

BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of
Central Hudson Gas and Electric Corporation
Cases 08-E-0887 & 08-G-0888
November 2008

Prepared Testimony of:

STAFF FORECASTING PANEL

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Water

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Department of Public Service
Three Empire State Plaza
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1 Q. Please state your names and business addresses.

2 A. Our names are Mary Ann Sorrentino and Gregory P.

3 Stella. Our business address is Three Empire

4 State Plaza, Albany, NY 12223.

5 Q. Ms. Sorrentino, have you previously discussed

6 your position, educational background and

7 professional experience?

8 A. Yes, that information is included within the

9 testimony of the Gas Rates Panel.

10 Q. Mr. Stella, by whom are you employed, and in

11 what capacity?

12 A. I am employed by the New York State Department

13 of Public Service (Department) as an Associate

14 Economist.

15 Q. Have you previously filed testimony before the

16 New York State Public Service Commission?

17 A. Yes, most recently in Case 07-E-0949.

18 Q. Mr. Stella, please briefly discuss your

19 educational background and professional

20 experience.

21 A. I hold a Ph.D. in Ecological Economics (2003)

22 from Rensselaer Polytechnic Institute.

23 Previously, I received Bachelor of Science and

24 Master of Arts degrees in Economics from the

1 State University of New York at Albany. My
2 initial work in the field of energy sales
3 forecasting was as an employee of the New York
4 State Energy Office, as part of the State's
5 Energy Master Plan process. Prior to joining
6 the Department in 2006, my most recent work
7 involved teaching applied forecasting techniques
8 as part of a course in Managerial Economics at
9 SUNY Albany in 2004 and 2005.

10 Q. What is the purpose of this Panel's testimony?

11 A. We are presenting Staff's recommendations
12 concerning gas customer counts, gas sales,
13 electricity customer counts, and electricity
14 sales for Central Hudson Gas and Electric
15 (Central Hudson or the Company), in response to
16 testimony filed by the Company's Gas Forecasting
17 Panel and Electric Forecasting Panel.

18 Q. Did you rely upon any information produced
19 during the discovery phase of this proceeding?

20 A. Yes. We relied on responses to numerous
21 interrogatory requests, especially those
22 supplying data on customer counts, energy usage,
23 and constructed forecast drivers.

24 Q. Is the Panel sponsoring any exhibits?

- 1 A. Yes.
- 2 Exhibit ___(FP-1) contains Company responses to
- 3 Staff interrogatories (DPS-8) and (DPS-37(i))
- 4 used in the development of this Panel's direct
- 5 testimony.
- 6 Exhibit ___(FP-2) contains gas customer and
- 7 sales regression results.
- 8 Exhibit ___(FP-3) contains electric customer and
- 9 sales regression results.
- 10 Exhibit ___(FP-4) shows a comparison of forecast
- 11 usage per customer for both gas and electric
- 12 residential heat.
- 13 Exhibit ___(FP-5) shows this Panel's regression
- 14 of gas heating degree days on time.
- 15 Exhibit ___(FP-6) is the Panel's gas sales
- 16 forecast.
- 17 Exhibit ___(FP-7) is the Panel's electricity
- 18 sales forecast.
- 19 Q. Please give a brief overview of the econometric
- 20 models used by Central Hudson to produce its
- 21 forecasts.
- 22 A. The Company's customer forecasting models employ
- 23 common specifications - the various projections
- 24 are driven by households, population,

1 employment, or past values (when exponential
2 smoothing is used). Its sales-per-customer
3 models are somewhat unique in that they rely on
4 nonlinear combinations of key economic,
5 demographic, and climatic variables to act as
6 forecast drivers. Regression coefficients of
7 these "X" variables act as scaling factors to
8 calibrate the models to the Central Hudson
9 service territory, and have no direct economic
10 interpretation. The only implied constraint is
11 that if each imposed nonlinearity (i.e.,
12 elasticity) has the correct sign, then the
13 coefficient of the corresponding "X" variable
14 would logically be positive.

15 Q. Please give an overview of how you assessed the
16 Company's models and projections.

17 A. Our assessment was accomplished in three stages.
18 In stage one, the model results presented by the
19 Company's two forecasting panels were
20 reproduced. This was done to verify the
21 accuracy of the historical data we received from
22 the Company. In stage two, we formulated our
23 own forecasting equations (using the same
24 historical data) with the Company's models as a

1 starting point. This process involved testing
2 the functional forms and several of the input
3 assumptions used by the Company. These were
4 checked for consistency both with economic
5 theory (e.g., sign and magnitude of the
6 individual coefficients) and with the
7 assumptions underlying the estimation procedure
8 (e.g., uncorrelated regression errors), and
9 subsequently were modified when our statistical
10 results indicated it was appropriate to do so.
11 Our estimation results are presented in
12 Exhibit___ (FP-2) (gas customers and sales) and
13 Exhibit___ (FP-3) (electric customers and
14 sales). In the final stage, we produced our own
15 forecasts using these modified equations, and
16 examined if these results differed materially
17 from those presented by the Company.

18 Q. Did you find the structure of the Company's
19 forecasting models acceptable?

20 A. Yes. In general, we found the regression
21 coefficients consistent with economic theory.
22 We are apprehensive about the structure of its
23 forecasting equations for commercial and
24 industrial non-demand electric sales, as in both

1 equations the coefficient of a key forecast
2 driver is negative. These exceptions aside, we
3 believe our changes to the Company's equations -
4 altering elasticity assumptions, adjusting error
5 structures, including/removing monthly dummy
6 variables, etc. - amount to minor adjustments to
7 the models. For example, an examination of
8 forecast sales to residential heating customers
9 showed changes to the forecasts of less than
10 one-half of one percent for gas, and less than
11 one percent for electricity, when identical
12 values of forecast drivers were used; details
13 are presented in Exhibit____(FP-4). We have
14 therefore concluded that any large forecast
15 differences are ultimately due to changes in
16 Rate Year values of forecast drivers.

17 Q. Please discuss the most significant differences
18 in the Panel's categorical forecasting equations
19 in comparison to the Company's.

20 A. We adjusted four of the elasticities assumed by
21 the Company: the income elasticity for gas and
22 electric residential non-heating sales, and the
23 output elasticity for gas commercial non-heating
24 and gas OPA sales. Wald tests showed that all

- 1 our point estimates differ from their original,
2 predetermined values at a 5% significance level.
3 Our model for industrial non-demand electricity
4 sales contains a varying-parameter (random walk)
5 intercept, projected out at its latest estimated
6 value. All our customer count forecasting
7 models predict customer numbers directly, as
8 opposed to indirectly through the prediction of
9 a rolling average. Since the forecast
10 saturation of gas space heating is a factor in
11 determining the fraction of residential space
12 heating electric customers, our residential
13 customer models also interconnect across fuels.
- 14 Q. Which of your forecast drivers' projected values
15 were identical to those used by the Company?
- 16 A. We accepted all indices reflecting Economy.com's
17 forecasts of employment, income and demographic-
18 related variables. Similarly, none of the
19 projections of engineering-based indices
20 embedded in the "X" variables supplied by Itron
21 were changed. We also used the same projections
22 for gas and electricity prices.
- 23 Q. To which forecast drivers did you make
24 modifications?

1 A. We modified the Company's forecasts of heating
2 degree-days and cooling degree-days to reflect
3 the respective latest 30-year averages, instead
4 of the trended-via-regression approach proposed
5 by the Company in this proceeding. For those
6 equations where degree-day projections are used
7 directly, we simply substituted our projections
8 for the Company's. Where degree-days enter
9 indirectly (through the heating- and cooling-
10 related "X" variables), we adjusted these
11 variables accordingly. Degree-days are used to
12 capture the effect, primarily through the end-
13 uses of electric air conditioning, electric
14 space heating, and gas space heating, of
15 temperature on sales.

16 Q. How did you adjust the variables to reflect your
17 degree-day modification?

18 A. Company work papers provided to Staff showed
19 that billing cycle-weighted degree-days enter
20 into the temperature-sensitive "X" variables as
21 a direct multiple. Therefore, we divided the
22 original forecast values by the Company's
23 degree-day projections, and multiplied by our

1 degree-day projections, thus creating the
2 desired forecast drivers.

3 Q. Explain the Panel's concern regarding the
4 Company's proposal.

5 A. As justification for the change in degree-day
6 methodology, the Company ultimately relies on
7 predictions of the United Nation's
8 Intergovernmental Panel on Climate Change, which
9 forecasts a continuation of global warming based
10 on the increasing presence of greenhouse gasses
11 from human activities. However, putting the
12 issue of global warming aside, we find the
13 Company's statistical evidence shows only an
14 inconsequential warming effect within its
15 service territory.

16 Q. Can you be more specific about the Company's
17 evidence in support of a trend in electric
18 degree days?

19 A. Yes. In response to Staff interrogatory DPS-
20 37(i), attached as Exhibit ____ (FP-1), pages
21 10-32, the Company provided 24 supporting
22 bivariate linear regression results of monthly
23 degree-days (electric) versus time. Nine of the
24 24 estimated equations, representing monthly

1 cooling degree-days from October through April
2 and monthly heating degree-days in July and
3 August, have little practical importance, as
4 less than one degree-day per day is a typical
5 occurrence. Of the remaining 15 equations, one
6 month (May) shows slight evidence of cooling,
7 not warming. Additionally, only for September
8 heating degree-days does the time trend have the
9 correct sign and meet the standard criterion for
10 variable inclusion: a P-Value no greater than
11 five percent. All variables included in the
12 Company's customer and sales models pass this
13 threshold. Had the Company applied this
14 criterion to its degree-day equations, it would
15 have discarded the time trend as insignificant
16 in all but the September heating degree-day
17 equation. What would remain for all other
18 months is an equation estimating degree-days as
19 a constant - i.e., at that month's average
20 historical level - duplicating the latest
21 30-year average approach. Alone, the proposed
22 September adjustment would lower forecasted
23 total heating degree-days negligibly, by less
24 than one percent.

- 1 Q. Can you be more specific about the Company's
2 estimate of a time trend in gas degree days?
- 3 A. Yes. Likewise, in response to Staff
4 interrogatory DPS-8, attached as Exhibit
5 ____ (FP-1), pages 3-7, the Company provided 13
6 regression results on gas-day based heating
7 degree-days: 12 month-specific regressions, and
8 one aggregate result. Similar to the regression
9 results for the electric heating degree-days,
10 only for the month of September is the sign and
11 P-Value as expected. Both of the two other
12 strongly significant slope coefficients - for
13 the months of July and August - have a positive
14 value, indicating that these months are getting
15 cooler over time, not warmer. While the
16 aggregate gas heating degree-day regression has
17 a statistically significant negative slope (an
18 indication of overall annual warming) this
19 particular result is misleading, as we will
20 explain below.
- 21 Q. Does the Panel have any other justification for
22 utilizing a 30-year average?
- 23 A. Yes. The World Meteorological Organization
24 (WMO) uses a simple 30-year average to define

1 normal weather. Also, every gas local
2 distribution company (LDC) in New York State
3 that has a weather normalization adjustment
4 utilizes this accepted international standard.
5 The Company's testimony does not provide
6 sufficient reasons for Central Hudson to deviate
7 from the definition used in Commission approved
8 applications by every LDC in New York State.

9 Q. Is the use of a 30-year average necessarily
10 inconsistent with research quoted by the
11 Company's Electric Forecasting Panel at page 19,
12 lines 19 and 20, which reads: "recent trends in
13 the climate are approximately linear"?

14 A. No. The cited research by Livezey et al. also
15 states at page 12 "... the WMO technique is a good
16 treatment for very weak climate trends ..." We
17 believe just such a circumstance (weak climate
18 trends) exists here.

19 Q. Do you have any other concerns?

20 A. Yes. A formal model of degree-days should
21 account for three separate effects: short-term
22 shocks, intermediate-term cyclical movements,
23 and long-term trends. While all these effects
24 are accounted for (as warranted) in the

1 Company's sales models, in the form of
2 autoregressive (AR) and moving average (MA)
3 terms, monthly dummy variables, and constructed
4 variables, respectively, the Company's degree-
5 day forecasting methodology effectively omits
6 all but the long-term trend. Given the well-
7 known importance of shorter-term climatological
8 effects (such as El Nino / La Nina
9 oscillations), we cannot concur the Company's
10 approach produces, as is stated at page 20 of
11 Central Hudson's Electric Forecasting Panel
12 direct testimony, the "most reasonably expected"
13 degree-day projections. For all these reasons,
14 we do not agree that the degree-day forecasting
15 equations presented by the Company are
16 consistent with a best forecast, and therefore
17 recommend continuing the status quo use of a
18 most recent 30-year average as a projection for
19 normal climate conditions.

20 Q. Please expound on your earlier statement that
21 the aggregate gas heating degree-day regression
22 is misleading.

23 A. It is misleading because the Company's
24 regression did not account for the statistical

1 property known as heteroskedasticity; that is,
2 unequal error variability from month to month.
3 An implicit assumption underlying the Company's
4 estimation of this equation is that the expected
5 value of all error terms, when squared, is the
6 same at any given point. As the range of errors
7 surrounding the January degree-day estimates
8 differ markedly from those surrounding the June
9 estimates, the assumption of time-independent
10 variance is a mistake. The consequences of such
11 a mistake were stated succinctly by
12 econometrician Robert Engle in a Fall, 2001
13 Journal of Economic Perspectives article at page
14 157: "The standard warning is that in the
15 presence of heteroskedasticity, the regression
16 coefficients for an ordinary least squares a
17 regression are still unbiased, but the standard
18 errors and confidence intervals estimated by
19 conventional procedures will be too narrow,
20 giving a false sense of precision."

21 Q. Did you perform a corrected version of the
22 regression?

23 A. Yes. We used an AutoRegressive Conditional
24 Heteroskedasticity (ARCH) model, which treats

1 heteroskedasticity as a non-constant variance to
2 be modeled.

3 Q. What was the result of this re-estimation?

4 A. The coefficient on the time trend remained
5 negative, but it no longer had a sufficiently
6 low P-Value. We have included this regression
7 result as Exhibit___ (FP-5).

8 Q. Returning to your customer forecasting results,
9 what did you find when comparing the two sets of
10 forecasts for the Rate Year ending June 30,
11 2010?

12 A. For both gas and electricity, all pairs of
13 customer forecasts were similar, with only small
14 differences in absolute and/or percentage terms.

15 Q. What is your recommendation to the Commission
16 with respect to forecasts of customer counts?

17 A. We recommend the Company's customer forecasts
18 for both gas and electricity be adopted, and we
19 have incorporated the Company's numbers to
20 produce our sales forecasts.

21 Q. How do the two sets of sales forecasts compare
22 for the Rate Year ending June 30, 2010?

23 A. Our forecasts for total billed sales of both gas
24 and electricity are higher than the Company's

1 forecasts, although this is not a uniform result
2 across service classes; several of our service
3 class-specific projections are lower than the
4 Company's corresponding figures. In general,
5 the more weather-sensitive a class is, the
6 larger the differences between forecasts.

7 Q. What are the specific sales projections produced
8 by the Panel's equations?

9 A. Aggregate and category specific forecasts for
10 gas sales for the 12 months ending June, 2010
11 are shown in Exhibit___ (FP-6); corresponding
12 figures for electricity sales are shown in
13 Exhibit___ (FP-7).

14 Q. What is your recommendation to the Commission
15 with regard to the Rate Year ending June 30,
16 2009?

17 A. We recommend that the Commission adopt the
18 forecasts we have presented in this proceeding,
19 as they are the forecasts consistent with the
20 status quo definition of normal climate.

21 Q. Does the Forecasting Panel intend to revise its
22 forecasts to reflect latest available data?

23 A. Yes.

24 Q. Does this conclude the Panel's testimony at this

- 1 time?
- 2 A. Yes, it does.