COLUMBIA STATEMENT NO. 2

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission	)	
vs.	)	Docket No. R-2015-2468056
Columbia Gas of Pennsylvania, Inc.	)	

DIRECT TESTIMONY OF
AMY L. EFLAND
ON BEHALF OF
COLUMBIA GAS OF PENNSYLVANIA, INC.

March 19, 2015

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I. Introduction

Q. Please state your name and business address.

A. My name is Amy L. Efland and my business address is 290 W. Nationwide Blvd. Columbus, OH 43215.

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

A. I am a Lead Forecasting Analyst for the NiSource Corporate Services Company.

Q. What are your responsibilities as Lead Forecasting Analyst?

A. I assist with the development of short-range and long-range forecasts of customers, energy consumption and peak demand for seven NiSource gas distribution companies, including Columbia Gas of Pennsylvania ("Columbia" or the "Company") and one NiSource electric company. I also assist with other business related analyses and forecasts.

Q. What is your educational and professional background?

A. I attended Earlham College where I earned a Bachelor of Arts Degree in Economics and Miami University where I earned a Master of Arts Degree in Economics. From 1997 to 2002, I worked as a forecast analyst for Cinergy, assisting with the production of the gas and electric long-term forecasts of customers, energy consumption and peak demand for the Cinergy (Public Service Indiana, Union Light, Heat & Power, and Cincinnati Gas & Electric) territories. I was promoted to Lead Analyst in 2002, a position I held until I left Cinergy in 2005. From 2005 to 2006, I worked as a Senior Forecasting Analyst with Limited Brands/Victoria's

Secret Direct. I provided analysis and recommendations surrounding circulation levels of catalogues and assisted with catalogue messaging relating to marketing offers. From 2006 to 2008, I worked as a Senior Marketing Analyst for JP Morgan Chase where I was responsible for the development of test designs for consumer and business banking marketing programs. I joined NiSource in 2008 as a Senior Forecast Analyst. In 2014, my title was changed to Lead Forecasting Analyst reflecting the same responsibilities I held while a Senior Forecast Analyst.

Q. Have you testified before this or any other Commission?

A. Yes, I have provided direct testimony related to weather normalization and customer usage trends before the Pennsylvania Public Utility Commission ("Commission"), Docket Nos. R-2009-2149262, R-2010-2215623, R-2012-2321748, R-2014-2406274 and the Kentucky Public Service Commission, Case No. 2009-00141.

Q. What test years will you be addressing in this testimony?

A. I will be addressing the twelve-month period ending November 30, 2014 as the Historic Test Year, the twelve-month period ending November 30, 2015 as the Future Test Year, and the twelve-month period ending December 31, 2016 as the Fully Forecasted Rate Year.

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

A. I will explain how residential and commercial sales are normalized for weather. The results of the normalization process are contained in Company witness Lai's testimony (Columbia Statement No. 3) and Exhibit 3 Schedule 4. I will also explain sales growth and comment on the residential consumption per customer.

II. Weather Normalization Process

Q. Please explain the weather normalization process.

A. For each month of the Historic Test Year for the residential and commercial classes, actual billing month sales per customer is separated into base-usage and temperature-sensitive usage. Temperature-sensitive usage is then scaled by the ratio of normal to actual heating degree days ("HDD") to derive normal temperature-sensitive use per customer. The normal temperature-sensitive use per customer is then added to the base-use per customer to arrive at the normal sales per customer. This value is then multiplied by the customer count to derive the normal sales.

Q. What data sources did you use for your calculations?

A. I used the Company's billing records to obtain monthly customer counts and billed sales. The temperatures used to calculate HDD were obtained from National Weather Service weather stations throughout the Company's service territory. Due to the geographical dispersion of Columbia's customers, temperature data from multiple weather stations is used. A weighted average HDD for the Company is calculated using the percent of residential heating customers assigned to each station as a weight for that station.

Q. How does the process calculate base usage?

A. The process assumes no temperature sensitive (heat) usage in July and August. For September, no temperature sensitive (heat) use is assumed when total use per customer per day (Total Use/Customer/Day) is less than July and/or August. The base use per customer per day is calculated by taking the average of the two lowest observed values from the months of July through September.

Q. How does the process weather normalize monthly sales?

A. First, the monthly base use per customer is determined. This equals the lesser of the base use per customer per day multiplied by the days in the billing cycle ((base use /customer/day)*days in billing cycle) or the monthly total use per customer. Second, monthly heat use per customer is calculated. Heat use per customer equals the total use per customer minus the base use. Third, the heat use per customer is normalized by multiplying by a ratio of Normal HDD to Actual HDD. Finally, normal use per customer is calculated by adding the base use per customer to the normal heat use per customer. Total monthly normalized usage is generated by multiplying monthly customers by the monthly normal use per customer. This calculation for the Historic Test Year is prepared separately for residential and commercial customers and the results are presented in Exhibit 10, Schedule 8.

Q. Has the process for normalizing weather changed from Columbia's last rate filing?

A. No—not other than updating the historic averages to include the most recent 20-year history. Normal weather is defined in this filing as the average HDD for the 20 years ended 2013. The previous base rate case filing defined normal weather as the

20-year average ending in 2012. In all other respects, the normalization process is the same.

Q. Why is Columbia using the 20-year average?

A. The settlement of the Company's 2014 base rate proceeding at Docket No. R-2014-2406274 designed rates based upon the Company's proposed throughput volumes, which reflected the Company's use of the 20-year average. Consistent with the Company's approach since 2008, the Company proposes to continue to use the 20-year average because an analysis of weather data shows that a rolling 20-year average is a superior measure to a rolling 30-year average. Table 1 below illustrates that, as a predictor of one-year-ahead weather, the 20-year average outperforms the 30-year average in 71% of the most recent 35 years. Table 1 also illustrates that the 20-year average has a lower mean absolute error, as compared to the 30-year average when considering both the most recent 35 year period and the most recent 10 year period.

In Table 2, the averages are used every year to predict each five year period for the 5-years ended 1985 through the five years ended 2014. In this analysis, the performance of the 20-year averages are compared to the 30-year average. When determining the smallest difference over the 5-year period, the 20-year average outperforms the 30-year average in 83% or 25 out of the 30 periods. When considering the most recent 10 periods, the 20-year average outperforms the 30-year average in 100% or all of the 10 periods.

Table 3 demonstrates that stability is not sacrificed when using a 20-year average. The average annual change for the 20-year average is 0.4%, while the average annual change for the 30-year averages is 0.3%. The 20-year normal is not only a better predictor, but also a more dynamic measure that is better able to react more quickly to change because it replaces 5% of the data each year rather than the 3% that is replaced with the 30-year average. This is particularly important, given the Company's frequent rate case filings. In conclusion, the 20-year measure performs better as compared to the 30-year in both the year ahead analysis and the five year analysis, and is both a better predictor and a more dynamic measure when compared to the 30-year average.

Table 1
Weather Averages as Predictors
Moving Averages used to Predict Following Years
Columbia Gas of Pennsylvania

	Annual Heating Degree Days			Absolute Error		Better 1-year predictor	
	Actual	20-yr Average	30-yr Average	20-yr Average	30-yr Average	20-yr Average	30-yr Average
1980	6010	5877	5766				
1981	6219	5887	5790	342	453	x	
1982	5915	5880	5811	28	125	x	
1983	5568	5848	5831	312	243		x
1984	6064	5860	5853	216	233	x	
1985	5236	5831	5845	624	617		x
1986	5571	5818	5839	260	274	x	
1987	5456	5796	5838	362	383	x	
1988	5892	5791	5835	96	54		x
1989	5724	5778	5833	67	111	x	
1990	5071	5737	5808	707	762	x	
1991	4908	5692	5771	829	900	x	
1992	5558	5680	5755	134	213	x	
1993	5455	5693	5730	225	300	x	
1994	5719	5709	5726	26	11		x
1995	5427	5706	5713	282	299	x	
1996	6005	5704	5719	299	292		x
1997	5641	5681	5711	63	78	x	
1998	4590	5601	5664	1091	1121	x	
1999	5166	5560	5637	435	498	x	
2000	5403	5529	5621	157	234	x	
2001	5385	5488	5606	144	236	x	
2002	5304	5457	5590	184	302	x	
2003	5825	5470	5611	368	236		x
2004	5329	5433	5608	141	282	x	
2005	5564	5450	5611	131	44		x
2006	5175	5430	5582	275	436	x	
2007	5295	5422	5555	135	287	x	
2008	5526	5404	5533	104	29		x
2009	5447	5390	5515	44	86	x	
2010	5400	5406	5495	10	115	x	
2011	5421	5432	5468	15	74	x	
2012	4669	5387	5426	763	799	x	
2013	5486	5389	5424	99	60		x
2014	5950	5400	5420	561	526		x

	Mean Absolute Error		Frequency of Lowest Absolute Error	
1981-2014	280	315	24	10
2005-2014	214	246	6	4

Relative Frequency of Lowest Absolute Error		
1981-2014	71%	29%
2005-2014	60%	40%

Table 2
Weather Averages as Predictors
Moving Averages used to Predict the Following Five Years
Columbia Gas of Pennsylvania

	Annual Heating Degree Days			Five Year Sum of Errors		Better 5-year predictor	
	Actual	20-yr Average	30-yr Average	20-yr Average	30-yr Average	20-yr Average	30-yr Average
1980	6010	5877	5766				
1981	6219	5887	5790				
1982	5915	5880	5811				
1983	5568	5848	5831				
1984	6064	5860	5853				
1985	5236	5831	5845	-382	173		x
1986	5571	5818	5839	-1080	-597		x
1987	5456	5796	5838	-1506	-1159		x
1988	5892	5791	5835	-1022	-937		x
1989	5724	5778	5833	-1422	-1386		x
1990	5071	5737	5808	-1442	-1512	x	
1991	4908	5692	5771	-2040	-2146	x	
1992	5558	5680	5755	-1827	-2038	x	
1993	5455	5693	5730	-2239	-2458	x	
1994	5719	5709	5726	-2179	-2454	x	
1995	5427	5706	5713	-1619	-1975	x	
1996	6005	5704	5719	-297	-693	x	
1997	5641	5681	5711	-151	-529	x	
1998	4590	5601	5664	-1083	-1268	x	
1999	5166	5560	5637	-1715	-1803	x	
2000	5403	5529	5621	-1725	-1762	x	
2001	5385	5488	5606	-2334	-2412	x	
2002	5304	5457	5590	-2557	-2706	x	
2003	5825	5470	5611	-924	-1236	x	
2004	5329	5433	5608	-553	-937	x	
2005	5564	5450	5611	-240	-696	x	
2006	5175	5430	5582	-241	-835	x	
2007	5295	5422	5555	-98	-760	x	
2008	5526	5404	5533	-461	-1165	x	
2009	5447	5390	5515	-159	-1035	x	
2010	5400	5406	5495	-405	-1212	x	
2011	5421	5432	5468	-60	-820	x	
2012	4669	5387	5426	-646	-1313	x	
2013	5486	5389	5424	-595	-1244	x	
2014	5950	5400	5420	-22	-649	x	

	Mean Error		Frequency of Lowest Error	
1985-2014	-1034	-1319	25	5
2005-2014	-293	-973	10	0

Relative Frequency of Lowest Error		
1985-2014	83%	17%
2005-2014	100%	0%

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Table 3

Stability of Weather Averages Annual Change in Averages 1981-2014 Absolute Values Columbia Gas of Pennsylvania			
	20-yr Average	30-yr Average	Annual HDD
Average	0.4%	0.3%	6.7%
Maximum	1.4%	0.8%	18.6%

III. Forecast Method

Q. Please explain the methodology employed for developing the forecasted number of customers and customer usage for the Future Test Year and the Fully Forecasted Rate Year.

A. Development of the forecasting methodology is presented in the following summary. This method was used to develop both the Future Test Year and the Fully Forecasted Rate Year. Price information included in the models is from the Company's databases, and average efficiency data is from Itron Inc., a national utility consulting firm. The economic variables and deflator information is from IHS Global Insight, Inc., a data consultant, and weather data is provided by Schneider Electric, a weather consulting service.

Residential and Commercial Customers

- Total new customer additions are forecasted for the initial three years of the forecast by Columbia's New Business Team. CHOICE customers are calibrated to the most recently observed level and the forecast is set to the current observed percentage of customers participating in the CHOICE program.

- Traditional transportation customers = existing transportation customers + new customers identified by the Large Customer Relations group.
- Existing customers are forecasted using the latest historical level. The forecast is calculated by applying an attrition rate calculated using recent historical data. The attrition rate is applied to the latest existing level of customers at the time the forecast is being prepared. The attrition rate used for the Future Test Year and Fully Forecasted Rate Year is 0.4% for Residential and 1.1% for Commercial.
- Total customers = existing customers + new customers – attrition customers
- Sales customers = total customers – CHOICE customers – traditional (commercial) transportation customers

Residential Dth/customer

- Residential use per customer is forecasted with an econometric model that incorporates real price, an average efficiency variable, real per capita income, and heating degree days. Residential CHOICE usage follows the total Residential usage trend.

Residential Volume

- Dth is forecasted for existing and new construction customers

  Dth = customers * Dth/customer

- CHOICE Dth forecasted as

  CHOICE Dth = customers * Dth/customer

- Sales Dth forecasted as residual

  Sales Dth = Dth – CHOICE Dth

Commercial Dth/customer

- Commercial use per customer is forecasted with an econometric model that incorporates real price, real gross county product, average efficiency variable, and heating degree days. Commercial CHOICE usage follows the total Commercial usage trend.

Commercial Dth

- Dth is forecasted for existing and new construction customers

  Dth = customers * Dth/customer

- CHOICE Dth is forecasted as

  CHOICE Dth = customers * Dth/customer

- Non-CHOICE transportation Dth for large commercial customers is forecasted by the Large Customer Relations group. Non-CHOICE transportation Dth for smaller commercial customers is forecasted as the trend in the forecast for total commercial use per customer.
- Sales Dth forecasted as residual

  Sales Dth = Dth – CHOICE Dth – non-CHOICE transportation

Industrial Volume

- The majority of the Industrial class forecast is provided by the Large Customer Relations group. This portion constitutes 91% of the total Industrial class forecast. The large customer portion of the forecast is developed by incorporating information generated through individual customer interviews. The remainder of the industrial class forecast is estimated using the trend from an econometric model for the full class. The model incorporates real price, manufacturing employment, industrial production, and heating degree days. The total industrial volume forecast is the sum of the large industrial forecast and the all other industrial forecast.

- The information provided through the interviews with customers, in addition to the small customer analysis, provides the sales/transportation split of Dth. Additional transportation Dth is forecasted with the trend from the econometric model.

Q. Please discuss the past performance of the forecast.

A. Residential and commercial forecast models are updated annually with the most current data. An internal review of forecast performance occurs on a regular basis. Variances for the residential and commercial predictions are calculated and assessed in order to measure accuracy. The average annual one year weather normalized variance for the residential models is 0.4%. For commercial, the average one year variance of the forecast is 1.6%.

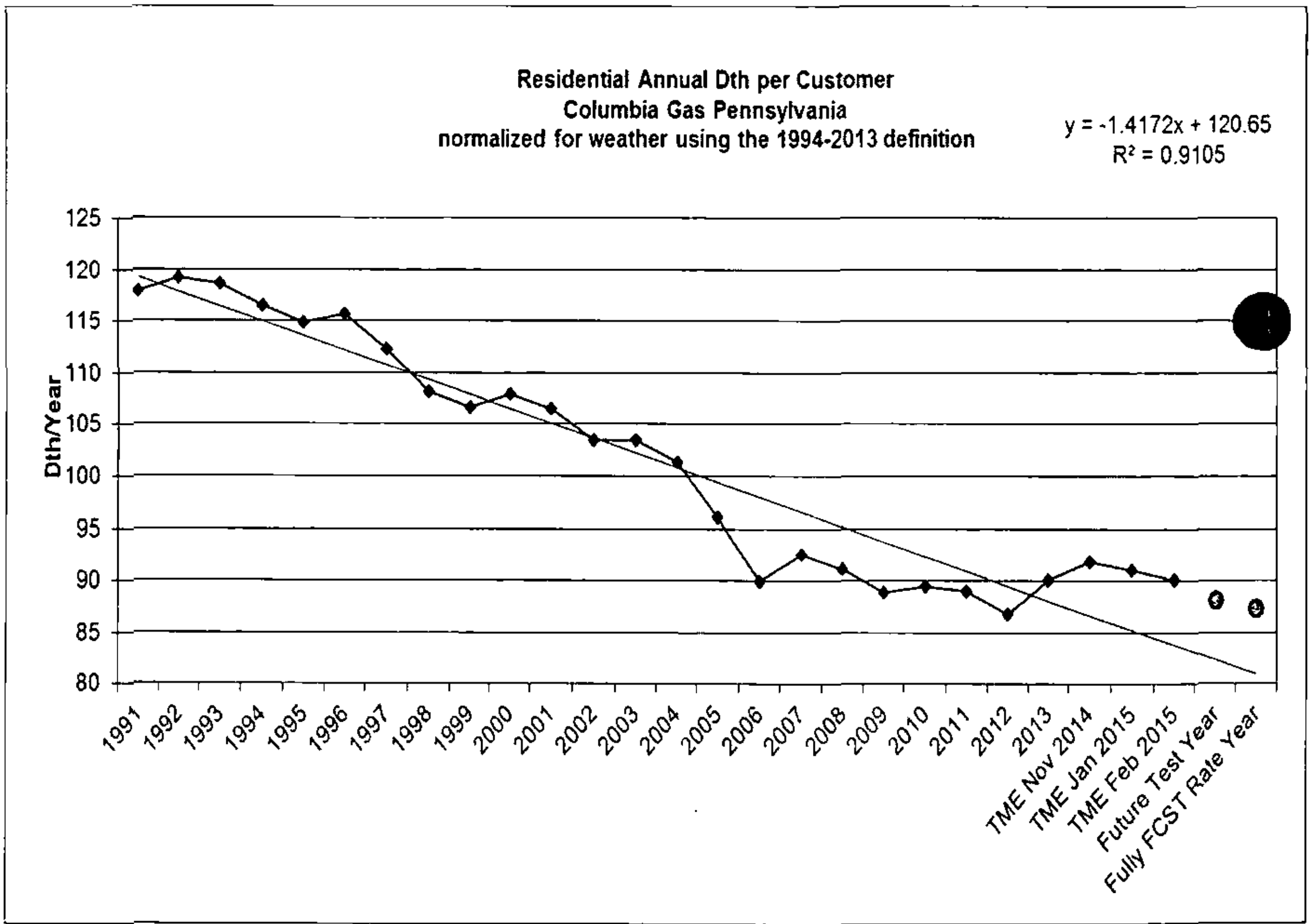
IV. Trend in Residential Use Per Customer

Q. Describe Columbia's recent trends related to residential use per customer.

A. Historical data shows that there has been a steady decline since 1991 in residential use per customer with only a few years exhibiting an increase in use. These periods of increase in use were all followed by periods with decreased usage, indicating that these points were not representative of the overall trend. Customer usage in years 2010 and 2011 illustrates the trend in declining usage. Although usage appears to flatten out during this period, when taking into account 2012, there is a decline of 2.5% from 2011. Usage falls from 89.0 Dth in 2011 to 86.8 Dth in 2012, supporting the overall trend and decline in usage.

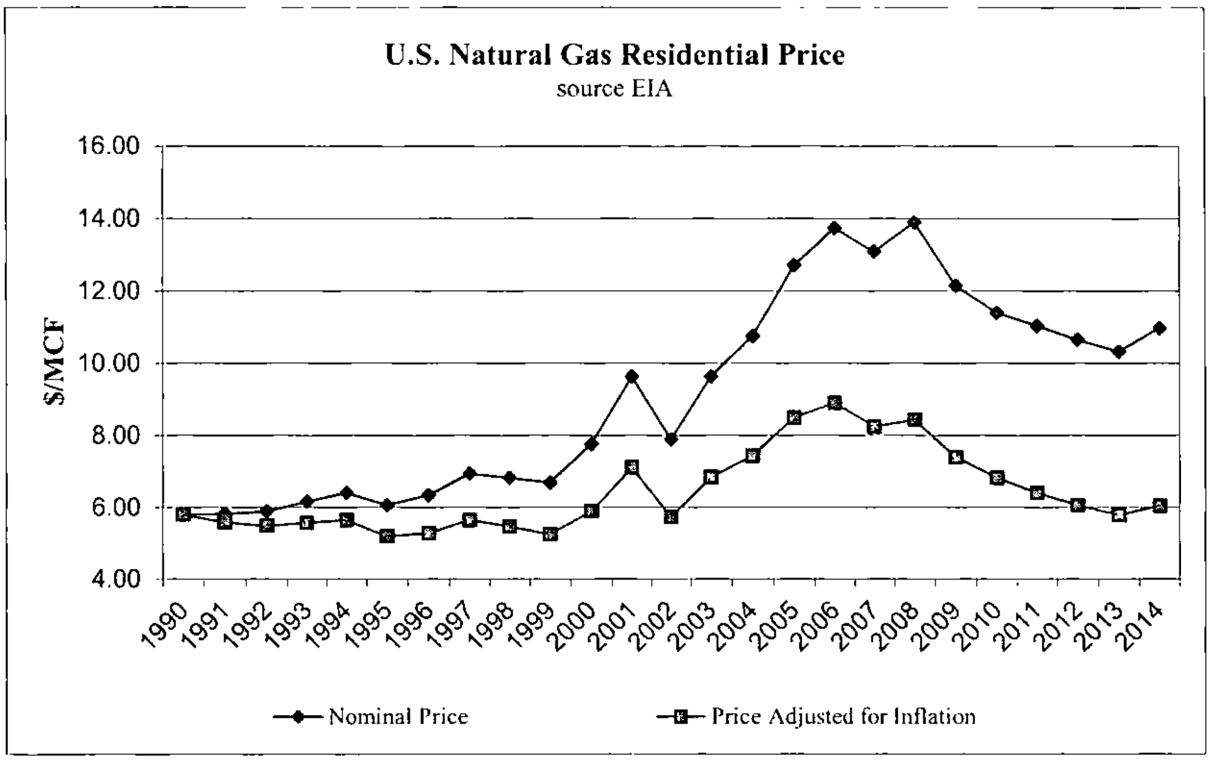
Unusually warm weather during the winter of 2011-2012 resulted in a consumption response, as measured by temperature sensitive use per customer per heating degree day from residential customers that was notably below that of recent years. This was followed by unusually cold weather during the winter of 2012-2013 and 2013-2014 that resulted in a consumption response notably above that of recent years. With the return of more temperate weather, usage should smooth out and reveal the continuation of the underlying downward trend. This can already be seen when comparing the level of usage for the twelve month period ending November 2014 with usage for the twelve month period ending January 2015. Residential use per customer drops from 91.83 Dth for TME November 2014 to 91.00 Dth for TME January 2015, reflecting nearly a 1% drop. When considering the usage level of 90.13 Dth for the twelve month period ending February, the drop is close to 2% compared to the TME November 2014 level of 91.13 Dth. This trend is projected to continue with the return of more moderate weather. The Forecasted Test Year and the Fully Forecasted Rate Year usage projections can be found in Exhibit No. 10 Schedule 2 on pages 7 and 8 and are included in the chart below. The Future Test Year usage level of 88.18 Dth and the Fully Forecasted Rate Year usage level of 87.36 Dth reflect the historical use per customer trend and are in line with more recent data. The points represent a decline in usage from the Historic Test Year acknowledging the overall downward trend in usage but both the Future Test Year and the Fully Forecasted Rate Year usage levels are above the data trend line and reflect current levels.

Residential use per customer trends are depicted in the chart below:



Q. What factors are causing the reduction in residential customer usage?

A. Throughout most of the 1990s natural gas consumption per residential customer decreased by 1% to 2% per year. This decline in consumption occurred in spite of a relatively constant nominal price, as is illustrated in the graph below.



When adjusted for inflation, the price actually decreased during the 1990s. This conservation was a result of increased appliance efficiency and more efficient construction standards that followed the major price increases that occurred in the 1970s and 1980s. Annual conservation increased significantly as a result of the large natural gas price increases that occurred in the winters of 2000-2001, 2004-2005, and 2005-2006. With limited end uses for natural gas, increasing appliance efficiency, and higher building standards, the downward trend in consumption per customer will continue. Appliance choice will also affect the trend. Customers choosing high efficiency furnaces, energy efficient gas water heaters and electric appliances such as electric water heaters, heat pumps and cooking ranges, will also contribute to the downward trend.

Q. Does this conclude your prepared direct testimony?

A. Yes it does.