**BEFORE THE**

**FLORIDA PUBLIC SERVICE COMMISSION**

**DOCKET NO. 20230023-GU**

**IN RE: PETITION FOR RATE INCREASE**

**BY PEOPLES GAS SYSTEM, INC.**

**PREPARED DIRECT TESTIMONY AND EXHIBIT**

**OF**

**ERIC FOX**

**ON BEHALF OF**

**PEOPLES GAS SYSTEM, INC.**

**BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**

**PREPARED DIRECT TESTIMONY**

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**ON BEHALF OF PEOPLES GAS SYSTEM, INC.**

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

**A.** My name is Eric Fox. My business address is 20 Park Plaza, Suite 428, Boston, Massachusetts 02116. I am employed by Itron, Inc.

**Q.** Please describe your duties and responsibilities in that position.

**A.** I am Director, Forecast Solutions, where I am responsible for supporting utilities, ISOs, and transmission companies’ sales and energy forecasting requirements. My work also includes providing forecast and modeling training, supporting Itron’s Energy Forecasting Group (EFG), providing regulatory support, and managing the Boston office forecasting group.

**Q.** Please provide a brief outline of your educational background, work, and regulatory experience.

**A.** I received my Master of Arts in Economics from San Diego State University in 1984 and my Bachelor of Arts in Economics from San Diego State University in 1981. While attending graduate school, I worked for Regional Economic Research, Inc. (“RER”) as an SAS programmer. After graduating, I worked as an Analyst in the Forecasting Department of San Diego Gas & Electric. I was later promoted to Senior Analyst in the Rate Department. I also taught statistics in the Economics Department of San Diego State University on a part-time basis.

 In 1986, I was employed by RER as a Senior Analyst. I worked at RER for three years before moving to Boston and taking a position with New England Electric as a Senior Analyst in the Forecasting Group. I was later promoted to Manager of Load Research. In 1994, I left New England Electric to open the Boston office for RER, which was acquired by Itron in 2002.

 Over the last 30 years, I have provided support for a wide range of utility operations and planning requirements, including forecasting, load research, weather normalization, rate design, financial analysis, and conservation and load management program evaluation. Clients include traditional integrated utilities, distribution companies, independent system operators, generation and power trading companies, and energy retailers. I have presented various forecasting and energy analysis topics at numerous forecasting conferences and forums. I also direct electric and gas forecasting workshops that focus on estimating econometric models and using statistical-based models for monthly sales and customer forecasting, weather normalization, and calculation of billed and unbilled sales. Over the last twenty years, I have provided forecast training to several hundred analysts from utilities and other industries.

 In the area of forecasting, I have implemented and directed numerous forecasts to support utility financial planning and long-term resource planning. Recent works include developing and supporting an energy and demand forecast for AES Indiana’s Integrated Resource Plan (IRP), developing a set of recommendations for improving the PJM system long-term load forecast, conducting commercial end-use analysis for the New York ISO (Independent System Operator), and assessing temperature trends and incorporating these trends in normalizing historical test-year sales for Sierra Pacific.

 I have provided direct testimony as part of both rate and resource planning filings. My previous testimony includes supporting sales weather normalization for historical rate case test years and forecasts for rate case future test years and long-term resource planning. Further details of my work and regulatory experience are included in Document No. 2 of my Exhibit No. EF-1.

**Q.** Have you provided testimony before the Florida Public Service Commission?

**A.** Yes. I have provided testimony supporting the long-term forecast in Orlando Utilities Commission’s 2006 determination of need for the Stanton Energy Center (Docket 20060155-EM), and review and assessment of Tampa Electric Company’s 2013 base rate proceeding, (Docket 20130040-EI).

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

**A.** The purpose of my direct testimony is to support the Projected 2024 Test Year residential and small commercial sales for Peoples Gas System, Inc. (“Peoples” or the “company”). The forecast was completed in October 2022.

**Q.** Did you prepare any exhibits in support of your prepared direct testimony?

**A.** Yes. Exhibit EF-1 was prepared under my direction and supervision. My Exhibit consists of three documents entitled:

 Document No. 1 List Of Minimum Filing Requirements

 Co-Sponsored By Eric Fox

 Document No. 2 Resume - Work and Regulatory Experience

 Document No. 3 Itron Forecast Report

 The Itron Forecast Report was prepared under my direction and supervision.

 Document No. 3 of my exhibit, the Itron Forecast Report, presents the company’s gas forecast and includes an overview of gas sales trends, summary of the forecast results, a description of the modeling approach, and discussion about the forecast model assumptions.

**Q.** Please describe recent customer and sales trends.

**A.** Over the last five years Peoples’ experienced strong customer growth with average residential customer growth of 4.3 percent and commercial average customer growth of 1.9 percent. This growth is the result of strong economic and population growth combined with expansion of the gas distribution system. As described in witness Richard K. Harper’s prepared direct testimony, low interest rates helped to fuel a robust housing market coupled with strong state in-migration, business expansion, and second-home purchases. In addition to strong regional populations and household growth, customer growth was positively impacted by expansion of the gas distribution system to areas where gas was previously unavailable. In half of the company’s Divisions, customer growth exceeded regional household growth.

 Between 2017 and 2022 residential plus small commercial sales averaged 2.1 percent annual growth (i.e., 2.0 percent on a weather normal basis). Sales growth would have been significantly stronger if not for the impact of COVID-19. In 2020, Peoples experienced a sharp drop in sales as businesses closed and work and school activities shifted to homes. Small commercial sales fell 12.8 percent. Somewhat mitigating the impact, residential sales increased 5.3 percent. But as the small commercial classes account for roughly 75 percent of sales, the drop in commercial sales had a much larger overall impact than the increase in residential sales; total sales fell 8.8 percent (i.e., 10.5 percent weather normalized). Since the bottom of the pandemic, sales growth has recovered with strong customer growth (even through the pandemic, the company continued to add residential and commercial customers), with commercial average use trending back to pre-COVID-19 levels.

**Q.** Please summarize the forecast.

**A.** Over the next five years (i.e., 2023 through 2027) Peoples should see relatively strong sales growth driven by projected household and economic growth and COVID-19 sales recovery in the commercial sector. Moody’s Analytics projects 1.7 percent state average annual household growth, up from 1.4 percent average growth over the last five years, and 1.4 percent annual employment growth, down from 1.9 percent as the prior-five-year average includes the COVID-19 2021 and 2022 job recovery.

 **Residential Sales**. Over the next five years, on a normal weather basis, residential sales are expected to average 2.1 percent annual growth with annual customer growth of 3.4 percent. Weather-normal average use drops in 2023 as customer use trends back to pre-COVID-19 levels. Beyond 2023, average use declines on average 0.8 percent as gas end-use efficiencies continue to improve. Table 1 below shows residential sales, customers, and average use forecast with historical and weather-normalized data. Projected 2024 Test Year sales and customers are bolded.

**Table 1: Residential Sales and Customer Forecast**



 Projected 2024 Test Year residential sales are 111,861 thousand therms compared with 2022 year-end sales of 99,013 thousand therms. There is a large increase in 2023 sales as a result of the transition from below normal weather in 2022 to normal weather in 2023. On a weather normal basis, Projected 2024 Test Year sales are 3.5 percent higher than 2022 sales.

 **Commercial Sales**. Commercial average use dropped significantly in 2020 because of the COVID-19 “work at home” mandate; normalized average use fell from 8,700 therms to slightly less than 7,600 therms. Average use has recovered since then and is expected to continue to recover with business operations trending back to pre-COVID-19 activity levels. Customer growth slows through the forecast period as it is tied to lower employment and residential customer growth projections. Table 2 below, shows commercial actual and forecasted sales.

**Table 2: Small Commercial Sales and Forecast**



**Q.** Please describe the overall forecasting approach.

**A.** A detailed summary of the forecast results, modeling approach, and model inputs are included in the Itron Forecast Report. To summarize,the forecast is based on a set of residential and small commercial customer and average use models estimated with historical billed sales and customer data. Models are estimated using linear regression and are specified to capture the impact of household and economic growth, weather, price, and end-use efficiency improvements on sales and customer growth. Separate models are estimated for each Peoples’ service area and include residential and commercial customer models and residential and commercial average use models. Residential and small commercial sales forecasts are derived as the product of the customer and average use forecast.

 Monthly average use models are estimated over the period January 2014 through July 2022, and monthly customer models from January 2016 through July 2022. Customer models are estimated using a shorter estimation period (than the average use models) to give more weight to the strong growth experienced over the last seven years; this period corresponds with significant expansion of the gas distribution system.

**Q.** Please describe how the customer models are developed.

**A.** Customer forecasts are based on Woods & Poole Metropolitan Statistical Area (“MSA”) historical and forecasted household and employment data. MSA forecasts are mapped to Divisions based on the Division’s location. For model estimation, the Woods & Poole household and employment series are converted from an annual to monthly data series. The household forecast is used in the residential customer model and employment in the commercial models. In some Divisions, the relationship between commercial customer growth and employment is statistically weak or insignificant; in these Divisions predicted residential customers are used to drive commercial customer growth as there is a strong correlation between residential and small commercial customer growth. The initial customer forecasts were based on the Woods & Poole June 2022 forecast. The forecast was updated in October 2022 to reflect Moody Analytics’ slightly lower state household and employment projections.

 Customer models also include auto-regressive terms. Auto-regressive terms use prior customer growth to partly explain future customer growth. These terms capture variation in customer growth around the household and employment trend lines and account for customer growth that exceeds near-term household and employment forecasts.

**Q.** Please describe how the average use models were developed.

**A.** Average use models are estimated for both residential and small commercial customer classes using what is known as a Statistically Adjusted End-Use (SAE) model. The SAE model is an end-use framework that relates monthly average use to heating (XHeat variable) and non-heating end-use (XOther variable) gas requirements. Linear regression is used to estimate the relationship between average use and XHeat and XOther; the estimated model coefficients effectively calibrate or statistically adjust the XHeat and XOther to actual customer usage. XHeat and XOther include structural drivers (thermal shell and end-use efficiency and saturation trends) as well as variables that capture short-term and long-term monthly utilization (heating degree-days (HDD), number of days in the billing period, price, household size and income in the residential model, and employment and gross state product in the commercial model).

 Figure 1 below, shows the residential SAE model structure.

***Figure 1: Residential SAE Model***



 The commercial SAE model is similar. Monthly binary variables and auto-regressive terms are also included in the model specification to account for seasonal variation not captured by the XHeat and XOther model variables.

**Q.** How are the thermal shell and end-use intensity trends derived?

**A.** The thermal shell index (which captures improvements in housing structure efficiency gains) and end-use intensity trends (which captures both efficiency and saturation) are derived from the U.S. Energy Information Administration’s (EIA) Annual Energy Outlook (AEO). Each year, Itron extracts the underlying end-use data (*e.g.*, end-use consumption, number of units, average stock efficiency, number of households, building shell efficiency index, and square footage) and constructs end-use intensity estimates (*i.e.*, end-use consumption per household in the residential sector and use per square foot in the commercial sector) that are organized in Excel spreadsheets and provided to Itron’s Energy Forecasting Group (“EFG”) members. The forecast is based on EIA’s 2022 South Atlantic Census Division outlook.

**Q.** How are Heating Degree Days (“HDD”) calculated?

**A.** HDDs are used to account for heating-related gas use and are based on the average daily temperature. HDD are positive when average daily temperature is below a defined temperature reference point. The NOAA published HDD is based on 65 degrees. If the average temperature is 55 degrees, the HDD would have a value of 10 (65 degrees – 55 degrees). The calendar-month HDD is the sum of the daily HDD. For most utilities, electric and gas heating use isn’t visible until the average daily temperature falls below 60 degrees; weather normalization and forecast models can be improved using HDD with a base of 60 degrees rather than 65 degrees. For Peoples, Jacksonville is the only service area where this is true. In the rest of Florida, heating-related gas use is starting at 65 degrees. In many of the central and southern divisions, heating-related use is visible at even higher temperature breakpoints; heating at these breakpoints is likely capturing pool and spa gas heating. For all but Jacksonville, gas heating is relatively small with residential heating accounting for 25 percent to 40 percent of gas use across the divisions. In comparison, residential customers in the South Atlantic Census Division use roughly 70 percent of gas for space heating. Jacksonville residential heating use is close to that of the Census Division. In the commercial sector, heating use is relatively small accounting for 5 to 20 percent of gas use across the Divisions. In comparison, gas heating accounts for roughly a third of the South Atlantic Census Division commercial gas use.

 Forecasted HDDs are based on a 20-year normal. Normal HDDs are calculated from daily average temperature data from January 1, 2002, through December 31, 2021. Daily average temperatures are first used to calculate daily HDDs. The daily HDDs are then averaged by date – all the January 1st HDD are averaged, January 2nd HDD are averaged, etc., through December 31st across all twenty years. Actual and normal daily degree-days are then weighted based on the meter read schedule and summed across the billing month period. This results in monthly cycle-weighted HDDs that are consistent with the monthly billed sales data.

**Q.** What are the economic variables and sources used in constructing the average use model variables?

**A.** The economic variables incorporated into the XHeat and XOther model variables are from Moody’s Analytics’ October 2022 state forecast. In the residential model this includes average household income and household size. In the commercial model, the economic drivers include employment and economic output (gross state product). Moody’s Analytics’ forecast is used in the average use models, rather than Woods & Poole, as Moody’s Analytics provides forecasts at lower-level periodicity (quarterly vs. annual basis) and more frequently updates the forecast. The lower-level periodicity allows the model to better capture short-terms sales variation tied to economic activity. The advantage of the Woods & Poole data is that it provides reasonably priced MSA level forecasts allowing us to better capture differences in customer growth across divisions.

**Q.** Do the average use models address the impacts of the COVID-19 pandemic?

**A.** Yes. Residential and commercial COVID-19 impact variables are also included in the average use models. The COVID-19 variables are based on Google Mobility Data which measures activity around generalized locations including homes, workplace, and retail. The COVID-19 model variables are statistically significant. For the forecast we assume that the COVID-19 variables trend back to the March 2020 baseline.

**Q.** How is the sales and customer forecast used?

**A.** Residential and small commercial customer and sales forecasts are used in estimating the Projected 2024 Test Year revenues at current rates. Residential sales and customers are allocated to three residential rate schedules and small commercial sales are allocated to four commercial rate schedules based on historical rate class shares of sales and customers. Rate-class level customer and sales forecasts are then priced at current tariff levels. A description of the base revenue forecast and revenue estimates are included in the prepared direct testimony of Peoples’ witness Rachel B. Parsons.

**SUMMARY**

**Q.** Please summarize your prepared direct testimony.

**A.** Given economic and population projections coupled with COVID-19 recovery in the commercial sector, we expect to see continued strong growth in gas sales led by new gas customer connections. By 2024, Peoples is expected to add over 31,000 new residential customers and 1,300 commercial customers over 2022. There is likely to be near-term COVID-19 resets in both commercial (higher) and residential (lower) use as home and business activity recovers from the pandemic. Over the long term residential average use will decline, and commercial average use will slow as improvements in end-use efficiency outweigh positive economic impact on usage.

**Q.** Are Peoples’ forecasts of customers and therms by rate class for the projected test year ending December 31, 2024, appropriate?

**A.** Yes. The customer and SAE average use models are theoretically and statistically strong as measured by model coefficient and overall model fit statistics; model statistics and results are included in the Itron Forecast Report. Forecast drivers are developed from highly regarded sources including Moody’s Analytics, Woods & Poole, The Energy Information Agency, and Google Mobility Data.

 The SAE model is based on an end-use modeling framework that has been adopted by numerous utilities in the U.S. and Canada for both electric and gas demand forecasting. SAE models have been used and accepted by state regulatory commissions across the country in support of both rate cases and Integrated Resource Plans. In Florida, the SAE modeling approach is used by Tampa Electric Company, Duke Energy, Orlando Utilities Commission, and Lakeland Electric and has been accepted by the Florida Public Service Commission in both resource-related and rate case filings.

 The strength of the SAE model is that it captures both long-term structural trends (e.g., end-use saturation and efficiency trends) as well as the impact and interaction of weather conditions, number of billing days, price, household size, and economic activity. Itron has been supporting the SAE models for over 25 years through Itron’s Energy Forecasting Group, model training, presentations, and participation in regulatory hearings.

 The SAE average use models, coupled with customer models based on regional household and employment projections, results in Projected 2024 Test Year sales that are reasonable and consistent with historical customer and usage trends.

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

**A.** Yes.

**EXHIBIT**

**OF**

**ERIC FOX**

**ON BEHALF OF PEOPLES GAS SYSTEM, INC.**

**Table of Contents**

|  |  |  |
| --- | --- | --- |
| **DOCUMENT NO.** | **TITLE** | **PAGE** |
| 1 | List Of Minimum Filing RequirementsCo-Sponsored By Eric Fox | 22 |
| 2 | Resume - Work and Regulatory Experience | 23 |
| 3 | Itron Forecast Report | 31 |

**List of Minimum Filing Requirements**

**Co-Sponsored by Eric Fox**

|  |  |  |
| --- | --- | --- |
| **MFR Schedule** | **Page No.** | **MFR Title** |
| G-2 | P. 6 | Historic Base Year + 1 – Revenues And Cost Of Gas |
| G-2 | P. 8 | Projected Test Year - Revenues And Cost Of Gas  |
| G-6 | P. 1 | Projected Test Year - Major Assumptions |