

STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

THE PEOPLES GAS LIGHT	:	
AND COKE COMPANY	:	
	:	No. 09-_____
Proposed General Increase	:	
In Rates For Gas Service	:	

Direct Testimony of

BRIAN M. MAROZAS

Manager, Planning, Modeling and Contract Administration
IntegrYS Business Support, LLC

On Behalf of

The Peoples Gas Light and Coke Company

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1 **I. INTRODUCTION AND WITNESS BACKGROUND**

2 **A. Witness Identification**

3 Q. Please state your name and business address.

4 A. My name is Brian M. Marozas. My business address is 130 E. Randolph Drive, Chicago,
5 Illinois, 60601.

6 Q. By whom are you employed and in what capacity?

7 A. I am employed by Integrys Business Support, LLC (“Integrys Support”). Integrys
8 Support is a centralized service company for Integrys Energy Group, Inc. (“Integrys”)
9 and its subsidiaries and affiliates. The Peoples Gas Light and Coke Company (“Peoples
10 Gas”) is a second tier, wholly-owned subsidiary of Integrys. My present position is
11 Manager of the Planning, Modeling and Contract Administration Department.

12 **B. Purpose of Testimony**

13 Q. Mr. Marozas, what is the purpose of your testimony?

14 A. I will explain how I developed the forecast of normal heating degree days (“HDD”) for
15 Peoples Gas.

16 **C. Summary of Conclusions**

17 Q. Please summarize your conclusions.

18 A. Using a twelve-year average (1996-2007) for HDD, I forecast 6,095 as the normal HDD.

19 **D. Background and Experience**

20 Q. Please briefly outline your educational background.

21 A. I have a B.A. in Mathematics & Statistics from Miami University, a B.A. in Engineering
22 Physics from Miami University, and an M.B.A. in Finance from DePaul University.

23 Q. Please summarize your work experience.

24 A. I joined Peoples Gas in 1991 as a member of the Gas Supply Planning Department where
25 I performed various duties related to the operation of the demand forecast and supply
26 optimization models for Peoples Gas and its affiliate, North Shore Gas Company (“North
27 Shore”). In 1998, I transferred to the Gas Supply Administration Department where I
28 performed various duties related to the purchase, transportation and storage of natural gas
29 for Peoples Gas and North Shore. In 1999, I became Risk Manager of Peoples Energy
30 Corporation’s Trading Risk Management Department where I performed various duties
31 related to managing market, operational, and other risks at Peoples Energy Corporation’s
32 different business segments. In 2004, I assumed the position of Senior Financial Analyst
33 in the Financial Analysis Department. In this position, I performed various duties related
34 to financial modeling. These models are used for long-term strategic planning, merger
35 and acquisition analyses, and large capital projects analyses. In 2007, I assumed my
36 present position and manage a services group (i.e. the Planning, Modeling and Contract
37 Administration Department) that supports Integrys Gas Group’s Gas Supply area.
38 (“Integrys Gas Group” refers to the five gas utility subsidiaries of Integrys.) Some
39 examples of services provided to the Gas Supply area are listed below:

- 40 • Coordination and assistance in the procurement of term gas supplies;
- 41 • Coordination and assistance in the procurement of pipeline transportation and
42 storage capacity;
- 43 • Support for testimony at state and federal regulatory proceedings regarding gas
44 supply;
- 45 • Modeling work needed to support the portfolio planning and other related
46 processes;
- 47 • Coordination and assistance in forecasting peak day demand;

- 48 • Coordination and assistance in securing NAESB base contracts with various
49 suppliers; and
- 50 • Contract administration leadership and guidance through the maintenance of all
51 contract files.

52 Q. Have you previously testified before any regulatory agency?

53 A. Yes, I have. I presented testimony before the Illinois Commerce Commission (“ICC” or
54 “Commission”) in ICC Docket Nos. 07-0241 and 07-0242 (Cons.), which are North
55 Shore’s and Peoples Gas’ most recent general rate cases.

56 **II. FORECAST OF NORMAL HEATING DEGREE DAYS**

57 Q. On what did you base your forecast of normal HDD?

58 A. I based the forecast on actual historical observations of the yearly HDD data recorded at
59 the O’Hare Airport weather station from 1959 to 2007.

60 Q. Please explain how you used this data to obtain a normal HDD forecast.

61 A. I used the common forecasting technique of using the average of historical outcomes to
62 predict future outcomes. In this case, I used the average of historical annual HDD to
63 predict weather three years into the future. For this analysis, I tested thirty alternative
64 means of forecasting normal HDD: 1) 1-year of HDD data in 2007, 2) a 2-year average of
65 HDD data ending in 2007, et cetera, and 30) a 30-year average of HDD data also ending
66 in 2007. I then conducted a statistical comparison of the predictive capability of these
67 time horizons to determine which was more appropriate. Specifically, I first calculated
68 and compared the root mean squared error for each of the averaging periods. Second, to
69 better understand these periods, I used a linear regression technique to examine the
70 trending behavior of the HDD data.

71 Q. Please describe how you analyzed the HDD data.

72 A. The data series from O'Hare Airport weather station begins in 1959, so it was possible to
73 calculate the 1 to 30-year averages for the years ending 1988 through 2007. I compared
74 the 1 to 30-year average HDD figure for each year with the actual temperature observed
75 three years later. For example, I compared the 1 to 30-year averages for 1988 with the
76 actual temperature for 1991, recording the difference (error) between the actual and
77 forecasted values for each. I repeated this process for each year from 1989 to 2004, the
78 most recent year for which actual data existed three years later. The analysis I conducted
79 parallels the situation with which Peoples Gas is confronted: using HDD data of the most
80 recent year available (2007) in order to predict weather three years ahead (2010, Peoples
81 Gas' test year).

82 Q. How did you compare the predictive capabilities of the thirty averages?

83 A. I conducted a statistical analysis to compare the predictive capabilities of the 1 to 30-year
84 averages. I calculated a standard statistic called the "root mean squared error"
85 ("RMSE"). The RMSE statistic, which is widely used to measure the accuracy of
86 forecasts, is a number representing the degree to which forecasted values differ from
87 actual data. The smaller the RMSE, the smaller the overall differences between the
88 actual and forecasted HDD. The formula for the RMSE is:

89
$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^n (HDD_i - HDD_i^F)^2}$$
 where the letter i denotes the year of the observation,

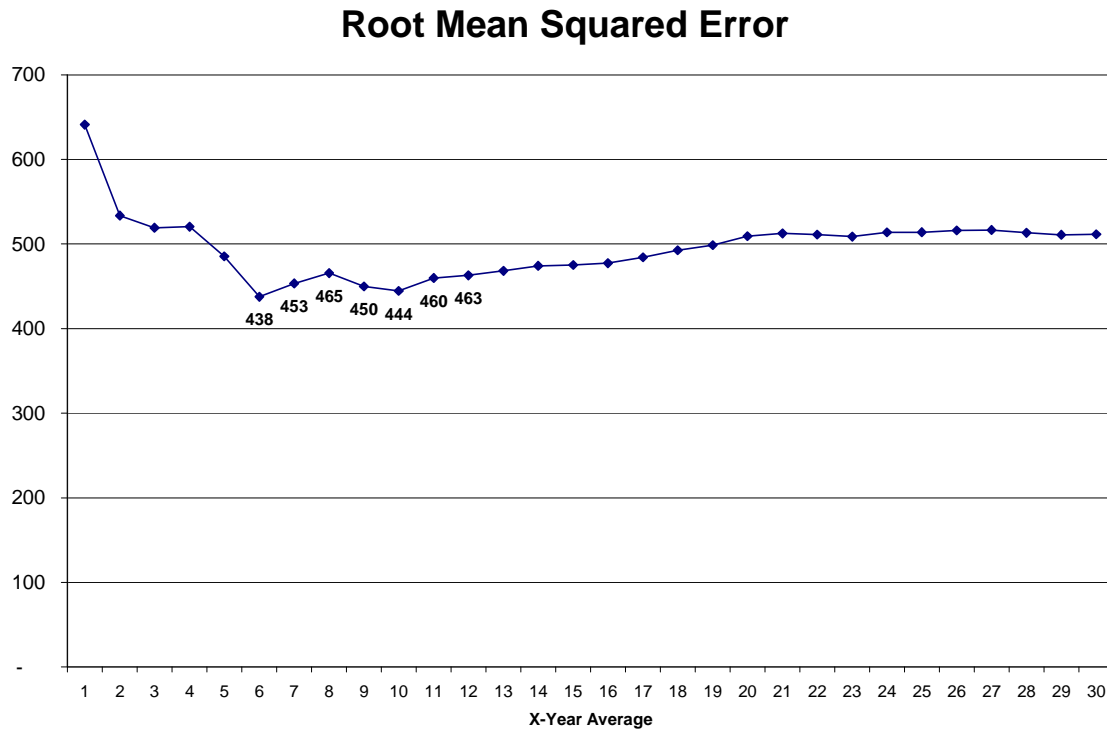
90 n denotes the total number of years (*i.e.*, 17), HDD_i refers to actual values, and HDD_i^F is
91 the forecasted HDD. $(HDD_i - HDD_i^F)$, therefore, measures the difference between
92 actual and forecasted value.

93 Q. Please describe your results.

94 A. My results are shown in Figure 1. Based on O'Hare weather station's historical data, the
95 6 to 12-year HDD average outperforms all other averages in predicting weather three
96 years into the future. In other words, as a forecasting instrument, the 6 to 12-year
97 averages tend to produce more accurate forecasts than all other averages. The data in
98 Figure 1 show that the seven most accurate averaging periods (in descending order of
99 accuracy) are 6 years, 10 years, 9 years, 7 years, 11 years, 12 years and 8 years for the
100 RMSE. These results show a clustering around a 10-year HDD average. Based on the
101 RMSE test, therefore, a 10-year HDD average represents the **most appropriate** option
102 for purposes of forecasting HDD.

103 Q. Besides the 10-year HDD average, is there another average that would be **an**
104 **appropriate** option for purposes of forecasting HDD?

105 A. Yes. Since the 12-year HDD average is part of this cluster, and since it was the approved
106 methodology from Peoples Gas' most recent rate case (ICC Docket Nos. 07-0241 and
107 07-0242 (Cons.)), the 12-year HDD average would be an appropriate option for purposes
108 of forecasting HDD.

Figure 1

110 Q. You said you examined the data using a linear regression technique. Please explain.

111 A. Linear regression is a technique used to explain the relationship between two variables by
 112 finding a straight line that best fits the data. Here, the two variables are the year and the
 113 observed HDD, and the linear regression technique can be used to estimate a time trend
 114 in the O'Hare HDD data. I used this model to obtain a HDD forecast, using the trend
 115 line. To perform the regressions, I used Microsoft[®] Excel.

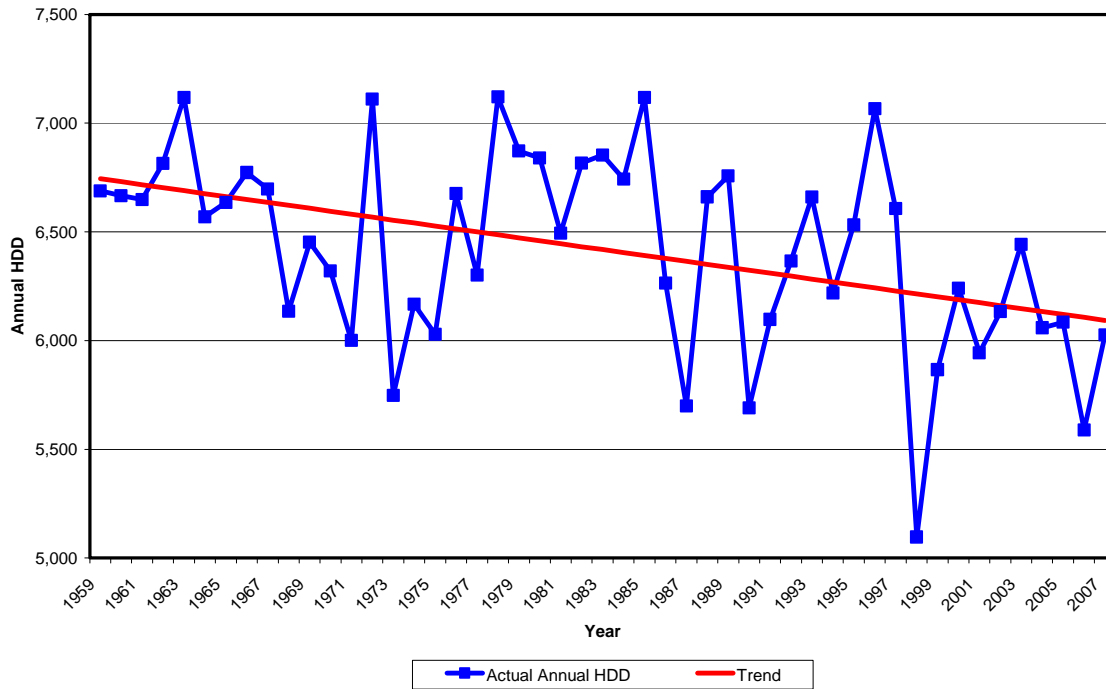
116 Q. What time period did you use to develop a forecast based on a linear regression?

117 A. I used HDD data from O'Hare for fiscal years 1959-2007.

118 Q. What were the results of your regression analysis?

119 A. Figure 2 shows the annual HDD observations and the trend line that best fits these points
120 for the years 1959-2007. The fitted line shows a downward trend that is statistically
121 significant as measured by a t-statistic. Broadly speaking, a test of significance is a
122 procedure by which sample results are used to verify the truth or falsity of a null
123 hypothesis. In our case, the null hypothesis is that the trend line is flat (*i.e.*, there is no
124 trend). In the language of significance tests, a statistic is said to be statistically
125 significant if the value of the test statistic lies in the critical region. This is a region of
126 values that would make the null hypothesis improbable should the results of the test of
127 significance fall into that region but would be relatively plausible for the alternative
128 hypothesis (*i.e.*, there is a trend). In this case the null hypothesis (*i.e.*, no trend) is
129 rejected. For the Peoples Gas regression analysis, the t-test would reject the null
130 hypothesis for every explanatory variable in the trend line equations to the 99th
131 percentile. In other words, each of the explanatory variables is statistically significant.

Figure 2



133

134 Q. What is the importance of this trend line to your analysis?

135 A. If a data series is “trend-less” (*i.e.*, the line slope is equal to zero), then its mean value
 136 will remain stable in time. In this case, an average calculated over a wide set of
 137 observations would be a good predictor of future values given that data is essentially
 138 mean stationary. However, the O’Hare HDD data shows a significant downward trend.
 139 Under these circumstances, any prediction that relies on an average taken over a long
 140 period of time (*e.g.*, 30 years) ignores the historical progression of the HDD series and
 141 would not be expected to be as accurate as an average based on a shorter time period
 142 (*e.g.*, 6-12 years) relating to a more recent period.

143 Q. What do you conclude from your forecasting results?

144 A. Table 1 shows the projection based on the 2007 6 to 12-year HDD averages at O’Hare.

Table 1

HDD Forecast Analysis	
<u>Method</u>	<u>2010 Forecast</u>
6-Year Average	6,056
7-Year Average	6,039
8-Year Average	6,065
9-Year Average	6,043
10-Year Average	5,948
11-Year Average	6,008
12-Year Average	6,095

145 As noted above, given the clear downward trend in HDD, a forecast based on a longer
146 term HDD average will tend to overstate expected HDD. A 12-year HDD average has
147 less of a tendency to overstate HDD since it focuses on a more recent period, thus partly
148 reflecting the historical downward trend in HDD. A forecast based on the 12-year
149 average reflects the historical trend, without forecasting that the trend will continue.
150 Based on these observations and the RMSE test results, I conclude that a 12-year HDD
151 average, 6,095 HDD, provides an appropriate forecast of normal weather.

152 Q. Does this conclude your direct testimony?

153 A. Yes, it does.