BEFORE THE TENNESSEE PUBLIC UTILITY COMMISSION
NASHVILLE, TENNESSEE

August 3, 2018

IN RE:	)	
	)	
CHATTANOOGA GAS COMPANY	)	
PETITION FOR APPROVAL OF	)	
AN ADJUSTMENT IN RATES AND	)	**Docket No.**
TARIFF; THE RECOVERY OF	)	**18-00017**
THE AUA MECHANISM	)	
REVENUE DEFICIENCY; AND	)	
THE IMPLEMENTATION OF	)	
ALTERNATIVE REGULATORY	)	
METHODS	)	

REBUTTAL TESTIMONY OF

HEATH J. BROOKS

ON BEHALF OF

CHATTANOOGA GAS COMPANY

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

2 A. Heath J. Brooks, Rate Analyst, Rate Design and Tariff Administration for

3   Southern Company Gas ("SCG"), 10 Peachtree Place NE, Atlanta, Georgia

4   30309.

5 **Q. Have you previously testified in this proceeding?**

6 A. Yes, direct testimony was submitted.

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

8 A. The purpose of my testimony is to present information for Chattanooga Gas

9   ("CGC" or "The Company") in response to the testimony of the Consumer

10   Advocate and Protection Division ("CPAD") witness William H. Novak

11   addressing attrition year revenues.

12 **Q. Are you including any exhibits in connection with your rebuttal testimony?**

13 A. Yes, Exhibit HJB-8, Exhibit HJB-9, Exhibit HJB-10, and Exhibit HJB-11.

14 **Q. Were these exhibits and related schedules prepared by you or under your**

15   **direct supervision?**

16 A. Yes.

17 **Q. Does the Company agree with the methodology used by Mr. Novak to**

18   **produce attrition year revenues?**

19 A. No.

20 **Q. Please explain.**

21 A. The Company has several reservations regarding the methodology used by Mr.

22   Novak to forecast attrition year revenues at pages 7-8. The most notable

23   disagreement is the utilization of only 12 monthly data points ending December

1   2017 to produce regressions used to forecast attrition year volume.   There is no

2   standard minimum of data points to use for a regression analysis, but generally

3   smaller sample sizes generate wider confidence intervals resulting in amplified

4   errors. Mr. Novak simply relies on the test year to determine normal consumption

5   per customer for the attrition year. The Company uses 166 monthly data points

6   for the residential and master commercial regressions resulting in equations that

7   fully capture heating sensitivity and consumption habits.   As seen below in

8   Exhibit HJB-9 illustrating CPAD's normal residential consumption produced on

9   an annual basis, Mr. Novak's technique can produce radically different results

10   year to year.

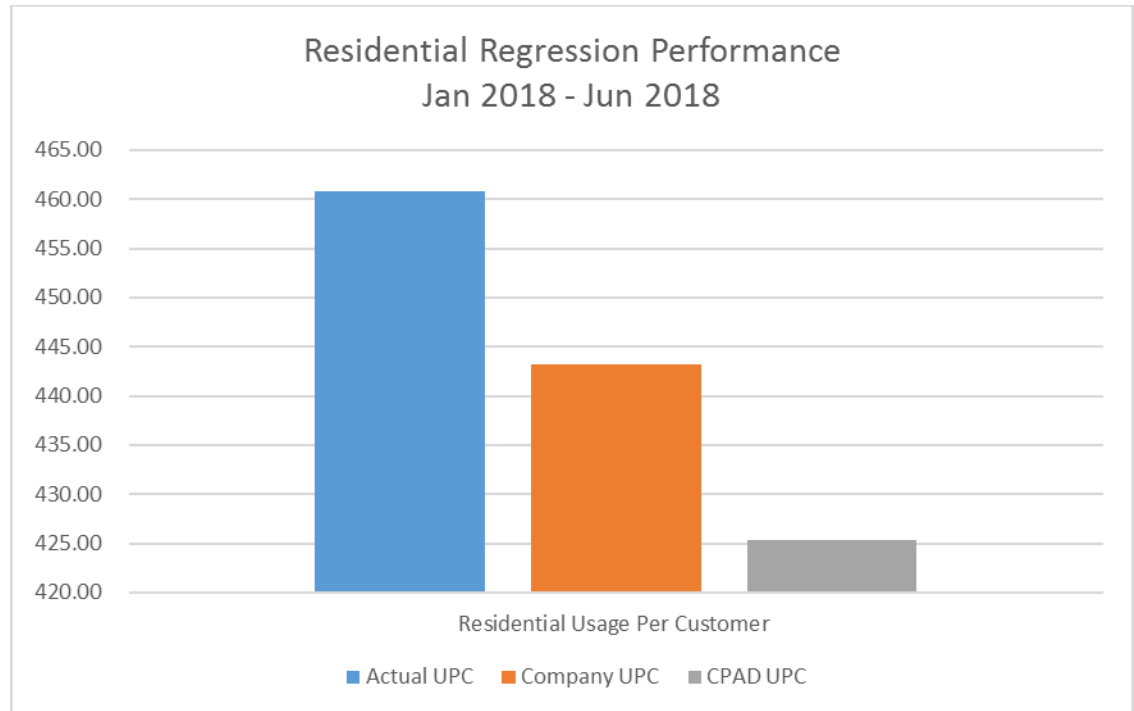CPAD Residential Normal Sales Per Customer

11
12
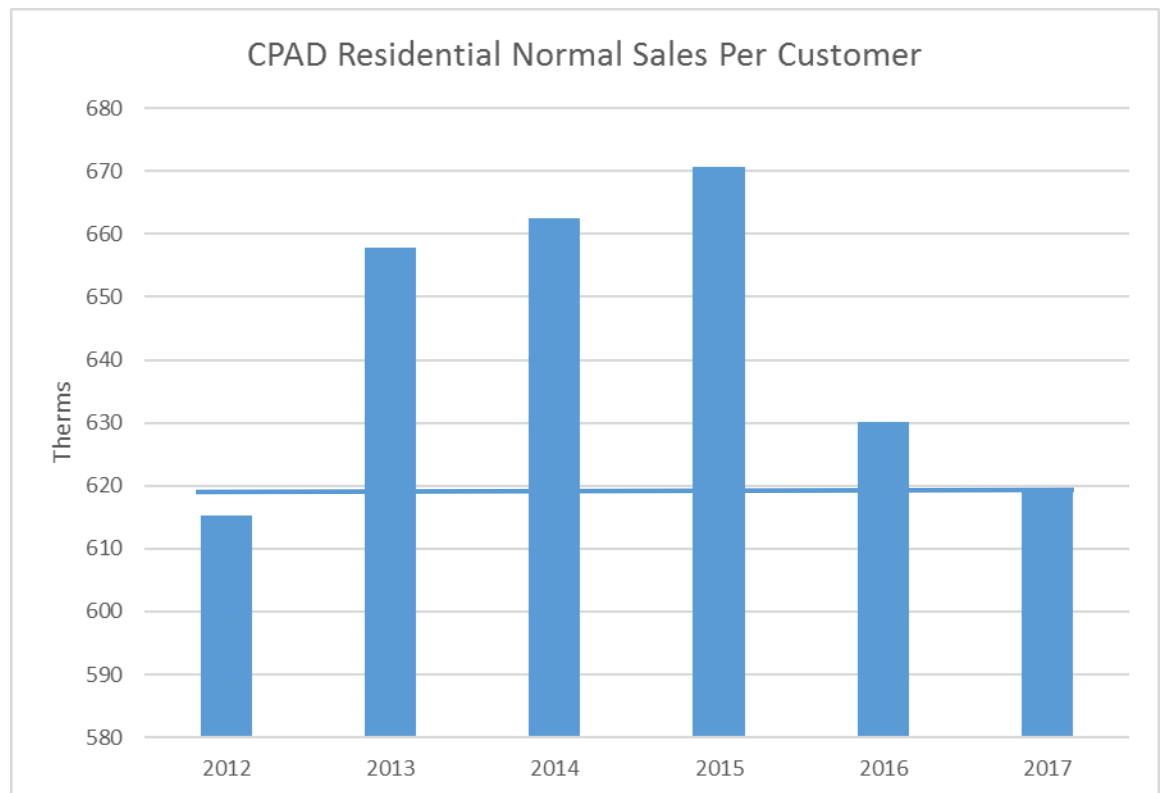
13   **Q.   What does this exhibit show?**

1 A.   Mr. Novak's methodology produces normal residential volumes for 2015 8.3%

2   higher than the proposed 2017 normal usage per customer that is used to calculate

3   attrition year volume. Using Mr. Novak's methodology, a revenue forecast for a

4   rate case in 2016 would have produced unusually high residential volumes. These

5   volumes would not have materialized, causing the company to under earn,

6   requiring another rate case. Similar normal consumption variations occur in Mr.

7   Novak's forecast for the C-1 and C-2 rate classes.

8 **Q.   But doesn't Mr. Novak state at page 7 that the differences in the billing**

9   **determinants forecasted by you and by him are relatively minor when**

10   **compared to the total results?**

11 A.   Yes, for the single year studied the conclusion is true, but as the analysis above

12   shows, minor differences in one year do not mean that the differences will remain

13   minor over time. The following graph, Exhibit HJB-10, displays the performance

14   of the Company's residential regression and Mr. Novak's compared to actual

15   consumption year to date by applying actual regression variables to the

16   coefficients used to calculate attrition year volumes. CPAD's regression is

17   currently underperforming compared to actuals by 8.3% while The Company's

18   regression is only underperforming by 3.9%. The magnitude of CPAD's

19   residential variance year to date clearly indicates that 12 data points and a single

20   heat load variable do not reasonably, or reliably capture residential consumption

21   behavior, especially for rate making purposes.

Residential Regression Performance
Jan 2018 - Jun 2018

Residential Usage Per Customer

■ Actual UPC   ■ Company UPC   ■ CPAD UPC

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3

4   Additionally, the utilization of 12 monthly data points significantly hinders the

5   ability to detect long term trends. Consumers replace furnaces every 16 to 20

6   years and water heaters every 8 to 12 years. Twelve months of data simply does

7   not capture the conservation associated with the replacement of these appliances.

8   The graph below, Exhibit HJB-8, displays the long term declining usage trend as

9   well as the Company's residential regression performance compared to actuals.

CGC Residential Backcast
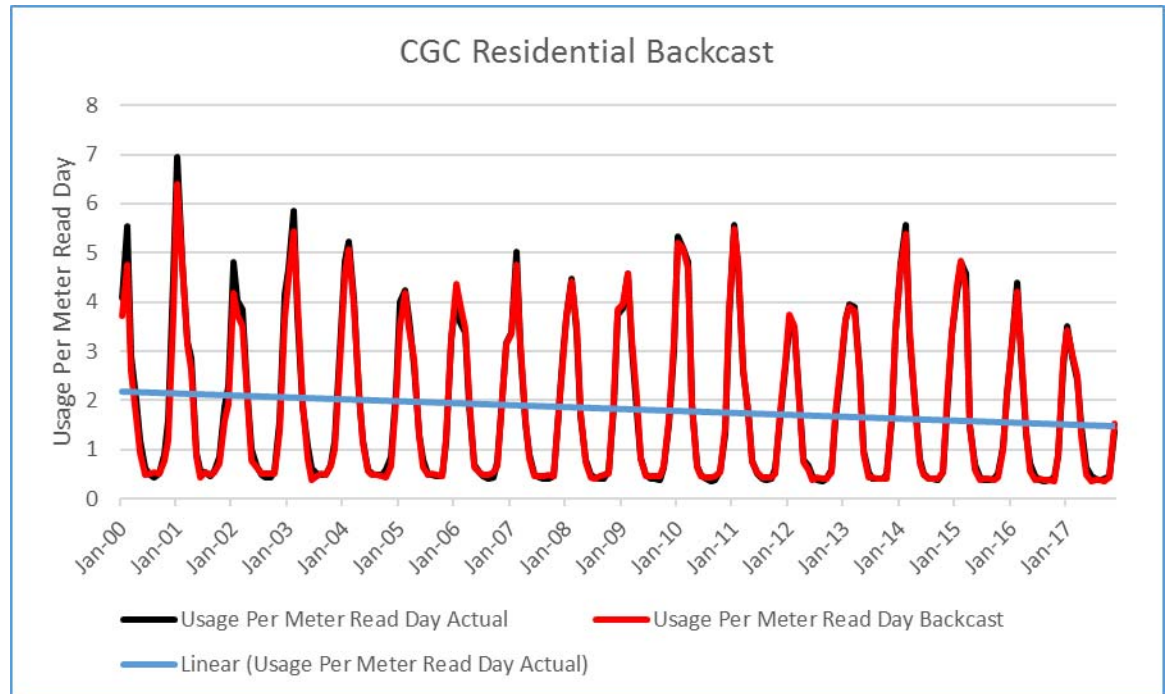
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3   **Q.**   **Are there other differences in the regression methodologies you used verses**

4   **Mr. Novak's approach?**

5   A.   Yes. Mr. Novak utilizes a simple regression model to project normal usage for

6   the attrition year. While the simple regression model has the potential to produce

7   accurate results, it is an over simplistic and outdated method used to forecast

8   consumption prior to the development of software packages that allow forecasters

9   to easily analyze multiple explanatory variables in a multiple regression model.

10   The multiple regression model is a direct extension of the simple regression

11   model with the only difference being the number of explanatory variables. The

12   Company uses Forecast Pro to analyze multiple explanatory variables, such as gas

13   prices, heat loads, and long-term trends, to determine the best combination of

14   variables to produce the most accurate attrition year volumes.

1   Additionally, Forecast Pro gives the Company the ability to analyze more

2   statistical measurements than Excel to determine a regression model's accuracy

3   and viability.   A notable measurement to consider when evaluating a regression's

4   performance is the mean average percentage error ("MAPE"), which is the

5   average of the absolute percentage errors comparing how the regression model

6   performs against actual results. The MAPE is a good indicator of the range of

7   error that will occur in the forecasted period.   A recreation of Mr. Novak's

8   residential regression in Forecast Pro revealed that the Company's residential

9   regression MAPE at 6.86% is almost half that of Mr. Novak's residential

10   regression MAPE at 11.07%. The Company is not comfortable using equations

11   that can produce an 11% variance that could be as high as 500,000 therms over or

12   under actual consumption in a single month.

13   The coefficient of determination, better known as the R^2, is also an important

14   benchmark to consider when determining the statistical significance of a

15   regression mode. The R^2 is the percentage of the variation of the dependent

16   variable that is explained by the regression model. For example, Mr. Novak's

17   regression model for the C-2 rate class explains 91.6% of the monthly variation in

18   consumption while the Company's C-2 regression model explains 98.6% of the

19   monthly variation in consumption. The company's C-1 and residential R^2 are also

20   higher than Mr. Novak's, indicating a better fit.

21 **Q.**   **What is your conclusion regarding CPAD's base rate revenues for the**
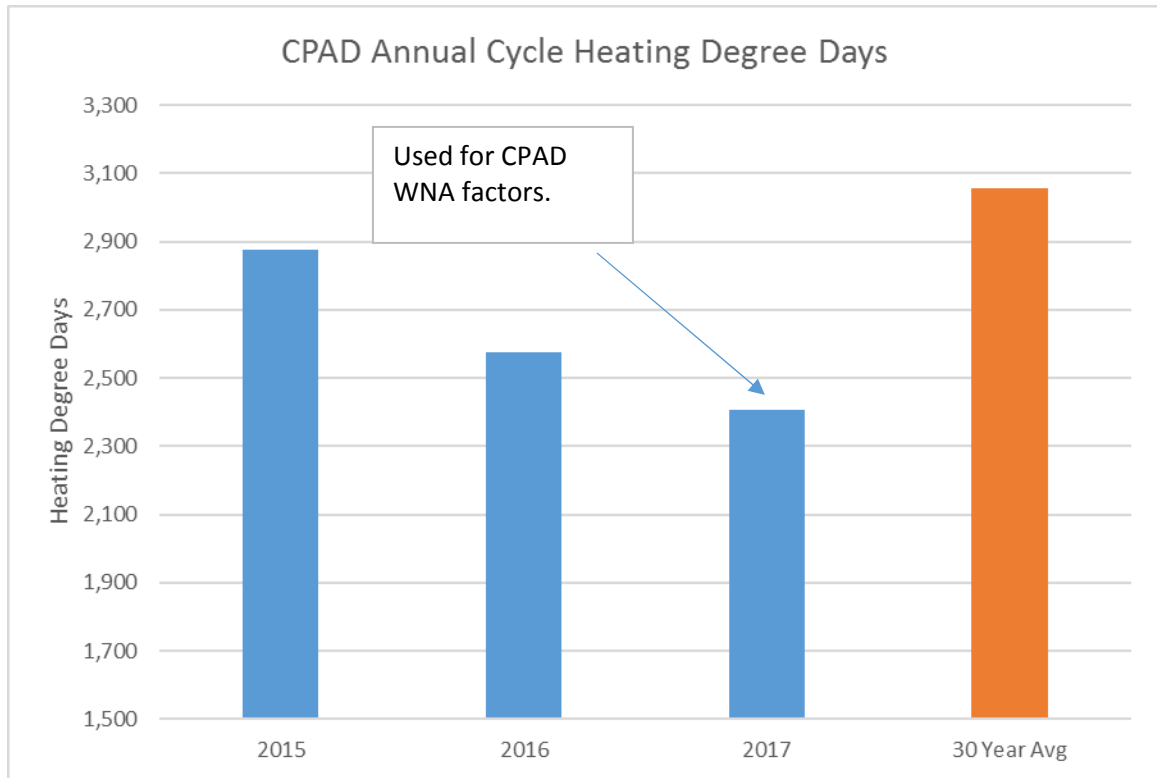
22   **attrition period?**

1   A.   CPAD's methodology used to produce base rate revenues is flawed and should be

2   rejected in favor of the more detailed and accurate approach the Company has

3   used.   Mr. Novak's base rate revenue may be only $179,705 higher than the

4   Company's results, which is within the margin of error, but as I have

5   demonstrated above, over time the variances in Mr. Novak's methodology will

6   produce wider fluctuations.   Since CGC is requesting that the Commission

7   approve a methodology in this case to be used in its later annual rate reviews, the

8   Commission should approve the methodology that is going to produce the most

9   consistent and reliable billing determinants.   That methodology is CGC's multiple

10   regression analysis.

11   **Q.**   **Does the Company Agree with Mr. Novak's method at pages 8-9 used to**

12   **produce weather normalization adjustment ("WNA") factors?**

13   A.   No.

14   **Q.**   **Please Explain.**

15   A.   Mr. Novak only uses 12 data points ending December 2017 to calculate his WNA

16   factors.   The same regression performance issues, as outlined above, apply to

17   using 12 data points for the WNA factors. Additionally, 2017 was 21% warmer

18   than CPAD's proposed 30-year weather normal, resulting in a higher projected

19   base load and lower heating sensitivity. The Company uses thirty data points in

20   order to be statistically significant and to reduce anomalies, such as 2017's

21   abnormally warm weather, as is seen below in Exhibit HJB-11.

CPAD Annual Cycle Heating Degree Days

Used for CPAD WNA factors.

| | 2015 | 2016 | 2017 | 30 Year Avg |

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3   Also, the Company believes that it is more suitable to use the volumes flowing

4   through the two Multi-Family (R-4) meters rather than dividing the volume out by

5   the billing units associated with the multi-family accounts.

6 **Q.   So, what is your conclusion with respect to Mr. Novak's WNA testimony?**

7 A.   Similarly, as with the approach Mr. Novak used to develop base revenues, his

8   WNA methodology is flawed. CGC's approach utilizing 30 data points should be

9   used in order to more accurately reflect customer heating patterns.

10 **Q.   Does this complete your rebuttal testimony?**

11 A.   Yes.