

# Outlook for Natural Gas Demand for the Summer of 2007

## Overview

Natural gas demand for the summer of 2007 should increase about 1.4 percent from the demand level for the prior summer,<sup>1</sup> when the impact of storage injections is excluded. However, when the ancillary demand associated with storage injections is included, the composite summer period demand figure increases to 1.8 percent. The composite increase in natural gas demand is due to a series of small increases, as demand is projected to grow modestly within each of the consuming sectors. Some of the increases within the various sectors are due to weather effects, while others are the result of modest economic growth.

Exhibit 1 provides both cumulative demand for the summer season in BCF and average daily demand for the summer period in BCFD. The latter is a common unit in the industry and will be the primary focus of this report, because of the ease of comparing BCFD to other industry statistics.

### Exhibit 1. Projected Gas Demand for April Through October 2007

Sector	2007		2006	
	BCF	Average BCFD	BCF	Average BCFD
Residential	1,375	6.4	1,291	6.0
Commercial	1,190	5.6	1,160	5.4
Industrial	3,756	17.6	3,740	17.5
Electric	4,389	20.5	4,361	20.4
Lease, Plant & Pipeline Fuel	981	4.6	972	4.5
<b>Subtotal</b>	<b>11,691</b>	<b>54.6</b>	<b>11,524</b>	<b>53.8</b>
Net Storage Injection	1,819	8.5	1,750	8.2

Source: EIA and EVA.

As is the case with most outlooks for summer gas demand, the area of greatest uncertainty is within the power sector. This uncertainty is, in part, due to the weather sensitive nature of the electric sector's summer gas demand compounded by the current lack of consensus among weather forecasters concerning this summer's weather.<sup>2</sup>

<sup>1</sup> For purposes of this report, summer refers to the period April through October, even though technically this period includes part of the spring and fall seasons. This terminology is used in order to simplify the discussion contained in this report.

<sup>2</sup> The initial forecast by the National Oceanic and Atmospheric Administration (NOAA) is for summer weather that is about 1.5 percent cooler than normal, which is well below last year's near record summer weather that was 10.4 percent warmer than normal.

# Outlook For Demand

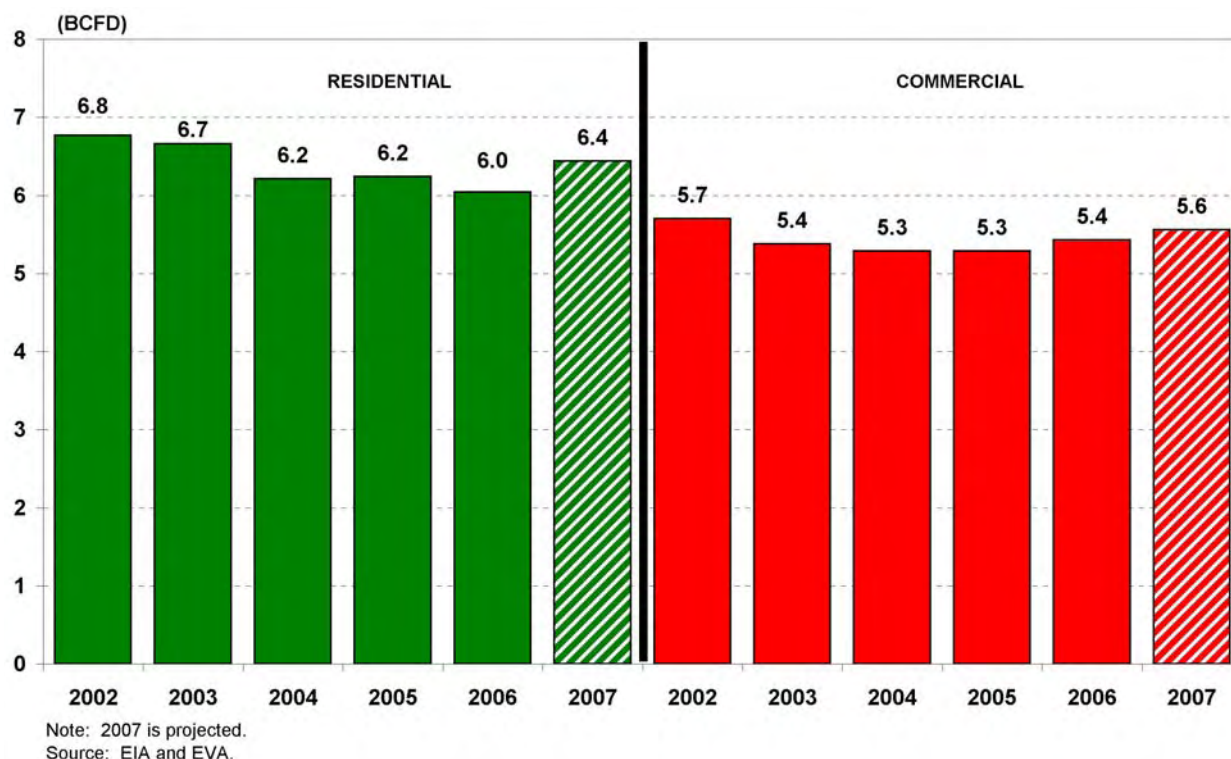
## Overview

The following provides an assessment of summer demand for each of the four major sectors. As has been the case historically, the outlook for summer weather represents the biggest unknown in this outlook. The impact of storage injections is addressed in a subsequent section.

## Residential And Commercial

Residential sector gas demand during the summer season is projected to increase about 6.4 percent, or 0.4 BCFD, as illustrated in Exhibit 2. Most of this increase is due to the lingering effects of cool weather during the early spring season, which is caused by some additional heating load. In particular, April and May 2007 are projected, on average, to be about 25 percent cooler than the same months in 2006, when temperatures were relatively mild.

**Exhibit 2. Summer Period Gas Demand**



With respect to the other factors that can impact residential gas demand, namely customer growth, which has been averaging about 1.4 percent per annum, and conservation, the impact of these factors is largely offsetting. Recent conservation within the residential sector has been both structural and behavioral, with the latter largely in response to the high gas prices over the past several years. Empirical evidence of this behavioral conservation (e.g., lowering thermostats during the heating periods) is illustrated by the fact that during November and December 2004 residential sector demand declined 2.2 percent versus the prior year, while heating degrees days (HDD) increased 1.4 percent. A similar set of circumstances existed for

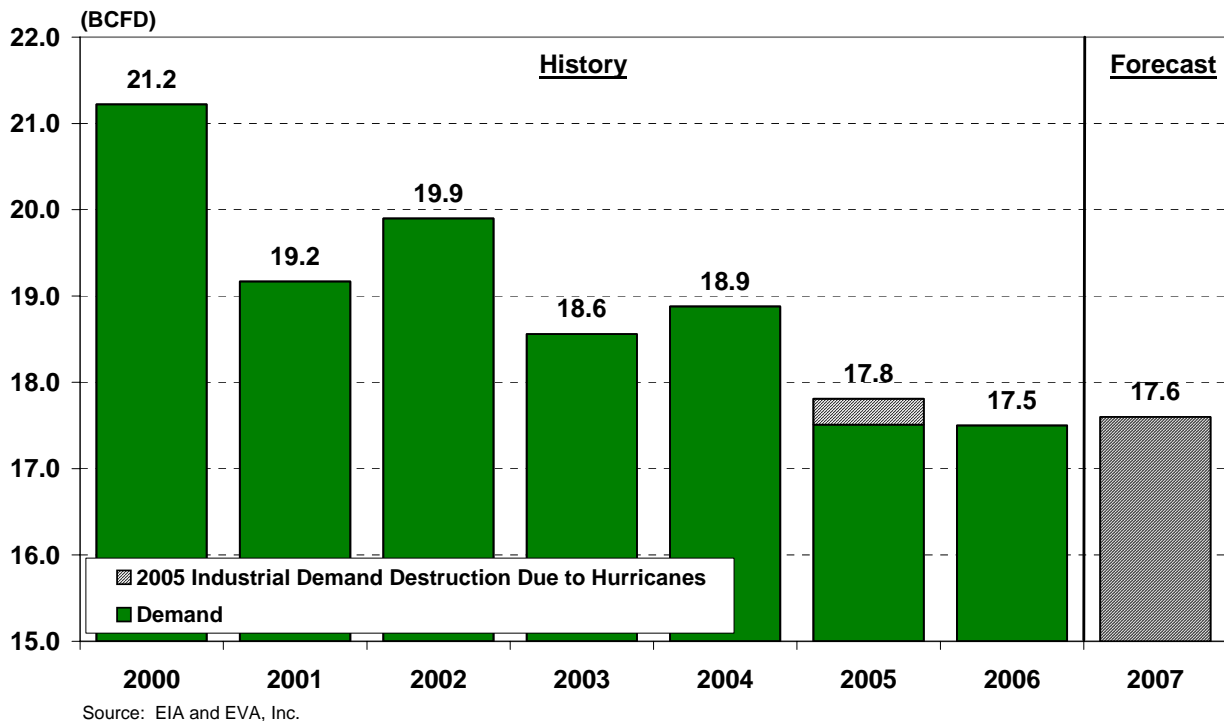
February 2006. This national level data is supported by numerous anecdotal observations by various local distribution companies.

The commercial sector also is sensitive to the anticipated cool spring, although to a lesser degree than the residential sector. As a result, weather effects are the primary factor behind the projected 2.5 percent, or 0.14 BCFD, increase in gas demand within this sector. Beyond the spring period weather effects a very modest growth rate in commercial sector demand is projected to occur, as a result of the impact of modest economic growth, which is partially offset by continuing conservation within the sector.

### **Industrial Sector**

The tension point in the industrial sector is to what degree continuing demand destruction within the sector will offset the impact of modest economic growth. To date there has been no recovery within the industrial sector, as periods of price moderation have been rather limited and the NYMEX gas futures still point to higher prices in the future.<sup>3</sup> A case in point is 2006 when summer period natural gas demand for the sector declined about 1.9 percent, or 0.3 BCFD (i.e., see Exhibit 3), if the impact of Hurricanes Katrina and Rita suppressing gas demand in the prior year is taken into account.

**Exhibit 3. Industrial Sector Gas Demand**

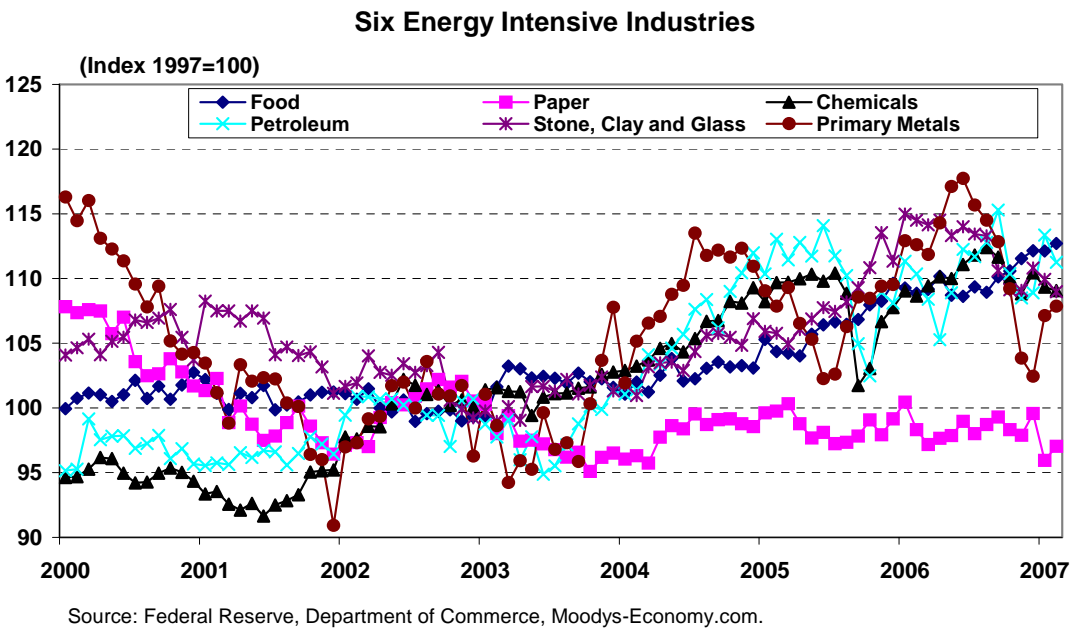
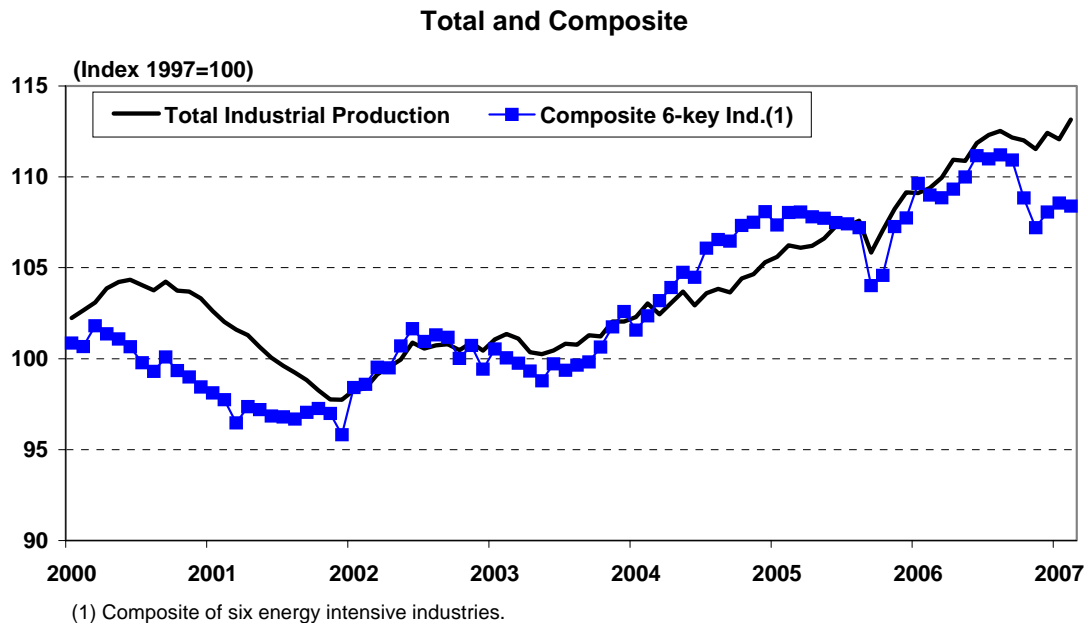


For 2007 industrial sector gas demand is projected to increase about 0.4 percent, or 0.1 BCFD, as the impact of economic growth within the sector is expected to fully offset additional demand

<sup>3</sup> The most significant period of price moderation in recent times was in September and October 2006, when Henry Hub gas prices averaged \$5.27 per MMBTU. However, in November prices returned to over \$7.00 per MMBTU.

destruction within the sector. The key area for growth within the industrial sector likely will be gas consumption associated with ethanol production.<sup>4</sup> Other than this single bright spot industrial production in the six key energy intensive industries that account for about 70 percent of industrial sector gas consumption appear to be lagging overall growth in U.S. industrial production, as illustrated in Exhibit 4.<sup>5</sup>

### Exhibit 4. Industrial Production Growth Rates



<sup>4</sup> Current gas consumption associated with ethanol production is estimated to be 0.4 to 0.5 BCFD (i.e., approximately 0.035 MCF/gallon). For 2007 gas consumption associated with ethanol production could increase about 0.15 BCFD.

<sup>5</sup> The upper graph in Exhibit 4 compares the composite index for the production associated with the six key energy intensive industries to the total U.S. production index.

## Electric Sector

Of the four sectors for natural gas demand, by far the most difficult to predict is the electric sector, primarily because there is a series of four offsetting factors that impact demand within this sector. These offsetting factors include:

- **Electric Demand:** Since natural gas demand is positioned to capture the majority of incremental electricity demand, the growth for electricity demand is more critical to the outlook for gas-fired generation and, as a result, electric sector gas demand, than it is for other fuels. For 2007 the projected growth rate for electricity sales is 2.2 percent, with the latter, in essence, reflecting overall economic growth.
- **Weather:** For 2007 the next most important factor by far is the current weather forecasts by the National Oceanic and Atmospheric Administration (NOAA), which project that the forthcoming summer weather will be significantly milder than last year's summer weather. Last year the summer weather was 10.4 percent hotter than normal,<sup>6</sup> whereas current projections for 2007 are for a summer that is 1.5 percent milder than normal.
- **Fuel Switching:** While fuel switching away from gas-fired generation to oil-fired generation reduces gas demand for the sector, in 2006 fuel switching by the industry was almost zero, and it also is expected to be near zero for 2007. This occurs because of the consistent delinkage between oil and gas prices that occurred in 2006 and is projected to continue in 2007. However, adverse weather conditions (e.g., a major hurricane) could result in oil and gas prices relinking for some period of time, which could cause some fuel switching.
- **Northwest Hydroelectric Generation:** Since the Northwest region is heavily dependent upon hydroelectric generation, drought conditions can cause significant declines in this form of electric power and offsetting increases in gas-fired generation, since gas-fired generation is the primary substitute. In 2006 hydroelectric generation in the Northwest was about 6.4 percent above a 10-year average.<sup>7</sup> While overall hydro conditions for 2007 likely will be above recent norms, hydro conditions in 2007 likely will not be as strong as in 2006. As a result, gas-fired generation in the Northwest, due to this phenomenon, should increase moderately.

With respect to the likelihood of a milder summer this year versus last year's near record breaking heat, Exhibit 5 summarizes recent electric sector gas demand by key periods, namely peak summer, total summer and winter. As illustrated, the biggest year-to-year changes in electric sector gas demand are concentrated in the peak summer period (i.e., July and August), when gas demand during the period can surge over five BCFD due to differences in weather conditions between two consecutive summers (e.g., 2005 versus 2004). Similarly, electric sector gas demand can decline over two BCFD when the transition is from hot to mild summer (e.g., 2002 versus 2003). The latter is what is projected for 2007, namely a noticeable decline in peak

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<sup>6</sup> Normal weather conditions are based upon the most recent 30 year average (i.e., 1977-2006).

<sup>7</sup> During drought conditions, such as in 2001, hydroelectric generation can decline to about 116 TWh, while in plentiful times it can reach about 190 TWh (e.g., 1997). In 2006 hydroelectric generation was 167 TWh.

summer electric sector gas demand, which will offset the impact of overall growth in electricity sales and result in total summer electric sector demand being almost flat with the prior summer's consumption level.

### Exhibit 5. Trends In Electric Sector Gas Demand

Year	Volume (BCFD)				Percent Change			
	Peak Summer	Summer	Winter	Full Year	Peak Summer	Summer	Winter	Full Year
2000	19.9	16.3	11.4	14.3				
2001	21.3	16.9	11.5	14.6	6.8%	3.5%	0.5%	2.5%
2002	23.4	17.9	12.2	15.5	9.9%	6.1%	6.3%	6.2%
2003	21.2	15.8	11.7	14.1	-9.5%	-11.9%	-4.4%	-9.4%
2004	20.0	16.8	12.3	14.9	-5.8%	6.4%	5.5%	6.0%
2005	25.3	18.6	12.5	16.1	26.7%	11.1%	1.1%	7.8%
2006	27.6	20.4	12.6	17.1	9.3%	9.4%	0.9%	6.4%
2007	26.1	20.5	13.5	17.6	-5.5%	0.6%	7.8%	3.0%

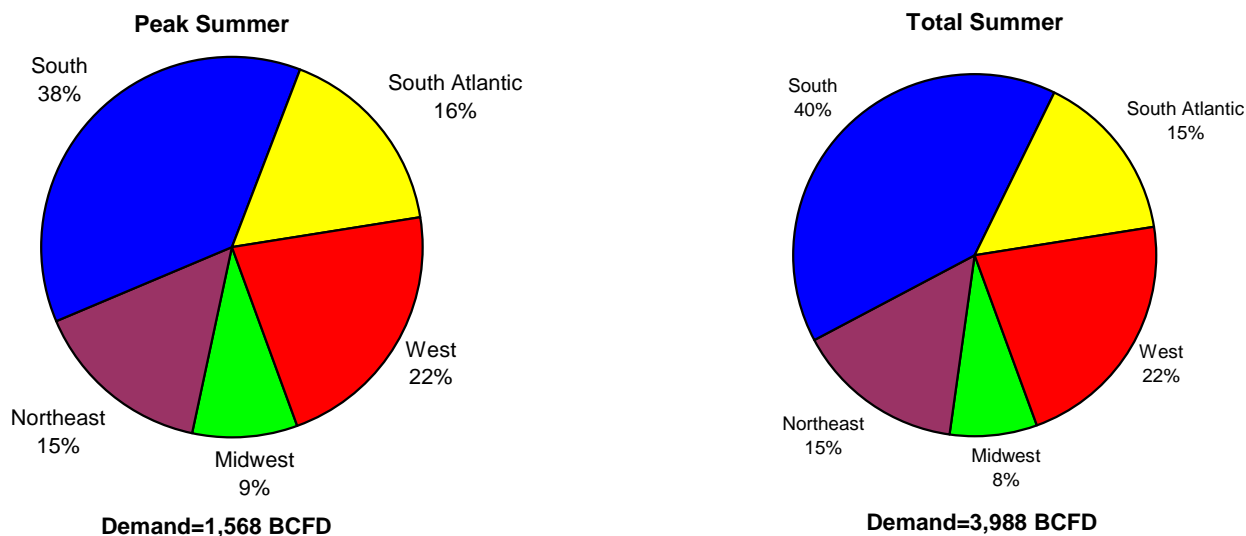
Peak Summer = July and August.

Summer = April through October.

Winter = Jan, Feb, Mar, Nov and Dec.

With respect to which regions of the country account for most of the demand within the electric sector during the summer period, Exhibit 6 illustrates that the South and South Atlantic regions account for about 55 percent of total electric sector gas demand during the summer period.<sup>8</sup>

### Exhibit 6. Electric Power Sector 2005 Gas Demand By Region And Time Of Year



<sup>8</sup> The Appendix contains a graphic illustrating the standard census regions. Also, other graphics illustrating the regionality of gas demand are contained in the Appendix.

While fuel switching is anticipated to be a non-event in 2007, as was the case in 2006, Exhibit 7 summarizes the recent levels of fuel switching (i.e., both average and peak). As illustrated, in many recent years fuel switching has reduced electric sector summer period gas demand between 0.3 and 0.9 BCFD. However, in 2006 the net reduction was zero, which is what is projected for 2007.

**Exhibit 7. Fuel Switching During The Summer Period<sup>(1)</sup>**

Year	Gas Demand Lost To Fuel Switching To Oil:	
	Average During Non-Winter (BCFD)	Peak Level Of Fuel Switching During Non-Winter Months (BCFD)
1998	1.3	1.9
1999	0.9	1.8
2000	0.6	0.9
2001	1.0	1.9
2002	0.4	1.2
2003	0.8	1.1
2004	0.9	1.6
2005	0.9	1.6
2006	0.0	0

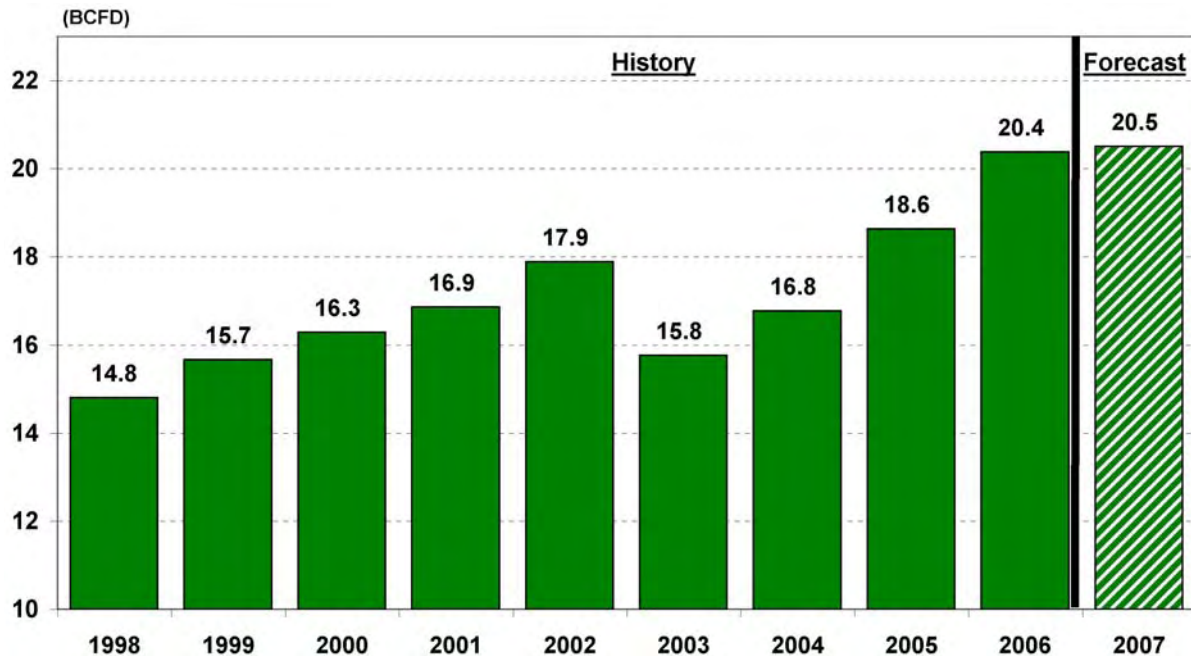
(1) Summer months are April through October.

The net integration of these four factors, namely:

- A 2.2 percent increase in overall electricity demand;
- A milder summer weather than that which occurred during the prior summer (i.e., about 1.5 percent milder than normal versus last year's 10.4 percent hotter than normal);
- In essence, little to no change in the outlook for hydroelectric generation in the Pacific Northwest; and,
- As was the case last year, minimal fuel switching levels this summer,

should result in electric gas demand increasing only moderately this summer (i.e., 0.6 percent, or 0.1 BCFD), as illustrated in Exhibit 8. This is in sharp contrast to the 1.0 BCFD to 1.8 BCFD annual increase in summer period gas demand over the last three years. The major uncertainty in this assessment is the possibility that the actual summer weather could differ considerably from current projections. In the event of a hot summer, electric sector demand would be higher, potentially significantly higher, than what is portrayed in Exhibit 8.

## Exhibit 8. Electric Demand



## Storage Injections

The final component of the demand picture for the summer of 2007 is the outlook for storage injections, which are projected to be slightly greater than in 2006, as illustrated in Exhibit 9. The combination of this level of storage injections and the relatively high, but not record, storage levels at the end of the withdrawal season (i.e., March 31) will result in storage levels entering the winter season (i.e., November 1) at relatively high levels for recent times, namely slightly under 3.4 TCF.<sup>9</sup> While this is below last year's record level entering the winter season (i.e., 3,452 BCF), it does represent the second highest level for recent times of storage inventories entering the winter season and is about 140 BCF above the five-year average for season ending storage levels.<sup>10</sup>

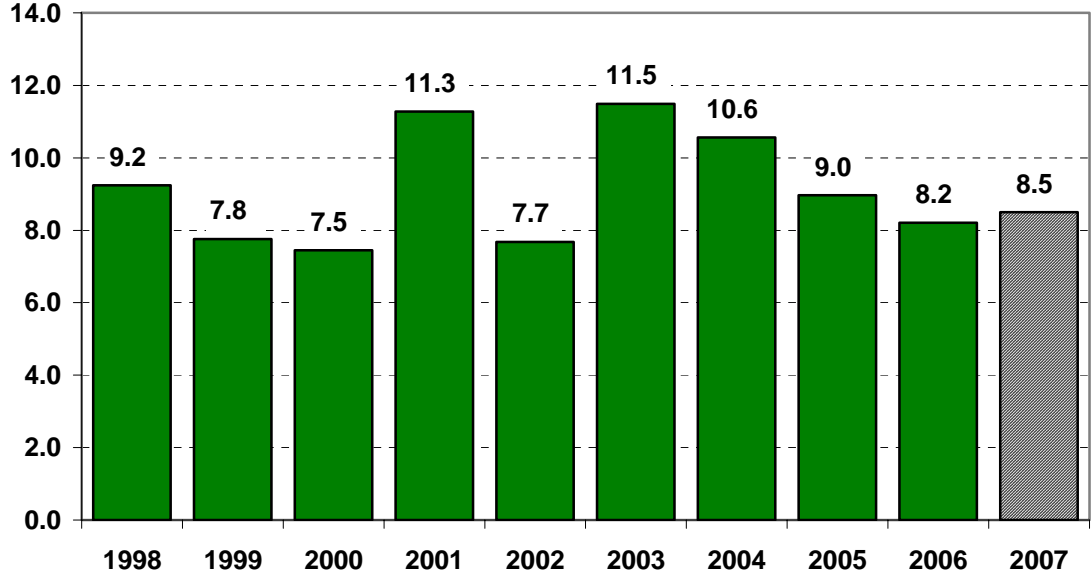
## Conclusion

The combination of a series of relatively small changes in each of the major sectors for natural gas consumption should result in 2007 summer period demand increasing about 1.4 percent, or 0.8 BCFD. Part of this series of small increases within the various sectors is due to weather effects, while the remainder is the result of modest economic growth. The major uncertainty in this assessment is whether the actual summer weather will be close to NOAA's current projections. A significant variance would alter the projections noted in Exhibit 1.

<sup>9</sup> Storage levels on March 31, 2007 were 1,569 BCF, which is below the record set on March 31, 2006 of 1,695 BCF. The 1,569 BCF figure is the second highest withdrawal season ending storage level for recent times.

<sup>10</sup> The five-year average for beginning of the winter (i.e., November 1) storage levels is 3,248 BCF. If the record levels of 2006 are excluded from this figure, then the five-year average is 3,183 BCF.

**Exhibit 9. Storage Injections**



Note: 2007 is projected.  
Source: EIA and EVA.

## **Appendix**

## Exhibit A. Selected Relevant Data

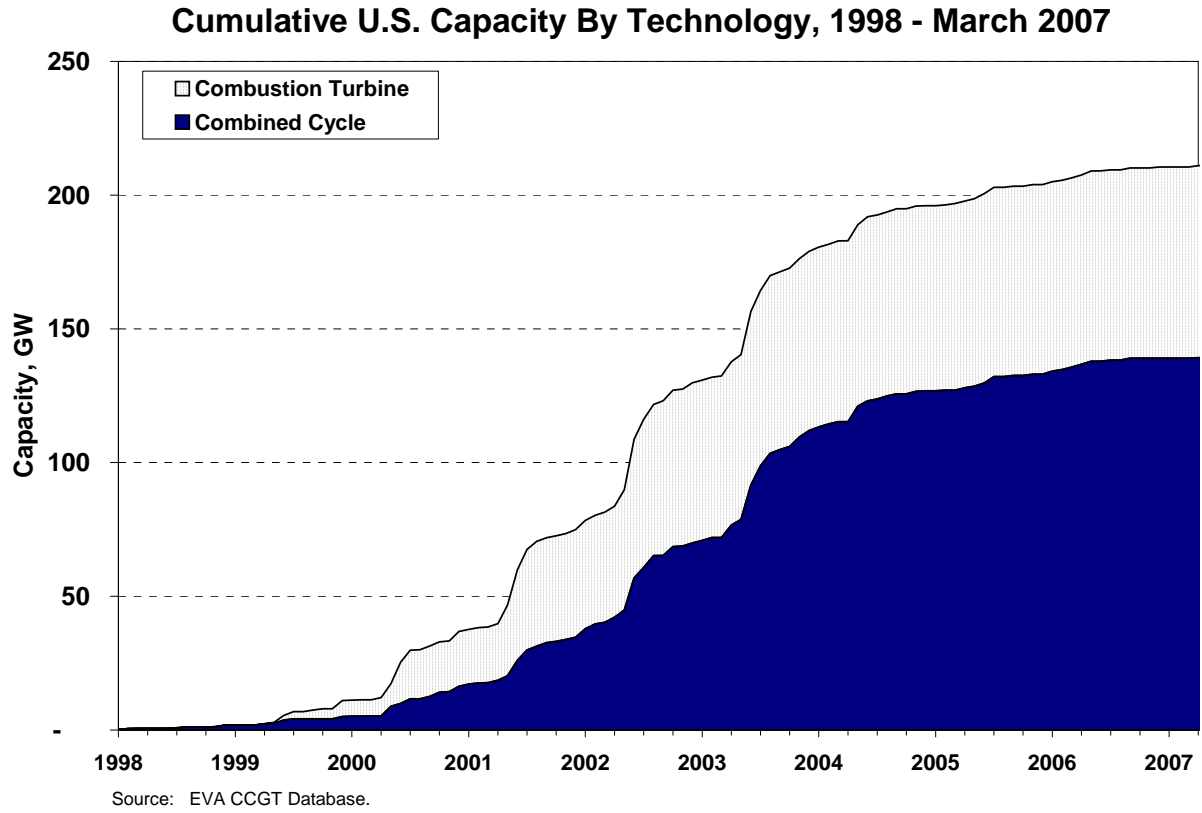
	Annual						Apr - Oct					
	2003	2004	2005	2006	2007	% Diff 07/06	2003	2004	2005	2006	2007	% Diff 07/06
Residential Housing Stock (Thousands)	108,968	110,012	111,040	112,280	113,645	1.2%	108,968	110,012	111,040	112,280	113,645	1.2%
Electric												
Weather												
Summer Weather (CDD) (Degrees)	1,291	1,232	1,395	1,383	1,238	-10.5%	1,231	1,170	1,343	1,320	1,178	-10.8%
Normal CDD <sup>2</sup> (Degrees)	1,250	1,250	1,250	1,250	1,250	0.0%	1,196	1,196	1,196	1,196	1,196	0.0%
% Change of Normal	103.3%	98.6%	111.6%	110.8%	99.0%	-10.5%	102.9%	97.8%	112.3%	110.4%	98.5%	-10.8%
New Gas-Fired Capacity <sup>1</sup>												
CC (MW)	45,989	15,468	9,807	7,901	6,128	-22.4%	36,717	11,033	8,376	9,736	4,158	-57.3%
CT (MW)	8,084	2,456	2,438	933	812	-13.0%	7,167	1,690	1,869	506	440	-13.0%
Hydro and Nuclear Generation												
Hydro Generation - Pacific (GWh)	140,201	137,929	143,327	148,936	280,000	88.0%	85,394	80,436	84,893	99,560	165,200	65.9%
Nuclear Generation (GWh)	761,147	788,553	780,858	787,219	806,000	2.4%	443,734	462,825	453,897	457,089	467,480	2.3%
Electric Demand Growth Rate	0.7%	1.7%	3.1%	1.1%	2.2%	--	-1.1%	2.5%	4.3%	2.4%	1.2%	--
Industrial (Index: 2002=100)												
Food	101.0	101.1	104.5	107.2	109.7	2.3%	97.7	102.1	104.4	106.5	109.0	2.3%
Paper	97.3	98.0	98.6	98.6	99.4	0.9%	92.2	91.8	97.3	99.3	100.1	0.8%
Chemicals	101.4	105.7	108.0	110.9	113.6	2.4%	105.1	109.3	102.1	102.2	104.6	2.4%
Petroleum	98.1	106.2	110.0	111.5	115.2	3.3%	101.0	106.2	103.4	100.5	103.8	3.3%
Stone, Clay and Glass	101.0	104.9	103.7	107.1	108.9	-0.2%	100.4	102.4	106.5	104.7	104.5	-0.2%
Primary Metals	98.9	109.3	107.1	114.5	116.4	1.6%	83.1	88.5	98.8	102.8	104.5	1.7%
Total Industrial Production	101.1	103.6	106.9	111.5	114.3	2.6%	110.7	115.5	107.9	111.4	114.2	2.5%
Composite 6-key Ind.	100.1	105.1	106.5	109.8	112.0	2.1%	98.5	102.5	101.8	102.4	104.5	2.0%
Fertilizer Production	103.9	107.1	108.5	109.5	110.6	1.0%	104.2	107.0	109.0	109.9	111.0	1.0%
Economy												
Real GDP (\$ Billions)	10,301	10,704	11,049	11,414	11,709	2.6%	10,343	10,772	11,159	11,528	11,795	2.3%
Employment (Thousands)	137,731	139,244	141,719	144,334	145,879	1.1%	129,877	131,534	133,545	136,010	138,520	1.8%
CPI (Index: 1999=100)	184.0	188.9	195.3	200.8	205.6	2.4%	184.0	189.2	195.9	201.4	206.0	2.3%

<sup>1</sup> Amount of capacity brought online in the period

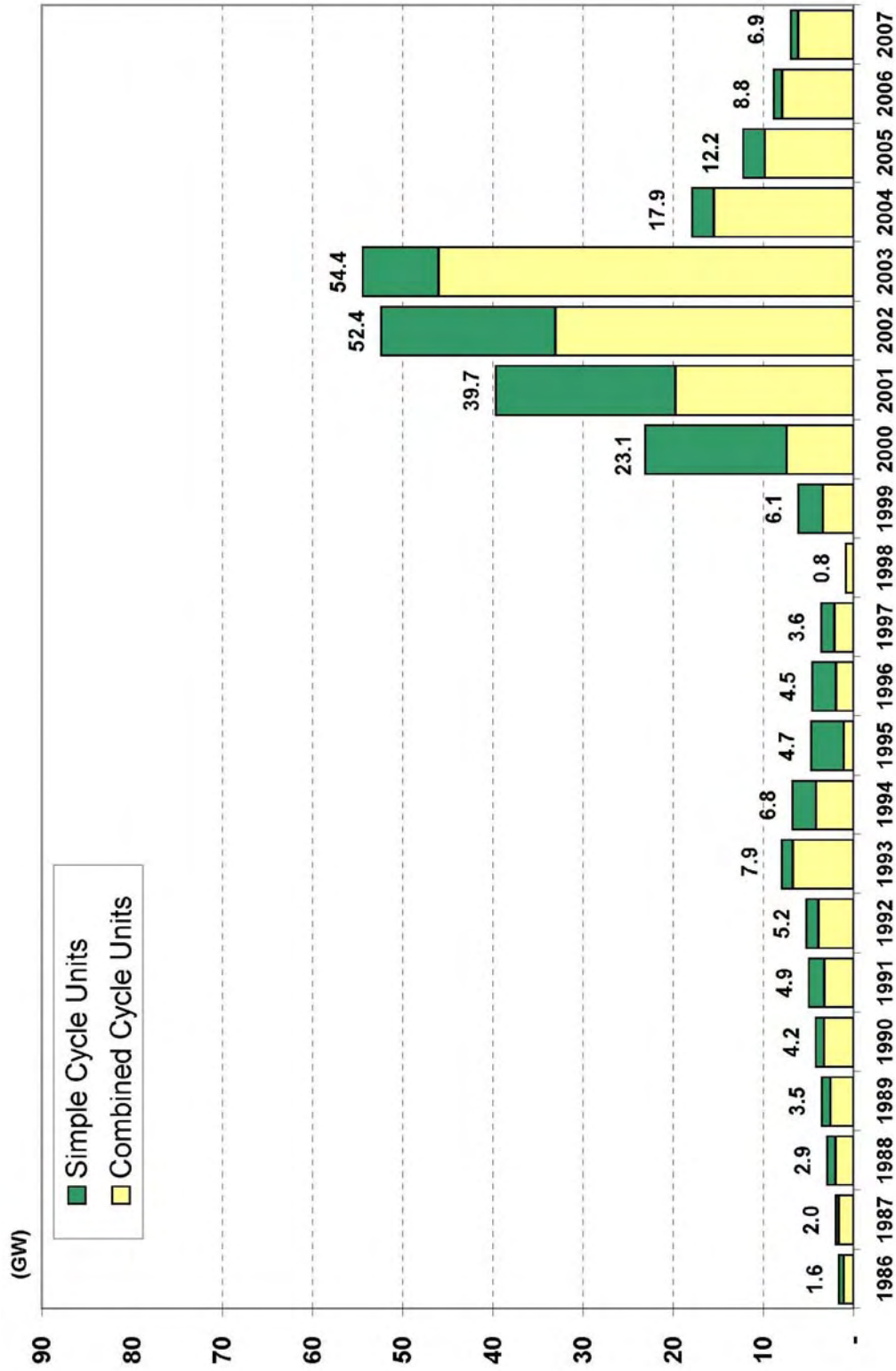
<sup>2</sup> Normal weather conditions are based upon the most recent 30 year average (i.e., 1977-2006).

	June - August					
	2003	2004	2005	2006	2007	% Diff 07/06
Residential Housing Stock (Thousands)	108,968	110,012	111,040	112,280	113,645	1.2%
Electric						
Weather						
Summer Weather (CDD) (Degrees)	869	759	967	962	836	-13.1%
Normal CDD <sup>2</sup> (Degrees)	850	850	850	850	850	0.0%
% Change of Normal	102.3%	89.3%	113.8%	113.2%	98.4%	-13.1%
New Gas-Fired Capacity <sup>1</sup>						
CC (MW)	26,725	4,505	5,330	6,051	3,968	-34.4%
CT (MW)	5,609	924	1,514	50	170	240.0%
Hydro and Nuclear Generation						
Hydro Generation - Pacific (GWh)	36,216	36,638	39,975	40,213	75,600	88.0%
Nuclear Generation (GWh)	201,432	210,826	207,631	212,594	209,560	-1.4%
Electric Demand Growth Rate	-1.7%	0.4%	8.0%	2.5%	0.5%	--
Industrial (Index: 2002=100)						
Food	97.9	102.1	104.4	106.5	109.0	2.3%
Paper	92.6	91.8	96.9	98.9	99.6	0.7%
Chemicals	104.5	109.3	103.4	103.5	105.9	2.3%
Petroleum	100.3	106.2	105.9	102.8	106.2	3.3%
Stone, Clay and Glass	100.5	102.6	106.1	104.2	104.0	-0.2%
Primary Metals	82.7	88.5	96.3	100.2	101.8	1.6%
Total Industrial Production	110.6	115.6	108.4	111.9	114.7	2.5%
Composite 6-key Ind.	98.2	102.5	102.2	102.8	104.8	2.0%
Fertilizer Production	104.0	107.0	111.9	112.9	114.0	1.0%
Economy						
Real GDP (\$ Billions)	10,355	10,775	11,169	11,539	11,805	2.3%
Employment (Thousands)	129,820	131,487	133,595	136,060	138,570	1.8%
CPI (Index: 1999=100)	183.9	189.3	195.1	200.6	205.2	2.3%

## Exhibit B. New Gas-Fired Capacity

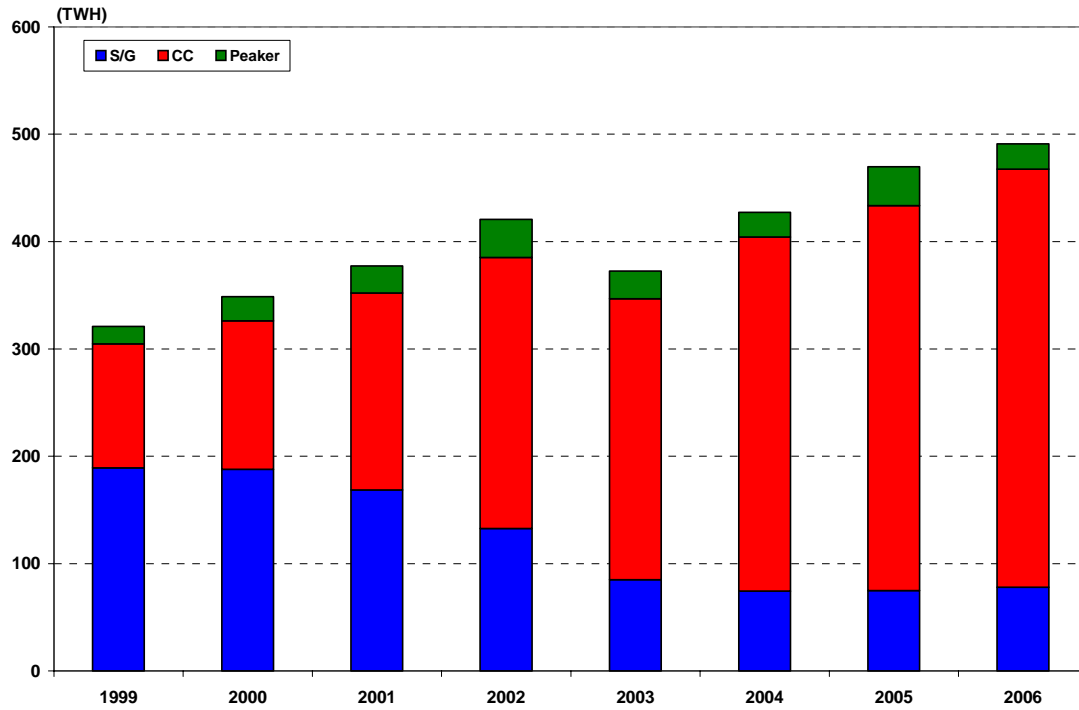


### Exhibit C. Annual Additions Of Gas-Fired Capacity 1986-2007

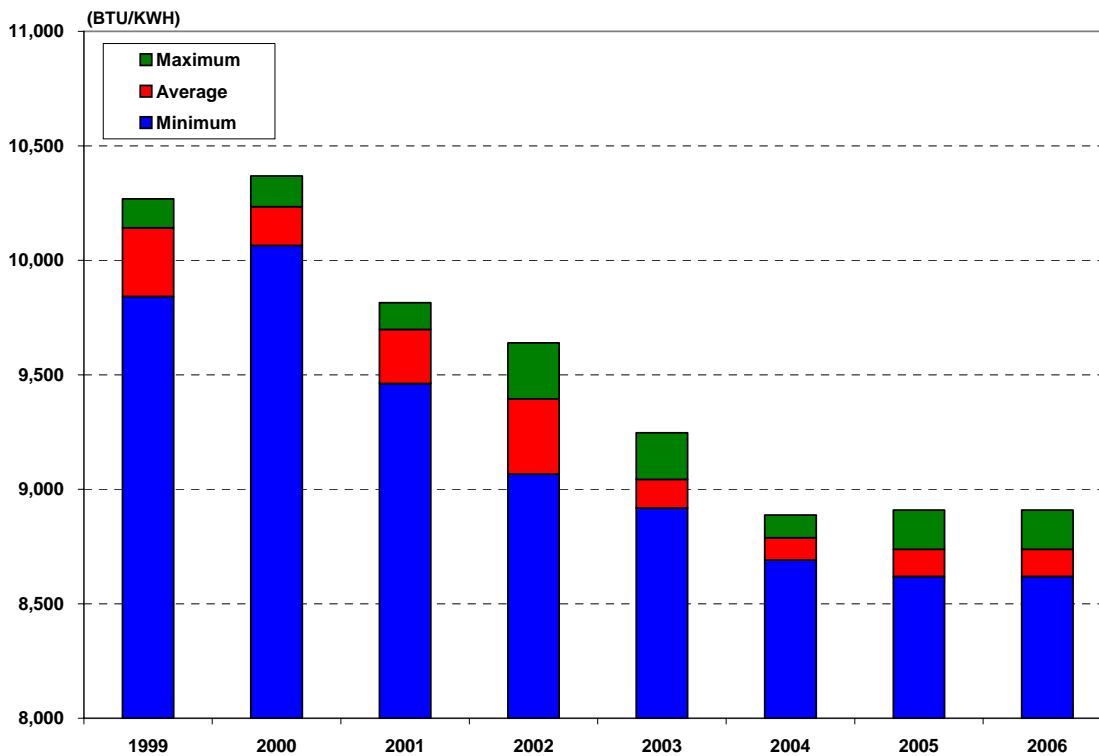


Note: Projected additions only include categories 1 through 4.  
 Source: EIA, EEI, and EVA for 1986 to 1998. EVA for 1999 and later.

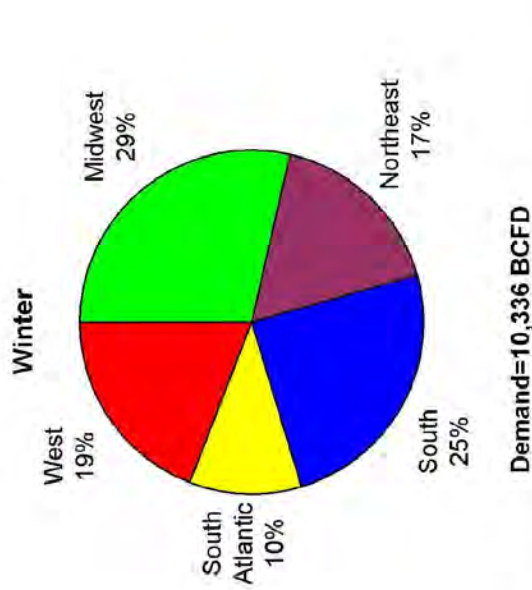
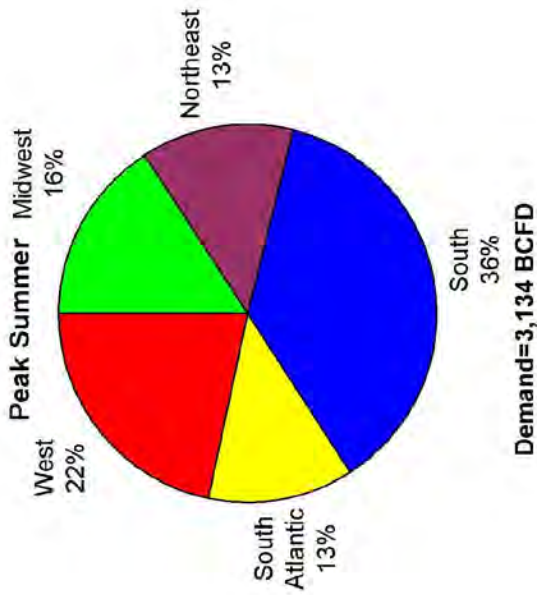
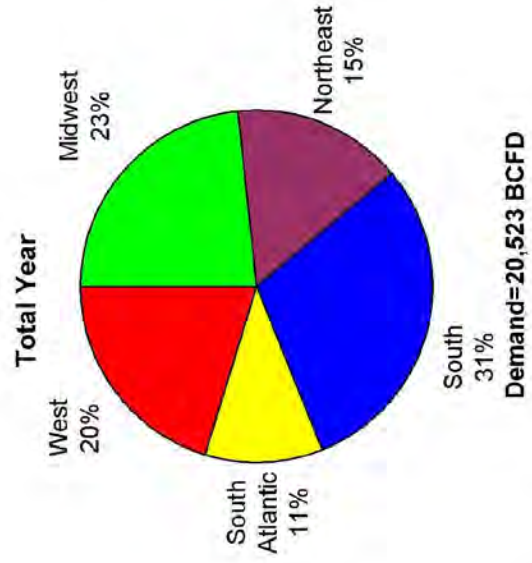
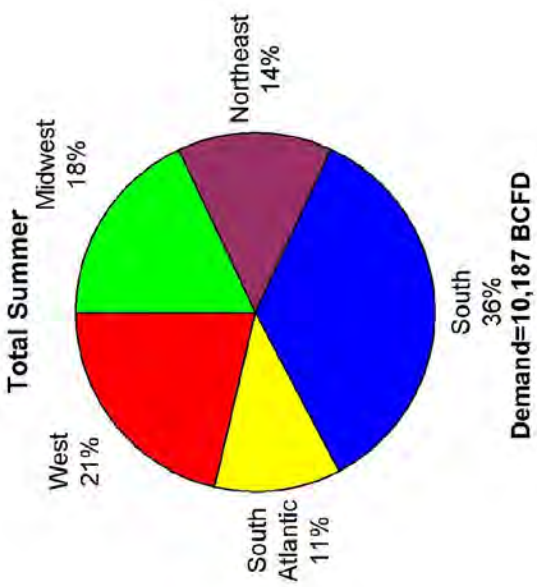
**Exhibit D. Characteristics Of Natural Gas Consumption In The Power Sector (Summer Generation)**



**Exhibit E. Characteristics Of Natural Gas Consumption In The Power Sector (Summer Heatrate)**

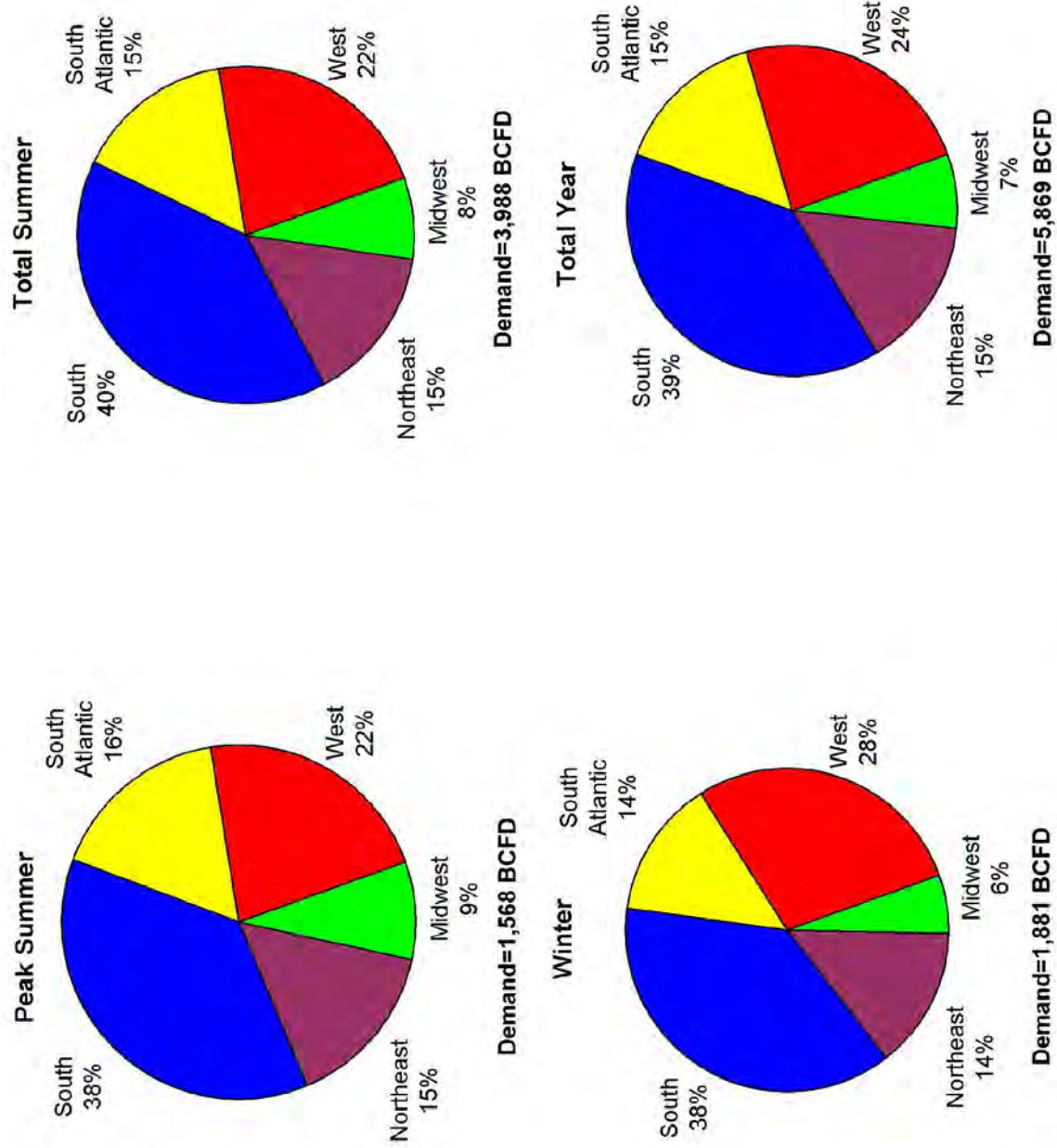


## Exhibit F. Total 2005 Gas Demand By Region And Time Of Year



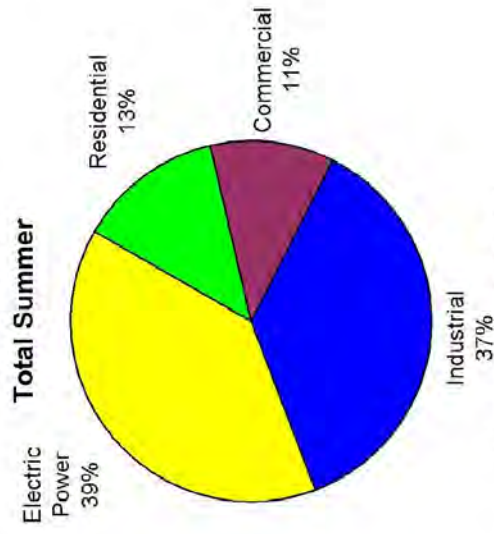
**Note:** Peak Summer = July & August; Total Summer = April through October; Winter = Jan, Feb, Mar, Nov, Dec.  
**Source:** U.S. DOE, Energy Information Administration.

## Exhibit G. Electric Power Sector 2005 Gas Demand By Region And Time Of Year

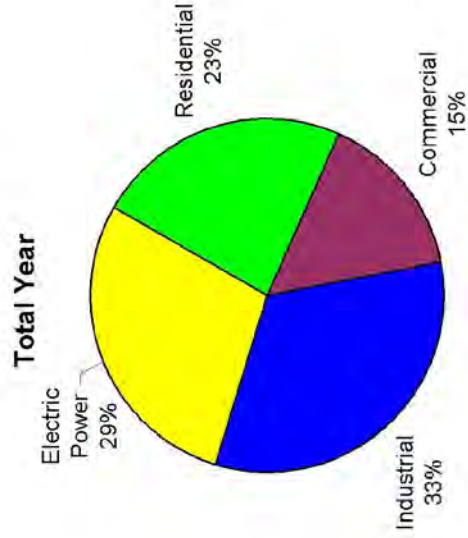


**Note:** Peak Summer = July & August; Total Summer = April through October; Winter = Jan, Feb, Mar, Nov, Dec.  
**Source:** U.S. DOE, Energy Information Administration.

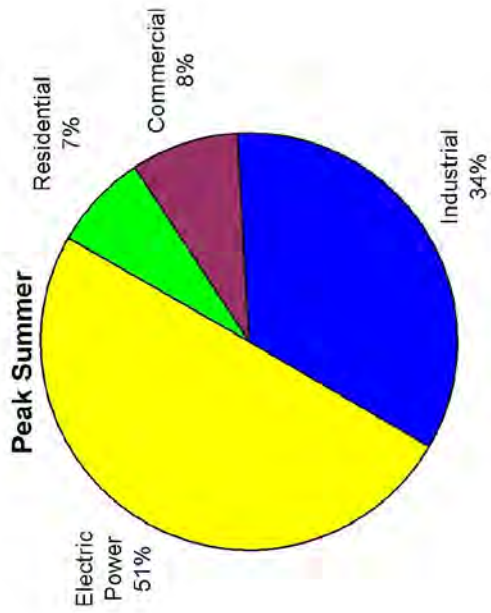
## Exhibit H. Total 2005 Gas Demand By Sector And Time Of Year



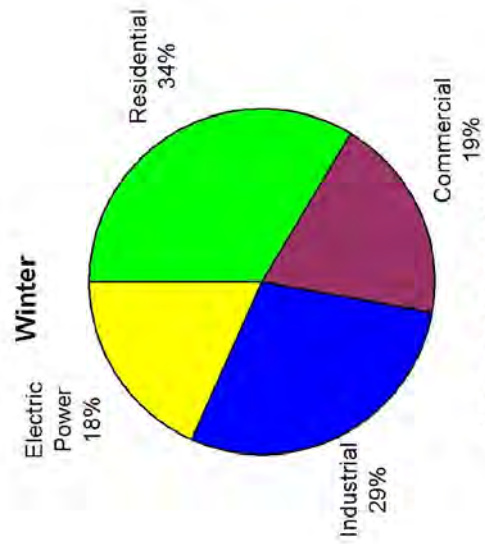
**Demand=10,187 BCFD**



**Demand=20,523 BCFD**



**Demand=3,134 BCFD**



**Demand=10,336 BCFD**

**Note:** Peak Summer = July & August; Total Summer = April through October; Winter = Jan, Feb, Mar, Nov, Dec.  
**Source:** U.S. DOE, Energy Information Administration.

Exhibit I. U.S. Census Regions

