

## Highlights

# Sales of Fuel Oil and Kerosene in 2004

Market conditions in 2004 were very different from those in 2003 when a large increase in distillate sales combined with sizable increases in sales of residual fuel oil and kerosene, resulted in a new record for combined fuel oil sales. In 2004, a sharp drop in sales of distillate more than offset increased sales of residual fuel oil and kerosene. Consequently, total sales of fuel oil and kerosene totaled 75.0 billion gallons or just over one billion gallons less than the all-time record of 76.1 billion gallons set in 2003. Distillate sales accounted for 83.0 percent of total sales the smallest share since 2001 when distillates accounted for 80.3 percent. Sales of residual fuel oil accounted for approximately 15.7 percent up from 15.0 percent in 2003 and sales of kerosene accounted for the remaining 1.3 percent compared to 1.1 percent of total sales in 2003.<sup>1</sup>

Despite robust economic growth, sales of distillate declined during 2004. With the exception of sales of on highway diesel fuel and sales to the construction and off road sectors, distillate sales fell in comparison

to the levels set in 2003. A number of factors had a negative influence on the market during the year, although high prices played a role, weather was an important factor as well. Not only was the winter warmer than normal but severe weather also had a negative impact on oil company direct use and sales to the agriculture sector. Total distillate sales were 62.3 billion gallons a drop of nearly 1.6 billion gallons (2.50 percent) from the all-time high set in 2003 of 63.9 billion gallons.

Despite a sharp decline in sales to the utility sector, overall sales of residual fuel oil increased on the strength of increased sales to the industrial and bunker sectors. Total sales of residual fuel increase by more than 381.5 million gallons (an increase of 3.3 percent) to reach 11.8 billion gallons, the highest level of sales since 2001.

Sales of kerosene also increased sharply continuing the recovery from the 2002 when sales plunged by 40 percent. Although sales increase by 18.1 percent to

**Table HL1. Volume Distribution of Distillate and Residual Fuel Oils, 2003 and 2004**

Energy Use	2004 Distillate		2003 Distillate		2004 Residual		2003 Residual	
	Volume (million gallons)	Percent Share						
Residential.....	6,645	10.7	6,927	10.8	—	—	—	—
Commercial.....	3,383	5.4	3,687	5.8	782	6.6	756	6.6
Industrial.....	2,327	3.7	2,394	3.7	1,540	13.1	1,414	12.4
Oil Company.....	473	0.8	514	0.8	47	0.4	84	0.7
Farm.....	3,189	5.1	3,201	5.0	—	—	—	—
Electric Power.....	823	1.3	1,148	1.8	4,704	39.9	5,273	46.2
Railroad.....	3,047	4.9	3,657	5.7	—	—	—	—
Vessel Bunkering.....	2,140	3.4	2,217	3.5	4,690	39.8	3,874	34.0
On-Highway.....	37,125	59.6	37,104	58.1	—	—	—	—
Military.....	359	0.6	416	0.7	30	0.3	10	0.1
Off-Highway.....	2,747	4.4	2,592	4.1	—	—	—	—
<b>Other.....</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>1</b>	<b>0.0</b>	<b>2</b>	<b>0.0</b>
<b>Total.....</b>	<b>62,258</b>		<b>63,855</b>		<b>11,761</b>		<b>11,413</b>	

Notes: Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration Form EIA-821, "Annual Fuel Oil and Kerosene Sales Report," for 2000-2004. On-Highway Diesel data are Federal Highway Administration statistics of highway special fuels use.

<sup>1</sup> Numbers may not sum to 100 percent due to rounding.

reach 988.7 million gallons, the total nonetheless remained below the record level of 1.1 billion gallons set in 2001.

## Distillate Fuel Oil

In 2004, distillate sales fell by nearly 1.6 billion gallons reflecting a very different pattern of sales from that in 2003 when distillate sales surged to a new record. Distillate sales had grown throughout the 1990's and with the single exception of 2001 continued to grow through 2003. The drop in 2004 not only goes against the long-term trend but also is nearly three times the size of the drop in sales that occurred in 2001 when total distillate sales fell by 588 million gallons.<sup>2</sup> In 2004, only two sectors showed any increase and the on-highway sector (accounting for more than half of all sales) was essentially unchanged increasing by less than one tenth of one percent. Only the off-highway and construction sector had more than a small increase growing by 6.0 percent or 155.1 million gallons. The overall decline in sales during 2004 came about as the result of a number of factors which for the most part acted to restrain sales, but which in some cases helped boost sales to a particular sector or region.

Economic conditions improved during 2004. Gross Domestic Product (GDP) a prime measure of the state of the economy increased by 4.4 percent in constant dollars, the highest increase since 2001. In 2003, rising fuel costs (especially for natural gas) contributed to a slight drop in the overall production of goods and an increase in industrial utilization of less than 0.3 percent. However, in 2004, even higher energy prices did not appear to restrain production. Instead, new construction in the commercial sector increased by 6.7 percent, production of durable goods increased by 6.9 percent, total manufacturing increased by 3.9 percent and the industrialization utilization rate increased by 3.4 percent.<sup>3</sup> Further, total energy consumption in the United States increased by 1.54 quads, an increase more than three times the increase of 2003. Consequently, total energy consumption for the nation reached an all-time high of 99.76 quads.<sup>4</sup> Improved economic conditions are also reflected by the drop in

unemployment from 6.0 to 5.5 percent, the lowest rate since 2001.<sup>5</sup>

Higher prices for oil products throughout most of the year counteracted the positive influence of the growth in the economy on sales to result in declining sales to most sectors of the fuel oil market. In particular, sales to the transportation sector, which had grown dramatically during 2003, fell in 2004. Sales to railroads dropped by 16.7 percent, more than 600 million gallons and sales of bunker fuel dropped by 3.5 percent or 77.3 million gallons. Sales to the on-highway sector did increase but only by about 22 million gallons, less than one tenth of one percent compared to a jump in sales in 2003 of 4.5 billion gallons. Vehicle Miles Traveled (VMT), measures total miles driven throughout the country by all types of vehicles in both urban and rural settings, in 2004, VMT increased by only 1.4 percent less than half of the increase of 2.9 percent of 2003.<sup>6</sup>

In the industrial and commercial sectors, the impact of higher oil prices was offset to some extent by the fuel switching brought about by the price of natural gas, that was significantly higher on a heating value than the price of oil. In early in 2004 the differential between oil and gas helped to boost distillate sales to the industrial sector as customers with the ability to switch from gas to oil did so during a cold snap in January.<sup>7</sup> However, unlike 2003 when fuel switching helped boost sales to the industrial and commercial sectors, in 2004 the cold did not last as long, prices of natural gas moderated sooner, and the nature of the fuel switching differed to some extent from what occurred in 2003. Fuel switching in 2004 benefited distillate sales by about 100,000 b/d but jet fuel and kerosene were the primarily beneficiaries.<sup>8</sup>

Weather was another factor that played a significant role in curtailing distillate demand in 2004 and its impact was more widespread than typical. 2004 was both considerably warmer than 2003 and also considerably warmer than normal. Although the overall difference in 2004 compared to 2003 as measured in heating degree days was just 3.8 percent for the nation as a whole, when examined on a regional basis the differences are more pronounced,

<sup>2</sup> The average increase during the period 1991-2001 was 1.47 billion gallons.

<sup>3</sup> *Economic Indicators*, May 2005, Washington D.C. U.S. Government Printing Office, p 12. (Data are adjusted for inflation using 2000 as the base).

<sup>4</sup> One quad equals one quadrillion (a one followed by fifteen zeros) British thermal units (Btu), source EIA, MER May 2004, Table 2.1

<sup>5</sup> *Economic Indicators*, September 2004, p 12. (Data are adjusted for inflation using 1996 as the base).

<sup>6</sup> Traffic Volume Trends, April 2005, <http://www.fhwa.dot.gov/ohim/tvwt/05aprtvt/page3.htm>

<sup>7</sup> *Oil Daily* January 16, 2004, page 2.

<sup>8</sup> *Oil Daily*, January 27, 2004, page 5.

particularly in the principal fuel oil consuming sections of the country (New England, the Middle Atlantic and East North Central) where heating oil demand for both residential and commercial consumers is the greatest. The winter of 2004 was warmer than the winter of 2003 in all three of the principal consuming regions and was also warmer than normal in both the Middle Atlantic and the East North Central regions. Overall, sales of heating oil to the residential sector decreased by 282 million gallons or 4.1 percent to 6.6 billion gallons.

The warmer than normal winter also contributed to a sharp decline in distillate sales for use in the electric power generation. In addition, the summer was also cooler than the summer of 2003 in most regions of the U.S.; consequently, demand for distillate fuel to meet peak summer generation loads was not as great as it had been in 2003.<sup>9</sup> Sales to the utility sector fell in every region of the country, dropping by 324.3 million gallons a decline of 28.3 percent.

The one sector of the market that exhibited sizeable growth during 2004 was the off-highway and construction sector. New construction was stimulated by interest rates that remained relatively low, consequently, the number of new housing units surged, increasing by more than 18 percent. Further, new construction in the commercial sector also increased, up by 6.7 percent and the combination helped boost distillate sales to the off-highway and construction market by 6.0 percent or 155.1 million gallons.<sup>10</sup>

At the national level, distillate sales to the agricultural sector were essentially unchanged at 3.2 billion gallons. Sales dropped by only 12.0 million gallons, just 0.4 percent and that small change is also reflected in the number of acres of major crops harvested during 2004. Although the number of acres harvested of cotton, soybeans and corn increased, considerably less wheat was harvested, and as a result, the amount of acres harvested for the principal crops taken together changed by only about

one percent. Nationally the amount of citrus fruit harvested increased slightly by 1.3 percent.<sup>11</sup> However, that conceals the fact that the increase took place primarily in the citrus growing regions in the far west, while Hurricane Ivan devastated portions of Florida, a major citrus production center. Distillate sales to the region of PAD District 1<sup>12</sup> that includes Florida plunged by 25.3 percent. Robust increases in the production of nuts, apples, and non-citrus fruits are reflected in a substantial gain in distillate sales for farm use of 16.4 percent in the PAD District 5.

Weather also had a negative impact on sales for direct use by oil companies. Hurricane Ivan also ravaged the oil and gas infrastructure in the Gulf of Mexico causing widespread and extensive damage to production platforms and to subsurface structures in the Gulf of Mexico that in some cases required months to repair. Sales of distillate for oil company direct use nationally fell by nearly 8 percent. The drop was primarily the result of plunging sales in the states adjacent to the Gulf of Mexico; sales in PAD District 3 fell by 15.8 percent. Two regions experienced growth in sales. In PAD District 2, the Middle West and the Rocky Mountains where major exploration efforts for natural gas especially in Wyoming and Colorado are underway. Sales increased by 7.5 million gallons or 10.4 percent in PAD District 2 and by 19.5 million gallons or 46.7 percent in PAD District 4.

On a regional basis, the warmer winter weather resulted in a drop in distillate sales to the residential sector in all three Subdistricts of PAD District 1 (the Atlantic Coast) and in PAD District 2 the Great Lakes and upper Mississippi River Valley. Sales also fell in PAD District 5 (the Pacific Coast). In PAD District 1, sales dropped by a total of 236.3 million gallons, in Subdistrict A, by 29.6 million gallons, in Subdistrict B by 189.7 million gallons, and in Subdistrict C by 16.8 million gallons. Sales increased in PAD District 4 (the Rocky Mountains) by 3.6 million gallons and in PAD District 3 (the Gulf Coast) by 6.6 million gallons.

<sup>9</sup> Smaller peaking units, especially older units are often combustion turbines (in some cases converted jet turbine engines that run on No 2 fuel oil). Such units are used in the winter when it is very cold, periods when interruptible contract provisions are triggered and some users of natural gas must switch to alternatives. It is also not unusual for distillate fuel to be used in such peaking units during the summer to meet peak cooling demand.

<sup>10</sup> *Economic Indicators*, May 2005, Washington, D.C., U.S. Government Printing Office, p 12.

<sup>11</sup> Department of Agriculture, National Agricultural Statistics Service,

<sup>12</sup> The U.S. is divided into 5 Petroleum Administration for Defense Districts (PAD Districts). District 1, East Coast, District 2, Midwest, District 3, Gulf Coast, District 4, Rocky Mountains, and District 5, Pacific Coast. PAD District 1 is broken into three subdivisions: Subdistrict 1A, New England, Subdistrict 1B, Middle Atlantic, and Subdistrict 1C, Southeast.

Sales to the commercial sector decreased sharply in Subdistricts A and B of PAD District 1 falling by 109.4 and 74.4 million gallons respectively. Sales also fell in PAD District 2, down by 52.2 million gallons, PAD District 3 was down by 67.6 million gallons and PAD District 5 where sales dropped by 13.9 million gallons. Sales increased in the South Atlantic portion of PAD District 1 by 11.2 million gallons. Sales also increased by 2.9 million gallons in the Rocky Mountain region. The substantial decreases in the Middle Atlantic and Northeast Subdistricts of PAD District 1, in large measure reflect reduced opportunities for fuel switching that resulted from warmer winter conditions than occurred in 2003.

In 2004, sales of distillate to the industrial sector were generally down on a regional basis. Sales increased only in Subdistrict B of PAD District 1, the Middle Atlantic and in PAD District 5, the Pacific Coast. The increase in the Middle Atlantic region of 35.3 million gallons reflects the significant degree of fuel switching on the part of some industrial consumers that took place in the region. Sales also increased sharply in the Pacific Coast region going up by 44.9 million gallons or 18.6 percent. Despite an increase in total energy consumption by the industrial sector of 0.34 percent sales elsewhere fell.<sup>13</sup> In the New England region of PAD District 1 sales plunged by 20.8 percent, in the South Atlantic portion of PAD District 1, sales dropped by 6.2 percent. Sales also dropped in PAD Districts 2, 3 and 4, by 2.9 percent or 18.8 million gallons, 13.2 percent or 57.0 million gallons, and 6.6 percent or 15.1 million gallons respectively.

Unlike the situation in 2003 when sales to the military surged, growing by more than 16 percent, in 2004 sales to the military fell by 13.7 percent nationally. Sales fell throughout the country with the exception of PAD District 2 where sales were essentially unchanged, registering a very small gain of only 13,000 gallons, about 0.1 percent. Sales in PAD District 1 dropped by 26.1 million gallons or 24.4 percent. In PAD District 3 sales dropped by 22.0 million gallons or 20.0 percent. In PAD District 4 sales fell by 4.9 million gallons or 82.9 percent. In PAD District 5 sales slipped by 4.0 million gallons or 2.2 percent.

Absent the opportunity for large-scale fuel-switching that occurred during the winter of 2003 coupled with

extensive damage from severe weather, especially from Hurricane Ivan to areas along the Gulf Coast distillate sales to the electric power sector dropped throughout the U.S. Although there were significant regional differences in the magnitude of the drop in sales, there were no exceptions; sales for use in the generation of electricity fell in every region including all three Subdistricts of PAD District 1. The largest drops occurred in the areas that sustained the most damage from the severe weather, including Hurricane Ivan. Sales in Subdistrict C of PAD District 1 that includes Florida fell by 121.4 million gallons, a drop of 35.0 percent. Sales in PAD District 3, which includes the remainder of the states along the Gulf of Mexico, dropped by 138.6 million gallons, plunging by 83.3 percent.

## Residual Fuel Oil

The strength of the economy, and a surge in sales of bunker fuel combined to boost overall sales of residual fuel oil by more than 380 million gallons, an increase of 3.3 percent. Although sales of residual fuel to the bunker market represented by far the largest increase in 2004, surging by more than 816 million gallons, or 21.1 percent, sales also increased to most other sectors as well. Prompted primarily by the high price of natural gas and by supplier constrained natural gas availability, some fuel switching on the part of some commercial and especially industrial consumers took place. Sales to the commercial sector were up by 26.0 million gallons or 3.4 percent and sales to the industrial sector grew by 125.8 million gallons or 8.9 percent.

Although overall sales of residual fuel oil increased, sales to two sectors declined. First, without the driver of a prolonged cold winter, sales of residual fuel for use in generating electric power fell by more than one third plunging by 569.1 million gallons. Although that drop in sales was substantial, it should be viewed in the context of the magnitude of the increase of more than one billion gallons that occurred in 2003. Approximately 40 percent of the gain in sales to utilities that took place during 2003 was retained in 2004 as the prolonged high prices for natural gas led some utilities to switch some dual-fueled units to oil on a long-term basis. Second, sales of residual fuel for direct use by oil companies fell by more than 40 percent dropping to 46.8 million gallons.

<sup>13</sup> EIA, *Monthly Energy Review*, May 2005, Table 2.1.

On a regional basis, sales of residual fuel to the commercial sector increased along the Atlantic Coast, in the Midwest and the Pacific regions of the country but declined in the Rocky Mountain and Gulf Coast sections of the country. The largest increase took place in PAD District 1 where more than 90 percent of sales are concentrated. In Subdistrict A, New England sales surged by nearly 30 percent, jumping from 88.5 to 150.2 million gallons. The largest decline in sales also took place in PAD District 1, in Subdistrict B, the Middle Atlantic where sales fell by 3.6 percent or 19.2 million gallons.

Sales to the industrial sector also increased the most along the Atlantic Coast. Sales increased in all three Subdistricts of PAD District 1. Sales jumped by 141.7 million gallons or 14.5 percent in the region. Sales fell the most in PAD District 3 along the Gulf Coast where a drop of 65.5 million gallons or 30.5 percent occurred.

For the second year in a row, sales to the military increased sharply. Sales increased by 22.3 million gallons or 544 percent in PAD District 1. Sales dropped the most in PAD District 2 where they fell by 4.7 million gallons, a drop of nearly 94 percent.<sup>14</sup>

Neither the relatively small drop of 37 million gallons of direct oil company sales nor the more substantial drop of nearly 570 million gallons to the utility sector was large enough to overwhelm the upsurge in the sales to the bunker, sector of more than 800 million gallons. Sales increased throughout every region of the country, including all three Subdistricts of PAD District 1.

Although sales of residual fuel oil increased in both 2003 and 2004 this does not necessarily mean that the long-trend in the decline of heavy fuel oil has been reversed. Rather, a new dynamic has entered the market. Whenever weather and high prices for competing fuels provide the incentive for fuel switching, larger customers in the industrial, commercial and especially the electric power sectors may take advantage of the situation and switch temporarily to oil. The long-term trend toward lower

sales of residual fuel remains and continues to affect the market; however with long-term higher priced natural gas, some industrial and particularly utilities have switched some units to fuel oil on a longer term basis than simply reacting to seasonal price spikes. The principle reasons for the changing relationship are: changing crude oil specifications; enhanced refinery sophistication resulting in increased production of gasoline and distillate at the expense of production of heavier products such as residual fuel oil, environmental constraints and restrictions on fuel oil use, and the availability of abundant relatively inexpensive natural gas have contributed to a diminished use of residual fuel oil in the production of electric power.<sup>15</sup> For residual fuel oil, although the overall trend has been for declining sales, fluctuations in the amount of fuel sold will occur whenever those with the ability to fuel switch when they are curtailed because of gas supply constraints during the coldest winter periods, or when price differentials between natural gas and fuel oil make switching attractive to sell natural gas into the market. In the past, fuel switching was typically of relatively short-term from a minimum of several days to a few weeks. However, in 2004, prolonged higher prices for natural gas made fuel switching attractive for some consumers over several months or longer.

## **Kerosene**

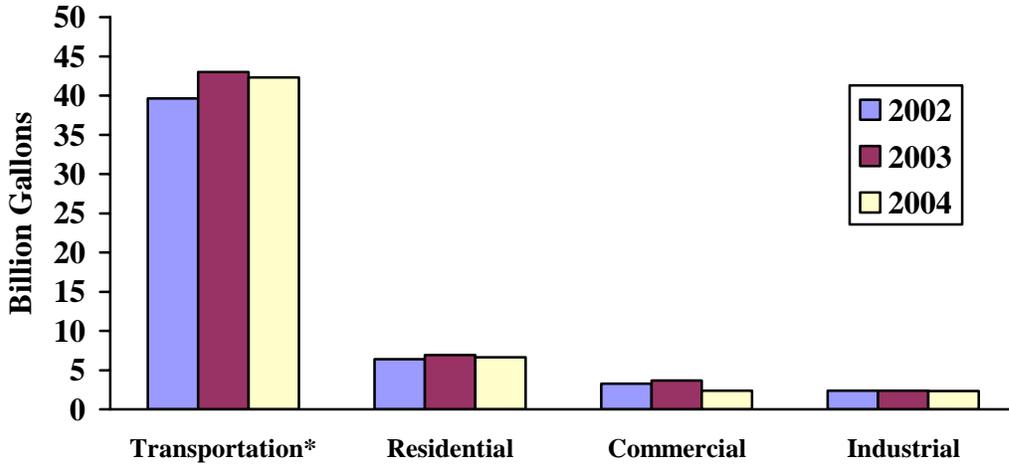
Sales of kerosene jumped by more than 18 percent increasing by 151.2 million gallons. Sales increased to all sectors generally in all regions of the country. The largest increases occurred residential and industrial sectors where sales increased by 107.0 million gallons and 28.2 million gallons respectively. Residential sales increased in all three Subdistricts of PAD District 1. Sales increased the most in Subdistrict B of PAD District 1 where they grew by 40.9 million gallons or 25.2 percent. Sales to the commercial sector increased in all regions with the exception of Subdistrict C of PAD District 1, the South Atlantic region which suffered damage from a number of hurricanes, particularly from Hurricane Ivan.

<sup>14</sup> No sales of residual fuel to the military were recorded in PAD District 3 or 4 in 2001, 2002, or 2003.

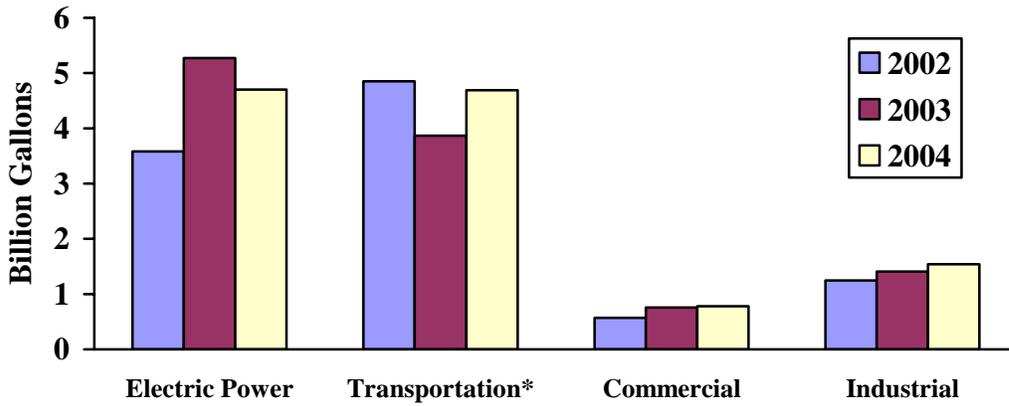
<sup>15</sup> It should be noted that the ability to increase production of light higher value products does not typically mean that refineries with upgraded processing capacity no longer possess the ability to produce heavier products such as residual fuel; rather, the economics involved dictate the production of the higher value products. Due to the divestiture of many electric power generation facilities, changes in fuel use and plant operations also contributed to the decline of residual fuel oil. For example, operators of these merchant plants blend fuels to achieve greater efficiency and to lower emissions of dirtier fuels (oil blended with natural gas and even oil and coal). When it is advantageous, the operators also may purchase power rather than generate electricity and re-sell the fuel.

Figure HL1. U.S. Sales of Distillate and Residual Fuel Oils by Energy Use, 2002-2004

### Distillate Fuel Oil



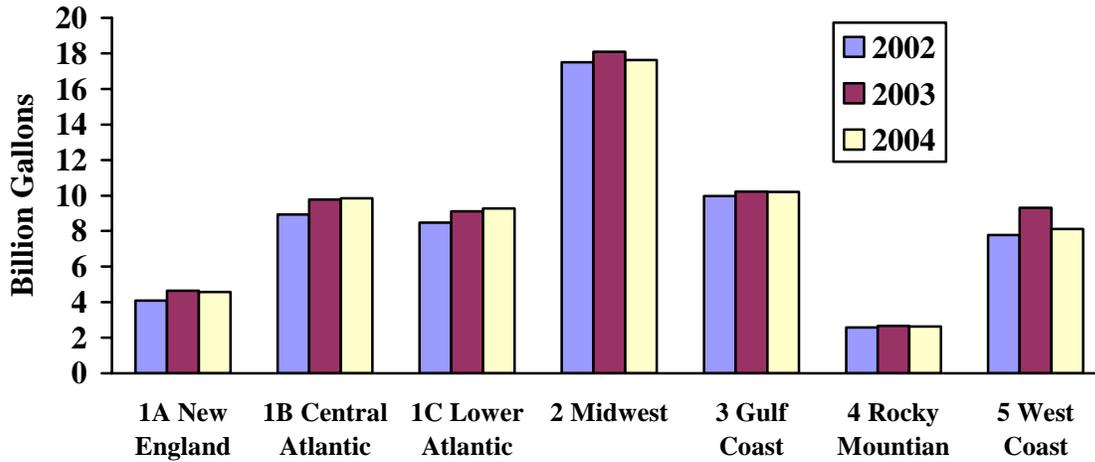
### Residual Fuel Oil



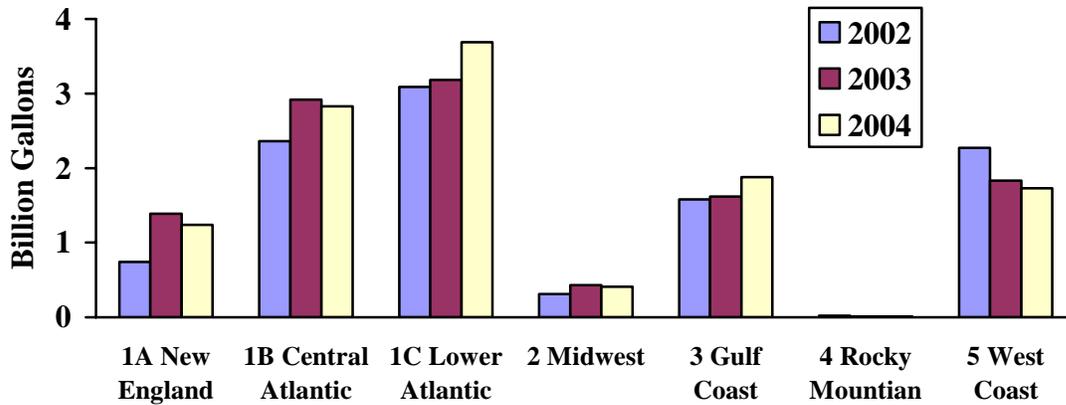
\*For distillate fuel oil, transportation use comprises railroad, vessel bunkering, and on-highway diesel energy use categories. For residual fuel oil, transportation use comprises vessel bunkering energy use category.  
 Source: Energy Information Administration, Form EIA-821, "Fuel Oil and Kerosene Sales Report," 2003 and 2004.

Figure HL2. Volume Distribution of Distillate and Residual Fuel Oils by PAD District, 2002-2004

### Distillate Fuel Oil



### Residual Fuel Oil

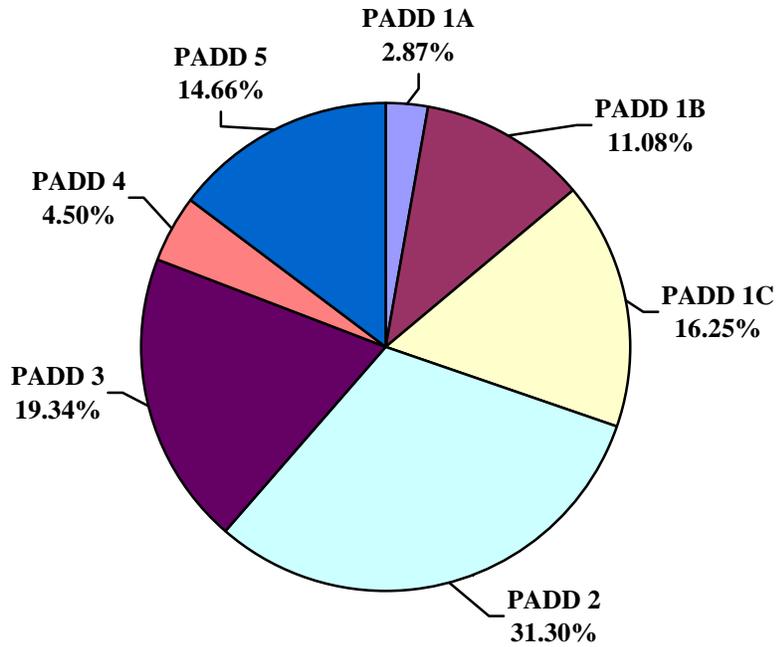


\*Residual fuel oil sales in PAD District 4 are too small to appear in the graph.

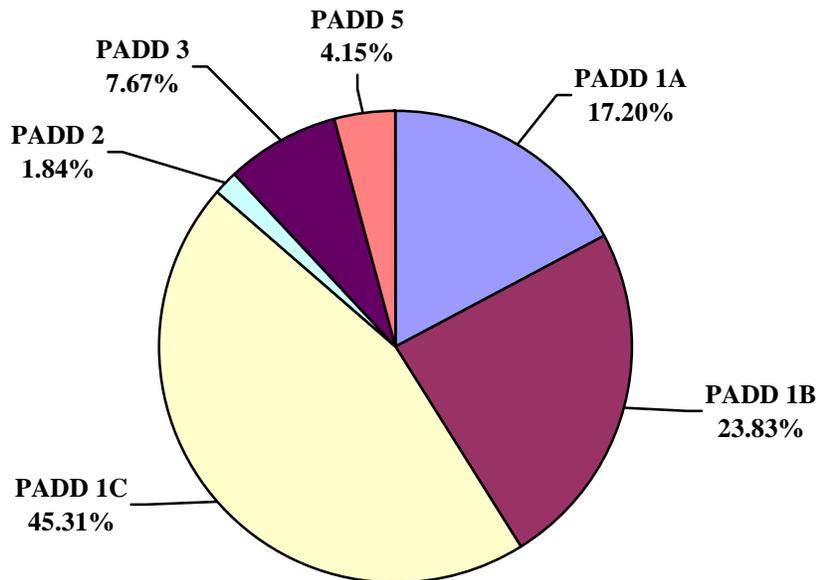
Source: Energy Information Administration, Form EIA-821, "Fuel Oil and Kerosene Sales Report," 2003 and 2004.

**Figure HL3. Distillate and Residual Fuel Oil Sales for Selected Energy Use Categories by PADD District, 2004**

**Distillate: Transportation**



**Residual: Electric Power**



\*Residual fuel oil sales in PAD District 4 are too small to appear in the graph..

Source: Energy Information Administration, Form EIA-821, "Fuel Oil and Kerosene Sales Report," 2004.