



Independent Statistics & Analysis
U.S. Energy Information
Administration

Fuel Oil and Kerosene Sales 2018

February 2020



This report was prepared by the U.S. Energy Information Administration (EIA), the statistical and analytical agency within the U.S. Department of Energy. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views in this report therefore should not be construed as representing those of the U.S. Department of Energy or other federal agencies.

Table of Contents

Introduction	4
Highlights	6
Distillate fuel oil	6
Residual fuel oil.....	6
Kerosene	6
U.S. sales of distillate and residual fuel oils by energy-use sectors, 2016-2018	8
Volume distribution of distillate and residual fuel oils by PADD, 2016-2018	9
Distillate and residual fuel oil sales for selected energy-use sectors by PADD, 2018	10
Technical Notes.....	11
Technical Note 1: EIA-821, <i>Annual Fuel Oil and Kerosene Sales Report</i>	11
Background	11
Discussion of Sampling Frame.....	11
Discussion of Sample Design.....	11
Imputation and Estimation	12
Collection Methods	13
Data Processing	13
Technical Note 2: Reliability of the Data	13
Technical Note 3: Data Adjustments	15
Alternate Source Data.....	15
Sales of Fuel Oil and Kerosene Data Tables:.....	15
Adjusted Sales of Fuel Oil and Kerosene Data Tables:	15
2018 Adjustments	15
Technical Note 4: Energy Use Descriptions and Petroleum Product Definitions	16
Energy Use Descriptions.....	16
Definitions of Petroleum Products and Other Related Terms	17

Tables

Table HL1. Volume distribution of distillate and residual fuel oils, 2017 and 2018 7

Figures

Figure HL1. Distillate fuel oil	8
Figure HL2. Residual fuel oil.....	8
Figure HL3. Distillate fuel oil	9
Figure HL4. Residual fuel oil.....	9
Figure HL5. Distillate: Transportation	10
Figure HL6. Residual: Electric Power.....	10

Introduction

The Fuel Oil and Kerosene Sales 2018 provides information, illustrations, and state-level statistical data on energy use sales of kerosene; No. 1, No. 2, and No. 4 distillate fuel oil; and residual fuel oil. State-level kerosene sales include volumes for residential, commercial, industrial, farm, and all other uses. State-level distillate sales include volumes for residential, commercial, industrial, oil company, railroad, vessel bunkering, military, electric power, farm, on-highway, off-highway construction, and other uses. State-level residual fuel oil sales include volumes for commercial, industrial, oil company, vessel bunkering, military, electric power, and other uses.

EIA's Office of Energy Production, Conversion & Delivery ensures the accuracy, quality, and confidentiality of the published data in the Fuel Oil and Kerosene Sales 2018.

Except for the kerosene and on-highway diesel information, data presented in the Data Tables; Sales of Distillate Fuel Oil by End Use, Sales of Residual Fuel Oil by End Use, and Distillate Fuel Oil and Kerosene Sales by End Use, present results of the EIA-821, *Annual Fuel Oil and Kerosene Sales Report*. Data Tables; Sales of Kerosene by End Use, Adjusted Sales of Distillate Fuel Oil by End Use, Adjusted Sales of Residual Fuel Oil by End Use, Adjusted Sales of Kerosene by End Use, and Adjusted Distillate Fuel Oil and Kerosene Sales by End Use, include volumes that are based on the EIA-821 survey but have been adjusted to equal the Products Supplied volumes as published on the [Supply and Disposition Data Table](#) for 2018.

The Sales of Fuel Oil and Kerosene Data Tables contain sales estimates resulting from the EIA-821 survey for all categories except kerosene and on-highway diesel. For on-highway diesel the survey was not expected to yield valid statistics because the sampling frame does not include a comprehensive listing of all truck stops. Hence, state-level data obtained from the Federal Highway Administration were used instead.

Kerosene sales data were not expected to be complete because a comprehensive listing of kerosene retailers was not available to serve as a sampling frame. It was thought that a complete frame would be expensive to construct because many kerosene retailers are convenience stores or other small businesses. Because of these concerns, kerosene sales data have been published only after adjusting the sales data so that they add to the U.S. total of kerosene Products Supplied volume as published on the [Supply and Disposition Data Table](#) for 2018.

In the Adjusted Sales of Fuel Oil and Kerosene Data Tables, estimates of distillate fuel oil are adjusted at the Petroleum Administration for Defense District (PADD) level to equal published [Petroleum Supply Annual](#) (PSA) volume estimates of products supplied. For certain sales categories, data obtained from alternate sources are used instead of the adjusted numbers. See [Technical Note 3 in Technical Notes](#) for further explanation.

Kerosene and residual fuel oil in the Adjusted Sales of Fuel Oil and Kerosene Data Tables are adjusted at the national level to equal published PSA products supplied estimates. Thus the kerosene figures in the Data Tables Sales of Kerosene by End Use and Adjusted Sales of Kerosene by End Use are identical.

The Sales of Fuel Oil and Kerosene Data Tables differ from the Adjusted Sales of Fuel Oil and Kerosene Data Tables estimates with the exception of kerosene and on-highway diesel for many reasons, including:

- Some products are interchangeable (fungible) and may be supplied as one product and sold as another product. For example, kerosene, low sulfur kerosene type jet fuel, and low sulfur No. 1 fuel oil can be used interchangeably.
- Products supplied into a PADD may be blended prior to final sale. For example, residual fuel oil and No. 2 distillate fuel may be blended and sold as No. 4 fuel oil or, in colder climates, kerosene may be blended with distillate fuel oil and sold as heating oil.
- Geographic differences can be attributed to the transportation of product by truck or rail from the district of production. Inter-PADD movements of products by these modes of transportation are not accounted for in the Adjusted Sales of Fuel Oil and Kerosene Data Tables.
- Products may be supplied into a PADD but the final sale may cross PADD boundaries. For example, a fuel oil dealer in Ohio (PADD 2) may make retail sales into Pennsylvania (PADD 1B) and/or West Virginia (PADD 1C).
- Drawdowns or buildups in stocks will cause volumes supplied to differ from sales volumes.

Highlights

Distillate fuel oil

Total U.S. distillate fuel oil sales increased 1,489.5 million gallons (2.4%) during 2018. Sales increased in the following energy-use sectors: On-Highway, 572.5 million gallons (1.4%), Residential, 452.5 million gallons (13.9%), Electric Power, 229.6 million gallons (55.8%), Railroad, 226.5 million gallons (6.6%), Oil Company, 204.4 million gallons (15.2%), Farm, 30.6 million gallons (0.9%), and Vessel Bunkering, 27.0 million gallons (1.2%). In contrast, decreases were observed in: Military, 32.6 million gallons (18.5%), Off-Highway, 48.3 million gallons (2.2%), Commercial, 69.5 million gallons (2.9%), and Industrial, 103.1 million gallons (5.0%).

Residual fuel oil

Total U.S. residual fuel oil sales increased 145.8 million gallons (4.6%) in 2018. Sales increased in the following energy-use sectors: Vessel Bunkering, 107.9 million gallons (4.2%) and Electric Power, 40.5 million gallons (10.1%). While decreases occurred in: Oil Company, 0.1 million gallons (0.8%), Military, 0.5 million gallons (97.3%), Industrial, 0.9 million gallons (0.5%), and Commercial, 1.1 million gallons (7.1%).

Kerosene

Total U.S. kerosene sales increased 3.6 million gallons (4.6%) in 2018. Sales increased in the following energy-use sectors: Industrial, 3.7 million gallons (52.8%), Commercial, 1.1 million gallons (12.6%), and All Other, 0.1 million gallons (82.3%). Sales to the Farm energy-use sector remained flat, while a decrease occurred in the Residential energy-use sector of 1.3 million gallons (2.0%).

Table HL1. Volume distribution of distillate and residual fuel oils, 2017 and 2018

Energy-Use Sectors	2018 Distillate		2017 Distillate		2018 Residual		2017 Residual	
	Volume (million gallons)	Percent Share	Volume (million gallons)	Percent Share	Volume (million gallons)	Percent Share	Volume (million gallons)	Percent Share
Residential	3,707	5.8	3,254	5.2	—	—	—	—
Commercial	2,359	3.7	2,429	3.9	14	0.4	15	0.5
Industrial	1,940	3.0	2,043	3.3	180	5.4	181	5.7
Oil Company	1,553	2.4	1,348	2.2	13	0.4	13	0.4
Farm	3,466	5.4	3,436	5.5	—	—	—	—
Electric Power	641	1.0	411	0.7	442	13.2	401	12.6
Railroad	3,641	5.7	3,414	5.5	—	—	—	—
Vessel Bunkering	2,213	3.5	2,186	3.5	2,687	80.6	2,580	80.9
On-Highway	41,978	65.8	41,405	66.4	—	—	—	—
Military	144	0.2	176	0.3	0	0.0	1	0.0
Off-Highway	2,195	3.4	2,244	3.6	—	—	—	—
All Other	0	0.0	0	0.0	0	0.0	0	0.0
Total	63,836		62,347		3,336		3,190	

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

Sources: U.S. Energy Information Administration, EIA-821, *Annual Fuel Oil and Kerosene Sales Report*.

On-Highway Diesel data are Federal Highway Administration statistics of highway special fuels use.

U.S. sales of distillate and residual fuel oils by energy-use sectors, 2016-2018

Figure HL1. Distillate fuel oil

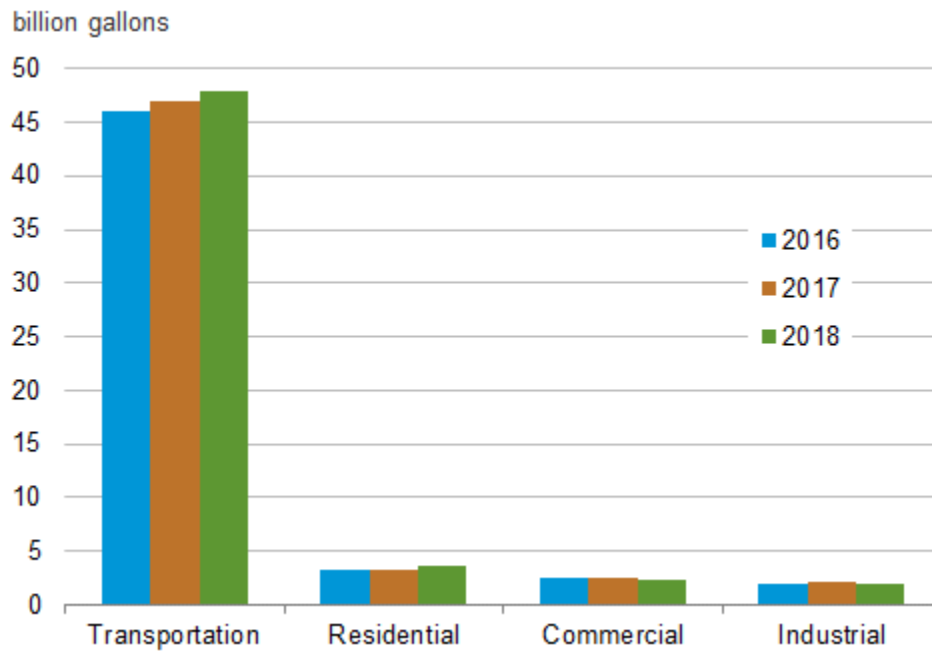
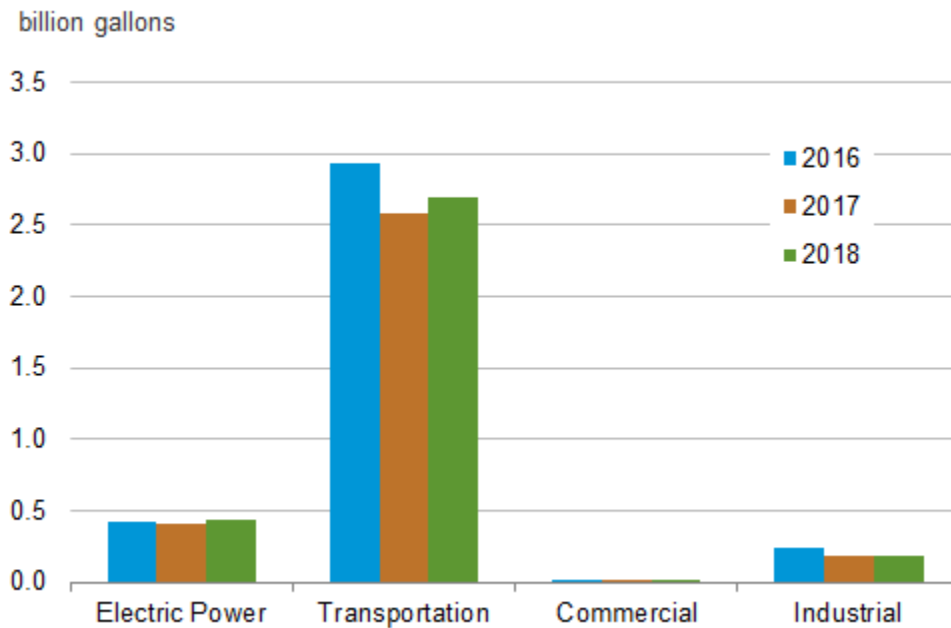


Figure HL2. Residual fuel oil



- For distillate fuel oil, transportation use comprises railroad, vessel bunkering, and on-highway diesel energy-use sectors. For residual fuel oil, transportation use comprises vessel bunkering energy-use sector.
- Source: U.S. Energy Information Administration, EIA-821, *Annual Fuel Oil and Kerosene Sales Report*.

Volume distribution of distillate and residual fuel oils by PADD, 2016-2018

Figure HL3. Distillate fuel oil

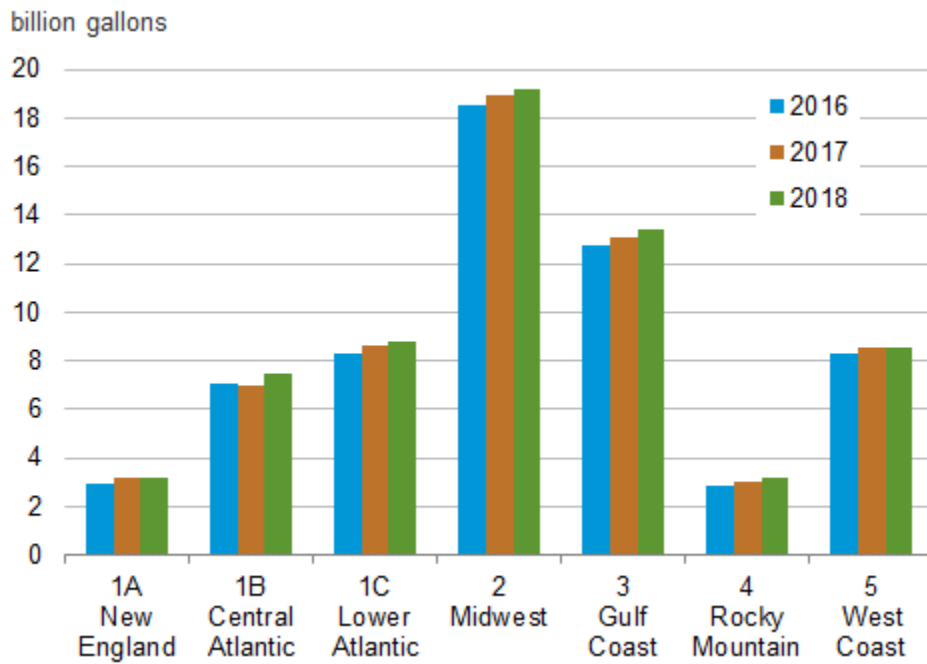
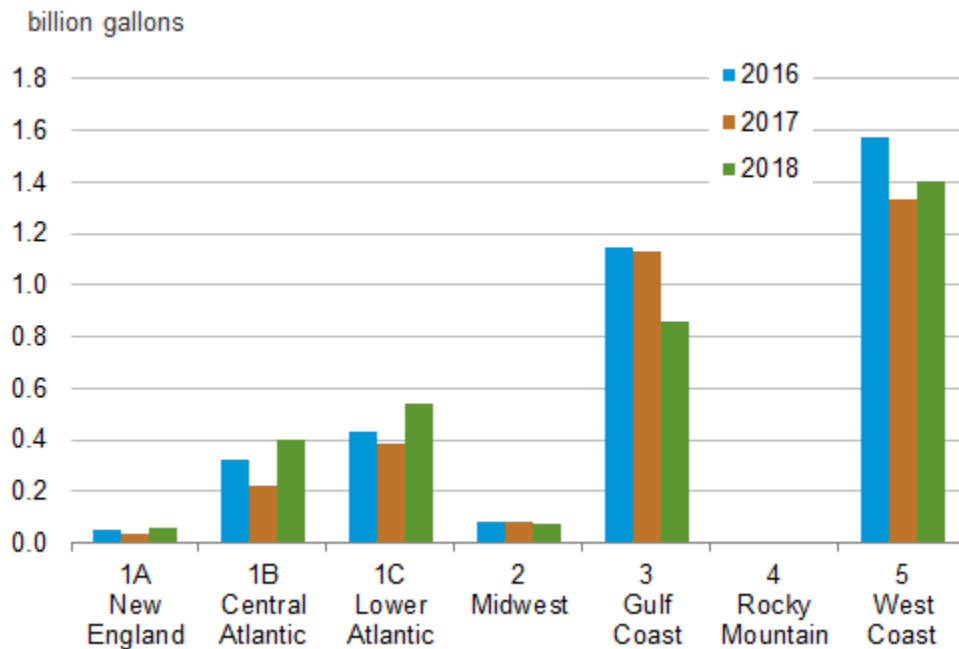


Figure HL4. Residual fuel oil



- Residual fuel oil sales in PADD 4 are too small to appear in the graph.
- Source: U.S. Energy Information Administration, EIA-821, *Annual Fuel Oil and Kerosene Sales Report*.

Distillate and residual fuel oil sales for selected energy-use sectors by PADD, 2018

Figure HL5. Distillate: Transportation

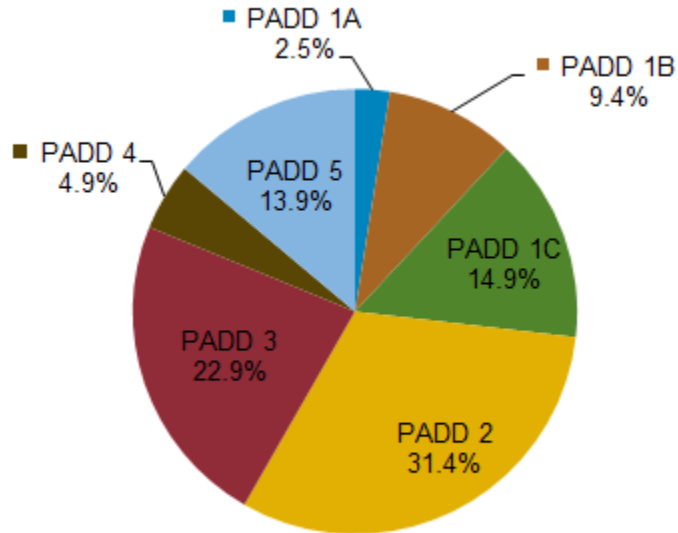
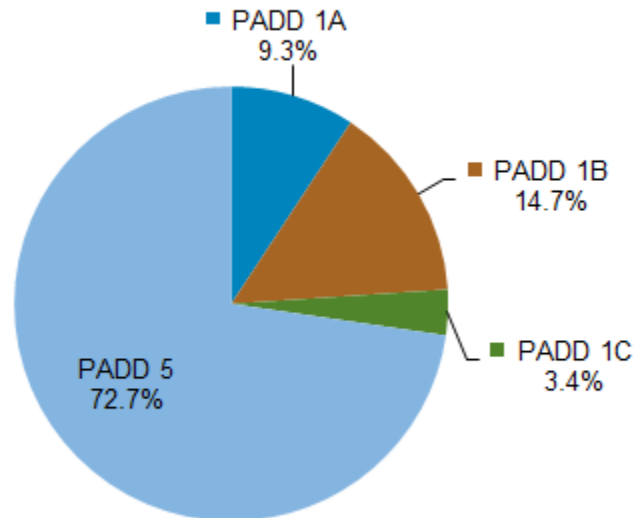


Figure HL6. Residual: Electric Power



- There are no residual fuel oil sales in PADDs 2, 3 and 4 for Electric Power.
- Source: U.S. Energy Information Administration, EIA-821, *Annual Fuel Oil and Kerosene Sales Report*.

Technical Notes

Technical Note 1: EIA-821, *Annual Fuel Oil and Kerosene Sales Report*

Background

The EIA-821, *Annual Fuel Oil and Kerosene Sales Report* survey was implemented to meet EIA legislative mandates and data user needs. Form EIA-821 is used to gather data on the sales to energy users of distillate fuel oil, residual fuel oil, and kerosene. The data are used to determine the level of demand by energy-use sectors and product at the state, regional, and national levels. This mandatory report is authorized by the Federal Energy Administration Act of 1974 (P. L. 93-275).

The predecessor survey to the EIA-821 was the EIA-172, *Sales Report of Fuel Oil and Kerosene* survey. The EIA-172 was conducted for reference years 1979 through 1982. Due to a serious deterioration in the sample of respondents during the 4-year period, the Form EIA-172 data were not collected for 1983. Instead, estimates for 1983 were published and a new sample of respondents was designed and selected from an improved sampling frame. The EIA-821 survey commenced with reference year 1984.

Discussion of Sampling Frame

The target population for the EIA-821, *Annual Fuel Oil and Kerosene Sales Report* survey is the universe of all active companies that sell distillate fuel oil, residual fuel oil, or kerosene in the 50 states and the District of Columbia.

The 2006 EIA-863 database provided a base sampling frame for the EIA-821 survey. The EIA-863, *Petroleum Product Sales Identification Survey*, was mailed to approximately 24,000 companies in January 2007 to collect 2006 state-level sales volume data for No. 2 distillate fuel, residual fuel oil, motor gasoline, and propane. Companies also indicated if they sold kerosene. The No. 2 distillate fuel data were further identified by residential No. 2 fuel oil and by nonresidential retail and wholesale for No. 2 fuel oil and No. 2 diesel fuel; the residual fuel oil data were identified by retail and wholesale. In addition, company/state-level volumes for distillate fuel, residual fuel oil, and kerosene from the 2008 EIA-821 survey, 2008 EIA-782A, *Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report*, and 2008 EIA-782B, *Resellers'/Retailers' Monthly Petroleum Product Sales Report* were also merged with the 2006 EIA-863 data. The integrated and comprehensive frame was then used to design and select the 2009 EIA-821 sample, which the 2018 survey is based.

Discussion of Sample Design

To select a sample for the EIA-821 survey, subsidiaries and parents of a company were merged by adding the volumes of parents and subsidiaries in a cluster (i.e., parent-subsidiary combination) to represent the company. The sample was drawn from a multi-attribute frame with four target variables of No. 2 residential fuel oil, No. 2 nonresidential fuel oil, No. 2 nonresidential diesel fuel, and No. 2 wholesale distillate fuel.

A company was classified as a certainty company if it met one of the following criteria:

- The company (or one of its subsidiaries) was a refiner as identified in the 2008 EIA-782A survey.
- The company had residual fuel oil sales.
- The company sold any EIA-821 product in at least five states.
- The sum of maximum percentage of the four distillate products at the state level across states was 5% or more.
- The company reported over 5% of the total weighted volume in any state for any specified product by end-use category in the 2008 EIA-821 survey.

A systematic probability proportional to size design (PPS) was used to sample noncertainty companies. Company State Units (CSUs) were the sampling units. A CSU selected by the sampling procedure was referred as a “basic” CSU. A company was included in the sample if it had at least one “basic” CSU. All non-“basic” CSUs of a sampled company were referred as “volunteer” CSUs.

In each state, the Dalenius-Hodges procedure was used to stratify CSUs, with each of the four target distillate variables, into zero, low, medium, and high volume four strata. Neyman allocation was used to obtain the sample size for each stratum to meet target coefficient of variation of 5%. The population of CSUs was divided into mutually exclusive cells by crossing the four stratifications such that every CSU in a particular cell was in the same stratum for each of the four stratifications. Each CSU was assigned a probability of selection, which was the largest sample proportion across all four stratifications. All CSUs within a cell had the same probability of selection. A systematic PPS sample of CSUs was then drawn for the state.

This design produced a final sample of approximately 4,000 companies. Selected companies were asked to report sales by end-use categories for distillate fuel, residual fuel oil, and kerosene.

Imputation and Estimation

Survey data gathered from the respondents may contain incomplete reporting, total nonresponse, or values that fail editing. Missing data are estimated, or implicitly imputed for; using the strata means and treated the same as reported data. The weighted estimate is defined as follows:

$$\hat{V} = \sum_h N_h \left(\frac{\sum_i W_{hi} V_{hi}}{\sum_i W_{hi}} \right)$$

where:

\hat{V} = total estimated volume

\sum_h = denotes summation over strata

N_h = stratum population for stratum h

\sum_i = denotes summation over units within stratum h

V_{hi} = volume reported for unit i in stratum h

W_{hi} = weight attached to unit i in stratum h

where: W_{hi} is inversely proportional to the probability of inclusion in the linked sample.

The degree of imputation by product and energy-use sectors at the U.S. total level ranged as follows for the 2018 EIA-821 data: distillate, 4.3% for railroad use to 29.0% for farm use; residual fuel oil, 0.0% for oil company use to 75.0% for military use; and kerosene, 15.7% for commercial use to 23.3% for industrial use.

Collection Methods

The EIA-821 form was sent in February 2019 to all companies selected for participation in the 2018 reference year survey. The completed form was due to EIA on April 19, 2019. Nonrespondent follow-up began approximately 1 month after the filing deadline. Emails and telephone calls were made to collect outstanding data and to verify reported data. Late submissions and resubmissions were processed when received.

Data Processing

As EIA-821 forms were received, they were logged into an automated Survey Control File that maintains company identification and survey form status information for each company selected to participate in the survey. The data were reviewed manually, entered onto the computer files, and then processed through an automated edit program, which detected missing data and outlying values. Data that failed the edits were resolved by contacting the data reporters and corrections were entered onto the computer files. Preliminary estimates were generated and processed through a series of validation procedures to flag and rectify potential misreporting of data. Statistical reports, including publication tables, were produced using only acceptable and verified data.

Technical Note 2: Reliability of the Data

Two types of errors are associated with data produced from a sample survey; sampling errors and nonsampling errors. Sampling errors occur because the estimates are based on a sample rather than on a census. The particular sample used for the EIA-821 survey is one of a large number of samples of equal size which could have been selected from the sampling frame using the same sample design. Each of these samples would produce a different estimate. If the estimates were averaged over all possible samples, the result would be the same as the estimate derived from a census of the sampling frame. The sampling error is a measure of variability among the estimates from all possible samples and, thus, is a measure of the precision with which an estimate from a particular sample approximates the results of a census.

Nonsampling errors and biases can arise from a number of sources: (1) inability to obtain information about all cases in the sample, (2) response errors, (3) differences in the interpretation of questions or definitions, (4) mistakes in recording or coding of the data obtained, and (5) other errors of collection, response, coverage, and estimation for missing data. Bias is the difference between the average of the

estimates over all possible samples of the same size and design, and the true value being estimated. It is not possible to estimate bias using the results of one sample.

Data obtained from alternate sources are not subject to sampling errors, but may be subject to nonsampling errors, the magnitudes of which are unknown. Nonsampling errors for survey estimates and estimates adjusted to alternate sources cannot be determined, but attempts are made throughout survey processing to minimize this type of error.

Data in the Sales of Fuel Oil and Kerosene tables are based on survey data that are subject to sampling errors. Coefficients of variation (CV), which are estimates of sampling errors, are estimated by:

$$CV(\hat{V}) = \frac{\sqrt{VAR(\hat{V})}}{\hat{V}}$$

where:

$$VAR(\hat{V}) = \sum_h n_h \left(1 - \frac{n_h}{N_h}\right) S_h^2$$

$$S_h^2 = \frac{\sum_{i=1}^{n_h} W_i^2 V_i^2 + \bar{V}_h^2 \sum_{i=1}^{n_h} W_i^2 - 2\bar{V}_h \sum_{i=1}^{n_h} W_i^2 V_i}{n_h - 1}$$

$$\bar{V}_h = \frac{\sum_{i=1}^{n_h} W_i V_i}{\sum_{i=1}^{n_h} W_i}$$

\hat{V} = total estimated volume

N_h = stratum population for stratum h

n_h = number of sample units in stratum h

V_i = volume for unit i

W_i = weight for unit i

Response rates also offer some indication of the reliability and comprehensiveness of survey results. For the 2018 EIA-821 survey, the overall response rate (the number of submissions received, divided by the number of submissions solicited and expected, times 100) was 89.2%.

Technical Note 3: Data Adjustments

Alternate Source Data

After all preliminary tabulations were verified, comparisons were made between the survey results and available alternate source data. The following energy-use sectors were replaced by alternate source data at the U.S., PADD, or state level:

Sales of Fuel Oil and Kerosene Data Tables:

On-Highway Diesel. Distillate fuel oil by state was calculated from the Federal Highway Administration data on-highway use of special fuels. Of the 2018 special fuels, more than 97.7% is diesel.

Adjusted Sales of Fuel Oil and Kerosene Data Tables:

The tables contain estimates of distillate fuel oil that have been adjusted at the PADD level to equal published EIA volume estimates of petroleum products supplied in the U.S. marketplace. The kerosene and residual fuel oil sales estimates have been adjusted at the national level. The Products Supplied volumes are published on the [Supply and Disposition Data Table](#) for 2018. In addition, electric power generation data and on-highway diesel data are used in lieu of adjusted survey results.

Electric Power. National-level distillate and residual fuel oil sales for electric power use were calculated from annual aggregations of data collected on the EIA-923, *Power Plant Operations Report*. From EIA-923 utility and non-utility, NAICS 22 companies, consumption data were added to the stock change of distillate and residual fuel oils, respectively. Allocations at the state level were based on the EIA-821 survey.

On-Highway Diesel. Distillate fuel oil by state was calculated from the Federal Highway Administration data on-highway use of special fuels. Of the 2018 special fuels, more than 97.7% is diesel.

2018 Adjustments

Total domestic adjusted sales of fuel oil and kerosene increased 4.4% from 65.6 billion gallons in 2017 to 68.5 billion gallons in 2018. Adjusted sales of distillate fuel oil and kerosene increased, 5.4% and 4.6% respectively, while residual fuel oil decreased 7.1% in 2018.

For kerosene, the 2018 survey resulted in 211,084 thousand gallons at the national level. The products supplied volume at the national level was 82,992 thousand gallons. Hence, the adjustment factor at the national level for 2018 was 0.4%.

For distillate, the adjustment factors at the PADD level for 2018 are as follows:

Distillate Fuel Oil

PADD 1:	1.0%
PADD 2:	1.1%
PADD 3:	1.0%
PADD 4:	1.0%
PADD 5:	0.8%

In the tables, total sales at the PADD level equal the Products Supplied volumes as published on the [Supply and Disposition Data Table](#) for 2018. For example, the 2018 survey yielded a volume for distillate residential use in PADD 2 of 183,934 thousand gallons. The total distillate volume for PADD 2 was 5,904,096 from the survey, after subtracting the volume coming from alternate sources. The product supplied total distillate volume for PADD 2 was 6,504,977 after removing alternate source volume. Hence, the adjusted 2018 estimate of distillate for residential use in PADD 2 was $(6,504,977/5,904,096) \times 183,934 = 202,654$. For distillate fuel, the PADD adjustments were made to each state and product-use category except on-highway diesel and electric power uses.

For residual fuel oil, the 2018 survey yielded 3,335,500 gallons of residual fuel oil, while the products supplied volume at the national level was 4,868,220 thousand gallons. Thus, the adjustment factor at the national level for 2018 was 1.5%, after subtracting the volumes coming from alternate sources. For residual fuel oil, the adjustments were made to each state and energy-use sectors except electric power.

Technical Note 4: Energy Use Descriptions and Petroleum Product Definitions

Energy Use Descriptions

All Other. Sales for all other energy-consuming sectors not included elsewhere.

Commercial. An energy-consuming sector that consists of service-providing facilities and equipment of nonmanufacturing businesses; federal, state, and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking and running a wide variety of other equipment.

Electric Power. An energy-consuming sector that consists of electricity only and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public; i.e., NAICS 22 plants. Volumes directly imported and used by the electric power companies are included.

Farm. An energy-consuming sector that consists of establishments where the primary activity is growing crops and/or raising animals. Energy use by all facilities and equipment at these establishments is included, whether or not it is directly associated with growing crops and/or raising animals. Common types of energy-using equipment include tractors, irrigation pumps, crop dryers, smudge pots, and milking machines. Facility energy use encompasses all structures at the establishment, including the farm house.

Industrial. An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity: manufacturing and mining. Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products.

Military. An energy-consuming sector that consists of the U.S. Armed Forces, Defense Energy Support Center (DESC), and all branches of the Department of Defense (DOD).

Off-Highway. An energy-consuming sector that consist of:

1. **Construction.** An energy-consuming sub sector that consist of all facilities and equipment including earthmoving equipment, cranes, generators, air compressors, etc.
2. **Other.** An energy-consuming sub sector that consists of all off-highway uses other than construction. Includes logging, scrape and junk yards, and refrigeration units on trucks.

Oil Company. An energy-consuming sector that consists of drilling companies, pipelines or other related oil companies not engaged in the selling of petroleum products. Includes fuel oil that was purchased or produced and used by company facilities for operation of drilling equipment, other field or refinery operations, and space heating at petroleum refineries, pipeline companies, and oil-drilling companies. Sales to other oil companies for field use are included, but sales for use as refinery charging stocks are excluded.

On-Highway Diesel. An energy-consuming sector that consists of motor vehicles: automobiles, trucks, and buses. Vehicles used in the marketing and distribution of petroleum products are also included.

Railroad. An energy-consuming sector that consists of all railroads for any use, including that used for heating buildings operated by railroads.

Residential. An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. Sales to farmhouses are reported under "Farm" and sales to apartment buildings are reported under "Commercial."

Vessel Bunkering. An energy-consuming sector that consists of commercial or private boats such as pleasure craft, fishing boats, tugboats, and ocean-going vessels, including vessels operated by oil companies. Excluded are volumes sold to the U. S. Armed Forces.

Definitions of Petroleum Products and Other Related Terms

ASTM. American Society for Testing and Materials.

Distillate Fuel Oil. A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-

highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation.

1. **No. 1 Distillate.** A light petroleum distillate that can be used as either a diesel fuel or a fuel oil.
 - a. **No. 1 Diesel Fuel.** A light distillate fuel oil that has distillation temperatures of 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM specification D 975. It is used in high-speed diesel engines generally operated under frequent speed and load changes, such as those in city buses and similar vehicles.
 - b. **No. 1 Fuel Oil.** A light distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 396. It is used primarily as fuel for portable outdoor stoves and portable outdoor heaters.
2. **No. 2 Distillate.** A petroleum distillate that can be used as either a diesel fuel or a fuel oil.
 - a. **No. 2 Diesel Fuel.** A fuel that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high speed diesel engines that are generally operated under uniform speed and load conditions such as those in railroads locomotives, trucks, and automobiles.
 - i. **Diesel 15 ppm Sulfur and Under (No. 2 Diesel \leq 15 ppm Sulfur, Ultra Low).** No. 2 diesel fuel that has a sulfur level no higher than 15 ppm by weight.
 - ii. **Diesel Greater than 15 to 500 ppm Sulfur (No. 2 Diesel > 15 and ≤ 500 ppm Sulfur, Low).** No. 2 diesel fuel that has a sulfur level higher than 15 and equal to or lower than 500 ppm by weight.
 - iii. **Diesel 500 ppm Sulfur and Under (No. 2 Diesel ≤ 500 ppm Sulfur, Low).** No. 2 diesel fuel that has a sulfur level lower than 500 ppm by weight. This includes Ultra Low Sulfur Diesel.
 - iv. **Diesel Greater than 500 ppm Sulfur (No. 2 Diesel > 500 ppm Sulfur, High).** No. 2 diesel fuel that has a sulfur level above 500 ppm by weight.
 - b. **No. 2 Fuel Oil (Heating Oil).** A distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the specification defined in ASTM specification D 396. It is used in atomizing type burners for domestic heating or for moderate capacity commercial/industrial burner units.
3. **No. 4 Fuel.** A distillate fuel oil made by blending distillate fuel oil and residual fuel oil stocks. It conforms with ASTM Specification D 396 or Federal Specification VV-F-815C and is used extensively in industrial plants and in commercial burner installations that are not equipped with preheating facilities. It also includes No. 4 diesel fuel used for low-and medium-speed diesel engines and conforms to ASTM Specification D 975.

NOTE: Respondents to the EIA-821 survey were instructed to report all volumes in accordance with what the product was sold as, regardless of the actual specifications of that product. For example, if a No. 2 distillate was sold as a heating oil or fuel oil, the volume would be reported in the category “No. 2 Fuel Oil” even if the product conformed to the higher specifications of a diesel fuel.

Kerosene. A light petroleum distillate that is used in space heater, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10-percent recovery point, a final boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. Included are No. 1-K and No. 2-K, the two grades of kerosene called range or stove oil, which have properties similar to those of No. 1 fuel oil.

Petroleum Administration for Defense Districts (PADD). A geographic aggregation of the 50 states and the District of Columbia into five Districts, with PADD 1 further split into three subdistricts. The PADDs include the states listed below:

1. **PADD 1 (East Coast):**
 - a. **PADD 1A (New England):** Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont
 - b. **PADD 1B (Central Atlantic):** Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania
 - c. **PADD 1C (Lower Atlantic):** Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia
2. **PADD 2 (Midwest):** Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and Wisconsin
3. **PADD 3 (Gulf Coast):** Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas
4. **PADD 4 (Rocky Mountain):** Colorado, Idaho, Montana, Utah, and Wyoming
5. **PADD 5 (West Coast):** Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington

Residual Fuel Oils. A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations. It conforms to ASTM Specification D 396 and D 975 and Federal Specification VV-F-815C. No. 5, a residual fuel oil of medium viscosity, is also known as Navy Special and is defined in Military Specification MIL-F859E, including Amendment 2 (NATO Symbol F-77). It is used in steam-powered vessels in government service and inshore power plants. No. 6 fuel oil includes Bunker C fuel oil and is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes.

United States. The 50 states and the District of Columbia.