW)</div> <div>Hill &amp; Pickens Retirements (157 MW)</div> <div>Tucker Units Retirement (160 MW)</div> </div> </div>											
$\text{Reserve Margin \%} = ((\text{Total Net Capacity}) - (\text{Net System Demand})) / \text{Net System Demand}$											

OG&E

Mr. Schroedter asked a series of questions about OG&E's AES contract. He asked why OG&E provided notice to terminate the AES contract and created the need for capacity in 2019, 2020 and 2021. Mr. Howell responded by explaining that this was done to save customer costs through the evaluation of other market opportunities for that capacity. Mr. Schroedter asked whether the Company conducted an RFP or performed an analysis prior to terminating the AES contract. Mr. Howell explained that OG&E is conducting an RFP this fall and AES is free to participate in that RFP process. Mr. Howell stated that they performed no analysis per se prior to terminating the AES contract but that the SPP capacity penalty charge is lower than the cost of the AES contract. Mr. Howell explained that OG&E would not want to be in a position of non-compliance with the SPP reserve margin requirement, but the comparison of the AES contract cost to the SPP penalty for non-compliance was illustrative of how high the AES contract is. Mr. Howell also explained that gas price reductions also reduced the market revenue margins realized from selling AES into the SPP IM, which made it less advantageous for customers. Mr. Howell stated that an RFP will allow OG&E to compare the AES option without market opportunities. Mr. Howell also explained that AES has only been provided notice and the termination will not take place until January. OG&E has until summer 2019 to replace that capacity in order to stay in compliance with SPP requirements.

Aaron Castleberry began presenting for OG&E and discussed the modeling data inputs used, starting with the generation alternatives examined by OG&E.

## 2018 Integrated Resource Plan

### Data Inputs

A variety of options were analyzed to meet long term capacity needs

Technology	Description	Nameplate Capacity (MW)	Nameplate Overnight Capital Cost (\$/kW)	Summer Peak Capacity (MW)
Wind	Wind	250	\$1,640	50
Solar	Solar Photovoltaic Single Axis	100	\$1,400	80
Energy Storage	Libraion Ion Battery	100	\$2,190	100
Conversion	Horseshoe Lake CC	80	\$2,510	80
Plant Improvement (PI)	McClain	42	\$880	42
	Radoud	60	\$800	60
Reciprocating Engine (Recip)	Recip Engine Single	6	\$2,130	6
	Recip Engine Multiple	49	\$1,540	49
Combustion Turbine - Aero	LM2500	105	\$1,400	93
	Trent 60 SCIT	66	\$780	57
Combustion Turbine - Frame	5000F SCIT	245	\$560	222
	G/H Class	245	\$730	244
	TEA	96	\$1,060	78
	2x3 8000H	1,066	\$680	989
	1x3 HR 82 DB	610	\$840	571
Combined Cycle	1x3 HR 82	497	\$960	462
	2x3 GE 7FA.05 DB	985	\$740	845
	2x3 GE 7FA.05	714	\$650	684

\$/kW capital costs given as 2018 \$, assume 2.5% inflation per year

PG&E  
ENERGY  
2018-12-12

OG&E

PG&E  
ENERGY  
2018-12-12

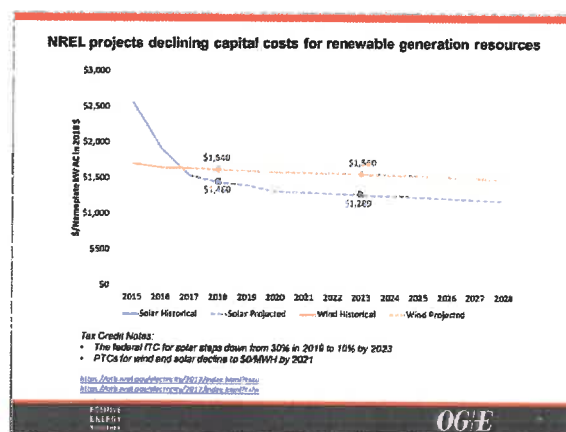
OG&E

Mr. Schroedter asked if the list presented represented all the resource options analyzed and whether OG&E considered PPA or plant acquisition. OG&E answered that the table contained all resource options considered. OG&E believes a new build cost is a reasonable estimate of a long-term PPA and the upcoming RFP will consider a range of options.

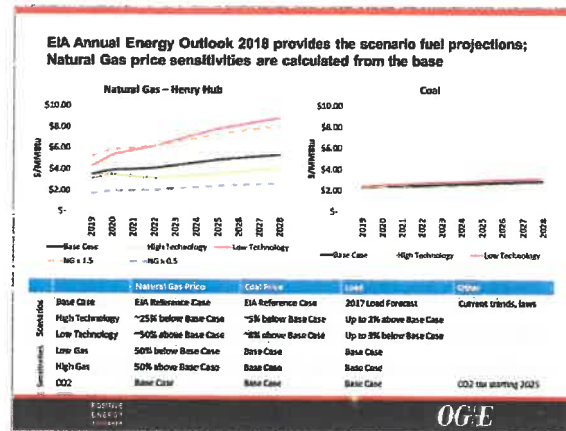
Alex B. asked how the overnight capital cost was derived. OG&E responded that Burns & McDonnell provided the estimates for thermal units.

Mark Becker of AEP asked if the CTs listed have Selective Catalytic Reduction (SCR) technology for NO<sub>x</sub> control. The resource planning team did not know the answer but said they would find out. *Later, the team confirmed that the CTs listed do have SCRs. Mr. Becker was provided that information.*

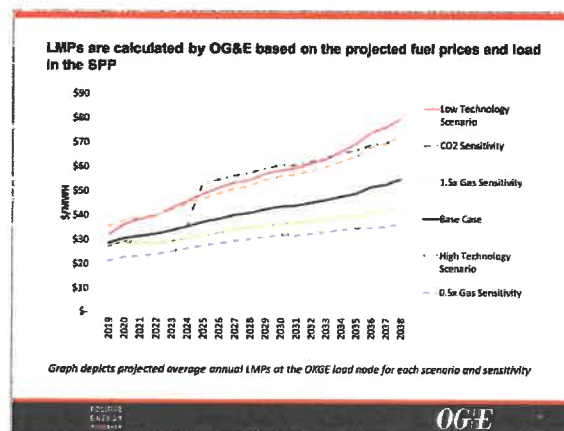
OG&E then highlighted the forward price projections for wind and solar as provided by the National Renewable Energy Laboratory (NREL).



OG&E presented the various fuel forecasts utilized in the risk analysis portion of the IRP.



OG&E then presented the projected locational marginal prices (LMPs) resulting from each of the scenarios and sensitivities discussed in the previous slide.



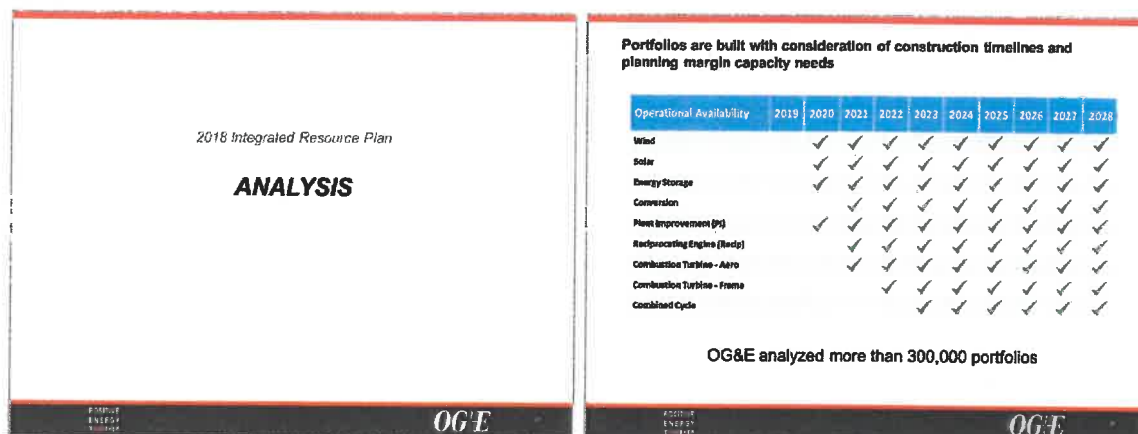
Mr. Becker asked OG&E to clarify whether any of the cases aside from the CO2 sensitivity included a CO2 tax. OG&E indicated there was no CO2 tax in any case aside from the CO2 sensitivity.

Lundy Kiger of AES asked about the scenarios' consideration of liquefied natural gas exports. OG&E did not have the answer available but directed those interested to the EIA website for clarification.

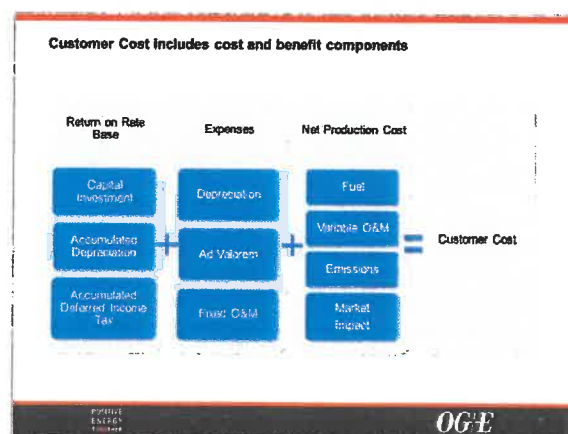
Mr. Schroedter asked if it would be possible to add coal sensitivities to the slide. OG&E clarified that coal price variations were only considered in the low and high technology scenarios shown on the slide. Mr. Howell explained that the small difference in coal price forecasts does not have a large impact on the various portfolios.



Zac Hager then began presenting information related to OG&E's analysis of capacity options. Mr. Hager illustrated the varied construction timing for each of the resource option types.



OG&E presented the slide below, illustrating the various components that make up the customer cost and pointed out that these components are considered for each potential new resource explained earlier. OG&E explained that all of the components are costs except for the Market Impact, which represents the generation revenue resources earn in the SPP Integrated Marketplace. Therefore, the generation revenue offsets some costs and will reduce the total customer cost.



OG&E explained that the portfolio evaluation process was designed to generate portfolios that meet the planning needs over the next ten years and identify an action plan for OG&E for the next five years. In all portfolios OG&E assumed a market opportunity would meet the needs for 2019 and 2020. OG&E is planning to conduct an RFP to clarify the pricing for a Market Opportunity for 2019. OG&E sorted the 300,000+ portfolios by the 30-year NPVCC for the Base Case scenario, which resulted in a list of the portfolios from least cost to highest cost. OG&E presented the ten least cost portfolios for each technology type in the time horizon as shown in the table. OG&E stated that these customer costs are

then recalculated using the scenarios and sensitivities such as the low gas and high gas as shown to the right of the base case costs.

**The best portfolios across a range of natural gas prices utilize similar resources**

Portfolio incremental 30-year NPVCC in million \$

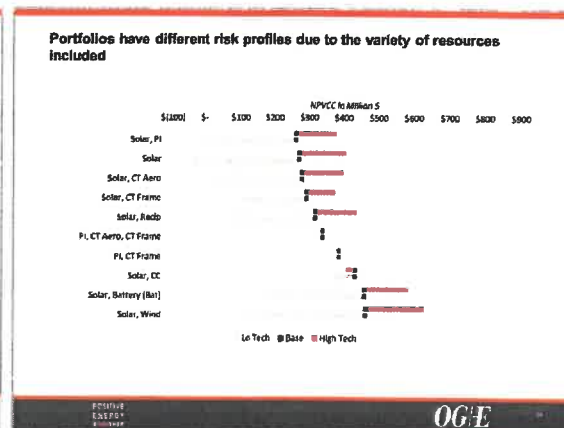
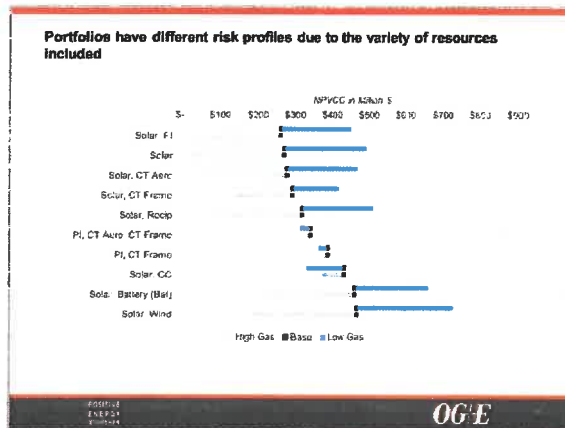
Portfolio Name	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Base Gas	Low Gas	High Gas
Solar, FI	Market Op	Solar			PI	Solar		Solar		Solar	\$261	\$451	\$462
Solar	Market Op	Solar			Solar	Solar	Solar	Solar	Solar	Solar	\$270	\$462	\$322
Solar, CT Aero	Market Op	Solar			CT Aero	Solar	Solar	Solar		Solar	\$278	\$480	\$301
Solar, CT Frame	Market Op	Solar			CT Frame		Solar	Solar		Solar	\$282	\$418	\$138
Solar, Rscp	Market Op	Solar			Rscp	Solar	Solar	Solar		Solar	\$317	\$511	\$386
PI, CT Aero, CT Frame	Market Op		PI	PI	CT Aero	CT Frame		CT Frame			\$330	\$312	\$331
PI, CT Frame	Market Op		PI	PI	CT Frame		CT Frame			CT Frame	\$367	\$382	\$378
Solar, CC	Market Op				CC						\$434	\$330	\$374
Solar, Battery (Bat)	Market Op				Bat	Solar	Solar	Solar	Solar	Solar	\$461	\$383	\$228
Solar, Wind	Market Op				Wind	Solar		Solar		Solar	\$486	\$730	\$186

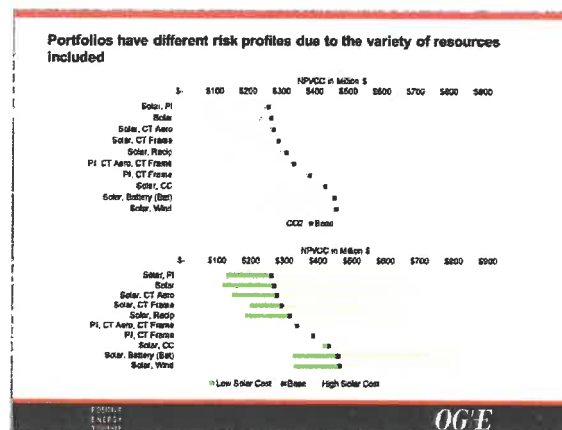
120 MW Market Opportunity in 2019 has been assigned a cost of \$0 for wholesale purchase.

OG&E

Zachary Quintero, OCC, asked when solar Investment Tax Credits (ITCs) decline. OG&E's analysis follows the current law that ITCs decline from the current 30% to 10% by 2023. Mr. Quintero also asked whether solar provides sufficient capacity without associated energy storage. OG&E assumes an SPP accreditation for solar of 70% to 80% based on the performance data from the Mustang solar facility.

OG&E then presented risk analysis of customer costs for the portfolios, as shown in the slides below, and made the following statements. The bars represent the customer cost range from the base case for each of the sensitivities and scenarios. The Black dot in the middle represents the customer cost in the Base Case. The risk analysis encompasses the generation revenue inherent in each case.





Finally, OG&E presented its Five-Year Action Plan.

2018 Integrated Resource Plan

**ACTION PLAN**

**The 5-year Action Plan**

- 1) OG&E will issue an all-sources RFP for capacity resources with a delivery date of 2019, 2020 or 2021.
- 2) Complete the RFP analysis, select capacity and satisfy the capacity need.

Mr. Schroedter then asked whether the details of the upcoming RFP have been finalized. Mr. Howell stated that the Company is still working out the details, but that the Commission Staff has been notified that the RFP is coming.

Jared Haines, Oklahoma AG, asked whether the short lead time for solar would allow OG&E to identify which sensitivity or scenario will be realized so the risk could be mitigated prior to implementation. OG&E responded that the short lead time for solar will allow price changes to be taken into account fairly quickly. Mr. Haines then asked about the time required to implement solar after a decision is made. OG&E's response was about two years including construction, procurement and regulatory processes. Mr. Haines stated the AG's office supports RFPs and they believe it is good to test the market. He also stated that he is appreciative of OG&E's process and that the AG has provided written comments with several observations about the IRP process. Mr. Haines then distributed additional remarks from the AG's office to all in attendance.

Mr. Schroedter asked for clarification concerning the term of the market opportunity that will be sought, in particular whether capacity will be sought only for 2019, 2020 and 2021. OG&E responded that the RFP will be open to long-term opportunities beginning in 2019, 2020 or 2021.

Mr. Schroedter asked whether someone could offer a long-term need into the RFP. OG&E responded that, although the RFP has not been completed, it expects to consider a range of potential terms.

Mr. Schroedter asked when the RFP technical conference would be conducted. OG&E stated it would be soon.

Mr. Schroedter provided to OG&E, questions from Scott Norwood with OIEC. OG&E agreed to respond to those questions offline. OG&E responded to OIECs additional questions on Monday, September 10<sup>th</sup>.

Mr. Kiger asked whether OG&E anticipated the RFP being completed by January 15, 2019. OG&E responded in the affirmative.

Mr. Becker asked how OG&E accounted for congestion for wind resources. OG&E responded that it accounted for congestion through nodal locational marginal prices.

The meeting was adjourned.

# OKLAHOMA GAS AND ELECTRIC COMPANY



## 2018 REQUEST FOR PROPOSALS FOR CAPACITY

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## 2018 OG&E Request for Proposals for Capacity

### 1 Definitions

Except in those certain instances where the context states another meaning, the following terms, when used in this Request for Proposals document, shall have the meanings below. These Request for Proposals definitions do not supplant the definitions used in the model Power Purchase Agreement(s) and Asset Purchase Agreement attached to this Request for Proposals.

**“APA”** means Asset Purchase Agreement, a document establishing the terms of a purchase and sale transaction of a generation facility between a utility and a bidder.

**“Bidder”** means a single legal entity.

**“Capacity”** means the quantity of electric power produced by a generating facility at a point in time, as measured in kilowatts or megawatts.

**“Commissions”** means collectively the Oklahoma Corporation Commission and the Arkansas Public Service Commission

**“Load Responsible Entity”** means any Asset Owner participating in the Integrated Marketplace with registered physical assets that are either load or firm Export Interchange Transactions.

**“Permits”** means permits, consents, licenses, franchises, certificates, authorizations, registrations, or waivers, extensions, renewals, or variances relating thereto, in each case issued by any Governmental Authority.

**“PPA”** means Power Purchase Agreement, a document establishing the terms of a purchased-power portfolio for a utility that meets the utility’s planning objectives and strikes an appropriate balance between power supply costs and the related risks to which consumers are exposed (e.g., purchased-power cost increases and power supply disruptions) over the term of the resource plan.

**“Resources”** means supply-side generating facilities including life extension and repowering projects for such facilities (and the output thereof). In this RFP, supply-side generating facilities are also called “projects.”

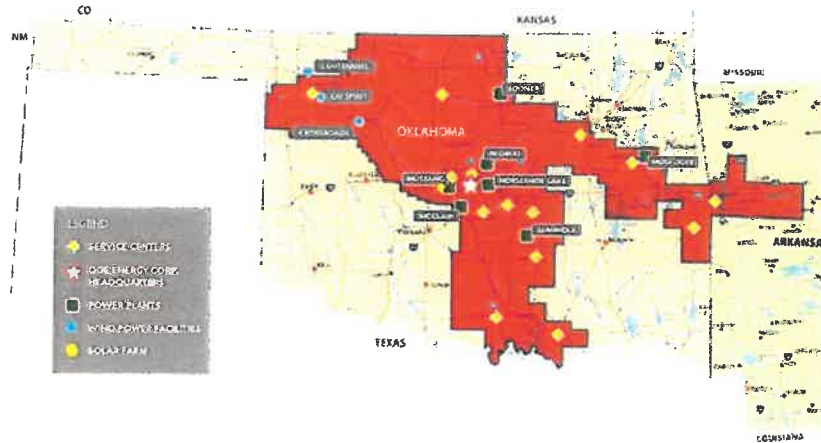
**“SPP”** means the Southwest Power Pool, the nonprofit regional transmission operator providing transmission services to OG&E and other utilities across 14 Midwestern and Southwestern states.

## 2 Background Information

### 2.1 Introduction

This document constitutes a Request for Proposals ("RFP") from qualified third parties to supply electric resources to Oklahoma Gas and Electric ("OG&E" or "the Company"), a subsidiary of OGE Energy Corp. OG&E was formed in 1902 and is Oklahoma's oldest and largest investor-owned electric utility. OG&E serves more than 842,000 customers in 276 towns and cities in a 30,000 square mile area of Oklahoma and western Arkansas. OG&E's service area is shown in Figure 1.

*Figure 1: OG&E Service Area*



This is an All Generation Sources RFP, meaning that any utility scale electric generation source may be considered, consistent with the requirements described herein.

OG&E invites proposals from all potential suppliers capable of meeting the requirements of this RFP, including other utilities, independent power producers, wholesale generators, and qualifying facilities ("Bidders"). OG&E seeks proposals for the transfer of ownership of existing or to-be-constructed generation facility(ies) to OG&E to be accomplished through one or more asset purchase agreements ("APAs"). Bidders may also provide proposals for power purchase agreements ("PPAs") for sale of capacity with a thirty (30) year term following commercial operation. Model form agreements for the APA and PPA are attached to this RFP as Appendix C and Appendix D, respectively. Neither OG&E nor any affiliated companies will submit a self-build option in response to this RFP.

This RFP allows Bidders to offer proposals for up to approximately 500 MW of capacity qualified to serve OG&E's reliability obligations as defined in Southwest Power Pool's (SPP's) Resource Adequacy Requirements as per Attachment AA section 4 of the SPP Open Access Transmission Tariff ("OATT") as

approved by the Federal Energy Commission on August 8, 2018. OG&E will accept proposals for capacity which qualifies to provide accredited capacity for reserve and peak purposes in compliance with SPP requirements; for PPA proposals, offers including the sale of energy or for a term of less than 30 years will be considered as non-conforming. OGE requires capacity be available to satisfy OG&E's resource adequacy obligations beginning as early as June 1, 2019 but no later than June 1, 2021. Proposals must be sized at a level consistent with the provision of a minimum of 50 MW of qualified capacity during the entire term of the APA or PPA transaction. Proposals must be for single generation facilities, or co-located generation facilities, that are located in and interconnected to SPP's transmission network. OG&E will consider procuring up to approximately 500 MW of qualified capacity if the procurement alternatives available are shown to benefit the Company's system. OG&E may elect to contract with one or multiple Bidders to procure capacity resources. Final execution of any negotiated agreement(s) will be subject to satisfactory completion of due diligence analysis by OG&E and its agents. While not required, Bidders are welcome to provide information to support due diligence of the proposal at any time. OGE has provided questions related to its initial due diligence in Appendix F. For Bidders who opt to provide due diligence information, OGE strongly encourages Bidders to provide OGE access to such information through a virtual data room. For access to due diligence information, OGE has provided a form Confidentiality Agreement in Appendix G which can be returned to [ResourceRFP2018NDA@oge.com](mailto:ResourceRFP2018NDA@oge.com) to begin the due diligence process.

## 2.2 RFP Objective

Taking into account the different factors set out in this RFP, OG&E's primary objective is to solicit competitive proposals to provide OG&E with cost-effective capacity resources consistent with the need identified and discussed in Section 2.3 below. With the capacity resource options received, OG&E strives to develop a resource plan that will allow it to meet its capacity obligations over a long-term planning horizon at the lowest reasonable cost to customers with due consideration of the uncertainties attributable to many of the planning assumptions and to other benefits which provide value to OG&E customers.

OG&E may select resources that represent the most cost-effective proposal(s) based on the evaluation criteria described herein. This evaluation will be based on an analysis of economic, operational, and technical attributes. Consistent with the goals for its resource plan, preference will be given to the lowest cost resources which also assist OG&E in satisfying SPP's planning reserve margin requirements; maintain or increase the ability of OG&E's portfolio to proficiently respond to locational requirements; provide diversity within OG&E's existing asset portfolio; and increase the overall reliability and resiliency of OG&E's system.

OG&E expects to evaluate individual proposals, as well as combinations of proposals, for the express purpose of identifying the most cost-effective capacity resource options available to OG&E.

## 2.3 Resource Need

This RFP and OG&E's overall procurement planning is informed by its Integrated Resource Plan ("IRP"). OG&E's 2018 IRP is currently under review by the Oklahoma Corporation Commission and Arkansas Public Service Commission ("Commissions") and is expected to be finalized in mid to late September 2018. The OG&E 2018 draft IRP submittal provides a detailed account of OG&E's current system outlook and projection for resource needs and is available <https://ogeenergy.gcs-web.com/static-files/58e52597-075b-4971-95e2-0df30c28b316>.

Within the 2018 Draft IRP, OG&E has identified an incremental capacity requirement beginning in 2019 and incrementing annually as load continues to grow as shown in Table 1.

Table 1: OG&E Planning Reserve Margin and Needed Capacity (MW unless noted)

	2019	2020	2021	2022	2023
<b>Total Capacity</b>	6,479	6,359	6,359	6,359	6,359
<b>Net Demand</b>	5,934	5,949	6,001	6,031	6,069
<b>Reserve Margin</b>	9%	7%	6%	5%	5%
<b>Needed Capacity*</b>	168	305	362	396	438
<i>*Indicates the potential capacity needed to restore the reserve margin to 12%.</i>					

Based on the identified need, OG&E is seeking projects that will be used to satisfy OG&E's load and planning reserve obligations as and Load Responsibly Entity ("LRE") within SPP beginning in 2019, 2020, or 2021.

## 2.4 Process Overview

This RFP will be administered in a fair, just, and reasonable manner consistent with Commission rules for competitive procurements Oklahoma Administrative Code ("OAC") 165:35-34 ("Commission Rules"). All communications will be governed by the process discussed in Section 2.5 to ensure fair and equitable treatment for all bidders.

OG&E has provided the draft RFP and will hold a technical conference that will allow interested parties to provide comments and feedback regarding the draft RFP. Comments and feedback on the draft RFP are encouraged to be submitted to OG&E via email in advance of the Technical Conference All feedback received through close of the business on the day of the technical conference will be considered within the final RFP.

Bidders may also submit questions to OG&E on the final RFP via email. OG&E will require a Notice of Intent to Bid for all bids that will subsequently be considered under this RFP process. Bidders will submit sealed bids to OG&E, and bids will be opened at the place and time identified in Section 2.10. OG&E will perform a detailed evaluation of bids and identify Bidder(s) selected for negotiation.

## 2.5 RFP Communication

All inquiries, and communications relating in any manner to this RFP, should be directed via email, to [ResourceRFP2018Questions@oge.com](mailto:ResourceRFP2018Questions@oge.com).

Any unsolicited direct contact with employees or personnel at OG&E concerning this RFP is not allowed and may constitute grounds for disqualification.

## 2.6 RFP Submission

Two (2) hard copies of the proposal must be submitted in a sealed envelope. Facsimile submittals may be rejected. In addition, submission of a complete electronic copy of the proposal on an USB flash drive is mandatory. Text file submissions should be in Microsoft Word or Adobe Acrobat; spreadsheets should be submitted in Microsoft Excel.

Proposals submitted in response to this RFP will not be returned to Bidders and will become the property of OG&E. At the conclusion of the process, all proposals will either be archived or destroyed.

### 2.6.1 Proposal Due Date

All hard copy and flash drive proposal materials **MUST** be received at the below location by October 22, 2018 at 6:00 pm Central Prevailing Time (CPT). Any proposals submitted after the stated time on the due date may be excluded from consideration.

<b>Via Standard Mail</b>	<b>Via Carrier Service or Hand Delivery</b>
Attn: OG&E RFP Response	Attn: OG&E RFP Response
P.O. Box 1514	321 N. Harvey
Oklahoma City, Okla. 73101	Oklahoma City, Okla. 73102

Bids must be submitted in a sealed package to ensure confidentiality, with the following information shown on the package: Response to OGE 2018 All-Source RFP Confidential Sealed Bid Proposal. The Bidder's company name and address must be clearly indicated on the package containing the bid.

### 2.6.2 Bidder Fees

A \$5,000 non-refundable filing fee must be submitted with each proposal of up to 100 MW in capacity. The bid fee will increase by \$100 for every incremental 20 MW above 100 MW in capacity to a maximum bid fee of \$7,000 per proposal offer. This bid fee includes one price, size or timing offer for a given sale/transfer proposal. Each additional price, size or timing offer for the same facility will cost an additional \$1,000. Filing fees should be submitted through one of the options listed below:

1. Standard check payable to Oklahoma Gas and Electric
2. Wire transfer to  
Oklahoma Gas and Electric Services

Bank of Oklahoma

ABA: 103900036

Acct: 814072665

Ref: RFP for Capacity.

A W9 statement from OGE has been provided on the RFP Website for Bidders should it be required to by the Bidder to prepare payment.

### 2.6.3 Bid Opening

In compliance with the Commission Rules, bids shall be opened at the time and location specified in Section 2.10 and participants indicated in section 165:35-34-3 (d) (1) (B) of the Commission Rules may attend and monitor the opening of the bids.

## 2.7 Bidder Questions

Prospective Bidders are encouraged to submit questions about this RFP on or before the deadline for submission of questions listed in the schedule. All questions, and responses to those questions, will be posted at <https://oge.com/wps/portal/oge/about-us/do-business/rfp-rfi> ("RFP Website") within five (5) days after receipt of the question to the best of OG&E's capabilities. OG&E's objective in posting these questions and answers is to ensure that all Bidders have equal access to information that may be potentially relevant to their proposals.

Should OG&E determine it is necessary to provide confidential information to provide necessary information for Bidders, then Bidders wishing to receive responses to those questions will be required to sign a confidentiality agreement. The determination of whether confidential treatment is required to inform Bidders will solely be at the discretion of OG&E.

## 2.8 Transmission Guidance

Any inquiries about generation interconnection or transmission service must be directed only to the appropriate party at SPP. SPP will be OG&E's sole point of contact for all questions and requests related to interconnection applications and studies relating to resources connected to the SPP transmission system.

## 2.9 Notice of Intent to Bid

Notice of Intent to Bid ("NOI") is mandatory for proposals to be accepted. Submittal of NOI does not bind Bidders to submit a proposal; however, submittal of a proposal does require that an NOI have been submitted by the NOI due date. Bidders must submit a NOI by midnight, Central Prevailing Time ("CPT") on October 18, 2018. The NOI form is included as Appendix A and is to be submitted via email as per Section 2.5 above. Receipt of the NOI will be confirmed via e-mail from OG&E to the Bidder(s).



## 2.10 Schedule

OG&E reserves the right to change the schedule at any time and at its sole discretion. Bidders are encouraged to attend the Technical Conference to provide comments on the draft RFP. The schedule in Table 2 will be applied to this RFP.

Table 2: Schedule for OG&E RFP for Capacity

Item	Date (all in 2018)
Notification to Commission of expected RFP	August 23
Draft RFP Filing Date	September 19
Draft RFP Technical Conference	October 5
RFP Final Issue Date (expected)	October 8
Final Submission of Questions	October 15
OG&E Response to Questions	October 17
Notice of Intent to Bid Due	October 18
Proposal and Proposal Fee Due	October 22
Opening of Bids	October 23
Selection of Projects for Negotiation (expected)	November 6
Complete Negotiations (expected)	November 20

The Technical Conference and opening of bids will take place at OG&E's headquarters at 321 N. Harvey, Oklahoma City according to the following schedule:

- Technical Conference: 9 am CPT on October 5, 2018 (final comments are due to OG&E by 6 pm October 5, 2018)
- Bids will be opened: 9 am CPT on October 23, 2018

## 2.11 Requests for Clarification of and/or Additional Information

Following the submission of proposals, OG&E may request clarification and additional information from Bidders at any time during the evaluation process. Such information will be subject to public posting and protection of confidential information as described elsewhere in this RFP, consistent with other bid submission materials. Bidders that do not respond promptly to such information requests or do not provide adequate information may be eliminated from further consideration or have the information in their proposals modified by OG&E to produce a reasonable and appropriate evaluation. Bidders may not alter their bid in response to requests for additional information.

## 2.12 Changes or Cancellations

The terms and conditions of this RFP may, at any time, be changed, postponed, withdrawn, and/or canceled, including any requirement, term, or condition of this RFP, any and all of which shall be without any liability to OG&E. All changes to the schedule will be posted on the OG&E RFP Website. OG&E will

endeavor to notify all participants who have filed a timely NOI of any such cancellations, modifications, or schedule changes that are made prior to the due date for the proposal. However, it is Bidder's responsibility to monitor the RFP Website. OG&E will have no responsibility for failing to notify Bidders of any changes, postponements, withdrawals, and/or cancellations.

### 2.13 Confidentiality of Response

Bids submitted in response to this RFP, and any contracts resulting from this RFP, will be treated as confidential. Bidders should be aware that information received in response to the RFP may be subject to review by applicable regulatory agencies. Information submitted in response to the RFP may become subject to federal or state laws pertaining to public access to information as a result of any reviews conducted by the aforementioned agencies. As such, Bidders should clearly designate all sensitive information as "Confidential." Except as required by regulatory reviews, OG&E will use reasonable efforts to avoid disclosure of such confidential information to persons other than those involved with the evaluation, selection, and any subsequent negotiations.

### 2.14 Validity of Proposals

Proposals shall remain valid for the entire evaluation period and should OG&E elect to seek pre-approval from the Commission, through the entire period of Commission proceedings. During these periods, proposals shall be considered as irrevocable and may not be modified, except as agreed upon in mutual negotiations in the post evaluation period.

### 2.15 Bidder Certification

An authorized officer or other duly authorized representative of a Bidder is required to certify by the submission of its proposal that:

1. The Bidder has reviewed this RFP and has investigated and familiarized itself with respect to all matters pertinent to this RFP and its proposal;
2. The Bidder has obtained all requisite internal approvals from its organization, parent company, and/or affiliates necessary to submit its proposal;
3. The Bidder's proposal is submitted in compliance with all applicable federal, state, and local laws and regulations, including antitrust and anti-corruption laws;
4. The Bidder accepts that confidential information about their proposal might be shared with any members of the evaluation team, negotiation team, or regulatory agencies; and
5. The proposal is binding and irrevocable through the evaluation and any Commission proceedings which may follow.
6. The individual signing represents and warrants that s/he is duly authorized to execute and deliver this proposal.

## 2.16 Limitation of Liability

Neither this RFP nor any other aspect of this solicitation shall create an agency, partnership, joint venture, or co-tenancy relationship among the members of the OG&E evaluation team or any other entities involved in the development or administration of this RFP, nor any other relationship or liability beyond those (if any) explicitly adopted in writing and executed by authorized representatives of OG&E and/or the appropriate entity. Neither OG&E nor any other persons or entities involved in the RFP administration and evaluation shall be liable for any act or omission. Neither this RFP nor any other aspect of this solicitation creates or is intended to create third-party beneficiaries hereunder. In no event will OG&E or participating RFP entities be liable to any person for special, incidental, punitive, exemplary, indirect, or consequential damages or lost profits, whether by statute, in tort or contract or otherwise.

## 2.17 Appendices

The included appendices provide form information OG&E requires for consideration in this RFP. These include:

- Appendix A: Notice of Intent to Bid Form
- Appendix B: Certification and Authorization
- Appendix C: Form Asset Purchase Agreement
- Appendix D: Form Power Purchase Agreement
- Appendix E: Bidder Forms A through S

Additionally, Appendix F: Due Diligence Questions and Appendix G: Form Confidentiality Agreement, are optional and Bidders may provide such information at any time in the RFP review process.

Bidders are responsible for ensuring the completion of required information in the appropriate format, including submitting a signed copy of Appendix B, completing all relevant forms within Appendix E, and ensuring that all of their submissions are responsive to the evaluation criteria listed in Sections 3.2, 3.3, and 3.4 below.

Model agreements for the APA and PPA are attached in Appendix C and Appendix D, respectfully. Bidders are responsible for reviewing all terms and conditions specified in the model agreements and taking these terms and conditions into consideration in developing their proposals.

# 3 Proposal Evaluation

## 3.1 Introduction

OG&E and its authorized agents will evaluate the proposals to determine which, if any, have the potential to provide the most economical, reliable, and viable alternatives for OG&E's customers. OG&E will use an evaluation process with three (3) components including a threshold review, a non-price

(qualitative) review, and a price (quantitative) review. Those proposals that are found to have satisfied the threshold RFP requirements will be evaluated based on the identified qualitative and quantitative criteria. OG&E may select the top-ranking bid based on the combined qualitative and quantitative score from among proposals received, or may select multiple bids to comprise a portfolio able to satisfy OG&E's need. Qualitative and quantitative factors will be considered simultaneously and weighted at 50% each.

### 3.2 Threshold Evaluation

OG&E will review each proposal to determine whether it satisfies the threshold criteria of completeness, technical viability, and Bidder financial ability and capability. The completeness review will ensure that the proposal follows the guidelines set forth in the RFP, and includes all information required for a more thorough review. The technical viability review will determine whether the proposal meets OG&E's requirements and within the timeframe stated in the RFP. The financial ability and capability review will judge whether the Bidder has adequate financial capability and adequate competence, resources, and skills to perform its proposal.

At OG&E's sole discretion, any proposal deemed materially incomplete or technically deficient may be excluded from further consideration. OG&E reserves the right to request that any Bidder clarify questions or additional information regarding that Bidder's proposals to resolve deficiencies identified in the threshold review.

The criteria to be considered in the threshold review are listed below:

- Completeness: Proposals must be complete including all forms and required other information;
- Size, Timing, and Term: Proposals must be between 50 MW and 500 MW accredited capacity and available to begin supply to OG&E between 2019 and 2021. Capacity must be available to support OG&E planning reserve obligations. The term of any PPA must be for a minimum of 30 years;
- Property Site Control: Bidders must demonstrate a high level of site control through executed land leases, options to lease, easements, or other instruments of conveyance;
- Unconditional: Proposals are not conditioned upon any contingencies
- Experience: Bidders proposing to develop new projects must have successfully completed one similar project successfully in the past; and
- Bidder Financial Ability: Bidders must demonstrate financial strength and credit worthiness as a counter-party.

### 3.3 Non-Price Evaluation Criteria (50% in aggregate)

OG&E will consider the following six non-economic criteria. These are not incorporated into the quantitative evaluation (see Section 3.4) of each proposal:

1. Contract Risk, Costs, and Benefits (15%)
2. Operational Characteristics and Viability (10%)
3. Locational Benefits, Reliability, Resiliency, and Security (10%)
4. Overall Project Development Risks (10%)
5. Resource Diversity, and Scalability (5%)
6. Environmental Impact (5%)

#### 3.3.1 Contract Risk, Costs, and Benefits (15%)

Contract risk and benefits will be assessed based on the extent to which pricing is firm; existing permits, easements, leases, and fuel, power supply, and other contracts are in good order and assignable; and/or the cost containment measures effectively limit cost risk for OG&E customers. This will include a review of all liabilities assumed under the proposed contract agreements. Additionally, proposals will be assessed on the extent to which the Bidder accepts all provisions relevant to the proposal submitted of the model APA or PPA agreements or shifts risk to buyers and their customers. OG&E has a strong preference and expectation for minimal changes to the proposed terms in the model APA and PPA.

For APA proposals that involve contract assignment or other obligation transfer (for example, assignment of fuel transport agreements, service agreements, etc), OG&E will consider the terms and conditions associated with such assignment. Where applicable, Bidders should provide an indication of such assignments as well as copies of the relevant contracts/agreements.

#### 3.3.2 Operational Characteristics and Viability (10%)

Projects will be assessed on their expected contract or asset life performance. Projects with demonstrable longevity as a capacity resource at consistent levels over time are preferred. New and existing projects should provide an O&M plan, an assessment of the peak operational performance of their facility, an assessment of the facility to continue to provide reliable reserve capacity and peak supply over time, an assessment of the ability of the facility to continue operation in extreme hot and cold weather temperatures, an assessment of the project lifetime expectations (i.e., remaining useful asset life), and an estimate of the reasonable capital investment (cost and timing) expected to maintain the facility in sound operational order over time.

Operational flexibility will be considered based on the cyclic on/off capability, ramp rates and other start-up characteristics, automatic generation control, the ability to provide ancillary services such as voltage support and balancing services, and the overall expected impact on transmission conditions including voltage and frequency. OG&E will further consider how complimentary the characteristics of the proposed alternatives are to the overall OG&E portfolio. Bidders shall provide appropriate information to document the resource operational flexibility.

#### 3.3.3 Locational Benefits, Reliability, Resiliency, and Security (10%)

OG&E prefers generation resources which provide locational benefits, including the ability to allow OG&E to maintain or increase the ability of its portfolio to respond at SPP's direction to localized

reliability issues. Likewise, OG&E seeks resources which minimize disruptions, decrease response time to disruptions, and provide support to the local transmission and distribution system where applicable. To the extent that a generation facility, by virtue of its location and operational characteristics, can enhance the reliability options that OG&E provides to large customers with particular needs that will be a positive attribute.

OG&E's security review will include resiliency to physical and cyber threats and vulnerabilities. Bidders should provide a risk mitigation plan which specifically addresses all measures and actions taken by the Bidder to minimize risk exposure to such threats and vulnerabilities.

For this category, OG&E will also consider the economic benefits, including job creation for the OG&E customer base, tax benefits, or other benefits accruing to OG&E customers. Bidders should provide their assessment of their expected impact on the local economy in support of this review.

#### 3.3.4 Overall Project Development Risk (5%)

This category is intended to assess the likelihood that the generation project can be successfully developed as proposed, based on a number of factors which influence project development feasibility and risk of development. Factors influencing the status of project development as well as the likelihood the project will be developed on schedule will be assessed. For this category, OG&E will evaluate factors including:

- Critical Path Schedule: To demonstrate credibility of the project schedule and ability to achieve commercial operation date, Bidders shall provide a detailed project schedule with critical path milestones for the project that include activities from the period of selection as the winning Bidder to the commercial operation date. OG&E will review and evaluate the project schedule to ensure there is a high likelihood the project can reach commercial operations as proposed. This review will include the risks of delays in securing the necessary environmental permits. This review will also include the risks of securing transmission interconnection and delivery capabilities. Bidders should provide a list of all required permits that must be obtained. In addition, Bidders should identify any rights-of-way that need to be acquired for the construction of supporting facilities (water pipelines, fuel lines, transmission lines, rail spurs, etc.) and provide a plan and schedule for securing the rights-of-way.
- Site Control: To demonstrate site control, Bidders must be able to 1) document they have obtained site control and provide documentation on which necessary permits have been obtained or 2) demonstrate how site control and permits will be obtained. To meet the site control requirement, each Bidder shall have identified a site and must provide a copy of documentation establishing that such Bidder has and/or will have control over the site for the entire term of the contract. Eligible documentation includes a demonstration of site ownership, an option to purchase the site, or a binding letter of intent from the landowners for the full term of the contract. Each Bidder must be able to obtain site control prior to signing a contract with the Company.

- **Technology:** Bidders must provide information about specific technology and equipment proposed for the project, including a description of the track record of the technology and equipment. Each Bidder should provide a detailed description and specifications for the proposed equipment (including, for example, the turbine, steam generator, cooling equipment and environmental control equipment proposed for thermal generation projects, or modules, inverters, and racking for solar photovoltaic projects). OG&E reserves the right to conduct further due diligence on the equipment. OG&E prefers proposals that demonstrate that the generation design and equipment proposed is technologically mature and the Bidder has included a reasonable plan to address how the project will conform to change in environmental requirements in the future. For existing facilities, Bidders must demonstrate the continued longevity of the facility including identification of expected capital investment to maintain the facility in good operation status continuing for a minimum of five years.
- **Fuel:** As applicable to their generation technology, Bidders should provide a detailed strategy for securing and delivering fuel to the plant site. If the project is in the early stages of development, OG&E requires a fuel supply and transportation plan that demonstrates that the fuel supply arrangements adequately conform to the type of project/technology proposed (e.g., gas-fired combined cycle). OG&E prefers proposals that demonstrate a secure and reliable fuel supply or strategy, including for any back-up fuels to be used, which demonstrates the ability of Bidder to secure a reliable supply for the project.
- **Bidder Experience:** Bidders are required to demonstrate experience and management capability to successfully develop and operate the project proposed. OG&E is particularly interested in project teams that have demonstrated success in projects of similar type, size, and technology and can demonstrate an ability to work together effectively to bring the project to commercial operation in a timely fashion. In addition, OG&E values experience that Bidders can show in successfully developing and operating projects within the SPP footprint.
- **Resource Financing:** For facilities to be developed, Bidders should demonstrate their ability to finance the proposed project. The financing plan should address how the facility will be financed including the sources and mechanisms for financing. Further, each Bidder should provide the project's initial financing structure, and proposed capital structure, estimated sources for debt and equity financing, and a description of any pre- and post-construction equity ownership agreements. Bidders should include the estimated constructed costs as well as the financing costs for the project. Each Bidder's response must provide a description of the current status of the financing plan.
- **Community Engagement:** Bidders should provide the status and completeness of the project stakeholder engagement plan for any proposed facilities.

### 3.3.5 Resource Diversity, and Scalability (5%)

OG&E prefers flexibility in the availability of capacity to scale over time, allowing OG&E to be responsive to growing capacity requirements. Likewise, OG&E aspires to maintain a balanced capacity portfolio,



which will allow OG&E to respond effectively to overall system needs in the short and long term. Consideration will also be given to the deliverability of the resource to OG&E territory.

Capacity credit will be assessed based on the SPP Planning Criteria. Bidders should demonstrate their approved capacity ratings according to SPP. Where such information is not available, Bidders should provide indications of their expected performance ratings for each required obligation period including data confirming the resource's designated operational performance, verifiable participation in the SPP Integrated Marketplace or identification as a network resource, confirmation of firm transmission service, status affirming the resource is not committed to other market participants or load outside the SPP Balancing Authority Area, and assurance the resource is not double-counted. Bidders should also indicate expected degradation in capacity qualification over time.

Resource diversity will be assessed through consideration of the impact to the balance of the OG&E portfolio and the Company's goals of maintaining a reasonable balance among natural gas, coal, and economically viable renewable, energy storage, and demand-side resources. Diversity will also be assessed against the age of OG&E's other capacity resources, to ensure a balanced portfolio of assets over time.

Resource scalability will be assessed by OG&E based on the benefits that the proposal provides to the existing OG&E portfolio in meeting reserve requirements on a timely basis.

To assess deliverability, Bidders should provide information regarding the resource firm transmission rights and any deliverability assessments which have been performed for the generation facility.

#### 3.3.6 Environmental Impact (5%)

Environmental impact will assess the environmental benefit provided by the proposed resource including the potential to reduce air emissions. Generation facilities will also be assessed for their site impact including their impact on land and water use. Bidders shall provide their expected emissions rates and supporting evidence for this expectation based on actual data for the resource or similar resources. Bidders must also provide environmental impact statements for the proposed generation facility(ies).

### 3.4 Quantitative Evaluation Criteria (50% in aggregate)

OG&E will consider the following two economic criteria.

#### 3.4.1 Net Present Value of OG&E Customer Impact (40%)

All proposals will be evaluated on price and operational performance factors in the quantitative evaluation through simulation of the impact of the proposal on the costs paid by OG&E's customers.

OG&E will evaluate all bids based on the expected customer impact resulting from detailed simulation modeling and sensitivity analysis consideration as performed in the OG&E IRP, which will account for the generation facility cost and dispatch characteristics of assets as well as any proposed price information

for PPAs. Expected dispatch and/or curtailment of resources in the SPP Integrated Marketplace will be projected by OG&E for a 30-year time horizon beginning in 2019. The modeling application will be consistent with the analysis and tools described in OG&E's 2018 IRP filing, including stress test analysis on customer cost.

Detailed assumptions used within the model are available in the OG&E IRP referenced above. Bidders are responsible to review OG&E's IRP and consider IRP assumptions and results in designing their bid.

#### 3.4.2 OG&E Financial Impact (10%)

OG&E will take into consideration any projected costs of direct or inferred debt. Inferred debt results when credit rating agencies infer an amount of debt associated with a power supply contract and, as a result, take the added debt into account when reviewing OG&E's credit standing. Factors which may additionally be considered include:

- Balance sheet impact
- Cash flow impact
- Bond rating impact

## 4 Bid Submittal Requirements

This section outlines the content and format requirements for all bids submitted in response to this RFP. Bids that do not include the information requested in this section will be ineligible for further evaluation unless the information requested is not applicable or relevant to a given bid.

A complete bid will include the following four components: (1) and executive summary, (2) a complete set of applicable forms, (3) narrative discussion, and (4) redline of PPA or APA form agreement. Expectations for each component are summarized in the following paragraphs.

### 4.1 Executive Summary

The first section of each bid must contain an Executive Summary that provides an overview of the bid's characteristics, including any unique aspects or benefits.

### 4.2 Applicable Forms

The second section of the bid must include the set of forms included in Appendix B and Appendix E. These forms will contain essential information about each bid, and a separate set of forms and related information must be submitted with each bid. A summary of the forms is provided in Table 3.

Table 3: Complete Set of Required Bidder Forms

Form	Form Title
Appendix B	Certification and Authorization
Appendix E Bidder Information Forms A to S	
Form A	Bidder Contact Information
Form B	Bid Summary
Form C	Bid Fee
Form D	Generation Facility Technical Description
Form E	SPP Capacity Accreditation
Form F	Intermittent Resource Operational Information – Operational Profile
Form G	Operational Information – Planned Maintenance Profile
Form H	Annual Data for Cost, Performance, and Permitting
Form I	Fuel Plan
Form J	O&M Plan
Form K	Critical Path Schedule
Form L	Environmental Impact – Air Emissions
Form M	Environmental Impact Statement
Form N	Site Information
Form O	Interconnection
Form P	Financing Information
Form Q	Project Management
Form R	Annual PPA Pricing Information
Form S	Monthly PPA Data for Contract Capacity

Bidder may also contact OGE at [ResourceRFP2018Questions@oge.com](mailto:ResourceRFP2018Questions@oge.com) to obtain the final copy of the MS Excel template for Appendix E forms which is embedded herein. The editable template in native Excel format will be emailed in response to requests received.

#### 4.3 Narrative Topics Discussion

In addition to completed forms, each bid must also include a thorough written discussion of each of the following topics. The narrative topics should be organized under the following headings, with each heading beginning on a separate page.

1. Summary of Bid, including overview of technical specifications for the proposal
2. Operations and Maintenance Plan
3. Risk Mitigation Plan, including risks posed by natural disaster, physical threats and vulnerability including fuel security, and cyber threats and vulnerabilities
4. Impact on Local Economic Conditions
5. Siting and Permitting Plan, including operational permits, land acquisition strategy and status, etc.

6. Interconnection Plan, including indication of expected network upgrade requirements associated with new or upgraded interconnections
7. Fuel Supply Plan (where appropriate)
8. Development Experience for Proposed Facilities (where applicable)
9. Operational Performance History (where applicable)

#### 4.4 Redline of PPA or APA Form Agreement

The fourth section will include the Bidder's redline review of the PPA form or APA agreements. This section may include an explanation of rationale for any significant changes. While Bidders are expected to provide reasonable redline related to technical aspects of their proposal, OG&E has a strong preference and expectation for minimal changes to the proposed commercial terms in the model APA and PPA. Bidders will not be penalized for reasonable redline suggestions related to technical aspects of their proposal such as modifying terminology related to facility operations of a dispatchable resource to be relevant to a non-dispatchable resource, or modifying terminology related to a new facility to be applicable to an existing facility.

## Appendix A: Notice of Intent to Bid Form

**Company Name:** \_\_\_\_\_

**Generation Project Name:** \_\_\_\_\_

Contact Person Information	
Name	
Title/Position	
Mailing Address	
Telephone Number	
Fax Number	
Email Address	

**Project Size (nameplate MW):** \_\_\_\_\_

**Project planning reserve contribution (MW):** \_\_\_\_\_

**Project Location:** \_\_\_\_\_

**Estimated Commercial Operation Date (Month-Year):** \_\_\_\_\_

**Authorized Signature:** \_\_\_\_\_

**Title** \_\_\_\_\_ **Date** \_\_\_\_\_

Bidders should send the completed Notice of Intent to Bid Form to  
[ResourceRFP2018NOI@oge.com](mailto:ResourceRFP2018NOI@oge.com)

## Appendix B: Certification and Authorization

### **A proposal will be considered incomplete unless all required signatures are provided**

The undersigned certifies that he or she is an authorized officer or other authorized representative of the Bidder, and further certifies that:

1. The Bidder has reviewed this RFP, and has investigated and familiarized itself with respect to all matters pertinent to this RFP and its proposal;
2. The Bidder has obtained all requisite internal approvals from its organization, parent company, and/or affiliates necessary to submit its proposal;
3. The Bidder's proposal is submitted in compliance with all applicable federal, state, and local laws and regulations, including antitrust and anti-corruption laws;
4. The Bidder accepts that confidential information about their proposal might be shared with any members of the evaluation team, negotiation team, or regulatory agencies; and
5. The individual signing below hereby represents and warrants that s/he is duly authorized to execute and deliver this proposal.

Violation of any of the above requirements may be reported to the appropriate government authorities and shall disqualify the Bidder from the RFP process.

The undersigned further certifies that the prices, terms, and conditions of the Bidder's proposal are valid and shall remain valid the entire evaluation period and should OG&E elect to seek pre-approval from the Commission, through the entire Commission proceedings. Proposals shall be considered as irrevocable and may not be modified, except as agreed upon in mutual negotiations in the post evaluation period.

The undersigned further certifies that he or she has personally examined and is familiar with the information submitted in this proposal and all appendices thereto, and based on reasonable investigation, including inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate, and complete to the best of the undersigned's knowledge and belief.

The undersigned understands that a false statement or failure to disclose material information in the submitted proposal may be punishable as a criminal offense under applicable law. The undersigned further certifies that that this proposal is on complete and accurate forms as provided without alteration of the text. The undersigned further understands and agrees to the provisions of this RFP related to confidential information, and consents to the limited exchange and sharing of confidential information related to the Bidder's proposal as described in this RFP.

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**Bidder Company Name**

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**Bidder or Bidder's Authorized Representative**

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**Print or Type Name**

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**Generation Project Name(s)**

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**Date**



## Appendix C: Form Asset Purchase Agreement

## Appendix D: Form Power Purchase Agreement

## Appendix E: Bidder Forms A – S

## Appendix F: Due Diligence Questions

## Appendix G: Form Confidentiality Agreement