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**FPUC's Responses to Staff's Second  
Request For Production Of Documents,  
Nos. 3-9**

**(Including Attachments)**

**DOCUMENTS REQUESTED**

3. Referring to witness Taylor's direct testimony, page 6, lines 6-23 and page 7, lines 1-13, please provide all documents in the Company's possession, in electronic Excel format where available and with cell formulas unlocked, that include all data, models, descriptions, assumptions, adjustments, equations, model outputs, and statistical diagnostics (in excel format with formulas intact and cells unlocked) used to forecast the following:
  - a. FPUC's 2023 modelled customer counts (by division and rate class). Please include and clearly identify all adjustment data, historical and forecasted, for each model.
  - b. FPUC's 2023 modelled therm use per customer groups (by division and rate class). Please include and clearly identify all adjustment data, historical and forecasted, for each model.

**Company Response:**

FPUC objects to this Request for Production as calling for the production of "all" documents. FPUC has made a good faith, reasonably diligent attempt to identify and obtain responsive documents, but it is not practicable or even possible to identify, obtain, and produce "all" documents. FPUC also objects to this Requests seeking that FPUC provide documents in a specific electronic format. FPUC will produce electronic data in its native format. Non-electronic documents will be scanned and produced in PDF format. Furthermore, FPUC objects to any request that calls for FPUC to create documents that it otherwise does not have because there is no such requirement under the applicable rules and law. The Company also objects because significant portions of this request are vague. The terms "data, models, descriptions, assumptions,

adjustments, equations, model outputs, and statistical diagnostics” are vague. The phrase “used to forecast” is vague. FPUC has made a good-faith and reasonable attempt to ascertain the meaning of such requests and provide a response based on such attempt. Without waiving the foregoing objections, please refer to the attached files:

Staff POD 2-3 CONFIDENTIAL Attachment 1.1 (Customer Data 2012)

Staff POD 2-3 CONFIDENTIAL Attachment 1.2 (Customer Data 2013)

Staff POD 2-3 CONFIDENTIAL Attachment 1.3 (Customer Data 2014)

Staff POD 2-3 CONFIDENTIAL Attachment 1.4 (Customer Data 2015)

Staff POD 2-3 CONFIDENTIAL Attachment 1.5 (Customer Data 2016)

Staff POD 2-3 CONFIDENTIAL Attachment 1.6 (Customer Data 2017)

Staff POD 2-3 CONFIDENTIAL Attachment 1.7 (Customer Data 2018)

Staff POD 2-3 CONFIDENTIAL Attachment 1.8 (Customer Data 2019)

Staff POD 2-3 CONFIDENTIAL Attachment 1.9 (Customer Data 2020)

Staff POD 2-3 CONFIDENTIAL Attachment 1.10 (Customer Data 2021)

Staff POD 2-3 Attachment 2 (Forecasting Models Map)

Staff POD 2-3 Attachment 3 (Commercial Customer Count White Paper)

Staff POD 2-3 Attachment 4 (Commercial Use per Customer White Paper)

Staff POD 2-3 Attachment 5 (Residential Customer Count White Paper)

Staff POD 2-3 Attachment 6 (Residential use per Customer White Paper)

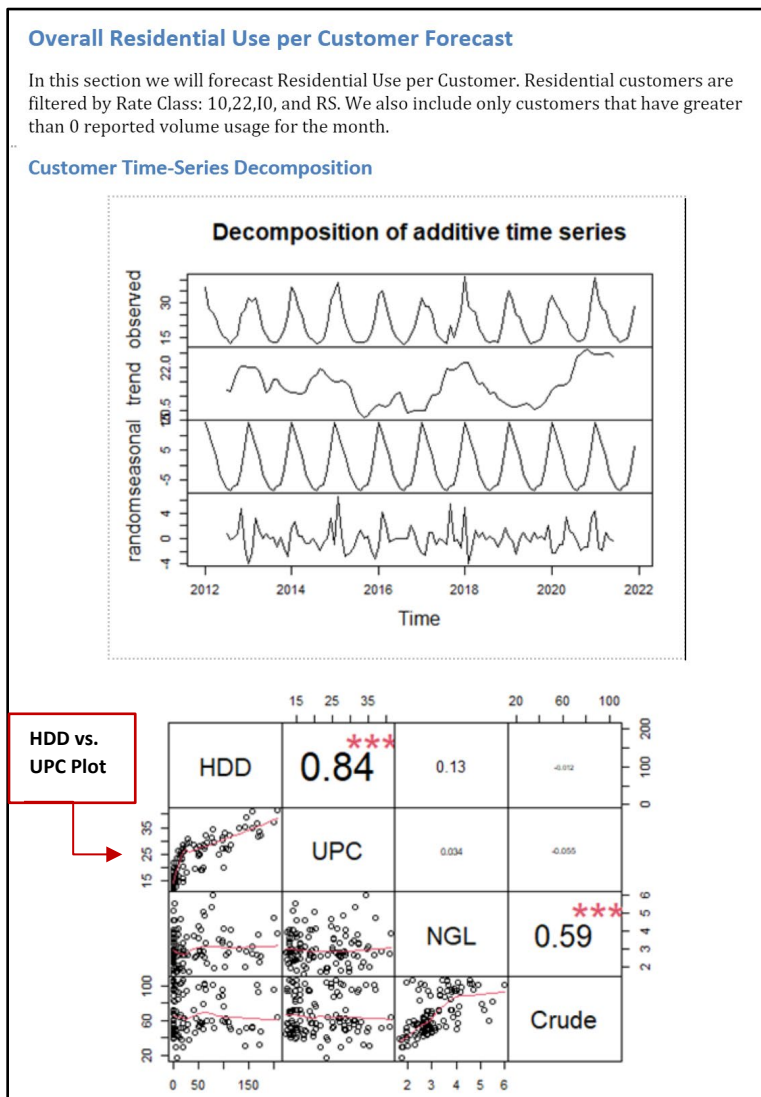
Please see Staff POD 2-3 Attachment 1.1 through Attachment 1.10 for the CONFIDENTIAL annual customer datasets from 2012 to 2021 as discussed in Mr. Taylor’s direct testimony, page 6, lines 6-23. The Initial Statistical Review discussed on page 7, lines 1-13 is provided in Staff POD 2-3 Attachment 2 and Staff POD 2-3 Attachment 3. The forecast whitepapers were created in RStudio using the R Programming Language and are provided as Staff POD 2-3 Attachment 3, Attachment 4, Attachment 5, and Attachment 6. The whitepapers provide details on the models and include Decomposition & Correlation Analysis, Model Diagnostics,

Back-Testing Analysis, and Forecasts for each forecasted customer class. For each forecast model there are four main sections: Time-Series Decomposition, Model Description & Diagnostics, Back-Testing, and 5 Year Forecast.

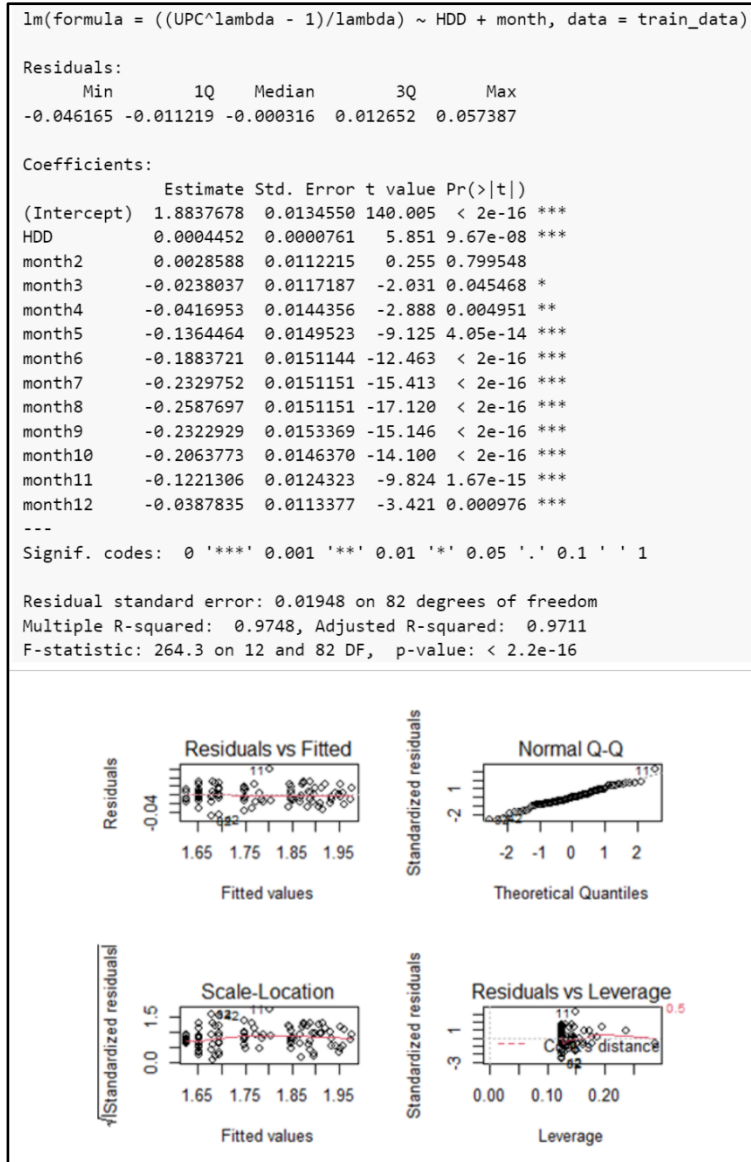
Time-Series Decomposition: Below is the Time-Series Decomposition section of the white papers.

The first chart the Additive Decomposition chart shows the Trend, Seasonal, and Random components of the observed (actual) time-series modeled in this section. This chart was used as an initial data exploration to visualize the data and support decisions on modeling.

The second chart is the Correlation Chart which provides correlation values and plots of the variables we are exploring. For example, we see that Heating Degree Days (HDD) and Use per Customer (UPC) have a correlation coefficient of .84. In addition, we can visualize their linearity in the data plots.



**Model Description & Diagnostics:** This model output summary and diagnostics provide details on what degree model assumptions are being met. The screenshot below provides the model diagnostics after a Box-Cox Transformation has been applied, which shows that all regression assumptions are met, and the model is highly significant with an R-Squared value of .971 and a p-value of <2.2e-16.



Back-Testing: In this section, the final model was back-tested on the previous 24 months in order to gauge predictive accuracy. In the table below, this model performs extremely well with an overall accuracy of 94% within the last 24 months.

**Back-Testing**

In this section we will back test our Regression model to evaluate performance accuracy. We will trim our data from 2012 to December 2019 in order to predict the next 24 months and evaluate accuracy. To imitate a real-life scenario we will also use the 20 year average HDD as the HDD regressor values.

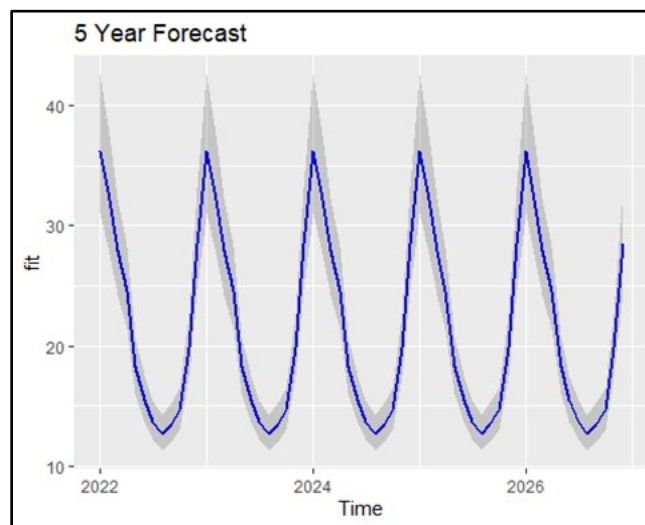
In the table below we see that regression model performs extremely well with an overall MAE of 1.47 and overall accuracy of 94% by predicting January 2020 to December 2021.

[1] 24 Month Mean Absolute Error (MAE): 1.41

[1] 24 Month Accuracy: 0.94

	Date	Actual.UPC	Predicted.UPC	Absolute.Error	Accuracy
97	Jan 2020	33.11	35.71	2.61	0.92
98	Feb 2020	29.59	32.41	2.82	0.90
99	Mar 2020	27.16	27.72	0.55	0.98
100	Apr 2020	23.43	24.42	0.99	0.96
101	May 2020	21.73	17.70	4.03	0.81
102	Jun 2020	16.79	15.18	1.61	0.90
103	Jul 2020	14.99	13.43	1.56	0.90
104	Aug 2020	13.36	12.54	0.82	0.94
105	Sep 2020	13.37	13.45	0.08	0.99
106	Oct 2020	14.49	14.60	0.11	0.99
107	Nov 2020	19.74	19.71	0.03	1.00
108	Dec 2020	32.00	28.18	3.82	0.88
109	Jan 2021	40.90	35.71	5.19	0.87
110	Feb 2021	31.38	32.41	1.03	0.97
111	Mar 2021	27.21	27.72	0.51	0.98
112	Apr 2021	26.47	24.42	2.05	0.92
113	May 2021	19.43	17.70	1.74	0.91
114	Jun 2021	16.01	15.18	0.83	0.95
115	Jul 2021	15.04	13.43	1.61	0.89
116	Aug 2021	13.00	12.54	0.46	0.96
117	Sep 2021	13.94	13.45	0.49	0.96
118	Oct 2021	14.63	14.60	0.03	1.00
119	Nov 2021	20.04	19.71	0.33	0.98
120	Dec 2021	28.68	28.18	0.50	0.98

5 Year Forecast: This section visualizes the forecasted values over the next 5 years.



**Company Response to 3a:**

Please refer to the Company's response to "OPC POD 21 WP-JDT\_Pro-Forma Rev and Other" for FPUC's 2023 modelled customer counts. Specifically, the results of the modelled customer counts are shown on Tabs starting with the title "WP\_Regression Summary".

**Company Response to 3b:**

Please refer to the Company's response to "OPC POD 21 WP-JDT\_Pro-Forma Rev and Other" for FPUC's 2023 modelled therms use per customer groups. Specifically, the results of the therms use per customer are shown on Tabs starting with the title "WP\_Regression Summary".



4. Referring to witness Taylor's direct testimony, page 6, lines 16-23, please provide documents, in electronic Excel format and with cell formulas unlocked, containing summary data resulting from step 3 – "Geo-Location and Incorporation of Weather Data" of FPUC's forecast process.

**Company Response:**

FPUC objects to this Request for Production as requesting documents in a specific electronic format. FPUC will produce electronic data in its native format. Non-electronic documents will be scanned and produced in PDF format. The Company also objects because significant portions of this request are vague, specifically, the term "summary data". FPUC has made a good-faith and reasonable attempt to ascertain the meaning of such requests and provide a response based on such attempt. Without waiving the foregoing objections, please refer to the attached files:

Staff POD 2-4 Attachment 1 (Weather Data)

Please see Staff POD 2-4 Attachment 1 for data resulting from step 3 – "Geo-Location and Incorporation of Weather Data" of FPUC's forecast process as discussed in Mr. Taylor's direct testimony, page 6, lines 16-23.

5. Please provide all data, data sources, assumptions, and calculations (in excel format with formulas intact and cells unlocked) of any out-of-model adjustments made to each model supporting the following:
  - a. FPUC's forecast of "trending" 2023 customer counts
  - b. FPUC's "weather-sensitive" 2023 therm use per customer groups

**Company Response:**

FPUC objects to this Requests for Production as calling for the production of "all data, data sources, assumption, and calculations." These terms are vague, unduly burdensome, and include documents not in the possession of FPUC. If given full effect such request could encompass vast numbers of documents. FPUC has made a good faith, reasonably diligent attempt to identify and obtain responsive documents, but it is not practicable or even possible to identify, obtain, and produce "all" such information. FPUC also objects to this Requests seeking that FPUC provide documents in a specific electronic format. FPUC will produce electronic data in its native format. Non-electronic documents will be scanned and produced in PDF format. Without waiving the foregoing, FPUC offers the following explanation in lieu of production. Please refer to Mr. Taylor's testimony on page 9 lines 11- 23 and page 10 lines 1-12. As Mr. Taylor explains adjustments were not made to the forecast to account for recent economic trends, global energy markets, etc.

- a. No adjustments were made in the regression model to develop forecasted customer counts.
- b. No adjustments were made in the regression model to develop forecasted use per customer.

6. Please provide documents, in electronic Excel format and with cell formulas unlocked, of the statistical analysis that was used to determine that customer usage was not dependent on natural gas prices, as witness Taylor testifies to on page 7, lines 5-6 of his direct testimony.

**Company Response:**

FPUC objects to this Requests seeking that FPUC provide documents in a specific electronic format. FPUC will produce electronic data in its native format. Non-electronic documents will be scanned and produced in PDF format. Without waiving the foregoing objection, FPUC responds as follows.

Please refer to the response to Staff POD 2-3 and Staff POD 2-3 Attachment 4 and 6. Specifically, please refer to the Time-Series Decomposition section discussing the Correlation Chart, which provides correlation values and plots of the variables.

7. Referring to witness Taylor's direct testimony, page 7, lines 1-6, please provide all documents in the Company's possession pertaining to the Time-Series Decomposition of each forecast group.

**Company Response:**

FPUC objects to this Requests for Production as calling for the production of "all" documents. FPUC has made a good faith, reasonably diligent attempt to identify and obtain responsive documents, but it is not practicable or even possible to identify, obtain, and produce "all" documents. Without waiving this objection, the Company provides the following response. Please refer to the Company's response to Staff POD 2-3 Attachment 3 through Attachment 6 for the Time-Series Decomposition of each forecast group.

8. Please refer to Exhibit JDT-2 for the following. Please provide all documents in the Company's possession, in electronic Excel format and with cell formulas unlocked, used to forecast the customer and therm use per customer billing determinants based on the following methods:
- a. Historical Average
  - b. Base Period
  - c. Adjusted
  - d. UPC Growth Rate

**Company Response:**

FPUC objects to this Requests for Production as calling for the production of "all" documents. FPUC has made a good faith, reasonably diligent attempt to identify and obtain responsive documents, but it is not practicable or even possible to identify, obtain, and produce "all" documents. Without waiving this objection, the Company provides the following responses:

- a. Please refer to the Company's response to "OPC POD 21 WP-JDT Pro-Forma Rev and Other", which was used in the development of the forecasting billing determinants using Historical Average, Base Period, Adjusted, and UPC Growth Rate methods.
- b. See response to Staff POD 2-8(a).
- c. See response to Staff POD 2-8(a).
- d. See response to Staff POD 2-8(a).

9. Please provide the electronic spreadsheets (in excel format with formulas intact and cells unlocked) that depict the aggregation of the individual rate class customer and usage forecasts into company level forecasts, as witness Taylor testifies to on page 7, lines 17-18 of his direct testimony.

**Company Response:**

FPUC also objects to this Requests seeking that FPUC provide documents in a specific electronic format. FPUC will produce electronic data in its native format. Non-electronic documents will be scanned and produced in PDF format. Without waiving the foregoing objection, FPUC responds as follows. Please refer to the Company's response to "OPC POD 21 WP-JDT Pro-Forma Rev and Other". Specifically, refer to column I (Fcst Code) on the "Master" tab. This column I (Fcst Code) is used to look up regression results and develop forecasted billing determinants summarized on the "Report\_Regression" tab within the same file.