BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

PACIFICORP

Direct Testimony of Kenneth Lee Elder, Jr.

February 2024

TABLE OF CONTENTS

Direct Testimony of Kenneth Lee Elder, Jr.

1		**I. INTRODUCTION AND QUALIFICATIONS**
2	**Q.**	**Please state your name, business address, and current position with PacifiCorp**
3		**d/b/a Pacific Power (PacifiCorp or Company).**
4	A.	My name is Kenneth Lee Elder, Jr. My business address is 825 NE Multnomah
5		Street, Suite 600, Portland, Oregon 97232. My position is Load Forecasting Manager.
6	**Q.**	**Please describe your education and professional experience.**
7	A.	I have a Bachelor's Degree in Agriculture Business from Tarleton State University
8		and a Master's Degree in Agricultural and Resource Economics from Colorado State
9		University. I have been employed by PacifiCorp since July 2016, where I have
10		managed load forecasting, load research and customer benefit indicator development.
11		From 2008 through 2016, I was an economist for a natural resource consulting firm.
12		From 2004 through 2008, I was an economist for the University of Alaska Fairbanks.
13	**Q.**	**Have you testified in previous regulatory proceedings?**
14	A.	Yes. I have previously filed testimony on behalf of the Company in regulatory
15		proceedings in Oregon, Utah, Washington, and Wyoming.
16		**II. PURPOSE OF TESTIMONY**
17	**Q.**	**What is the purpose of your testimony in this case?**
18	A.	I provide testimony related to the Company's sales and load forecast.
19		**III. SALES AND LOAD FORECAST**
20	**Q.**	**Please summarize your testimony on PacifiCorp's sales and load forecast.**
21	A.	I provide PacifiCorp's forecasts of the number of customers, kilowatt-hour (kWh)
22		sales at the meter (sales), system loads and system peak loads at the system input
23		level (loads), and number of bills by rate schedule for the 12-month period ending

Direct Testimony of Kenneth Lee Elder, Jr.

1   December 31, 2025. PacifiCorp's load forecast has been updated with the most recent

2   information available and includes certain changes in methodology to more

3   accurately forecast load.

4 **Q.**   **When did PacifiCorp prepare the sales and load forecast used in this filing?**

5 A.   The sales and load forecast used in this filing was completed in May 2023. The

6   May 2023 sales and load forecast is the most recent forecast of sales and loads

7   prepared by the Company.

8 **Q.**   **What is the difference between sales and load?**

9 A.   Sales are measured at the customer meter, while load is measured at the generator or

10   system input level.

11 **Q.**   **How did the Company use the May 2023 sales and load forecast in its**

12   **preparation of this general rate case (Rate Case)?**

13 A.   The May 2023 load forecast was used by Company witness Ms. Sherona L. Cheung

14   to calculate the inter-jurisdictional allocation factors. The sales forecast by rate

15   schedule was used by Company witness Mr. Robert M. Meredith to allocate costs

16   between customer classes and to design rates that correctly reflect the cost of service.

17 **Q.**   **Please provide a general overview of PacifiCorp's sales and load forecast**

18   **methodology.**

19 A.   PacifiCorp first develops a forecast of monthly sales by customer class and monthly

20   peak load by state. This sales forecast becomes the basis of the load forecast by

21   adding line losses, meaning kWh sales levels are grossed-up to a generation or

22   "input" level. The monthly loads are then spread to each hour based on the peak load

23   forecast and typical hourly load patterns to produce the hourly load forecast.

Direct Testimony of Kenneth Lee Elder, Jr.

1	Q.	**Please provide a summary of the forecast energy sales for 2025.**

2	A.	Table 1 provides the forecasted energy sales in megawatt-hours (MWh) for the 12-

3		month period ending December 31, 2025 (Test Period).

4	**Table 1. Test Period Sales Forecast (MWh)**

2025 Rate Case (CY 2025)		
Customer Class	**Total-Company**	**Oregon**
Residential	18,229,909	5,936,359
Commercial	23,791,222	7,986,695
Industrial	18,467,000	1,467,541
Irrigation	1,464,877	254,046
Lighting	98,916	30,286
Total	62,051,923	15,674,929

5	Q.	**How does the total-Company sales forecast for 2025 compare to the sales**

6		**forecast used in the 2023 Rate Case[1]?**

7	A.	As shown in Table 2, total-Company 2025 forecast sales are 7.5 percent higher than

8		2023 forecast sales used in the 2023 Rate Case. The difference in the forecasts is

9		attributable to an increase in commercial and residential sales. The growth in the

10		commercial class is related to data center growth, while residential load is increasing

11		due to a higher customer forecast and an increase in air-conditioning loads. The

12		industrial class decrease is attributable to lower projected sales in Utah, Idaho, and

13		Washington.

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[1] *In the Matters of PacifiCorp, dba Pacific Power, Request for a General Rate Revision,* Docket Nos. UE 399, UM 1964, UM 2134, UM 2142, UM 2167, UM 2185, UM 2186, and UM 2201 (cons.), Order No. 22-491 at 3 (Dec. 16, 2022).

Direct Testimony of Kenneth Lee Elder, Jr.

1 **Table 2. Total-Company Sales Comparison (MWh)**

Customer Class	Previous Rate Case CY 2023	Current Rate Case CY 2025	Percentage Difference
Residential	17,109,240	18,229,909	6.6%
Commercial	20,419,167	23,791,222	16.5%
Industrial	18,619,291	18,467,000	-0.8%
Irrigation	1,475,938	1,464,877	-0.7%
Lighting	100,089	98,916	-1.2%
Total	57,723,723	62,051,923	7.5%

2 **Q.   How does the Oregon sales forecast for 2025 compare to the sales forecast for the**

3 **2023 Rate Case?**

4 A.   As shown in Table 3, the 2025 Oregon sales forecast has increased by 12.5 percent

5   from the 2023 sales forecast used in the 2023 Rate Case. In Oregon, the residential

6   class forecast is higher due to a higher customer forecast and an increase in air-

7   conditioning loads. The commercial class increase in the forecast is attributable to

8   data center growth expectations. The irrigation class forecast is lower due to the

9   reclassification of a large customer, while the lighting class is lower due to light-

10   emitting diode (LED) adoption.

11 **Table 3. Oregon Sales Comparison (MWh)**

Customer Class	Previous Rate Case CY 2023	Current Rate Case CY 2025	Percentage Difference
Residential	5,780,833	5,936,359	2.7%
Commercial	6,321,549	7,986,695	26.3%
Industrial	1,465,509	1,467,541	0.1%
Irrigation	333,716	254,046	-23.9%
Lighting	35,996	30,286	-15.9%
Total	13,937,602	15,674,929	12.5%

Direct Testimony of Kenneth Lee Elder, Jr.

1 **Q. Please summarize the major updates used to produce this forecast as compared**

2 **to the forecast used in the 2023 Rate Case.**

3 A. The Company updated many of its data inputs when compared to the forecast

4 prepared for the 2023 Rate Case. For each of these updates, the Company used the

5 most recent information available.

6 1. For Oregon, the residential and commercial classes use a historical data period

7 of January 2006 through February 2023. The historical data period used to

8 develop the industrial monthly sales is from January 2008 through

9 February 2023. The irrigation class uses the historical data period of January

10 2006 through February 2023, while the lighting class uses the historical data

11 period of April 2006 through February 2023.

12 2. The Company updated the historical data period used to develop the monthly

13 peak forecasts to include January 2008 through December 2022.

14 3. The Company updated the economic drivers for each of the Company's

15 jurisdictions using IHS Markit data released in March 2023.

16 4. The Company updated the forecast of individual industrial and commercial

17 customer usage based on the best information available as of April 2023.

18 5. The time period used to calculate normal weather was defined as the 20-year

19 time period of 2003 through 2022.

20 6. The Company used the climate change impact estimate from the March 2021

21 United States Bureau of Reclamation to adjust the normal weather for

Direct Testimony of Kenneth Lee Elder, Jr.

1   expected climate change impacts.[2]

2   7. The Company rolled forward the line loss calculation to the five-year period

3   ending December 2022.

4   8. The data used to develop temperature splines was rolled forward based on

5   available customer class hourly data (October 2017 through September 2022).

6   9. The Company used the residential use-per-customer model with appliance

7   saturation and efficiency results released in October 2022.

8   **Q.**   **Are there any changes in the load forecast methodology since the 2023 Rate**

9   **Case?**

10 **A.**   Yes. The changes in methodology include:

11   The Company has adopted climate change impacts to normal weather, updated the

12   timeframe used for developing the jurisdictional hourly load shapes as well as the

13   timeframe used to develop the chaotic normal weather pattern relied on in the

14   forecast.

15   •   In order to capture climate change impacts on the load forecast, the Company
16   has adopted the climate change adjustment to normal weather. The climate
17   change weather uses the data from the historical period (2003 through 2022)
18   and adjusts the percentile of the data to achieve the expected target average
19   annual temperature and calculate the heating degree days and cooling degree
20   days impacts and peak producing weather impacts within the energy forecast
21   and peak forecast, respectively. This is the same methodology adopted in the
22   Company's 2023 Integrated Resource Plan.

23   •   In order to capture the most recent hourly weather trends, the May 2023
24   forecast used the most recent five years of actuals, 2018 through 2022, to
25   develop jurisdictional hourly shapes over the forecast horizon.

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[2] United States Bureau of Reclamation, March 2021, Managing Water in the West, Technical Memorandum No. ENV-2021-001, West-Wide Climate Risk Assessments: Hydroclimate Projections. https://www.usbr.gov/climate/secure/docs/2021secure/westwidesecurereport1-2.pdf

Direct Testimony of Kenneth Lee Elder, Jr.

1   • The weather pattern used to capture a normal amount of variability in daily
2   weather across the Company's six state service territory was updated based on
3   the period of 2013 to 2020.

4   • The Company updated its peak models to remove base load from the historical
5   peaks before model input and only modeled the incremental load above base
6   load. The final peak forecast is the forecasted base load plus the peak adder
7   calculated from the peak model.

8   **A.**   **Monthly Sales Forecast Methodology**

9   **Q.**   **How are the forecasts for number of customers developed?**

10   A.   For the residential class, PacifiCorp forecasts the number of customers using IHS

11   Markit's forecast of number of households or population as the major driver. For the

12   commercial class, PacifiCorp forecasts the number of customers using households,

13   population or residential customer forecast as the major economic driver. For the

14   industrial, irrigation and street lighting classes, the customer forecasts are fairly static

15   and developed using time series or regression models without any economic drivers.

16   **Q.**   **What methodology does PacifiCorp use to forecast the residential class sales?**

17   A.   PacifiCorp develops the residential sales forecasts as a product of two separate

18   forecasts: (1) the number of customers–as described above; and (2) sales per

19   customer. PacifiCorp models sales-per-customer for the residential class through a

20   Statistically Adjusted End-Use model, which combines the end-use modeling

21   concepts with traditional regression analysis techniques.

22   **Q.**   **What methodology does the Company use to forecast the commercial class sales?**

23   A.   For the commercial class, PacifiCorp forecasts sales using regression analysis

24   techniques with non-manufacturing employment or non-farm employment, as the

25   economic drivers, in addition to weather-related variables. Also, similar to how

26   PacifiCorp forecasts its largest industrial customers, large commercial customers such

Direct Testimony of Kenneth Lee Elder, Jr.

1   as data centers are based on input from the Company's regional business managers

2   (RBMs).

3   **Q.   How does PacifiCorp forecast sales for the industrial customer class?**

4   A.   The majority of industrial customers are modeled using regression analysis with trend

5   and economic variables. Manufacturing employment is used as the major economic

6   driver. For a small number of industrial customers (the largest on the system),

7   PacifiCorp individually prepares forecasts based on input from the customer and the

8   RBMs.

9   **Q.   What methodology does PacifiCorp use for the irrigation and lighting sales**

10   **forecasts?**

11   A.   For the irrigation class, PacifiCorp forecasts sales using regression analysis

12   techniques based on historical sales volumes and weather-related variables. Monthly

13   sales for lighting are forecast using regression analysis techniques based on historical

14   sales volumes and a LED lighting adoption curve.

15   **B.   Hourly Load Forecast**

16   **Q.   Please outline how the hourly load forecast is developed.**

17   A.   After PacifiCorp develops the forecasts of monthly energy sales by customer class, a

18   forecast of hourly loads is developed in two steps. First, monthly peak forecasts are

19   developed for each state. The monthly peak model uses historical peak-producing

20   weather for each state, and incorporates the impact of weather on peak loads through

21   several weather variables that drive heating and cooling usage. This forecast is based

22   on average monthly historical peak-producing weather for January 2003 through

23   December 2022.

Direct Testimony of Kenneth Lee Elder, Jr.

1   Second, hourly load forecasts are developed for each state using hourly load

2   models that include state-specific hourly load data, daily weather variables, the

3   20-year average temperatures identified above, a typical annual weather pattern, and

4   day-type variables such as weekends and holidays as inputs to the model. The hourly

5   loads are adjusted to match the monthly peaks from the first step above. Also, the

6   hourly loads are adjusted so the monthly sum of hourly loads equals monthly sales

7   plus line losses.

8   **Q.   How are monthly system coincident peaks derived?**

9   A.   After the hourly load forecasts are developed for each state, hourly loads are

10   aggregated to the total system level. The system coincident peaks can then be

11   identified, as well as the contribution of each jurisdiction to those monthly peaks.

12   **C.   Forecasts by Rate Schedule**

13   **Q.   Were any additional forecasts created for these proceedings?**

14   A.   Yes. As mentioned earlier, Mr. Meredith requires two additional forecasts that are

15   based on the kWh sales forecast and the number of customers forecast. Once the kWh

16   sales forecast is complete, it must be applied to individual rate schedules to forecast

17   kWh sales by rate schedule. In addition, the forecast of number of customers by rate

18   schedule must be expressed in number of bills.

19   **Q.   How are rate schedule level forecasts produced?**

20   A.   PacifiCorp develops this forecast in two steps: (1) it forecasts test year sales by rate

21   schedule; and (2) it proportionally adjusts the rate schedule sales forecasts so that the

22   total matches the customer class forecast.

Direct Testimony of Kenneth Lee Elder, Jr.

1   **Q.**   **Finally, how does PacifiCorp forecast the number of bills for each rate schedule?**

2   A.   The forecast of the number of bills for each rate schedule follows the same process as

3   the sales forecast for each rate schedule. First, PacifiCorp forecasts the number of

4   bills by class and by rate schedule. Then, PacifiCorp proportionally adjusts the

5   forecasted number of bills by rate schedule so that the total number of bills matches

6   the customer class forecasted number of bills.

7   **Q.**   **Does this conclude your direct testimony?**

8   A.   Yes.

Direct Testimony of Kenneth Lee Elder, Jr.