

BEFORE THE CORPORATION COMMISSION OF THE STATE OF OKLAHOMA

IN THE MATTER OF THE APPLICATION OF)
OKLAHOMA GAS AND ELECTRIC COMPANY)
FOR COMMISSION PREAPPROVAL OF NEW) Case No. PUD 2023-000038
GENERATION CAPACITY PURSUANT)
TO 17 O.S. SECTION 286(C))

REDACTED

Direct Testimony

of

Robert Doupe

On behalf of

Oklahoma Gas and Electric Company

May 31, 2023

Robert Doupe
Direct Testimony

1 Q. **Please state your name and business address.**

2 A. My name is Robert Doupe. My business address is 321 North Harvey, Oklahoma City,
3 Oklahoma 73102.

4
5 Q. **By whom are you employed and in what capacity?**

6 A. I am employed by Oklahoma Gas and Electric Company (“OG&E” or “Company”) as
7 Director, Power Supply Services.

8
9 Q. **Please summarize your professional and educational background.**

10 A. I have a Bachelor of Science degree in Mechanical Engineering from University of
11 Missouri – Rolla (now known as Missouri University of Science and Technology). I have
12 been employed by OG&E for the last 22 years in several positions of increasing
13 responsibility including engineering, maintenance, and operations. I began my career with
14 OG&E in 2000 as a Process/Maintenance Engineer at the Horseshoe Lake and Mustang
15 Power Plants. In March of 2005, I moved to the Power Supply Services group as a Staff
16 Mechanical Engineer. In 2008, I became the Superintendent of Power Generation – Coal
17 at Sooner Power Plant. In February of 2011, I became the Director of Redbud Power Plant,
18 and, in October of 2017, Horseshoe Lake Power Plant was added to my responsibilities.
19 In February of 2021, I transitioned into the role of Director of Power Supply Services.

20 In my current role, I am responsible for the operations and maintenance engineering
21 functions and management of capital projects for all OG&E’s thermal generation fleet. In
22 this role, I supervise a team of approximately 80 members including engineers, project
23 managers, and construction services personnel. In addition, I supervise the asset condition
24 monitoring organization that is accountable for the predictive maintenance technologies
25 OG&E deploys to monitor and analyze the condition of our plants. I have worked at several
26 OG&E Plants throughout my career either as a member of the plant or as a Power Supply
27 Services Engineer. Overall, my experience as an engineer and leader at different levels

1 throughout Power Supply has allowed me to become well versed in the operations and
2 maintenance needs of the OG&E fleet.

3 **Q. Have you previously testified before the Oklahoma Corporation Commission?**

4 A. Yes, I have filed testimony in Cause Nos. PUD 202100072, PUD 202100118, and PUD
5 202100164.

6
7 **Q. What is the purpose of your testimony?**

8 A. The purpose of my testimony is to explain the need for retiring Horseshoe Lake Units 6, 7,
9 and 8 according to the schedule identified in the 2021 Integrated Resource Plan (“IRP”). I
10 also explain the operational advantages of locating new combustion turbines at Horseshoe
11 Lake, especially the specific Combustion Turbines (“CT”) selected by OG&E (with which
12 I am very familiar). Finally, I explain the Long-Term Service Agreement entered into by
13 the Company related to the new CTs and how they are beneficial for monitoring and
14 maintaining those new generating facilities.

15
16 **Q. Please provide an overview of the Horseshoe Lake self-build project.**

17 A. OG&E’s internal construction team proposed to construct two General Electric (“GE”)
18 7F.05 CTs with Dry Low-NOx Combustion systems at the existing Horseshoe Lake (“HL”)
19 power plant in a simple cycle configuration. The HL CTs are natural gas-fired combustion
20 turbines (but capable of burning a hydrogen blend) with a summer capacity of 224 MW
21 per unit for a total of 448 MW. These CTs have the ability to be turned off and on quickly,
22 which allows them to supply power during peak times, to serve unscheduled demand, and
23 to supply ancillary services to the grid.

24
25 **Horseshoe Lake Generating Facility**

26 **Q. Please describe the Horseshoe Lake Generating Facility.**

27 A. The Horseshoe Lake Generating Facility is located on the east side of Oklahoma City in
28 Oklahoma County, Oklahoma. For nearly 100 years, OG&E customers have benefited
29 from power generated at the Horseshoe Lake Facility. The facility has grown as our
30 customer’s needs have grown. Horseshoe Lake Units 1 through 3 were commissioned in

1 the 1920's and Units 4 through 5 were commissioned in 1947. Horseshoe Lake Units 1
2 through 5 were all previously retired in 1981. Horseshoe Lake currently has three steam
3 turbine generating units (designated as Horseshoe Lake 6, 7, and 8) that have a total
4 capacity of 782 MWs. The facility also has two simple cycle gas turbines designated as
5 Horseshoe Lake 9 and 10, which contribute an additional 86 MWs.

6
7 **Q. What is the current age of the existing Horseshoe Lake Units 6, 7, and 8 units and**
8 **what is the estimated retirement schedule for those units?**

9 A. Horseshoe Lake Unit 6 is a 168 MW natural gas-fired steam turbine unit originally
10 commissioned in 1958. Unit 6 is the oldest unit in OG&E's current generation fleet and
11 depreciation studies prepared for OG&E have shown probable retirement dates for
12 Horseshoe Lake 6 as early as 2013. Similarly sized natural gas-fired steam generators have
13 reached retirement after an average of 54 years of operation. OG&E will retire Horseshoe
14 Lake Unit 6 in 2023, after 65 years of service.

15 Horseshoe Lake Unit 7 was originally commissioned in 1963 as one of the world's
16 first large, combined cycle units with a gas turbine and a natural gas-fired steam turbine.
17 Unit 7's 26 MW gas turbine has already been retired after last operating in 2015. OG&E
18 has worked to keep the remaining 211 MW steam unit operating without the legacy gas
19 turbine. Previous depreciation studies have shown Horseshoe Lake Unit 7's probable
20 retirement date as early as 2019. Similarly sized natural gas-fired steam generators have
21 reached retirement after an average of 54 years of operation. OG&E plans to retire
22 Horseshoe Lake unit 7 by 2025, after 62 years of service.

23 Horseshoe Lake Unit 8 is a 403 MW natural gas-fired steam turbine unit originally
24 commissioned in 1969. Previous depreciation studies have shown a probable retirement
25 date as early as 2024. Similarly sized natural gas-fired steam generators have reached
26 retirement after an average of 46 years of operation. OG&E plans to retire Horseshoe Lake
27 Unit 8 in 2027, after 58 years of service.

28
29 **Q. What is the basis for the retirement dates for Horseshoe Lake Units 6, 7, and 8?**

30 A. Horseshoe Lake Units 6, 7 and 8 are the oldest in OG&E's generation fleet and among the
31 oldest units of their type and size operating in the Southwest Power Pool ("SPP"). These

1 Horseshoe Lake units have provided value to OG&E's customers, as well as to consumers
2 across the SPP, for many years. The evolution in the electricity marketplace has led to the
3 units being operated in a more seasonal manner and outside of their original design
4 parameters. Through prudent investment and the dedication of the Horseshoe Lake
5 members, the Horseshoe Lake Units have provided value to OG&E's customers for a
6 number of years, but they have now reached the end of their useful lives and should be
7 retired. The risk of significant failure with these units is material and increasing every
8 year. Multiple components of Horseshoe Lake units 6, 7, and 8 have been in service since
9 the units came online in the 1950s and 1960s. Replacement parts for these units are not
10 readily available or supported by the manufacturers and, instead, must frequently be
11 specially produced at significant expense and production lead time. Failure of a critical
12 component could lead to the units being unavailable to meet load requirements for an
13 extended period while replacement parts are engineered, produced, and procured.
14 Furthermore, units of this age are more susceptible to catastrophic component failure.
15 Some of these components include but are not limited to high-speed rotating equipment,
16 high voltage equipment, and pressure containing parts. Failure of any of the
17 aforementioned components could lead to additional collateral equipment damage and
18 OG&E employee exposure to hazardous conditions.

19
20 **Q. What other factors contributed to your decision to retire these units?**

21 A. The Horseshoe Lake steam turbine units were originally designed for base-load type
22 operation and operated this way until the OG&E coal units became operational. As the
23 units have aged and newer technologies have become available, their operating profile
24 shifted to more off and on cycling and an intermittent mode of operation. This operational
25 profile is outside the original design parameters of the unit. Since the integration of the
26 OG&E fleet into the SPP Integrated Marketplace ("IM"), the Horseshoe Lake Units 6, 7,
27 and 8, with their relatively higher operational cost, have operated at roughly 10% capacity
28 factor ("CF"). The existing Horseshoe Lake steam turbine units, because of their design,
29 are not well suited for this cyclic mode of operation, which will further increase the risk of
30 unplanned outages and major component failure.

1 Q. **What are the effects of frequently cycling units off and on that were originally**
2 **designed for baseload or load following operation?**

3 A. The effects of frequent cycling are well known within the industry. For example, cycling
4 units off and on creates significant thermal stresses on pressure components and rotating
5 machinery. These increased stresses tend to reduce the lifecycle of such components and
6 cause premature failures. This tendency increases with the age of the asset and the number
7 of cycling events. The Horseshoe Lake steam turbine units are outdated technology and
8 new technology exists that is better suited to meet the need of the current day market.
9 Failure to be able to function in a required/desired role adversely affects the usefulness of
10 the asset and the benefit to the customer.

11
12 Q. **Are there any reliability impacts that would result from the component failures**
13 **described above?**

14 A. Yes. If failure were to occur in one of several major components such as the turbine, boiler
15 headers or a generator step up transformer, the units could be offline for over two years.
16 Parts for units of this age are essentially non-existent, not supported by manufacturers or
17 were produced by manufacturers that are no longer in business. The lack of availability
18 requires that parts must be reverse engineered and specially made at a significant expense
19 and delay.

20
21 Q. **Is the decision to retire Horseshoe Lake 6 and 7 units by year-end 2024 and Horseshoe**
22 **Lake Unit 8 in 2027 consistent with OG&E's past approach as it relates to the**
23 **retirement age of gas fired steam units?**

24 A. Yes. OG&E has retired a number of gas-fired steam units over its 121-year history. Since
25 the early 1980s, OG&E has retired several gas-fired units including Muskogee Unit 3, the
26 Arbuckle Plant, the Osage Plant, the Belle Isle plant, and Mustang Units 1, 2, 3, 4. The
27 average retirement age of these OG&E gas-fired steam plants were 55 years old. As in
28 previous cases, OG&E also reflected the planned retirements in its integrated resource
29 plans, so all stakeholders were informed.

1 Q. **When the Horseshoe Lake units are retired, how will OG&E replace the generation?**

2 A. OG&E will replace both Horseshoe Lake 6 and 7 vintage gas fired steam units with new
3 gas fired Combustion Turbines (“CT”) totaling 448 MWs. OG&E Witness Riley discusses
4 how these CTs meet OG&E’s capacity need and was the best option from the alternatives
5 evaluated from the 2021 Integrated Resource Plan (“IRP”) and various competitive
6 procurement processes.

7
8 Q. **Please describe the type of units OG&E intends to install at the Horseshoe Lake site
9 and the associated benefits of such units.**

10 A. The new units will be a class of assets referred to as simple cycle CTs. These CTs have
11 the ability to be turned off and on quickly, which allows them to supply power during peak
12 times, to serve unscheduled demand, and to supply ancillary services to the grid. Compared
13 to the retiring Horseshoe Lake units, these units will deliver better reliability, improved
14 efficiency (*i.e.*, lower heat rates and more energy from less fuel), better load response,
15 improved operational flexibility, and lower emission rates (*i.e.*, more MWs for the same
16 amount of emissions). CTs resemble a jet engine, in that air flows through a compressor
17 that brings it to a higher pressure. Energy is then added by spraying fuel (natural gas) into
18 the air and igniting it, so the combustion generates a high pressure, high-temperature flow
19 that expands through a turbine. The turbine is connected by a shaft to a generator, which
20 produces electricity.

21
22 Q. **Does OG&E currently operate any combustion turbines?**

23 A. Yes. OG&E currently operates a number of CTs throughout our fleet. OG&E operates
24 twenty (20) CTs, of which thirteen (13) are aeroderivative combustion turbines in simple
25 cycle mode and seven (7) industrial frame combustion turbines in a combined cycle mode.
26 These CTs are located at the Company’s Redbud, McClain, Mustang, Frontier, and
27 Horseshoe Lake plants. The new HSL CTs will be 7F Class turbines, similar to units
28 operated at OG&E’s Redbud and McClain generating facilities.

1 Q. **What is the track record with this 7F Class turbine technology?**

2 A. The GE 7F Class combustion turbine has been in operation for over 30 years and is a proven
3 technology. Today, there are approximately 950 of these units installed throughout the
4 world. A simple-cycle 7 F.05 gas turbine can reliably produce 200 MW within 10 minutes
5 and reach full load in less than 11 minutes. It has a ramp rate of 40MW per minute while
6 maintaining emissions compliance. OG&E currently operates six GE 7F Class gas turbines
7 at our Redbud and McClain power plants. They are configured in a combined cycle setup.
8 OG&E has owned and operated McClain since 2005 and Redbud power plant since 2009.
9 Redbud and McClain Power Plants are consistently some of OG&E's top performing plants
10 and they have performed with an average Equivalent Forced Outage Rate ("EFOR") of
11 1.34 percent since 2015. OG&E has a great operational track record with the reliability of
12 the 7F Class CTs.

13

14 Q. **Do you have personal experience with operating, monitoring, and maintaining 7F**
15 **Class CTs?**

16 A. Yes. I was previously the Plant Director of Redbud power plant from February 2011
17 through February 2021. At Redbud, I was responsible for the safe and reliable operation of
18 four GE 7F Class CTs in a combined cycle configuration.

19

20 Q. **Are the new HL CTs also "hydrogen capable" and able to burn hydrogen instead of**
21 **just natural gas?**

22 A. Yes. "Hydrogen capable" means the CTs will be designed and engineered at
23 commissioning to have the potential to safely and reliably burn hydrogen blended with
24 natural gas as a fuel, including the ability to convert the facility to using hydrogen as its
25 primary fuel in the future. This capability will provide an added amount of flexibility for
26 the future.

27

28 Q. **Please explain the advantages the existing Horseshoe Lake site has with respect to its**
29 **proximity to the OG&E load center.**

30 A. Maintaining generation at this location is very important to OG&E's system operations.
31 The Horseshoe Lake site is close to OG&E's largest load center (Oklahoma City), as well

1 as Tinker Air Force base. Generation close to the load source reduces line losses, reduces
2 line congestion and cost, and supports voltage control and reliable system operations. This
3 results in better reliability of the transmission grid as opposed to locating the new
4 generation at a more remote location. It also already has an existing high voltage 138 kV
5 transmission interconnection in place and serves as a critical facility in restoring energy to
6 the grid in the event of some system disruption.

7
8 **Q. What are some of the other operational advantages of the existing Horseshoe Lake
9 site?**

10 A. The Horseshoe Lake site already has the overall land and infrastructure needed to support
11 a generating facility, *i.e.*, secure property, existing roads, facilities to support maintenance
12 and operation, water supply/water rights, and gas pipeline infrastructure. This avoids the
13 significant expense and need to develop a completely new site and infrastructure.
14 Additionally, the Horseshoe Lake site is currently staffed with a highly skilled and trained
15 workforce.

16
17 **Q. Can OG&E utilize Horseshoe Lake's existing environmental permit to the benefit of
18 customers?**

19 A. Yes. The Horseshoe Lake site already has the environmental permits necessary for
20 operation. We currently have a window of opportunity to use the emissions allowed in the
21 existing air permit to support the permitting of the new units through a process generally
22 referred to as netting. This process typically allows for quicker permitting and in turn a
23 shorter project timeline.

24
25 **Long Term Service Agreements**

26 **Q. What are Long Term Service Agreements ("LTSAs")?**

27 A. LTSAs are agreements through which a third party (usually the turbine manufacturer)
28 provide parts, services, outage planning, and technical resources for the major maintenance
29 of a turbine generator. It establishes the terms and conditions for maintaining and
30 monitoring the "Covered Unit." The contract reduces the downtime for outages through
31 effective planning and forecasting of expected maintenance. This is critical to reducing

1 the risk of equipment failures that could impact the performance of the units to the
2 detriment of OG&E customers. In addition to providing for major maintenance, the LTSA
3 also provides for the required annual inspections, as well as remote monitoring of the units.
4

5 **Q. Does OG&E currently have Long-Term Service Agreement's ("LTSA")?**

6 A. Yes. OG&E currently has LTSA agreements for the Steam Turbine Generator and Gas
7 Turbine Generator sets at McClain and the Gas Turbine Generator sets at Redbud.
8

9 **Q. In your professional opinion, why are LTSAs necessary?**

10 A. It is my opinion that LTSAs are necessary because they not only provide the asset
11 monitoring, maintenance, and repair services necessary to ensure reliable operations of the
12 Covered Units, but they create a partnership with the LTSA provider. This partnership
13 means the LTSA provider has a vested interest in the reliable operation of the assets. The
14 LTSA partner is responsible for repairs of unexpected failures and parts "fall out"
15 (unrepairable parts that must be replaced with new) of the Covered Units. This risk transfer
16 to the LTSA provider can be a major benefit of an LTSA when compared to other
17 maintenance execution strategies, such as self-perform or transactional maintenance. For
18 example, a benefit of this particular LTSA is that the customer receives a 25 percent
19 discount on parts and 15 percent discount on labor. Due to the long-term nature of the
20 agreement, this risk transfer is in place for the entire contract term. The long-term nature
21 of the contract and the risk transfer incentivizes the LTSA provider to continuously monitor
22 the assets, investigate unexpected failures and develop corrective actions to prevent them
23 from happening again, and be engaged in the operations and maintenance of the assets.
24 This partnership from the LTSA provider has ultimately manifested high levels of
25 reliability evidenced by the very low EFOR at Redbud and McClain, as discussed above.
26

27 **Q. What is the term of the LTSA for the HL CTs?**

28 A. The term of the HL CT's LTSA is 2500 starts or 64,000 hours on each CT. The expected
29 life of the contract is roughly 13 years, but this will ultimately be driven by the operational
30 profile of the units.

1 Q. **How does this LTSA differ from the agreements utilized at McClain and Redbud?**

2 A. In an LTSA contract, there are two types of maintenance classifications on the Covered
3 Unit. The first type of maintenance is the Covered Maintenance, which includes the
4 inspection and repair or replacement of components or parts of the Covered Units. The
5 second type of maintenance on the Covered Unit is Inspect Only, which includes the
6 inspection only of the components but not the repair or replacement of the components. At
7 Redbud and McClain, the LTSA contracts cover the hot gas path components and
8 combustion hardware as part of the covered maintenance. Inspect only components include
9 the generator, compressor, unit rotor, shells, and turbine exhaust frame. The proposed
10 LTSA for the new Horseshoe Lake CTs not only covers the hot gas path components and
11 combustion hardware in covered maintenance but also includes the compressor and unit
12 rotor. The new LTSA contract also includes better Technical Information Letters (TIL)
13 coverage, term warranty and collateral damage coverage. The contract also provides
14 OG&E with escalation caps that offer protection from future inflation. Inflation is tracked
15 off known indices, which are decided and agreed upon at the signing of the contract and
16 these indices govern the inflation rate of the contract. This helps to limit OG&E's financial
17 risk in future years.

18

19 Q. **What are the costs associated with the LTSAs requested in this project?**

20 A. OG&E estimates the LTSA will cost [Redacted] million through the first major outage. The
21 LTSA contract would include a hot gas path inspection at 1250 starts and a major outage
22 at 2500 starts for each CT. The expected life of the contract is roughly 13 years, but this
23 will ultimately be driven by the operational profile of the units.

24

25 Q. **While the LTSA spans many years, what are the immediate costs to customers in the
26 first several years?**

27 A. The immediate cost to the customers will include a milestone payment for the purchase of
28 spare parts needed for performing outages and to mitigate the risk of an extended outage
29 due to parts lead time in the event of a component failure. The initial payment of [Redacted]
30 million at contract execution will secure all combustion parts and the first stage nozzle set
31 of the hot gas path components. These items are considered to be at a higher risk of

1 unplanned failure due to operational temperatures and pressures. An additional payment
2 of [Redacted] million will secure the remaining hot gas path parts in year three (3) of the contract.
3 These parts are considered to be less likely to fail due to the lower temperatures and
4 pressures experienced in their operational environment. The remaining cost of the parts
5 and parts repair will be spread across the term of the contract. In order to perform the
6 necessary maintenance, OG&E would have to purchase a set of spare parts whether it was
7 under a LTSA agreement or not. The advantage to purchasing the parts under a LTSA is
8 the cost is at a discount and spread across the life of the contract.

9

10 Q. **Does this conclude your testimony?**

11 A. Yes.

CERTIFICATE OF MAILING

I hereby certify that on the 31st day of May 2023, a true and correct copy of the foregoing Application was electronically transmitted to the following via email:

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AFFIDAVIT

STATE OF OKLAHOMA)
)
COUNTY OF OKLAHOMA)

On the 30th day of May 2023, before me appeared Robert Doupe, to me personally known, who, being by me first duly sworn, states that he is the Director of Power Supply Services for Oklahoma Gas and Electric ("OG&E") and acknowledges that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge, and belief.

Print Robert Doupe

Signature 

Subscribed and sworn to before this 30th day of May, 2023.


Notary Public

My commission expires: 10-17-2026

Seal

