Petroleum Overview

The 25 petroleum products included in the State Energy Data System (SEDS) are explained in this section. For 10 of these products, the method of estimating their prices by state is described in individual sections. The 10 petroleum products are:

- Asphalt and road oil (AR)
- Aviation gasoline (AV)
- Distillate fuel oil (DF)
- Jet fuel (JF)
- Kerosene (KS)
- Liquefied petroleum gases (LG)
- Lubricants (LU)
- Motor gasoline (MG)
- Petroleum coke (PC)
- Residual fuel oil (RF)

Fifteen separate products, plus petroleum coke, are included in the category called "other petroleum products" (PO). Of the 15 products, prices are developed for 6 products. All of these products are used in the industrial sector:

- Miscellaneous products
- Petrochemical feedstocks, naphtha
- Petrochemical feedstocks, other oils
- Petrochemical feedstocks, still gas (1970–1985)
- Special naphthas
- Waxes

Price estimates for petroleum coke are discussed in the petroleum coke section.

Expenditures for each petroleum product are calculated by multiplying the price estimates by the SEDS consumption estimates. The consumption estimates are adjusted to remove intermediate petroleum products. (See Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm.) Estimates of average prices and total expenditures for total petroleum are also computed. Total petroleum expenditures are the sum of the expenditures of the 16 petroleum products, and average prices for total petroleum are calculated by dividing total expenditures by the sum of the adjusted consumption of the 16 petroleum products.

Asphalt and Road Oil

The State Energy Data System (SEDS) assumes that all asphalt and road oil consumption occurs in the industrial sector. Asphalt and road oil are used primarily for road construction. Other uses include waterproofing products such as roofing and sealing. The prices captured in SEDS are prices of asphalt binder or asphalt cement used in road construction. Taxes are not included in the prices because most street and highway paving is done under contract to state, county, and other public authorities who are typically exempt from paying taxes.

Physical unit prices: 2009 forward

Asphalt physical unit prices for 2009 forward are developed from individual state Department of Transportation data available online. A simple average of the reported weekly or monthly prices is calculated to estimate the average annual price. States that do not report prices – Arkansas, California, Colorado, Iowa, Michigan, Minnesota, Mississippi, North Dakota, Nebraska, Texas, Wisconsin, and the District of Columbia – are assigned their corresponding Census division simple average prices. For states with an incomplete series – Hawaii (2009 through 2011) and South Dakota (2014) – the corresponding Census division growth rate is applied to available data to estimate missing years.

Physical unit prices: 1970 through 2008

Asphalt physical unit prices for 1970 through 2008 are developed from monthly reports in the *Engineering News-Record*, a construction industry weekly magazine published by McGraw-Hill, Inc. The source data consist of monthly reports from correspondents in 20 U.S. cities with price quotes for tank cars, drums, or both, for the three major types of asphalt products: asphalt cement (AC-20), asphalt emulsion (rapid set and slow set), and asphalt cutback.

For 1986 through 2008, the tank car price is used. However, for 1986 and 1987, the drum price is used if a tank car price is not available. For 1970 through 1985, when both tank car and drum prices are available, a simple average of the two prices is used. When only one price is available, that price is used.

Asphalt prices are developed by calculating a simple average annual price from the monthly prices for each city for the three products. City prices are assigned to states. California, Ohio (1970 through 1985, and 1992 through 2008), and Pennsylvania have prices from two cities; in these cases, simple averages of the two city prices are used. No states have prices from more than two cities. Kansas City prices are assigned to Kansas and not used in the Missouri price estimates. An outlier data value for Minneapolis in June 1995 was omitted and the Minnesota price for 1995 is an 11-month average. States with no prices are assigned a Census division simple average price. If there is no Census division price, the simple average of the prices for the other Census divisions within that Census region is used.

State average asphalt prices are calculated as the quantity-weighted average prices of the three products for each state. Quantity data for 1970 through 1980 are taken from the Bureau of Mines and U.S. Energy Information Administration (EIA) reports on sales of asphalt. Quantity data for 1981 forward are taken from the *Asphalt Usage Survey for the United States and Canada*, published by the Asphalt Institute.

For 1970 through 1982, asphalt and road oil are estimated as separate data series. Asphalt prices are estimated as discussed above. Road oil prices are assumed to equal asphalt emulsion prices because specific prices are not available from any source.

Btu prices: all years

For 2009 forward, asphalt prices in dollars per short ton are converted to dollars per million Btu using the following factors: 5.5 barrels per short ton and 6.636 million Btu per barrel.

Before 2009, asphalt prices in dollars per short ton are converted to dollars per gallon by dividing by 235 gallons per short ton for asphalt cement, 241 gallons per short ton for emulsion, and 248.6 gallons per short ton for cutback. These prices are then multiplied by 42 gallons per barrel and divided by 6.636 million Btu per barrel to get dollars per million Btu. Road oil unit prices of dollars per short ton are converted to dollars per million Btu by using the constant conversion factors of 5.5 barrels per short ton and 6.636 million Btu per barrel. The average price of all asphalt and road oil is the consumption-weighted average of the individual product prices.

U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2009 forward: State Department of Transportation websites, most of which are listed in U.S. Department of Transportation, Federal Highway Administration, AASHTO Subcommittee – Fall 2009, Subcommittee on Construction, Contract Administration Section, Survey on the Use of Price Adjustment Clauses, http://www.fhwa.dot.gov/programadmin/contracts/

aashto.cfm.

1970 through 2008: McGraw-Hill, Inc., *Engineering News-Record*, http://www.enr.com.

Quantities for calculating weighted average prices through 2008

1981-2008: Asphalt Institute, *Asphalt Usage Survey for the United States and Canada,* table titled "U.S. Asphalt Usage."

1977-1980: EIA, Energy Data Reports, *Sales of Asphalt* (1978-1980) and *Asphalt Sales, Annual* (1977), Table 2.

1970-1976: Bureau of Mines, U.S. Department of the Interior, Mineral Industry Survey, *Asphalt Sales, Annual* (1971-1976) and *Asphalt Shipments, Annual* (1970), Table 2.

Consumption

1970 forward: EIA State Energy Data System, industrial sector, asphalt and road oil consumption.

Conversion factors: all years

Conversion factors used are: 5.5 barrels per short ton of asphalt (2009 forward); 235 gallons per short ton of asphalt cement (1960–2008); 241 gallons per short ton of emulsion (1960–2008); 248.6 gallons per short ton of cutback (1960–2008); 42 gallons per barrel; 5.5 barrels per short ton of road oil; 6.636 million Btu per barrel.

Aviation Gasoline

Aviation gasoline prices are developed for the transportation sector. Estimates of the amount of aviation gasoline consumed by the transportation sector are taken from the State Energy Data System (SEDS). Aviation gasoline prices are national averages, excluding taxes. In all cases, physical unit prices are developed and then converted to Btu prices. Federal and state excise taxes, as well as state and local sales taxes, are not included.

Physical unit prices: 2015

The national average refiners sales price to end users published in the U.S. Energy Information Administration (EIA) website was withheld for 2015. The growth rate derived from the annual U.S. aviation gasoline sales price for resale published on the EIA website is applied to the previous year's refiner sales price to end users to estimate transportation aviation gasoline price.

Physical unit prices: 2008 through 2014

Aviation gasoline prices for 2008 through 2014 are assumed to be the national average refiners sales prices to end users published in the U.S. Energy Information Administration (EIA) *Petroleum Marketing Annual* (through 2009) and on the EIA website.

Physical unit prices: 1976 through 2007

Aviation gasoline prices for 1978 through 2007 are assumed to be the national average refiners sales prices to end users published in EIA's *Annual Energy Review*. The 1976 and 1977 prices are assumed to be the national average retail prices published in EIA's *Monthly Energy Review*.

Physical unit prices: 1970 through 1975

For 1970 through 1975, aviation gasoline prices are not available. Prices are derived by dividing the national motor gasoline prices for those years by the 1976 national motor gasoline price and applying those percent changes to the 1976 national aviation gasoline price.

Btu prices: all years

Aviation gasoline Btu prices are calculated by converting the physical unit prices from dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu (5.048 million Btu per barrel).

Data sources

Prices

2015: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, Resale—Aviation Gasoline, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPV_PWG_dpgal_a.htm.

2010-2014: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Aviation Gasoline, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPV_PTG_dpgal_a.htm.

2008, 2009: EIA, *Petroleum Marketing Annual,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma.html, Petroleum chapter Table 32, row titled "Refiner Prices of Aviation Gasoline, Sales to End Users", also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_dcu_nus_a.htm.

1978-2007: EIA, *Annual Energy Review,* http://www.eia.gov/aer/contents.html, Petroleum chapter Table 5.22 (1991-2007), Table 5.20 (1979-1990), and Table 5.21 (1978), row titled "Sales Prices to End Users: Aviation Gasoline." Also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_dcu_nus_a.htm.

1976, 1977: EIA, *Monthly Energy Review*, April 1984, page 106, column titled "Aviation Gasoline, Retail."

1970-1975: EIA, *Annual Energy Review 1989*, Table 70, column titled "Motor Gasoline, Leaded Regular, Nominal."

Consumption

1970 forward: EIA, State Energy Data System, transportation sector, aviation gasoline consumption.

Conversion factor: all years

5.048 million Btu per barrel.

Distillate Fuel Oil

Distillate fuel oil prices are developed for all sectors. Distillate fuel oil prices in the transportation sector are assumed to be retail diesel prices. Estimates of the amount of distillate fuel oil consumed in each sector are taken from the State Energy Data System (SEDS). Estimated consumption for the industrial sector is adjusted to remove the estimated refinery consumption of distillate fuel oil in each state. (See the discussion in Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm.)

Residential sector

Residential distillate fuel oil prices are developed by using a variety of data sources and several estimation methods, depending on the years involved. In all cases, physical unit prices for states are developed first, then Btu prices are calculated by using the physical unit prices and the conversion factor. The prices contained in this series are the retail prices paid by consumers for residential heating oil, including taxes.

Physical unit prices: 2011 forward

The survey that provides reseller and retailer sales prices for distillate fuel oil by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," was discontinued in 2011. As a result, data for distillate prices by sales type, which are based on survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B are no longer available. To estimate residential distillate fuel oil prices, regression equations are developed for each Petroleum Administration for Defense (PAD) district and subdistrict using historical refiner residential sales prices for No. 2 fuel oil and No. 2 diesel fuel from EIA-782A as the independent variables and the historical prices for residential distillate prices as the dependent variable. These regression equations are used to estimate the current residential distillate fuel oil prices for the PAD districts and subdistricts and for states that have refiner residential prices, historical refiner/reseller/retailer prices, and sizable sales volume—AK, MA, NH, NY, PA, and VT. All other states are assigned the corresponding PAD district or subdistrict estimated price. See Figure TN3 in "Introduction," at http://www.eia.gov/state/seds/sep_prices/notes/pr_intro.pdf. State general sales taxes are added to the state estimated prices.

For 2013 forward, refiners' prices for PAD subdistricts 1A and 1B are not available and are estimated by applying the growth rate of U.S. refiners' price to the previous year's subdistrict prices. Refiners' prices for states other than

Alaska are also not available so the regression equation estimates cannot be computed. They are assigned the corresponding PADD district or subdistrict estimated price.

Physical unit prices: 1997 through 2010

For 1997 through 2009, physical unit distillate fuel oil prices in cents per gallon (excluding taxes) are generally available for 23 states from the U.S. Energy Information Administration (EIA) *Petroleum Marketing Annual (PMA).* State-level prices for the states without *PMA* prices are estimated by using the *PMA* Petroleum Administration for Defense (PAD) district or subdistrict prices. The estimation procedures are described below and include the addition of state general sales taxes.

1. State prices are generally available from the *PMA* for the following 23 states: AK, CT, DE, ID, IL, IN, MA, MD, ME, MI, MN, NH, NJ, NY, OH, OR, PA, RI, VA, VT, WA, WI, and WV. Prices for these states are converted from cents to dollars per gallon, and state general sales taxes from the U.S. Census Bureau and successor sources are added.
2. States that do not have prices in the *PMA* are assigned a *PMA* PAD district or subdistrict price, and state general sales taxes are added. For 2003 through 2008, the PAD District 3 residential price is withheld in the *PMA* and the PAD District 3 average distillate retail sales price is used instead. The states that are assigned PAD district or subdistrict prices are shown in Table TN4.1.

For 2010, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website.

Physical unit prices: 1983 through 1990 and 1992 through 1996

For 1983 through 1990 and 1992 through 1996, physical unit distillate fuel oil prices in cents per gallon (excluding taxes) are generally available for 23 states from the U.S. Energy Information Administration (EIA) *Petroleum Marketing Annual (PMA)*. For 1989 through 1993, prices represent No. 2 fuel oil, only. For 1994 forward, prices include other No. 2 distillates. State-level prices for the states without *PMA* prices are estimated by using price data from the American Gas Association (AGA), SEDS consumption data, and *PMA* Petroleum Administration for Defense (PAD) district or subdistrict prices. The estimation procedures are described below and include the addition of state general sales taxes.

1. State prices are generally available from the *PMA* for the following 23 states: AK, CT, DE, ID, IL, IN, MA, MD, ME, MI, MN, NH, NJ, NY, OH, OR, PA, RI, VA, VT, WA, WI, and WV. Prices for these states are converted from cents to dollars per gallon, and state general sales taxes from the U.S. Census Bureau and successor sources are added.
2. For the states that do not have prices in the *PMA*, prices are estimated by using AGA fuel oil prices, SEDS consumption data, and *PMA* PAD district or subdistrict prices. The following steps are used to estimate the prices:
   a. Distillate prices from the *PMA* for PAD districts or subdistricts are converted from cents per gallon to dollars per gallon.
   b. For 1983 through 1990 and 1992 through 1996, the AGA lists fuel oil prices by company for the principal city served in dollars per million Btu, including state sales taxes. A simple average of the city-level prices is used to derive a state-level price for each of the states without *PMA* prices for these years.
   c. The AGA state prices derived in step 2b are combined into PAD district or subdistrict averages by using SEDS consumption to weight each state's values. This procedure gives AGA consumption-weighted average prices for PAD districts and subdistricts comparable to the volume-weighted prices published in the *PMA*. The AGA PAD district and subdistrict averages are calculated by using only the available states; if a state does not appear in the survey, it is not included in the PAD district or subdistrict calculation.
   d. Adjustment factors, ratios of the *PMA* PAD district or subdistrict price divided by the AGA-derived PAD district or subdistrict price, are calculated.
   e. Prices for the states not published in the *PMA* are calculated by multiplying the AGA state prices derived in step 2b by the appropriate PAD district or subdistrict adjustment factor from step 2d and then adding state general sales taxes.
   f. States that do not have prices in either the *PMA* or the AGA are assigned a *PMA* PAD district or subdistrict price, and state general sales taxes are added. The states with assigned PAD district or subdistrict prices are as shown in Table TN4.1.

Physical unit prices: 1991

Physical unit distillate fuel oil prices in cents per gallon (excluding taxes) are available for 24 states from the *PMA*. Because prices are not available from AGA for 1991, state-level prices for the remaining 27 states are estimated by using physical unit prices derived for 1990 in SEDS and the 1991 *PMA* PAD district or subdistrict prices. The estimation procedures, including the addition of state general sales taxes, are described as follows:

1. State prices are available from the *PMA* for the following 24 states: AK, CT, DC, DE, ID, IL, IN, MA, MD, ME, MI, MN, NH, NJ, NY, OH, OR, PA, RI, VA, VT, WA, WI, and WV. Prices for these states are converted from

Table TN4.1. Distillate fuel oil residential sector PAD district and subdistrict price assignments, 1983 through 1990 and 1992 through 2010

State	Years	Assignments
AL	1997–2010	District 3
AR	1988, 1993–2010	District 3
AZ	1992–2010	District 5
CA	1984, 1992–2010	District 5
CO	1997–2010	District 4
DC	2000, 2002–2010	Subdistrict 1B
FL	1993, 1997–2010	Subdistrict 1C
GA	1996–2010	Subdistrict 1C
HI	1983–1990, 1992–2010	District 5
IA	1997–2010	District 2
IL	1986	District 2
KS	1986, 1989, 1996–2010	District 2
KY	1997–2010	District 2
LA	1986, 1996–2010	District 3
MI	2000, 2001	District 2
MO	1997–2010	District 2
MS	1983, 1985, 1986, 1995–2010	District 3
MT	1994, 1995, 1997–2010	District 4
NC	1997–2010	Subdistrict 1C
ND	1994, 1995, 1997–2010	District 2
NE	1996–2010	District 2
NM	1984–1990, 1992–2010	District 3
NV	1994, 1995, 1997–2010	District 5
OK	1986, 1989, 1990, 1992, 1993, 1995–2010	District 2
SC	1997–2010	Subdistrict 1C
SD	1986, 1995–2010	District 2
TN	1997–2010	District 2
TX	1992–1995, 1997–2010	District 3
UT	1985, 1995, 1997–2010	District 4
WY	1994, 1997–2010	District 4

cents to dollars per gallon, and state general sales taxes from the U.S Census Bureau's *State Government Tax Collections (SGTC)* are added.

2. For the remaining 27 states that do not have prices in the *PMA*, prices are estimated by using the 1990 SEDS physical unit prices and *PMA* PAD district or subdistrict prices for 1990 and 1991. The following steps are used to estimate the prices:
   a. For 1990, the Subdistrict 1C price is withheld in the *PMA* and the average of the VA and WV prices is used as the Subdistrict 1C price.
   b. The 1990 state prices derived from AGA and *PMA*, as described below, are adjusted by the percentage change in the 1990 and 1991 prices for each state's *PMA* PAD district or subdistrict.
   c. The state general sales taxes from *SGTC* are added.

Physical unit prices: 1978 through 1982

Procedures for the 1978 through 1982 period are similar to those for 1983 forward except for changes in data sources. Annual physical unit prices are either taken directly from the *Monthly Energy Review (MER)* or calculated from monthly regional price data, also from the *MER*. These data were collected on Form EIA-9A (formerly EIA Form 9 and FEA Form P112—1) and include taxes. Price data from *Platt's Oil Price Handbook and Oilmanac (Platt's)* and SEDS consumption data for 1978 through 1982 are used to compute state prices when only regional data are available. These calculations are described step-by-step below.

1. Annual state physical unit prices are generally available from the *MER* for the same 23 states covered by the *PMA* in 1983 and forward. These 23 states compose all of Federal Regions 1, 2, 3, 5, and 10 (see Figure TN2 in "Introduction," at http://www.eia.gov/state/seds/sep_prices/notes/pr_intro.pdf). Prices for these states exclude taxes and are converted to dollars per gallon.

2. Of the states without *MER* prices, the 22 in Federal Regions 4, 7, 8, and 9 have annual prices estimated from the monthly federal regional prices published in the *MER*. No regional prices are available for Federal Region 6 for the 1978 through 1982 period, and some monthly prices are missing in regions 7, 8, and 9 in 1980, 1981, and 1982.
   a. Missing monthly prices for federal regions are estimated with assigned prices as follows: the Region 9 November 1980 price is assigned to December 1980; an average of the Region 7 July and October 1982 prices is assigned to August and September 1982; an average of Region 8 June and September 1982 prices is assigned to July and August 1982; and an average of Region 3 August and October 1982 prices is assigned to September 1982. Imputation of missing Region 6 prices for 1978 through 1982 and missing Region 9 prices for 1981 and 1982 is discussed later.
   b. The simple average of monthly state-level normal heating degree-day data is averaged for all the states within each of the 10 federal regions and is used to estimate average federal region heating degree-days. AK, DC, and HI are assigned the monthly heating degree-days from MN, MD, and FL, respectively.
   c. Weighted average annual physical unit distillate prices for the

residential sector are calculated for Federal Regions 4, 7, 8, and 9 (except for Region 9 in 1981 and 1982) by using the regional normal heating degree-days and the monthly regional prices from the *MER*.

d. In 1981, only March and May prices are available for Federal Region 9. To estimate the average annual price for this region, the relationship between the U.S. annual heating oil price (from the *MER*) and the U.S. March and May prices is expressed as a ratio and is used with the Region 9 March and May prices to estimate the 1981 annual Region 9 price.
e. City-level prices from *Platt's* are assigned to states as shown in Table TN4.2 The assigned state-level *Platt's* prices for states are consumption-weighted into federal regions by using residential sector consumption data from SEDS.
f. Adjustment factors, ratios of the regional *MER* distillate prices to the regional *Platt's*-based distillate prices, are calculated for Federal Regions 4, 7, 8, and 9 (except for 1982).
g. Since there are no monthly regional distillate prices from the *MER* for Federal Region 6 for 1978 through 1982 and Federal Region 9 for 1982, the adjustment factors for these regions are based on the adjustment factors for previous time periods. The Region 6 adjustment factor for each of the years in the 1978 through 1982 period is equal to 1.1313, which is the average of the adjustment factor for the West South Central Census Division for 1976 and 1977. The Region 9 adjustment factor for 1982 is equal to 1.1995, which is the average adjustment factor for Region 9 from 1978 through 1981.
h. The residential sector distillate state prices for the 27 states in Federal Regions 4, 6, 7, 8, and 9 are calculated by multiplying the regional adjustment factors for each year and the state-level assigned *Platt's* prices.

Physical unit prices: 1975 through 1977

For the years 1975 through 1977, no state-level data are available, and regional data from Form EIA-9A are available only at the Census division level, except for federal region prices for November and December of 1977. Using a methodology similar to that described above for the allocation of regional data to states, adjustment factors are calculated at the regional level and applied to *Platt's* price data assigned to states. The resulting prices implicitly include average regional taxes but do not reflect individual state differences.

1. Monthly regional price data for 1975 and 1976 are reported in the *MER* only for Census divisions. In 1977, however, monthly price data are reported for Census divisions for January through October and for federal regions for November and December. The federal region prices for November and December are assigned to their respective states and reaggregated into Census divisions in order to create a consistent set of monthly Census division prices for 1977. Annual residential sector distillate consumption data from SEDS are used to do the reaggregation.
2. The Census division monthly price data from the *MER* for 1975, 1976, and the first 10 months of 1977 are used with the estimated Census division price data for November and December 1977 to estimate state-level prices.
   a. Missing monthly prices in the East South Central Division for June and November 1975 and the Mountain Division for March and July 1975 are estimated by using an average of the prices for the month preceding and the month following the missing month. Missing November and December West South Central Division prices in 1977 are estimated with the assignment of the October price to both months. No monthly price data are available for the West South Central Division in 1975; step 2f., below, discusses how the calculations are handled for this division.
   b. The monthly state-level normal heating degree-day data are averaged for the states within each Census division to estimate regional monthly heating degree-days. AK, DC, and HI are assigned the monthly heating degree-days from MN, MD, and FL, respectively.
   c. Weighted average annual distillate prices for Census divisions are calculated by using the monthly Census division price data from the *MER* and the normal heating degree-days estimated for Census divisions.
   d. City-level No. 2 fuel oil refinery and terminal prices from *Platt's* for 1975 through 1977 are assigned to states as shown in Table TN4.2. The assigned *Platt's* prices for states are consumption-weighted into Census divisions by using residential sector consumption data from SEDS.
   e. Adjustment factors are calculated as the ratios of the *MER* distillate Census division prices to the *Platt's* distillate Census division prices.
   f. Since there are no 1975 *MER* price data for the West South Central Division from which to calculate an adjustment factor, the 1975 adjustment factor for this region is assumed to be equal to the simple average of the West South Central adjustment factors for 1976 and 1977 (i.e., 1.1313).
   g. The residential sector distillate state prices for all states are calculated by multiplying the regional adjustment factors for each year by the state-level assigned *Platt's* prices.

Physical unit prices: 1970 through 1974

Table TN4.2. Platt's prices for No. 2 fuel assigned to states, 1970 through 1982

State	Years	Assigned city or state prices	State	Years	Assigned city or state prices	State	Years	Assigned city or state prices
AK	1970–1976	Los Angeles/San Francisco, CA	KY	1970	Baton Rouge/New Orleans, LA			Columbus/Dayton
	1977, 1978	Portland, OR		1971–1982	New Orleans, LA		1973–1982	Detroit, MI
	1979, 1980	Seattle, WA	LA	1970	Baton Rouge/New Orleans	OK	1970–1982	Oklahoma (Group 3)
	1981, 1982	Seattle-Tacoma/Spokane, WA		1971–1982	New Orleans	OR	1970–1976	Los Angeles/San Francisco, CA
AL	1970–1974	Birmingham/Mobile/Montgomery	MA	1970–1982	Boston		1977–1982	Portland
	1975–1977	Mobile/Birmingham	MD	1970–1982	Baltimore	PA	1970–1978	Philadelphia
	1978–1982	Birmingham	ME	1970–1982	Portland		1979–1982	Philadelphia/Pittsburgh
AR	1970–1982	Arkansas	MI	1970–1982	Detroit	RI	1970–1975	Providence
AZ	1970–1978	Los Angeles/San Francisco, CA	MN	1970–1982	Minneapolis-St. Paul		1976–1982	New Haven, CT
	1979–1982	Phoenix	MO	1970	Baton Rouge/New Orleans, LA	SC	1970–1975	Charleston/Spartanburg/Belton
CA	1970–1982	Los Angeles/San Francisco		1971–1973	New Orleans, LA		1976–1982	Charleston/Spartanburg
CO	1970–1976	Minneapolis-St. Paul, MN		1974–1982	St. Louis	SD	1970–1982	Minneapolis-St. Paul, MN
	1977–1982	Denver	MS	1970–1973	Greenville/Meridian	TN	1970–1973	Chattanooga
CT	1970–1982	New Haven		1974–1982	New Orleans, LA		1974–1982	New Orleans, LA
DC	1970–1982	Baltimore, MD	MT	1970–1976	Minneapolis-St. Paul, MN	TX	1970–1972	New Mexico-West Texas
DE	1970–1982	Baltimore, MD		1977–1982	Billings		1973–1978	New Orleans, LA
FL	1970–1972	Jacksonville/Miami/Tampa/	NC	1970–1973	Greensboro/Wilmington/Charlotte/		1979, 1980	Houston
		Pensacola/Panama City/Port			Salisbury/Selma		1981	Dallas-Fort Worth/Houston
		Everglades		1974–1975	Greensboro/Wilmington/Charlotte		1982	Amarillo/Corpus Christi/Dallas Fort
	1973	Miami/Tampa/Pensacola		1976–1982	Greensboro/Wilmington			Worth/Houston
	1974–1975,	Miami/Tampa	ND	1970–1982	Minneapolis-St. Paul, MN	UT	1970–1976	Minneapolis-St. Paul, MN
	1981–1982		NE	1970	Baton Rouge/New Orleans, LA		1977–1982	Salt Lake City
	1976–1980	Miami		1971–1973	New Orleans, LA	VA	1970–1973	Norfolk/Roanoke
GA	1970–1973	Atlanta/Savannah/Albany/Athens/		1974–1982	St. Louis, MO		1974–1982	Norfolk
		Bainbridge/Columbus/Macon	NH	1970–1982	Portland, ME	VT	1970–1982	Portland, ME
	1974–1982	Atlanta/Savannah	NJ	1970–1975	New York/Albany/Buffalo, NY	WA	1970–1976	Los Angeles/San Francisco, CA
HI	1970–1982	Los Angeles/San Francisco, CA		1976–1982	New York/Albany, NY		1977, 1979,	Seattle
IA	1970–1981	Chicago, IL	NM	1970–1972	New Mexico-West Texas		1980	
	1982	Des Moines		1973–1976	Los Angeles/San Francisco, CA		1978	Portland, OR
ID	1970–1976	Los Angeles/San Francisco, CA		1977–1980	Albuquerque		1981–1982	Seattle-Tacoma/Spokane
	1977–1982	Portland, OR		1981, 1982	Albuquerque/Farmington	WI	1970–1982	Chicago, IL
IL	1970–1982	Chicago	NV	1970–1982	Los Angeles/San Francisco, CA	WV	1970–1973	Norfolk/Roanoke, VA
IN	1970–1982	Chicago, IL	NY	1970–1975	New York/Albany/Buffalo		1974–1982	Norfolk, VA
KS	1970–1973	Los Angeles/San Francisco, CA		1976–1982	New York/Albany	WY	1970–1976	Minneapolis-St, Paul, MN
	1974–1982	St. Louis, MO	OH	1970–1972	Toledo/Cleveland/Zanesville/		1977–1982	Cheyenne

There are no regional or state-level distillate fuel oil price data directly available for the 1970 through 1974 period. To estimate state prices, regional average prices are first derived from the relationship between U.S. prices and federal region prices for 1975 through 1980. State prices are then estimated from the regional prices by using a methodology similar to that described for 1978 through 1982. The resulting prices implicitly include average regional taxes but do not reflect individual state differences.

1. The first step in the estimation of residential distillate prices for the 1970 through 1974 time period is to develop an equation that uses U.S. prices to estimate prices for federal regions. Regression techniques are used for this purpose. U.S. prices for 1975 through 1980 from the *Annual Energy Review (AER)* are used as the independent variable for developing the equation; annual federal region prices are used as the dependent variable. Federal region prices for 1978 through 1980 are calculated above, but *MER* prices for 1975 through 1977 are for Census divisions. To convert these annual Census division prices into federal region prices, the estimated state prices for 1975 through 1977 are aggregated into federal regions by using SEDS consumption data.
2. Regression techniques are applied to the pooled federal region price data (dependent variable) and the U.S. prices from the *AER* (independent variable) for 1975 through 1980. U.S. prices for 1970 through 1974 are input to estimate annual federal region prices for 1970 through 1974.
3. City-level prices from *Platt's* for 1970 through 1974 are assigned to states as shown in Table TN4.2. The assigned state-level *Platt's* prices are consumption-weighted into federal regions by using residential sector distillate consumption data from SEDS.
4. Adjustment factors, which are ratios of the regional *MER* distillate federal region prices to the *Platt's*-based distillate federal region prices, are calculated.
5. The residential sector distillate prices for all states are calculated by multiplying the regional adjustment factors for each year by the state-level assigned *Platt's* prices.

Btu prices: all years

Btu prices for states are computed by converting the physical unit prices in dollars per gallon to dollars per barrel (42 gallons per barrel). The prices are then converted to dollars per million Btu using the conversion factors calculated by EIA and presented in SEDS Consumption Technical Notes, Table B1. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

2010: EIA, Petroleum & Other Liquids data website, No. 2 Distillate Prices by Sales Type, http://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_PRT_dpgal_a.htm.

1983-2009: EIA, *Petroleum Marketing Annual 1985*, Volume 1, Table 25 (1983-1985) and annual issues of the *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 36 (1986-1988), Table 38 (1989-1993), Table 39 (1994-2006), and Table 35 (2007-2009), column titled "Sales to End Users—Residential Consumers."

1983-1990, 1992 through 1996: AGA, *Residential Natural Gas Market Survey* (1989, 1990, 1992-1996), and *Gas Househeating Survey* (1983-1988), Appendix titled, "Competitive Fuel Prices," column titled "Distillate."

1970-1982: McGraw-Hill, Inc., *Platt's Oil Price Handbook and Oilmanac*, refinery and terminal prices for No. 2 fuel oil, average of highs and lows.

1975-1982: National Oceanic and Atmospheric Administration, U.S. Department of Commerce, *State, Regional, and National Monthly and Seasonal Heating Degree-Days Weighted by Population (1980 Census)*, Historical Climatology Series 5-1, table titled "1951-80 State Pop. Wgt'd Heating Degree-Days."

1975-1982: EIA, *Monthly Energy Review,* table titled "Residential Heating Oil Prices by Region," February 1978, page 67 (1975, 1976); April 1980, page 83 (1977, 1978); July 1982, page 87 (1979-1982).

1970-1982: EIA, *Annual Energy Review 1988*, Table 67, "Motor Gasoline and Residential Heating Oil Prices, 1949-1988."

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change

occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1983-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections*, table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage rate, Sept. 1."

Consumption

1970 forward: EIA, State Energy Data System, residential sector distillate consumption.

Conversion factors: all years

1970 forward: EIA, State Energy Data System, Consumption Technical Notes, Table B1.

Commercial sector

Commercial sector distillate prices are estimated by using several different data sources and estimation methodologies, depending on the years involved. For 2011 forward, commercial distillate prices are estimated using regional-level regression equations (see below). For 1983 through 2009, retail prices paid by commercial/institutional establishments (excluding taxes) for No. 2 distillate fuel oil are taken from the EIA's *Petroleum Marketing Annual (PMA).* For 2010, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. State general sales taxes from the U.S. Census Bureau and successor sources are added. For 1970 through 1982, commercial distillate prices are based on refinery and terminal (wholesale) prices from *Platt's* and markups from Fostor Associates, Inc. *Energy Prices*: 1960-73 that include taxes. Btu prices are computed by using the physical unit prices and the conversion factor.

Physical unit prices: 2011 forward

The survey that provides reseller and retailer sales prices for distillate fuel oil by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," was discontinued in 2011. As a result, data for distillate prices by sales type, which are based on survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B are no longer available. To estimate commercial distillate fuel oil prices, regression equations are developed for each Petroleum Administration for Defense (PAD) district and subdistrict using historical refiner commercial sales prices for No. 2 diesel fuel from EIA-782A as the independent variable and the historical prices for commercial distillate prices as the dependent variable. These regression equations are used to estimate the current commercial distillate fuel oil prices for the PAD districts and subdistricts and for states that have historical refiner/reseller/retailer prices and sizable sales volume—AK, CT, DE, ID, IL, IN, MA, MD, MI, MN, NH, NJ, NY, OH, OR, PA, VA, VT, WA, WI, and WV, provided that they have refiner commercial prices. All other states are assigned the corresponding PAD district or subdistrict estimated price. They are shown in Table TN4.3. State general sales taxes are added to the state estimated prices.

Physical unit prices: 1983 through 2010

Physical unit No. 2 distillate prices in dollars or cents per gallon (excluding taxes) are generally available for 24 states. State-level prices for the remaining 27 states are estimated by using the Petroleum Administration for Defense (PAD) district or subdistrict prices as shown in Table TN4.3. State general sales taxes are then added.

Physical unit prices: 1970 through 1982

Commercial sector distillate physical unit prices for 1970 through 1982 are calculated by using *Platt's* prices assigned to states and commercial sector markups estimated from *Energy Prices: 1960-73*. The resulting estimates implicitly include state-specific taxes.

1. The first step is to compute the markups. *Energy Prices* contains single price estimates for small commercial users and two price estimates for large commercial users for 10 cities: Boston, MA; Albany, NY; New York, NY; Charlotte, NC; Washington, DC; Chicago, IL; Detroit MI; Minneapolis/St. Paul, MN; St. Louis, MO; and Seattle, WA. First, a simple average of the two large commercial prices is calculated for each city except for Albany and New York. In this case, all four large

commercial prices are averaged together, since cities are assigned to their respective states.

2. For the nine states covered by the *Energy Prices* data (noted in step 1), the markup of the reported prices from *Energy Prices* over the assigned *Platt's* prices (Table TN4.2 on page 38) and the markup of the residential prices calculated above for 1970 through 1972 over the *Platt's* prices is calculated.
3. At this point, residential and commercial sector retail markups have been computed for nine states for each of the years 1970 through 1972. The next step is to calculate the average retail markup for the 3-year period for each sector. A simple average of the markup ratios is calculated.
4. The average commercial and residential sector retail markups for the nine available states are assigned, as shown in Table TN4.4.
5. To translate the average commercial and residential markups for 1970 through 1972 into the estimated commercial sector retail markups to be used for 1970 through 1982, the relationship between these two markups is used, with the residential markups calculated for all states for each year. The calculation of the residential markups follows the same procedure used in step 2.
6. The commercial sector adjustment factors for each state for each of the years 1970 through 1982 are multiplied by the corresponding *Platt's* prices for 1970 through 1982 to calculate the final commercial sector physical unit prices.

Btu prices: all years

Btu prices for states are calculated by converting the physical unit prices from dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu using the conversion factors calculated by EIA and presented in SEDS Consumption Technical Notes, Table B1. U.S. prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

2010: EIA, Petroleum & Other Liquids data website, No. 2 Distillate Prices by Sales Type, http://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_PCS_dpgal_a.htm.

Table TN4.3. Distillate fuel oil commercial sector PAD district and subdistrict price assignments, 1983 forward

States	Years	Assignments
AL	1983–2015	District 3
AR	1983–2015	District 3
AZ	1983–2015	District 5
CA	1983–2015	District 5
CO	1983–2015	District 4
CT	2014, 2015	Subdistrict 1A
DC	2011–2015	Subdistrict 1B
FL	1983–2015	Subdistrict 1C
GA	1983–2015	Subdistrict 1C
HI	1983–2015	District 5
IA	1983–2015	District 2
KS	1983–2015	District 2
KY	1983–2015	District 2
LA	1983–2015	District 3
ME	2011–2015	Subdistrict 1A
MO	1983–2015	District 2
MS	1983–2015	District 3
MT	1983–2015	District 4
NC	1983–2015	Subdistrict 1C
ND	1983–2015	District 2
NE	1983–2015	District 2
NH	2015	Subdistrict 1A
NM	1983–2015	District 3
NV	1983–2015	District 5
OK	1983–2015	District 2
RI	2011–2015	Subdistrict 1A
SC	1983–2015	Subdistrict 1C
SD	1983–2015	District 2
TN	1983–2015	District 2
TX	1983–2015	District 3
UT	1983–2015	District 4
WY	1983–2015	District 4

1983-2009: EIA, *Petroleum Marketing Annual 1985, Volume 1,* Table 25 (1983-1985) and annual issues of the *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 36 (1986-1988), Table 38 (1989-1993), Table 39 (1994-2006), and Table 35 (2007-2009), column titled "Sales to End

Table TN4.4. Distillate fuel oil commercial sector average retail markup price assignments, 1970 through 1972

State	City price assignments	State	City price assignments
AK	Seattle, WA	MT	Minneapolis-St. Paul, MN
AL	Charlotte, NC	NC	Charlotte, NC
AR	St. Louis, MO	ND	Minneapolis-St. Paul, MN
AZ	Seattle, WA	NE	St. Louis, MO
CA	Seattle, WA	NH	Boston, MA
CO	Minneapolis-St. Paul, MN	NJ	Albany and New York, NY
CT	Boston, MA	NM	Seattle, WA
DC	Washington, DC	NV	Seattle, WA
DE	Washington, DC	NY	Albany and New York, NY
FL	Charlotte, NC	OH	Detroit, MI
GA	Charlotte, NC	OK	St. Louis, MO
HI	Seattle, WA	OR	Seattle, WA
IA	St. Louis, MO	PA	Albany and New York, NY
ID	Seattle, WA	RI	Boston, MA
IL	Chicago, IL	SC	Charlotte, NC
IN	Chicago, IL	SD	Minneapolis-St. Paul, MN
KS	St. Louis, MO	TN	Chicago, IL
KY	Chicago, IL	TX	St. Louis, MO
LA	St. Louis, MO	UT	Minneapolis-St. Paul, MN
MA	Boston, MA	VA	Washington, DC
MD	Washington, DC	VT	Boston, MA
ME	Boston, MA	WA	Seattle, WA
MI	Detroit, MI	WI	Chicago, IL
MN	Minneapolis-St. Paul, MN	WV	Washington, DC
MO	St. Louis, MO	WY	Minneapolis-St. Paul, MN
MS	Charlotte, NC		

Users—Commercial/Institutional Consumers."

1970-1982: McGraw-Hill, Inc., *Platt's Oil Price Handbook and Oilmanac*, refinery and terminal prices for No. 2 fuel oil, average of highs and lows.

1970-1982: Foster Associates, Inc., 1974, *Energy Prices 1960-73*, Tables 4-c and 5-b.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1983-1992: Census Bureau, U.S. Department of Commerce, State Government Tax Collections, table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage rate, Sept. 1."

Consumption

1970 forward: EIA, State Energy Data System, commercial sector distillate consumption.

Conversion factors: all years

1970 forward: EIA, State Energy Data System, Consumption Technical Notes, Table B1.

Electric power sector

The price of distillate fuel oil used for electric power is the average delivered cost of No. 2 distillate fuel oil receipts at electric plants. For 1973 through 2009, these prices are taken from the EIA *Cost and Quality of Fuels for Electric Plants (C&Q)*. For 2010 forward, C&Q is no longer available, but data on the cost of distillate fuel oil delivered to the electric utilities are available from the Office of Electricity, Renewables, and Uranium Statistics (ERUS). For 1970 through 1972, prices from Edison Electric Institute's *Statistical Yearbook of the Electric Utility Industry* are used with regression analysis. Btu prices are developed directly from the data sources and include all applicable taxes.

Prices: 1973 forward

Contiguous 48 states

Btu prices for 1973 forward are reported in the EIA *C&Q* or are available from ERUS. For 1973, 1974, and 1980 forward, Btu prices are taken directly from the data source and are converted from cents per million Btu to dollars per million Btu. For 1975 through 1979, consumption-weighted average Btu prices are calculated from prices and consumption reported separately for steam-electric plants and for combustion turbine and internal combustion units. Wherever individual state prices are unavailable, quantity-weighted Census division prices are assigned, as shown in Table TN4.5.

Alaska

Btu prices for Alaska for 2005, 2006, and 2008 through 2012 are available from the source. For 2013 and 2014, the quantity-weighted Census division prices are assigned to the missing prices, as shown in Table TN4.5. For 1994 through 2010, missing prices are estimated as the consumption-weighted averages of prices reported by power plants taken from FERC Form 1, Form EIA-412 (1994-2000), and the Alaska Energy Authority publication, *Statistical Report of the Power Cost Equalization Program*.

Prior to 1994, prices are estimated each year by calculating the ratio of the Alaska price from the *Statistical Yearbook* to the *Statistical Yearbook* U.S. price and multiplying the ratio by the *C&Q* U.S. price for that year. Alaska prices for 1973, 1975, and 1978 are not published in the *Statistical Yearbook* and are estimated by calculating an average of the ratios of the Alaska to U.S. *Statistical Yearbook* prices in adjacent years. The 1973 estimated price is based on the average ratio for 1972 and 1974, the 1975 price is based on the average ratio for 1974 and 1976, and the 1978 price is based on the average ratio for 1977 and 1979. The average ratio is then applied to the U.S. *C&Q* price for the missing year.

Hawaii

The *C&Q* does not have prices for Hawaii from 1973 through 1982, 1992 through 1996, and 2002 through 2007. Price assignments for 2002 forward are shown in Table TN4.5. Prices for Hawaii from 1994 through 1996 are estimated as the consumption-weighted averages of prices reported by power plants taken from FERC Form 1 and Form EIA-412.

Prior to 1994, prices are estimated each year by calculating the ratio of the Hawaii price from the *Statistical Yearbook* to the *Statistical Yearbook* U.S. price and multiplying the ratio by the *C&Q* U.S. price for that year.

U.S. prices

U.S. Btu prices for all years are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Prices: 1970 through 1972

Btu prices for 1970 through 1972 are estimated by using data from *Statistical Yearbook of the Electric Utility Industry*. U.S. prices are then computed by using the state-level prices and the electric utility distillate consumption data from SEDS.

1. Regression techniques are used to arrive at the equation for estimating electric utility sector distillate prices for the 1970 through 1972 period. Alabama is treated as the reference state. The regression equation

Table TN4.5. Distillate fuel oil electric plant Census division price assignments, 1973 forward

State	Years	Census division
AK	2013, 2014	Pacific Noncontiguous
CA	1983–1985, 1987, 1988	Pacific
	1990–1992, 1995–1997, 2002, 2007	Pacific Contiguous
	2013–2015	
CO	1996–1998	Mountain
CT	1973, 2000–2007, 2011, 2013 –2015	New England
DC	1973, 2002–2012	South Atlantic
DE	1973, 2006, 2007, 2011–2015	South Atlantic
HI	2002–2004	Pacific Contiguous
	2005–2007	Pacific Noncontiguous
ID	1973, 1974, 1976, 1980–2009, 2011–2015	Mountain
MA	2011	New England
MD	1973, 2002–2007, 2011–2015	South Atlantic
ME	1973, 1974, 1999–2007, 2011–2015	New England
MT	1973–1975, 1977, 1983, 2000, 2001,	Mountain
	2007, 2012–2015	
NH	1973, 1974	New England
NJ	1973, 1974, 2011–2015	Mid-Atlantic
NV	2007	Mountain
NY	2002	Mid-Atlantic
OK	2011	West South Central
OR	1987, 1988	Pacific
	1996	Pacific Contiguous
PA	2007, 2011–2015	Mid-Atlantic
RI	1976–1994, 1997–2007, 2011–2015	New England
SD	1973, 1974, 1992, 1994, 1995,	West North Central
	1997–2002, 2007	
TN	1973	East South Central
VT	1973, 1974, 1978, 1983–1992, 1999,	New England
	2001–2004, 2006, 2007, 2009, 2011, 2013–	
	2015	
WA	1973–1977	Pacific
	2002–2005, 2007	Pacific Contiguous
WV	1973	South Atlantic
WY	1973	Mountain

uses *Statistical Yearbook* state-level prices for 1974 through 1980 as the independent variable and the state-level prices calculated above for 1974 through 1980 as the dependent variable. Substituting Btu prices for 1970 through 1972 from the *Statistical Yearbook* into the regression equation yields the estimated electric utility sector state-level distillate prices.

2. Wherever individual state prices are unavailable, quantity-weighted Census division prices are assigned as follows: ID in 1970 through 1972; TN in 1970; and WA in 1970 and 1971. AK in 1971 is calculated as the average of the AK price in 1970 and 1972.
3. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2010 forward: EIA, Office of Electricity, Renewables, and Uranium Statistics, data on average delivered cost of distillate fuel oil to regulated electric power plants.

1973-2009: EIA, *Cost and Quality of Fuels for Electric Plants*, http://www.eia.gov/electricity/cost_quality/, Table 6 (1973, 1974); Tables 5, 6, 12, 13 (1975-1979); Table 45 (1980-1982); Table 51 (1983, 1984); Table 41 (1985-1989); Table 14 (1990, 1991); Table 8 (1992-2000), Table 9 (2001), Table 7.B (2002 and 2003), Table 7.A (2004-2008), and Table 11 (2009).

1994-2004, 2007 (Alaska), and 1994 through 1996 (Hawaii): EIA, unpublished prices reported by electric power plants in AK and HI on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others,"; Form EIA-412, "Annual Electric Industry Financial Report" (previously, "Annual Report of Public Electric Utilities,") http://www.eia.gov/electricity/data/eia412/ (1994-2000), and AK's *Statistical Report of the Power Cost Equalization Program*, http://www.akenergyauthority.org/Programs/PCE/.

1970-1993: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, table titled, "Analysis of Fuel for Electric Generation-Total Electric Utility Industry" (1970-1988) and table titled, "Fossil Fuels Used for Electric Generation Total Electric Utility Industry" (1990-1993).

Consumption

1970 forward: EIA, State Energy Data System, electric power sector distillate consumption.

Conversion factors: all years

Btu prices are developed directly from data sources, except for AK for 1994 through 2004. The conversion factor used in these instances is 5.825 million

Btu per barrel.

Industrial sector

The industrial sector distillate fuel oil prices are developed by using a variety of data sources and several estimation methods, depending on the years involved. For 2011 forward, industrial distillate prices are estimated using regional-level regression equations (see below). For 1983 through 2009, prices of No. 2 distillate fuel oil (excluding taxes) are reported by the *Petroleum Marketing Annual (PMA).* For 2010, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. State general sales taxes from the U.S. Census Bureau and successor sources are added. For 1970 through 1982, prices are the average cost of distillate to manufacturing firms and implicitly include taxes that reflect individual state differences.

Physical unit prices: 2011 forward

The survey that provides reseller and retailer sales prices for distillate fuel oil by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," was discontinued in 2011. As a result, data for distillate prices by sales type, which are based on survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B are no longer available. To estimate industrial distillate fuel oil prices, regression equations are developed for each Petroleum Administration for Defense (PAD) district and subdistrict using historical refiner industrial sales prices for No. 2 diesel fuel and No. 2 fuel oil from EIA-782A as the independent variables and the historical prices for industrial distillate prices as the dependent variable. These regression equations are used to estimate the current industrial distillate fuel oil prices for the PAD districts and subdistricts and for states that have historical refiner/reseller/retailer prices and sizable sales volume—AK, DE, ID, IL, IN, MD, MN, NJ, NY, PA, VA, and WA, provided that they have refiner industrial prices. All other states are assigned the corresponding PAD district or subdistrict estimated price, provided that they have reported refiner industrial prices. They are shown in Table TN4.6. State general sales taxes are added to the state estimated prices.

Physical unit prices: 1983 through 2010

Physical unit distillate fuel oil prices in dollars or cents per gallon (excluding taxes) are generally available for 24 states. State-level prices for the remaining 27 states are estimated by using the Petroleum Administration for Defense (PAD) district or subdistrict prices, as shown in Table TN4.6, state general sales taxes are then added.

In 2000, the PAD District 4 average industrial sector price was withheld in the PMA. PAD District 4 commercial and industrial sector prices for 1995 through 1999 were compared and the average percentage difference between the sectors' prices was applied to the 2000 commercial sector PAD District 4 price to derive an industrial sector PAD District 4 price.

Physical unit prices: 1982

In 1984, the U.S Census Bureau announced that state-level fuel cost and quantity information would no longer be published in either the *Annual Survey of Manufactures (ASM)* or *Census of Manufactures (CM)*. In addition, the *PMA*, the source for 1983 forward industrial sector distillate price data, did not contain 1982 prices. Because of this lack of price data, the 1982 industrial sector distillate prices are estimated on the basis of the relationship of industrial sector prices to electric power sector prices for 1978 through 1981. The 1983 prices are not used in the estimation because they exclude taxes, while the 1978 through 1981 prices include taxes.

1. In order to calculate the average ratios of industrial-to-electric power distillate prices, electric power sector price assignments are made for: AK in 1978 through 1982 from WA; ID in 1979 through 1982 from MT; RI in 1978 through 1982 from CT; and VT in 1978 from ME.
2. The average 1978 through 1981 ratios of industrial-to-electric power sector distillate prices are calculated for each state.
3. Prices for 1982 are estimated by multiplying the average ratios by the electric power data for 1982.

Physical unit prices: 1971, 1974 through 1981

For the years 1971 and 1974 through 1981, industrial sector distillate prices are calculated directly from cost and quantity data from the *Annual Survey of Manufactures (ASM)* or *Census of Manufactures (CM)* for all states where data are available. Taxes are included in the prices. There are no missing prices for 1971. Six states are missing some *ASM* cost and quantity data for the 1974 through 1981 period. Cost and quantity data for these states are estimated as the simple average of the cost and quantity data for their adjacent states. The states, the years for which data are estimated, and the adjacent states used to make the estimation are shown in Table TN4.7.

Physical unit prices: 1970, 1972, 1973

Since *ASM* and *CM* data are not available for these years, the prices must be estimated. Physical unit prices are based on the ratio of 1971 *CM* prices to the 1971-assigned *Platt's* prices (Table TN4.2 on page 38). The resulting ratios for each state are used with the *Platt's* assigned prices for 1970, 1972, and

Table TN4.6. Distillate fuel oil industrial sector PAD district and subdistrict price assignments, 1983 forward

State	Years	Assignments
AL	1983–2015	District 3
AR	1983–2015	District 3
AZ	1983–2015	District 5
CA	1983–2015	District 5
CO	1983–2015	District 4
CT	2011–2015	Subdistrict 1A
DC	1994, 1997–2001, 2003–2015	Subdistrict 1B
FL	1983–2004, 2007–2015	Subdistrict 1C
	2005, 2006	District 1
GA	1983–2004, 2007–2015	Subdistrict 1C
	2005, 2006	District 1
HI	1983–2015	District 5
IA	1983–2015	District 2
IL	2005, 2006	District 2
KS	1983–2015	District 2
KY	1983–2015	District 2
LA	1983–2015	District 3
MA	2010–2015	Subdistrict 1A
MD	2014, 2015	Subdistrict 1B
ME	1997, 2011–2015	Subdistrict 1A
MI	2001, 2011–2015	District 2
MO	1983–2015	District 2
MS	1983–2015	District 3
MT	1983–2015	District 4
NC	1983–2004, 2007–2015	Subdistrict 1C
	2005, 2006	District 1
ND	1983–2015	District 2
NE	1983–2015	District 2
NH	2011–2015	Subdistrict 1A
NJ	2015	Subdistrict 1B
NM	1983–2015	District 3
NV	1983–2015	District 5
NY	1987	Subdistrict 1B
OH	1983, 2011–2015	District 2
OK	1983–2015	District 2
OR	2011–2015	District 5
RI	2003, 2011–2015	Subdistrict 1A
SC	1983–2004, 2007–2015	Subdistrict 1C
	2005, 2006	District 1
SD	1983–2015	District 2
TN	1983–2015	District 2
TX	1983–2015	District 3
UT	1983–2015	District 4
VA	2014, 2015	Subdistrict 1C
VT	2011–2015	Subdistrict 1A
WI	2011–2015	District 2
WV	2011–2015	Subdistrict 1C
WY	1983–2015	District 4

Table TN4.7. Distillate industrial sector price assignments, 1974 through 1981

State	Year	State prices used
HI	1979–1981	CA
ND	1979–1981	MN, MT, SD
NM	1974–1979	AZ, CO, TX
NV	1974–1981	AZ, CA, ID, OR, UT
OK	1974–1978	AR, CO, KS, MO, TX
WY	1974–1981	CO, ID, MT, NE, SD, UT

1973 to impute prices.

1. The first step is to calculate state-level ratios between prices calculated from the 1971 *CM* cost and quantity data and the 1971 assigned *Platt's* prices. There are no missing states in either of these two sets of prices.
2. State-level physical unit prices for 1970, 1972, and 1973 are estimated by multiplying the 1971 ratio by the assigned state-level *Platt's* prices for each respective year.

Btu prices: all years

Btu prices for states are calculated by converting the physical unit prices from dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu using the conversion factors calculated by EIA and presented in SEDS Consumption Technical Notes, Table B1. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS, adjusted for process fuel consumption.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

2010: EIA, Petroleum & Other Liquids data website, No. 2 Distillate Prices by Sales Type, http://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_pin_dpgal_a.htm.

1983-2009: EIA, *Petroleum Marketing Annual 1985, Volume 1,* Table 25 (1983-1985), and annual issues of the *Petroleum Marketing Annual,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 36 (1986-1988), Table 38 (1989-1993), Table 39 (1994-2006), and Table 35 (2007-2009), column titled "Sales to End Users—Industrial Consumers."

1970-1982: McGraw-Hill, Inc., *Platt's Oil Price Handbook and Oilmanac,* refinery and terminal prices for No. 2 fuel oil, average of highs and lows.

1971, 1977, and 1981: Census Bureau, U.S. Department of Commerce, *Census of Manufactures,* Table 4 (1971) and Table 3 (1977, 1981).

1974-1976 and 1978-1980: Census Bureau, U.S. Department of Commerce, *Annual Survey of Manufactures,* Table 3.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each State as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95 and 1996-97,* Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review,* Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1983-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage rate, Sept. 1."

Consumption

1970 forward: EIA, State Energy Data System, industrial sector distillate consumption.

Conversion factors: all years

1970 forward: EIA, State Energy Data System, Consumption Technical Notes, Table B1.

Transportation sector

Consumption of distillate fuel oil in the transportation sector includes distillate fuel oil used for vessel bunkering and for military and railroad use, plus on-highway diesel fuel use. Because on-highway diesel fuel use accounts for the largest portion of this sector, prices and expenditures are calculated by using diesel fuel prices.

For 2011 forward, physical unit prices for states other than Alaska and Hawaii are estimated using retail prices for ultra low sulfur diesel from Form EIA-888, "*On-Highway Diesel Fuel Price Survey*." For 1986 to 2010, physical unit prices are based on sales to end users throgh retail outlets from the EIA *Petroleum Marketing Annual* (*PMA*). For 1983 to 1985, physical unit prices are based on sales to end users through retail outlets, from the *PMA*, and agricultural prices from the Crop Reporting Board, U.S. Department of Agriculture, *Agriculture Prices* publication. Before 1983, physical unit prices are based on agricultural prices from the *Agriculture Prices* publication.

Through 2010, the state and federal excise taxes on diesel fuel are added to *PMA* prices to derive final physical unit prices, which are converted to dollars per gallon. In cases where the tax rate is not constant throughout the year, an annual average tax is calculated on the basis of the number of months each rate was in effect. Due to the lack of uniformity in application, state sales taxes have not been included in the price estimates through 2009. In 2010, sales taxes for California, Georgia, Illinois, Indiana, Michigan, New York, and Virginia (states identified by EIA *Petroleum Marketing Monthly* that charge state sales taxes on diesel) are added to their price estimates to make them more compatible to the Form EIA-888 retail prices for ultra low sulfur diesel prices. From 2011 forward, all taxes are presumed to be included in the EIA-888 source data for retail prices.

Btu prices for all years are calculated by using the physical unit prices and the distillate conversion factor.

Physical unit prices: 2011 forward

Diesel fuel physical unit prices for 2011 forward are based on Form EIA-888, which provides retail diesel prices for each Petroleum Administration for Defense (PAD) district and subdistrict as well as for the state of California. For each state except Alaska, California, and Hawaii, the physical unit price is estimated by applying the growth rate of the corresponding district or subdistrict between 2010 and the current year, to the 2010 price. The

California price is obtained directly from Form EIA-888. For Hawaii, diesel prices are taken from Monthly Energy Data available at Hawaii's Department of Business, Economic Development & Tourism website. Alaska prices are estimated by applying the average Alaska to U.S. price ratio between 2001 and 2010 to the U.S. prices from Form EIA-888.

Physical unit prices: 2000 through 2010

Diesel fuel physical unit prices for 2000 through 2010 are based on the annual state-level price data available from the *PMA* and on the EIA website for approximately 23 states, and monthly tax rate information from the EIA *Petroleum Marketing Monthly (PMM)* for every state.

State and federal diesel tax rates are taken from Table EN1 of the EIA *PMM*. EIA updates this table twice a year, reporting the tax rates on January 1 and July 1. Changes to tax rates that occur in between those months will not be reflected until the next update. To compile the average tax rates for the year, information on the effective date of rate changes is collected from additional sources. These include State Department of Revenue offices, the U.S. Department of Defense, Defense Energy Support Center, annual report entitled *Compilation of United States Fuel Taxes, Inspection Fees and Environmental Taxes and Fees*, and the U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* report. They are combined with the federal tax rate to adjust the *PMA* prices.

For the remaining states for which no prices are published, the PAD district or subdistrict prices for diesel fuel and motor gasoline and state motor gasoline prices are used. The state diesel fuel price is estimated as the ratio of the PAD district or subdistrict diesel fuel price to the PAD district or subdistrict motor gasoline price times the state motor gasoline price. This assumes that the relationship between the state and PAD district or subdistrict prices for diesel fuel is similar to that of the state and PAD district or subdistrict prices for motor gasoline. The series for motor gasoline physical unit prices is based on the average annual sales prices (excluding taxes) of finished motor gasoline to end users through retail outlets contained in Table 28 of the *PMA* or at http://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_dpgal_a.htm. This series reflects data collected from refiners, resellers, and retailers in the industry, and provides more comprehensive coverage than the series previously used, which reflected data collected from refiners only. State and federal excise taxes are added as described above.

Physical unit prices: 1986 through 1999

Diesel fuel physical unit prices for 1986 through 1999 are based on the annual state-level price data available from the *PMA* for approximately 23 states and monthly tax rate information from *Highway Statistics*. State and federal excise taxes on diesel fuel are added to *PMA* prices to derive final physical unit prices.

For the remaining states for which no prices are published, the *PMA* PAD district or subdistrict prices for diesel fuel and motor gasoline and state motor gasoline prices are used. The state diesel fuel price is estimated as the ratio of the PAD district or subdistrict diesel fuel price to the PAD district or subdistrict motor gasoline price times the state motor gasoline price. Motor gasoline prices to end users at all refiners' company outlets are used. When a state has no price available in either data series, the motor gasoline price to end users by all types of sellers through company outlets is used as the state motor gasoline price. The District of Columbia has no published diesel fuel or motor gasoline prices for 1991-1999, 2001, and 2003 forward and is assigned the Maryland diesel fuel price. State and federal excise taxes are added as described above.

Physical unit prices: 1983 through 1985

Diesel fuel physical unit prices for 1983 through 1985 are based on the annual state-level price data available from the *PMA* and monthly state and federal tax rate information from *Highway Statistics* for 24 states. The prices for the remaining 27 states are calculated by using *Agricultural Prices* as outlined in the 1977 through 1982 methodology.

The *PMA* provides physical unit prices for approximately 24 states, excluding taxes. In 1983 through 1985, the DC price is missing, and the MD price is assigned. In 1983, RI has no price and the PAD Subdistrict 1A average is assigned. A simple average of monthly state and federal excise taxes is calculated as a combined average tax and added to the *PMA* price for a final physical unit price. State and local sales and other general taxes are not included.

Physical unit prices: 1977 through 1982

Monthly prices from *Agricultural Prices* and monthly special fuels consumption data from *Highway Statistics* are collected for the states. MD prices are assigned to DC. Prices include state and local per-gallon taxes. Federal taxes and state and local sales and other general taxes are not included.

The volume-weighted annual diesel physical unit prices for states and the United States are calculated by using the monthly *Agricultural Prices* price data, weighted by the monthly *Highway Statistics* consumption data. The AK 1977 through 1982 prices are estimated on the basis of the assumption that the ratio of AK-to-U.S. diesel fuel price is the same as the ratio of the AK-to-U.S. motor gasoline price each year.

Physical unit prices: 1970 through 1976

Quarterly prices from *Agricultural Prices* and monthly special fuels consumption data from *Highway Statistics* are collected for the states. Prices include state and local per-gallon taxes. Federal taxes and state and local sales taxes and other general taxes are not included.

1. Prices for 1970 through 1972 are reported in cents per gallon and must be converted to dollars per gallon. Prices for 1973 through 1976 are already reported in dollars per gallon.
2. For 1971 through 1973, state-level prices are not available for CT, MA, ME, NH, RI, and VT. Each is assigned the New England regional price for the 3 years.
3. The third quarter DE price is assigned to the missing fourth quarter DE price in 1972.
4. The combined MD/DE prices reported in 1973 are assigned to each of the states.
5. For 1970 through 1976, MD (or MD/DE) prices are assigned to DC.

The monthly special fuels consumption for 1970 through 1976 are converted into quarterly consumption by summing the months for each quarter.

The consumption-weighted annual diesel physical unit prices for the states are calculated by using the quarterly weights and quarterly prices.

For 1970 through 1972, the quarterly prices from *Agriculture Prices* are converted from cents per gallon to dollars per gallon. For 1973 forward, the prices are already in dollars per gallon in the source. AK/1970 through 1976 prices are estimated on the basis of the assumption that the ratio of AK-to-U.S. diesel fuel price is the same as the ratio of AK-to-U.S. motor gasoline price each year.

Btu prices: all years

Btu prices for states are calculated by converting the physical unit prices from dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu using the conversion factors calculated by EIA and presented in SEDS Consumption Technical Notes, Table B1. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption from SEDS.

Data sources

Prices

2011 forward: EIA, Weekly Retail Gasoline and Diesel Prices, Ultra Low Sulfur Diesel, annual averages, http://www.eia.gov/dnav/pet/pet_pri_gnd_a_EPD2DXL0_pte_dpgal_a.htm and Hawaii's Department of Business, Economic Development & Tourism, Monthly Energy Data, http://dbedt.hawaii.gov/economic/energy-trends-2/.

2010: EIA, Petroleum & Other Liquids data website, No. 2 Distillate Prices by Sales Type, http://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_PTC_dpgal_a.htm.

1986-2009: EIA, *Petroleum Marketing Annual,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 36 (1986-1988), Table 38 (1989-1993), column titled "Sales to End Users, Through Company-Operated Retail Outlets," Table 40 (1994-2006), and Table 36 (2007 forward), column titled "Sales to End Users, Through Retail Outlets," for diesel fuel prices.

2000-2008: EIA, *Petroleum Marketing Annual*, Table 31 (2000-2006), and Table 28 (2007-2009), column titled "All Grades, Sales to End Users, Through Retail Outlets," and EIA website at http://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_dpgal_a.htm, for refiner/reseller/retailer motor gasoline prices.

1986-1999: EIA, *Petroleum Marketing Annual*, Table 29 (1986-1988) and Table 30 (1989-1993), column titled "All Refiners, Sales to End Users, Through Company Outlets," Table 35 (1994-1999), column titled "All Grades, Sales to End Users, Through Retail Outlets," for refiner motor gasoline prices.

1983-1985: EIA, *Petroleum Marketing Annual 1985*, Volume 1, Table 25, column titled "Sales to End Users, Sales Through Company-Operated Retail Outlets."

1970-1985: Crop Reporting Board, U.S. Department of Agriculture, Agriculture Prices, tables generally titled "Motor Supplies: Average Price Paid by Farmers for Motor Fuel" for 1970-1979, and "Diesel Fuel: Average Price Paid by States" for 1980-1985.

1970-1985: Federal Highway Administration, U.S. Department of Transportation, *Highway Statistics*, Table MF-25 for special fuels consumption data. Table MF-25 is not included in the 1976 volume but is publicly available directly from the Federal Highway Administration.

Taxes

2000 through 2010 (state excise taxes): EIA, *Petroleum Marketing Monthly,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pmm.html, Table EN1, column titled "Diesel Fuel," supplemented with information from state revenue offices and the Federal Highway Administration, U.S. Department of Transportation, *Highway*

Statistics, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-121T.

2010 (state sales taxes): EIA, *Petroleum Marketing Monthly,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pmm.html, Table EN1, footnote 3.

1970-1999: Federal Highway Administration, U.S. Department of Transportation, *Highway Statistics*, Table MF-121T for state tax rates, supplemented with information from state revenue offices. Federal taxes are from *Highway Statistics* Table FE-101 (1970 through 1992) and Table MF-121T (1993 forward).

Consumption

1970 forward: EIA, State Energy Data System, transportation sector distillate consumption.

Conversion factors: all years

1970 forward: EIA, State Energy Data System, Consumption Technical Notes, Table B1.

Jet Fuel

Jet fuel prices are estimated for all years in the transportation sector and for 1972 through 1982 in the electric power sector.

Transportation sector

Prices are developed for kerosene-type jet fuel in the State Energy Data System (SEDS) and are used as the price for both kerosene and naphtha-type jet fuels. Since 1997, virtually all jet fuel used for transportation is kerosene-type. Taxes are not included in the prices.

Physical unit prices: 1983 forward

Transportation sector jet fuel prices for 1983 forward are based on data from U.S. Energy Information Administration (EIA)'s *Petroleum Marketing Annual* and *Petroleum Marketing Monthly*. Annual refiner prices of sales to end users are available for most states. Prices are converted to dollars per gallon. States without prices are assigned adjacent state or PAD district or subdistrict prices, as shown in Table TN4.8.

Physical unit prices: 1976 through 1982

State-level jet fuel prices for 1976 through 1982 are calculated from the *Producer Prices and Price Indexes (PPI)* monthly indices for Census divisions and the jet fuel base prices by state for July 1975. The monthly price for each Census division is equal to the *PPI* monthly index times the jet fuel base price for July 1975 for that Census division. Census division monthly prices are assigned to each state within the Census division, and annual jet fuel prices are computed as simple averages of the monthly state prices.

Physical unit prices: 1970 through 1975

Jet fuel physical unit state-level prices for the 1970 through 1975 period are based on U.S. annual wholesale prices from the *PPI* and the relationship of these prices to wholesale kerosene prices reported in *Platt's.* The U.S. prices are converted to Census division prices, which are then assigned directly to states.

Preliminary U.S. jet fuel prices from the *PPI* for 1973 through 1980 are calculated by using the annual jet fuel price indices, the jet fuel U.S. base price for July 1975 (0.276 dollars per gallon) and the U.S. index for July 1975 (235.8). The index for 1973 is assumed to be equal to a simple average of the 11 available monthly indices.

Table TN4.8. Jet fuel transportation sector price assignments, 1983 forward

State	Years	Assignment
AK	2015	PAD District 5
AR	2001–2003, 2007–2015	PAD District 3
CT	2008–2015	PAD Subdistrict 1A
DC	1983–1988, 1990, 1993	MD
DE	1987, 2003–2015	PAD Subdistrict 1B
GA	2015	PAD Subdistrict 1C
HI	2000–2012, 2015	PAD District 5
IA	2015	PAD District 2
ID	2007–2011, 2014, 2015	PAD District 4
KS	1996, 2006–2015	PAD District 2
KY	2006–2008, 2014, 2015	PAD District 2
MA	1996, 2003–2010, 2013, 2014	PAD Subdistrict 1A
MD	2012, 2014, 2015	PAD Subdistrict 1B
ME	1985, 1990, 1991, 1993–2015	PAD Subdistrict 1A
MI	2015	PAD District 2
MO	2007, 2010, 2013–2015	PAD District 2
MS	2002, 2007, 2009–2012	PAD District 3
MT	2009–2011, 2013–2015	PAD District 4
NC	2013–2015	PAD Subdistrict 1C
ND	2002–2015	PAD District 2
NE	2004, 2006, 2007, 2012, 2014, 2015	PAD District 2
NH	1987, 1995, 2000, 2004–2015	PAD Subdistrict 1A
NM	2007, 2008, 2012–2015	PAD District 3
NY	2014, 2015	PAD Subdistrict 1B
PA	2015	PAD Subdistrict 1B
RI	1983–1988, 1998–2000, 2002–2015	PAD Subdistrict 1A
SC	2014, 2015	PAD District 1C
SD	2009–2011, 2013	PAD District 2
TN	2009–2015	PAD District 2
VT	1984–1988, 1991, 1992, 1999, 2003–2015	PAD Subdistrict 1A
WI	2003, 2008–2015	PAD District 2
WV	1993–2000, 2003–2010, 2012–2015	PAD District 1C
WY	2003, 2005–2007, 2009–2015	PAD District 4

The calculated preliminary U.S. jet fuel prices from the *PPI* are used as the dependent variable in a regression equation for 1973 through 1980, where the wholesale kerosene prices from *Platt's* are the independent variable. The regression equation is used to estimate U.S. annual jet fuel prices for 1970 through 1972.

Jet fuel prices for Census divisions are estimated by using the preliminary U.S. prices derived above for 1970 through 1975 (calculated directly from the *PPI* data for 1973 through 1975 and estimated for 1970 through 1972). These prices are used as inputs to a regression equation which establishes a linear relationship between preliminary U.S. prices and Census division prices for the years 1970 through 1975. Census division prices are assigned to each state within the Census division.

Btu prices: all years

Btu prices for states are calculated from the physical unit prices and the Btu conversion factor (5.670 million Btu per barrel). U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2010 forward: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Kerosene-type Jet Fuel, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPJK_PTG_dpgal_a.htm.

1985-2009: EIA, *Petroleum Marketing Annual,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 21, column titled "Kerosene-Type Jet Fuel" (1985), Table 33, column titled "Kerosene-Type Jet Fuel, Sales to End Users," (1986-1988), Table 35 (1989-1993), Table 36 (1994-2006), and Table 32 (2007 forward). Also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPJK_PTG_dpgal_a.htm.

1983, 1984: EIA, *Petroleum Marketing Annual 1994*, Table A2, column titled "Kerosene-Type Jet Fuel, Sales to End Users."

1973-1982: Bureau of Labor Statistics, U.S. Department of Labor, *Producer Prices and Price Indexes, Supplement,* table titled "Producer price indexes for refined petroleum products by region."

1970-1975: McGraw-Hill, Inc., *Platt's Oil Price Handbook and Oilmanac,* 57th Edition, page 480.

Consumption

1970 forward: EIA, State Energy Data System, transportation sector jet fuel consumption.

Conversion factor: all years

5.670 million Btu per barrel.

Electric power sector

Jet fuel electric power consumption estimates are available in SEDS for 1972 through 1982 only. For 1970 and 1971, no parallel series is available; and for the years after 1982, the series is a part of "light oil" and assigned the electric power distillate fuel oil price by state. (See Distillate Fuel Oil, Electric Power Sector on page 43). All applicable taxes are included in the prices.

Btu prices: 1975 through 1982

For the states that consumed kerosene-type jet fuel at electric utilities during these years, the Btu prices are taken directly from EIA's *Cost and Quality of Fuels for Electric Plants (C&Q).*

Btu prices: 1972 through 1974

Because *C&Q* prices are not available for 1972 through 1974, prices are estimated from *C&Q* prices for 1975 and 1976 and the U.S. Department of Agriculture's *Agricultural Prices* data for 1972 through 1976.

1. Simple annual averages of *Agricultural Prices* quarterly values are calculated for 1972 through 1976. New England Census Division prices are assigned to CT, MA, ME, NH, RI, and VT.
2. The average annual prices based on *Agricultural Prices* values for 1975 and 1976 are used as the independent variables in a regression where the dependent variables are state-level prices based on *C&Q* prices for 1975 and 1976.
3. State-level price estimates for 1972 through 1974 are derived from the results of the regression analysis and the *Agricultural Prices* values for 1972 through 1974.

U.S. Btu prices: all years

U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

1975-1982: EIA, *Cost and Quality of Fuels for Electric Plants*, Tables 6 and 13 (1975), Table 13 (1976-1979), and Table 47 (1980-1982).

1972-1976: Crop Reporting Board, U.S. Department of Agriculture, *Agriculture Prices*, table titled "Household Supplies: Average Prices Paid by Farmers for Lawn Mowers and Petroleum Products."

Consumption

1972-1982: EIA, State Energy Data System, electric power sector kerosene-type jet fuel consumption.

Conversion factors: all years

Because Btu prices are available directly from the data sources, no conversion factors are used.

Kerosene

Kerosene prices are developed for the residential, commercial, and industrial sectors. For 1970 through 1982, prices are developed for the residential and industrial sectors, and the industrial sector prices are assigned to the commercial sector. For 1983 forward, end-user prices are used for the residential and commercial sectors and prices of kerosene sold for resale are used for the industrial sector. Estimates of the amount of kerosene consumed by the residential, commercial, and industrial sectors are taken from the State Energy Data System (SEDS).

Residential sector

Residential sector kerosene prices are estimated by using several data sources and estimation methodologies, depending on the year. For 1983 through 2009, prices of kerosene sales to end users (excluding taxes) are taken from the U.S. Energy Information Administration's (EIA) *Petroleum Marketing Annual (PMA).* For 2010 forward, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. State general sales taxes from the U.S Census Bureau and successor sources are added. For 1970 through 1982, residential kerosene prices are developed from the U.S. Bureau of Labor Statistics *Producer Prices and Price Indexes (PPI)* data series and the U.S. Department of Agriculture *Agricultural Prices* for kerosene. For all years, physical unit prices are calculated from the data sources, and Btu prices are computed by using the physical unit prices and the conversion factor.

Physical unit prices: 2015

In 2015, all kerosene end-user prices are withheld. For 2015, the U.S. end-user price is estimated by applying the 2013 to 2015 growth rate of the U.S. sales for resale price to the 2013 U.S. end-user price. All the states are assigned the U.S. price estimate. State general sales taxes are then added.

Physical unit prices: 1983 through 2014

Prices of kerosene sold to end users, published in the EIA *PMA* and/or available on the EIA website ae used as residential sector prices. The prices, in dollars or cents per gallon (excluding taxes) are available for as few as 1 or as many as 30 states, depending on the year. States with residential kerosene consumption, but no published prices, are assigned their Petroleum Administration for Defense (PAD) district or subdistrict prices as shown in Table TN4.9.

In 1990 and 1991, the PAD District 4 prices of kerosene sold to end users are out-of-range. In 1990, the ratio between the 1989 PAD District 4 end-user price and the U.S. end-user price is applied to the 1990 U.S. end-user price to estimate the PAD District 4 end-user price. Similarly, in 1991, the ratio between the 1992 PAD District 4 end-user price and the U.S. end-user price is applied to the 1991 U.S. end-user price to estimate the PAD District 4 end-user price.

For 1998 through 2002, the PAD District 4 prices of kerosene sold to end users are withheld. The average of the ratios between the end-user price of kerosene and the price of kerosene sold for resale in PAD Subdistricts 1A through 1C and PAD District 2 is applied to the PAD District 4 sales for resale price to estimate the PAD District 4 end-user price for each year.

In 2003, the PAD District 3, 4, and 5 prices of kerosene sold to end users are withheld. For PAD Districts 3 and 4, the average of the ratios between the end-user price and the sales for resale price in PAD Subdistricts 1A through 1C and PAD District 2 is applied to the PAD Districts 3 and 4 resale prices to estimate their end-user prices. The PAD District 5 end-user price is assigned the average of the District's end-user prices in 2001 and 2002.

For 2004 through 2006, only PAD District 1, Subdistrict 1B, and Subdistrict 1C end-user prices for kerosene are available. For PAD Subdistrict 1A, the PAD District 1 end-user prices are assigned. For the other PAD districts, the average of the ratios between the end-user price and the sales for resale price in PAD Subdistricts 1B and 1C is applied to the missing districts' resale prices to estimate their end-user prices for each year.

For 2007 forward, the end-user prices for kerosene are only available for PAD District 1, Subdistricts 1B and 1C, and for PAD District 3 (2007) and Subdistrict 1A (2007-2009). When PAD Subdistrict 1A price is not available, the PAD District 1 end-user price is assigned. In 2014, end-user price for Subdistrict 1C is also withheld. It is estimated using the 2014 growth rate of the District 1 end-user price. For the other missing PAD end-user prices, the average of the ratios between end-user prices and the sales for resale prices in PAD Subdistricts 1B and 1C is applied to the missing districts' sales for resale prices to estimate their end-user prices. However, the sales for resale prices for PAD Districts 4 and 5 are also withheld for 2007 forward (except for 2011 District 4 price). In these instances, the year-on-year percentage increase of the U.S. sales for resale prices are applied to the previous year's sales for resale prices of the missing districts. The resulting estimates are then used to calculate the districts' end-user price.

Once missing prices have been assigned, state general sales taxes are then added.

Table TN4.9. Kerosene residential and commercial sectors PAD district and subdistrict price assignments, 1983 through 2014

State	Years	Assignments	State	Years	Assignments
AK	1983–2014	District 5	MT	1983–2014	District 4
AL	1986, 1991, 1993, 1996, 1997, 2002–2014	District 3	NC	2006–2014	Subdistrict 1C
AR	1984, 1986–2014	District 3	ND	1983–2014	District 2
AZ	1983–2014	District 5	NE	1983–2014	District 2
CA	1983–2014	District 5	NH	1983, 1984, 1986–1995, 1997, 1998,	Subdistrict 1A
CO	1985–2014	District 4		2001–2014	
CT	1983, 1987–1992, 1994–2014	Subdistrict 1A	NJ	1983, 1984, 1987, 1989, 1994, 1996–1998,	Subdistrict 1B
DC	1983–2005	Subdistrict 1B		2002–2014	
DE	1991–2014	Subdistrict 1B	NM	1983, 1985, 1987–2014	District 3
FL	1985, 2005, 2008–2014	Subdistrict 1C	NV	1983–2014	District 5
GA	1993, 2000, 2004–2014	Subdistrict 1C	NY	2013, 2014	Subdistrict 1B
HI	1983–2014	District 5	OH	2004, 2006, 2008–2014	District 2
IA	1983–2014	District 2	OK	1983, 1987–1998, 2000–2014	District 2
ID	1983–2014	District 4	OR	1983–2014	District 5
IL	1987, 2000, 2003–2014	District 2	RI	1983, 1988–1992, 1994–2014	Subdistrict 1A
IN	1996, 1997, 1999–2014	District 2	SC	1993, 2004, 2006–2014	Subdistrict 1C
KS	1983–2014	District 2	SD	1983–2014	District 2
KY	1983, 1999–2014	District 2	TN	2004–2014	District 2
LA	1991–2000, 2004–2014	District 3	TX	1993–1996, 1998, 1999, 2002–2014	District 3
MA	2002, 2004–2006, 2012, 2014	Subdistrict 1A	UT	1983–2014	District 4
MD	1998–2014	Subdistrict 1B	VA	2000, 2006–2014	Subdistrict 1C
ME	1986–2014	Subdistrict 1A	VT	1984, 1985, 1989–1998, 2000–2014	Subdistrict 1A
MI	1993, 2004–2014	District 2	WA	1983–2014	District 5
MN	1983, 1985, 1990, 1992–1998, 2000–2014	District 2	WI	1983–1997, 1999–2014	District 2
MO	1987–1989, 1991–2014	District 2	WV	2006–2014	Subdistrict 1C
MS	1988, 1989, 1991–2014	District 3	WY	1983–2014	District 4

Physical unit prices: 1977 through 1982

Monthly Census division prices and price indices from the Bureau of Labor Statistics *PPI* are used as the basis for the residential kerosene series from 1977 through 1982. To maintain consistency in the agricultural price series used for 1970 through 1976, the *PPI* prices are multiplied by an adjustment factor that accounts for the relationship between *PPI* and *Agricultural Prices* data for quarters in which the two series overlap. In the description of computational procedures below, the adjustment factor is derived first, the PPI prices for 1977 through 1982 are estimated, and the final kerosene physical unit and Btu prices for states are calculated. The final residential sector kerosene prices approximate the average prices paid by farmers. Taxes are included in the source data from *Agricultural Prices* and are, therefore, reflected in the final price estimates.

The first step is to compute the adjustment factor relating *PPI* and *Agricultural Prices* data.

1. Monthly *PPI* prices for the 18 months covered from July 1975 through December 1976 are calculated from the July 1975 base prices and monthly indices for Census divisions.
2. The calculated Census division monthly prices are assigned to each state within the respective Census division.
3. Volume-weighted quarterly *PPI*-based prices for states are calculated by using the monthly volume weights developed from *Retail Sales and Inventories* sales data for "other distillate fuel oil."
4. The adjustment factor relating *PPI and Agricultural Prices* data is

calculated as the simple average of the ratios of the quarterly kerosene price by state from *Agricultural Prices* to the calculated quarterly *PPI*-based kerosene prices by state.

The next step is the calculation of monthly state-level prices from *PPI* kerosene Census division data for 1977 through 1982.

1. Monthly Census division *PPI* prices are calculated by using the July 1975 base prices and the monthly price indices for 1977 through 1982. The missing monthly indices for February, June, July, and October 1980 for the East South Central Division are assumed to be equal to the index for the preceding month.
2. Each state is assigned its respective Census division monthly prices.

The next step is the calculation of annual physical unit state prices.

1. Annual *PPI*-based physical unit prices for states are computed from the monthly *PPI* prices and the monthly consumption weights.
2. Final residential kerosene prices for states are estimated as the product of the annual *PPI*-based state price and the adjustment factor calculated above.

Physical unit prices: 1970 through 1976

Physical unit prices for states are calculated from quarterly price data from the U.S. Department of Agriculture's *Agricultural Prices* and consumption weights derived from EIA's *Retail Sales and Inventories of Fuel Oil*. Taxes are included in the source data.

The quarterly physical unit price data from *Agricultural Prices* for 1970 through 1976 are published in several different forms. The first step in the calculation of prices for these years is to organize the published *Agricultural Prices* data into a consistent form.

1. For 1971 through 1973, no quarterly prices are available for CT, MA, ME, NH, RI, and VT. Each of these states is assigned the quarterly prices reported for the New England Census Division.
2. For 1973, combined MD/DE quarterly prices are reported instead of separate state prices. For this year, the combined prices are assigned to both states.
3. No prices are reported for AK and DC for 1970 through 1976. Quarterly weighted Census division prices are assigned to AK, and MD prices are assigned to DC for these years.

In order to weight the quarterly prices from *Agricultural Prices* into annual state prices, monthly quantity weights are calculated from *Retail Sales and Inventories of Fuel Oil*. This assumes that the "other distillate oil" consumption data by PAD districts or subdistricts is kerosene.

1. Monthly weights are computed by using simple averaging of all available "other distillate oil" sales data for each month for each PAD district or subdistrict. Since data are available from November 1978 to March 1981, some months have averages based on three data points, while others are based on one or two data points. For example, the average weight for March is the simple average of the 1979, 1980, and 1981 March volumes published in *Retail Sales and Inventories of Fuel Oil*.
2. Each month's share of average annual sales is calculated by PAD district or subdistrict from the average monthly sales figures. These shares, which become the monthly weights, are then assigned to each state within its respective district or subdistrict.

Final state annual kerosene physical unit prices are calculated as the weighted average of the *Agricultural Prices* quarterly prices. The monthly weights (shares) are converted to quarterly weights by summing the shares for months within a particular quarter. These same weights are used with the state-level price data for each year from 1970 to 1976.

Alaska Btu prices: 1970 through 1979

Kerosene residential prices for AK are estimated on the basis of the assumption that the ratio of AK-to-U.S. kerosene residential prices is the same as the ratio of AK-to-U.S. distillate fuel oil residential prices.

Btu prices: all years

Btu prices for states are computed by converting the physical unit prices in dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu (5.670 million Btu per barrel). U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2010 forward: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Kerosene, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PTG_dpgal_a.htm; EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, Resale—Kerosene, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm.

1983-2009: EIA, *Petroleum Marketing Annual,* also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PTG_dpgal_a.htm and http://

www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm, select Excel file labled "Download Series History."

1975-1982: Bureau of Labor Statistics, U.S. Department of Labor, *Producer Prices and Price Indexes, Supplement,* table titled "Producer price indexes for refined petroleum products by region."

1978-1981: EIA, *Retail Sales and Inventories of Fuel Oil,* Table 2.

1970-1976: Crop Reporting Board, U.S. Department of Agriculture, *Agricultural Prices*, table titled "Household Supplies: Average Price Paid by Farmers for Lawn Mowers and Petroleum Products."

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010.

Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97,* Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1983-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections*, table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage rate, Sept. 1."

Consumption

1970 forward: EIA, State Energy Data System, residential sector kerosene consumption.

Conversion factor: all years

5.670 million Btu per barrel.

Commercial sector

Commercial sector kerosene prices are estimated by using different data sources and estimation methodologies, depending on the year. For 1983 through 2009, prices of kerosene sales to end users (excluding taxes) are taken from the EIA *Petroleum Marketing Annual (PMA).* For 2010 forward, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. State general sales taxes from the U.S. Census Bureau and successor sources are added. For 1970 through 1982, prices for the industrial sector are assigned to the commercial sector.

Physical unit prices: 2015

In 2015, all kerosene end-user prices are withheld. For 2015, the U.S. end-user price is estimated by applying the 2013 to 2015 growth rate of the U.S. sales for resale price to the 2013 U.S. end-user price. All the states are assigned the U.S. price estimate. State general sales taxes are then added.

Physical unit prices: 1983 through 2014

Prices of kerosene sold to end users, published in the EIA *PMA,* are used as commercial sector prices. The prices, in dollars or cents per gallon (excluding taxes) are available for as few as 1 or as many as 30 states, depending on the year. States with commercial kerosene consumption, but no *PMA* published prices, are assigned their Petroleum Administration for Defense (PAD) district or subdistrict prices as shown in Table TN4.9.

In 1990 and 1991, the PAD District 4 prices of kerosene sold to end users are out-of-range. In 1990, the ratio between the 1989 PAD District 4 end-user price and the U.S. end-user price is applied to the 1990 U.S. end-user price to estimate the PAD District 4 end-user price. Similarly, in 1991, the ratio between the 1992 PAD District 4 end-user price and the U.S. end-user price is applied to the 1991 U.S. end-user price to estimate the PAD District 4 end-user price.

For 1998 through 2002, the PAD District 4 prices of kerosene sold to end users are withheld. The average of the ratios between the end-user price of kerosene and the price of kerosene sold for resale in PAD Subdistricts 1A

through 1C and PAD District 2 is applied to the PAD District 4 sales for resale price to estimate the PAD District 4 end-user price for each year.

In 2003, the PAD District 3, 4, and 5 prices of kerosene sold to end users are withheld. For PAD Districts 3 and 4, the average of the ratios between the end-user price and the sales for resale price in PAD Subdistricts 1A through 1C and PAD District 2 is applied to the PAD Districts 3 and 4 resale prices to estimate their end-user prices. The PAD District 5 end-user price is assigned the average of the District's end-user prices in 2001 and 2002.

For 2004 through 2006, only PAD District 1, Subdistrict 1B, and Subdistrict 1C end-user prices are available. For PAD Subdistrict 1A, the PAD District 1 end-user prices are assigned. For the other PAD districts, the average of the ratios between the end-user price and the sales for resale price in PAD Subdistricts 1B and 1C is applied to the districts' sales for resale prices to estimate their end-user prices for each year.

For 2007 forward, the end-user prices for kerosene are only available for PAD District 1, Subdistricts 1B and 1C, and for PAD District 3 (2007) and Subdistrict 1A (2007-2009). When PAD Subdistrict 1A price is not available, the PAD District 1 end-user price is assigned. In 2014, end-user price for Subdistrict 1C is also withheld. It is estimated using the 2014 growth rate of the District 1 end-user price. For the other missing PAD end-user prices, the average of the ratios between end-user prices and the sales for resale prices in PAD Subdistricts 1B and 1C is applied to the missing districts' sales for resale prices to estimate their end-user prices. However, the sales for resale prices for PAD Districts 4 and 5 are also withheld for 2007 forward (except for 2011 District 4 price). In these instances, the year-on-year percentage increase of the U.S. sales for resale prices are applied to the previous year's sales for resale prices of the missing districts. The resulting estimates are then used to calculate the districts' end-user prices.

Once missing prices have been assigned, state general sales taxes are then added.

Physical unit prices: 1970 through 1982

For 1970 through 1982, state prices for kerosene sold to the industrial sector are assigned to the commercial sector.

Btu prices: all years

Btu prices for states are computed by converting the physical unit prices in dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu (5.670 million Btu per barrel). U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2010 forward: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Kerosene, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PTG_dpgal_a.htm; EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, Resale—Kerosene, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm.

1983-2009: EIA *Petroleum Marketing Annual,* also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PTG_dpgal_a.htm and http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm, select Excel file labled "Download Series History."

1970-1982: Industrial sector kerosene prices from SEDS.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism*, Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1983-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections*, table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage rate, Sept. 1."

Consumption

1970 forward: EIA, State Energy Data System, commercial sector kerosene consumption.

Conversion factor: all years

5.670 million Btu per barrel.

Industrial sector

Industrial sector kerosene prices are estimated by using different data sources and estimation methodologies, depending on the year. For 1983 through 2009, prices of kerosene sold for resale (excluding taxes) are taken from the EIA *PMA*. For 2010 forward, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. State general sales taxes from the U.S. Census Bureau and successor sources are added.

For 1970 through 1982, the industrial sector kerosene prices are based on wholesale price and price index data and on the industrial sector distillate prices. The procedures vary slightly for 1970 through 1974 and 1975 through 1982. For 1970 through 1982, physical unit prices are calculated first; then Btu prices are computed by using the physical unit prices and the conversion factor. Prices approximate an average kerosene price for the manufacturing sector. Taxes are included in the distillate fuel oil prices and are, therefore, reflected in the kerosene price estimates.

Physical unit prices: 1983 forward

Prices of kerosene sold for resale are used as industrial sector kerosene prices. The prices, in dollars or cents per gallon (excluding taxes) are generally available for 9 to over 30 states depending on the year. States with industrial kerosene consumption, but no *PMA* published price are assigned their Petroleum Administration for Defense (PAD) district or sub-district price as shown in Table TN4.10. In 2003, the PAD District 5 sales for resale price is withheld and is assigned the average of the 2001, 2002, and 2004 PAD District 5 sales for resale prices. For 2007 forward, withheld sales for resale prices for PAD District 4 (2007-2010 and 2012 forward) and District 5 (2007 forward) are estimated by applying the year-on-year percentage increases of the U.S. sales for resale prices to the previous year's sales for resale prices for the missing districts. Withheld sales for resale prices for PAD Subdistrict 1A (2008, 2010, and 2012 forward) are estimated by applying the year-on-year percentage increase of the PAD District 1 sales for resale price to the previous year's sales for resale price of the missing district. State general sales taxes are then added.

Physical unit prices: 1975 through 1982

Physical unit industrial kerosene prices for 1975 through 1982 are estimated from the Bureau of Labor Statistics *Producer Prices and Price Indexes (PPI)* base prices and indices for kerosene and No. 2 distillate oil and from the industrial sector distillate prices in physical units. The ratio of *PPI* kerosene prices to *PPI* distillate prices is used as an adjustment factor to estimate kerosene prices.

Annual wholesale prices are calculated from *PPI* annual indices for kerosene and No. 2 distillate fuel oil and their respective July 1975 base prices for Census divisions. Annual average distillate price indices for 1976 are estimated as the simple average of monthly indices. Census division prices for both kerosene and fuel oil No. 2 are assigned to each state within the respective Census divisions. The industrial sector physical unit kerosene prices for states are computed by using the distillate industrial physical unit prices and the ratio of *PPI* kerosene prices to *PPI* fuel oil No. 2 prices.

Physical unit prices: 1970 through 1974

Physical unit state-level prices for 1970 through 1974 are estimated from the distillate industrial prices and the average ratio of kerosene to distillate prices from *PPI* for 1975 through 1978. The average annual wholesale price ratio between kerosene and fuel oil No. 2 (distillate) is *PPI*-based data for the years 1975 through 1978. State-level kerosene industrial physical unit prices are calculated as the product of the ratios and the industrial sector distillate prices for 1970 through 1974.

Btu prices: all years

Btu prices for states are computed by converting the physical unit prices in dollars per gallon to dollars per barrel (42 gallons per barrel) and then to dollars per million Btu (5.670 million Btu per barrel). U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2010 forward: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, Resale—Kerosene, http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_m.htm.

1983-2009: EIA *Petroleum Marketing Annual,* also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_m.htm, select Excel file labeled "Download Series History."

1970-1982: Industrial sector distillate fuel oil price estimates for the current and previous year and the industrial sector kerosene price estimates for the previous year are from SEDS.

1975-1982: Bureau of Labor Statistics, U.S. Department of Labor, *Producer Prices and Price Indexes, Supplement,* table titled "Producer price indexes for refined petroleum products by region."

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95 and 1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1983-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections*, table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage

Table TN4.10. Kerosene industrial sector PAD district and subdistrict price assignments, 1983 forward

State	Years	Assignments
AK	1983–2015	District 5
AL	2007, 2012–2015	District 3
AR	1997, 1998, 2002, 2006–2015	District 3
AZ	1983–2015	District 5
CA	1992, 1993, 2002, 2003, 2005–2015	District 5
CO	1985–1997, 1999–2000, 2006–2015	District 4
CT	1995, 1998, 1999–2000, 2006, 2010–2015	Subdistrict 1A
DC	1983, 1986, 1988, 1991, 1996, 1997, 1999	Subdistrict 1B
DE	1995–1998, 2003–2015	Subdistrict 1B
FL	2006–2015	Subdistrict 1C
GA	2009, 2010, 2012–2015	Subdistrict 1C
HI	1983–2015	District 5
IA	2008, 2010–2015	District 2
ID	1983–1997, 1999–2015	District 4
IL	2008, 2012–2015	District 2
IN	2009, 2012, 2014, 2015	District 2
KS	2007–2009, 2012	District 2
KY	2000, 2006–2015	District 2
LA	2003, 2007, 2008, 2010, 2013–2015	District 3
MA	2001, 2004–2015	Subdistrict 1A
MD	2010–2015	Subdistrict 1B
ME	1989, 2007–2015	Subdistrict 1A
MI	2001, 2003–2006, 2008–2015	District 2
MN	2000–2002, 2006, 2010, 2012, 2013, 2015	District 2
MO	2008–2015	District 2
MS	1987–1994, 1997–2005, 2009, 2011, 2012, 2014, 2015	District 3
MT	1983–1993, 1998–2008, 2010–2015	District 4
NC	2013–2015	Subdistrict 1C
ND	1983–1993, 1997, 1999–2015	District 2
NE	1988, 1991, 2000–2001, 2007–2015	District 2
NH	1983, 1990, 1992, 1993, 1995–1998, 2000, 2002, 2005, 2007–2015	Subdistrict 1A
NM	1994, 1995, 1997–1999, 2004–2006, 2009–2015	District 3
NV	1983–2015	District 5
NY	2015	Subdistrict 1B
OH	2005, 2006, 2009, 2010, 2012–2015	District 2
OK	2006–2015	District 2
OR	1983–1993, 1999–2015	District 5
RI	1990–1992, 1995, 1998–2003, 2005–2008, 2011–2015	Subdistrict 1A
SC	2010, 2012, 2014, 2015	Subdistrict 1C
SD	1983–1993, 2000–2015	District 2
TN	2010–2015	District 2
TX	2003–2006, 2010, 2013–2015	District 3
UT	1983–2015	District 4
VA	2012–2015	Subdistrict 1C
VT	1992, 1993, 1995, 1998, 2000–2002, 2004–2015	Subdistrict 1A
WA	1983–1991, 1993, 1999–2015	District 5
WI	2010, 2012, 2014	District 2
WV	2008–2015	Subdistrict 1C
WY	1983–2001, 2003–2015	District 4

rate, Sept. 1."

Consumption

1970 forward: EIA, State Energy Data System, industrial sector kerosene consumption.

Conversion factor: all years

5.670 million Btu per barrel.

Liquefied Petroleum Gases

Prices for liquefied petroleum gases (LPG) are developed for the residential, commercial, industrial, and transportation sectors. With a few exceptions for industrial prices in the early period, they are represented by the consumer grade propane prices. Estimates of the amount of LPG consumed by sector are taken from the State Energy Data System (SEDS) and are adjusted to remove process fuel and intermediate product consumption in the industrial sector. (See the discussion under Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm.)

Residential sector

For 1994 forward, residential sector LPG prices are derived by EIA from unpublished data on consumer grade propane prices collected from EIA surveys. Physical unit prices are in dollars or cents per gallon and sales taxes are added. Btu prices are then calculated using the physical unit prices and Btu conversion factors. For 1973 through 1993, residential sector LPG prices in dollars per million Btu are the average reported prices of propane delivered to residential consumers in areas where natural gas is available as a competing fuel as reported by natural gas suppliers to the American Gas Association. For 1970 through 1972, physical unit prices from the U.S. Department of Agriculture are calculated first and Btu prices are calculated by using the physical unit prices and Btu conversion factors. Taxes are included in the prices for 1970 through 1993. Prices for AK and HI in 1970 through 1993 are estimated by a different methodology described in a separate section on page 63.

Physical unit prices: 2011 forward

Before 2011, SEDS based residential propane price estimates on data from survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report." Both EIA-782A and EIA-782B were used because refiners, gas plant operators, resellers, and retailers all reported sales to the residential sector on these forms. Form EIA-782B was discontinued in 2011, and an adjustment to the estimation methodology was required. To estimate residential propane prices, regression equations are developed for the Petroleum Administration for Defense (PAD) districts and subdistricts, using EIA-782A historical refiner residential sales prices for propane as the independent variables and the combined EIA-782A and EIA-782B historical prices for residential propane prices as the dependent variables. These

regression equations are used to estimate the current residential propane prices for the PAD districts and subdistricts and for states that have refiner residential prices, historical refiner/reseller/retailer prices, and sizable sales volume—AL, CT, FL, GA, IN, KY, MA, MD, ME, MS, NC, NH, NJ, NM, NY, OH, PA, RI, TN, TX, VA, VT, WI, and WV. In the past, prices for states in PAD District 5—AK, AZ, CA, HI, NV, OR, and WA—deviated drastically from the district's average prices. The 2011 propane prices for these states are estimated by applying the computed 2011 growth rate of District 5 price to the states' 2010 LPG prices. All other states are assigned the corresponding PAD district or subdistrict estimated price. They are shown in Table TN4.11. State general sales taxes are added to the state estimated prices.

For 2013 forward, refiner residential sales prices from EIA-782A are not compatible with prices from earlier years because some refiners sold their retail businesses. As an interim measure, the annual growth rates of the refiner wholesale (sales for resale) prices for the PAD districts and subdistricts are applied to the previous year's refiner residential retail prices, which are then used as independent variables in the regression equations to derive the current year residential propane prices.

Physical unit prices: 1994 through 2010

For 1994 through 2010, residential LPG prices are estimated in cents per gallon by using data collected on Forms EIA-782A and EIA-782B. No price is reported for the District of Columbia, and it is assigned the average price of Maryland and Virginia. State general sales taxes are added to the state estimated prices.

Btu prices: 1994 forward

The physical unit prices are converted to dollars per million Btu by using 42 gallons per barrel and the approximate heat content of 3.836 Btu per barrel for propane.

Btu prices: 1973 through 1990, 1992, and 1993

Propane prices by company are reported by the American Gas Association (AGA) directly in dollars per million Btu, including taxes. The simple average of available company prices is used as the state annual average. Prices that fall outside of a reasonable range are omitted from consideration for Central Hudson Gas and Electric for NY in 1979 through 1981; Arkansas Louisiana Gas for AR in 1989; Public Service Electric & Gas for NJ in 1989; Northwestern Public Service for SD in 1989; City of Long Beach for CA in 1989 and 1990; Orange & Rockland Utilities for NY in 1989 and 1990; Pike County Light & Power for PA in 1989 and 1990; Fitchburg Gas & Electric and Commonwealth Gas Co for MA in 1993; and Providence Gas Co. for RI in 1993.

To estimate missing prices (other than Alaska and Hawaii, which are described in a separate section that follows), simple averages of adjacent states' prices are used, as shown in Table TN4.12. Estimated data for one state are not used to estimate prices for another state.

Btu prices: 1991

Propane prices from the AGA are not available for 1991. Propane prices from the EIA *Petroleum Marketing Annual (PMA)* are used to calculate the percentage change in propane prices between 1990 and 1991 for each Petroleum Administration for Defense (PAD) district or subdistrict. These percentages are applied to the 1990 state residential LPG prices from SEDS to estimate 1991 prices for the contiguous 48 states and the District of Columbia. Prices for LPG in Alaska and Hawaii are developed by using the methodology described on page 63.

Prices for PAD Subdistricts 1A and 1B and PAD District 5 are not available for 1990 in the *PMA,* and prices for PAD Subdistrict 1A and PAD District 5 for 1991 are not available. To estimate the missing PAD district or subdistrict prices, a ratio of the end-user price to the sales for resale price for propane published for an adjacent district is calculated and applied to the known sales for resale price for the PAD districts and subdistricts without an end-user price. For 1990, the PAD District 1 end-user-to-resale ratio is multiplied by the PAD Subdistricts 1A and 1B sales for resale prices to estimate an end-user price for those subdistricts. For 1991, the PAD Subdistrict 1B end-user-to-resale ratio is multiplied by the PAD Subdistrict 1A sales for resale prices to estimate an end-user price. For both years, the U.S. end-user-to-resale price ratio is applied to the PAD District 5 sales for resale price to estimate a PAD District 5 end-user price.

Physical unit prices: 1971, 1972

Physical unit residential LPG prices are based on the city-level propane prices reported by AGA in cents per gallon. Prices for missing states are estimated. The AGA prices are the average delivered prices for propane purchased by residential consumers as of December 31.

1. City-level propane prices from AGA are assigned to their respective states. The AL 1971 price for the Phoenix City Utilities System is omitted because it falls outside a reasonable range.
2. Physical unit prices for a state are calculated directly from the available city/utility price observations reported by AGA. Final physical unit prices are equal to the simple average of the price observations for each

Table TN4.11. LPG residential sector PAD district and subdistrict price assignments, 2011 forward

State	Year	Asignments
AR	2011–2014	District 3
CO	2011–2014	District 4
DC	2011–2014	Subdistrict 1B
DE	2011–2014	Subdistrict 1B
IA	2011–2014	District 2
ID	2011–2014	District 4
IL	2011–2014	District 2
KS	2011–2014	District 2
LA	2011–2014	District 3
MI	2011–2014	District 2
MN	2011–2014	District 2
MO	2011–2014	District 2
MT	2011–2014	District 4
ND	2011–2014	District 2
NE	2011–2014	District 2
OK	2011–2014	District 2
SC	2011–2014	Subdistrict 1C
SD	2011–2014	District 2
UT	2011–2014	District 4
WY	2011–2014	District 4

state.

3. MD prices are assigned for missing DC prices. AK and HI prices are discussed in a separate section that follows.

Physical unit prices: 1970

Since AGA did not publish LPG prices prior to 1971, the residential sector LPG prices for 1970 are estimated. To maintain continuity with the AGA prices for 1971 forward, prices for 1970 are estimated by using simple regression analysis. The relationship between AGA data for 1971 and 1972 and corresponding U.S. Department of Agriculture's *Agricultural Prices* data is the basis for the estimation.

1. Before regression analysis can be applied, *Agricultural Prices* data for 1970 through 1972 are prepared for 49 states (no AK or HI prices are available). These prices include taxes. Development of AK and HI prices are described in a separate section below.
   a. State-level prices for small purchases, representing residential end users, for 1970 through 1972 are published by *Agricultural Prices* in cents per pound. When price per pound data are not available, price per gallon data, representing larger volume purchases, are used. These prices per gallon are multiplied by 0.543, the average ratio of price per pound to price per gallon for the United States for 1970 through 1972, to create uniform input data in price per pound.
   b. For 1971 and 1972, the price reported for the New England Region is assigned to CT, MA, ME, NH, RI, and VT.
   c. Data in cents per pound are converted to dollars per gallon by multiplying by the propane conversion factor of 4.2 pounds per gallon (taken from the *Petroleum Products Handbook*) and dividing by 100.
   d. Missing prices use adjacent states' average prices as shown in Table TN4.13.

Table TN4.12. LPG residential sector price assignments, 1973 through 1993

State	Years	State prices used in the estimation
AR	1977	MO, MS, OK, TN, TX
CT	1990	MA, NY, RI
DC	1973–1983, 1990	MD
DE	1976, 1984	MD, NJ, PA
ID	1977	MT, NV, OR, UT, WA, WY
LA	1977	MS, TX
ME	1973–1977, 1985, 1986, 1992	MA, NH, VT
MO	1986	IA, IL, KS
ND	1973	MN, MT, SD
NM	1987, 1988	AZ, CO, UT
NV	1973, 1975	AZ, CA, ID, OR, UT, WY
OR	1976	CA, ID, NV, WY
SD	1986	MN, MT, ND
UT	1974, 1978, 1985, 1993	AZ, CO, ID, NV, WY
VT	1979	MA, NH, NY
WV	1992	KY, MD, OH, PA, VA

2. The physical unit AGA prices and *Agricultural Prices* data for 1971 through 1972 (excluding AK and HI) are used with simple regression analysis to estimate final physical unit LPG residential prices.

Btu prices: 1970 through 1972

For 1970 through 1972, Btu prices for states are calculated by converting the physical unit prices by using the approximate heat content of 3.836 million Btu per barrel for propane. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Alaska and Hawaii prices: 1970 through 1993

Prices cannot be estimated for AK and HI by using adjacent state price assignments. Missing prices for these two states are estimated by computing ratios of the AK or HI prices to the simple average U.S. prices calculated from the AGA data for years when AK or HI prices are available and applying these ratios to the U.S. simple average prices in years when prices need to be estimated.

1. AGA prices for AK are available in 1972 and 1980. The 1972 AK-to-U.S. ratio is used to estimate prices for 1970, 1971, and 1973 through 1979. The 1980 AK-to-U.S. price ratio is used to estimate prices for 1981 through 1993.
2. AGA prices for HI are available in 1971, 1977 through 1979, and 1989. The 1971 HI-to-U.S. AGA is used to estimate prices for 1970 and 1972 through 1974. The average ratio of the HI-to-U.S. prices for 1977 through 1979 is used to estimate prices for 1975, 1976, and 1980 through 1984. The 1989 HI-to-U.S. ratio is used to estimate prices for 1985 through 1988 and 1990 through 1993.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

1994-2010: EIA, Forms EIA-782A "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B "Resellers'/Retailers' Monthly Petroleum Product Sales Report."

1971-1990, 1992, 1993: American Gas Association (AGA), *Gas Househeating Survey* (1971-1988), *Residential Gas Market Survey* (1989 and 1990), and *Residential Natural Gas Market Survey* (1992, 1993), Appendix 2, "Competitive Fuel Prices."

1991: EIA, State Energy Data System, 1990 residential sector LPG prices.

1991: EIA, *Petroleum Marketing Annual,* Table 35 (1990 and 1991), columns titled "Propane (Consumer Grade)."

1970-1972: Crop Reporting Board, U.S. Department of Agriculture, *Agricultural Prices*, table titled "Average Price Paid by Farmers for Lawn Mowers and Petroleum Products, Specified Dates, by State," column titled "L.P. Gas."

Taxes

An annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year.

Table TN4.13. LPG residential agricultural prices assigned to estimate 1970 prices

State	Years	State prices used
DC	1970–1972	MD
NV	1970, 1971	AZ, CA, ID, UT
OR	1971–1972	CA, ID
UT	1972	AZ, CO, ID, NV, WY
WA	1970–1972	CA, ID

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97,* Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism*, Tables 14 and 26.

Consumption

1970 forward: EIA, State Energy Data System, residential sector LPG consumption.

Conversion factors: all years

1970-1972, 1994 forward: 3.836 million Btu per barrel.

1970-1972: 4.2 pounds per gallon from Guthrie, Virgil, ed., 1960. *Petroleum Products Handbook*. John Wiley and Sons, Inc., New York, New York, pages 3-5.

Conversion factors are not necessary for other years because Btu prices are available directly from the data sources.

Commercial sector

Physical unit prices: 2011 forward

Before 2011, SEDS based commercial propane price estimates on data from survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report." Both EIA-782A and EIA-782B were used because refiners, gas plant operators, resellers, and retailers all reported sales to the commercial sector on these forms. Form EIA-782B was discontinued in 2011, and an adjustment to the estimation methodology was required. To

estimate commerical propane prices, regression equations are developed for the Petroleum Administration for Defense (PAD) districts and subdistricts, using EIA-782A historical refiner commercial sales prices for propane as the independent variables and the combined EIA-782A and EIA-782B historical prices for commercial propane prices as the dependent variables. These regression equations are used to estimate the current commercial propane prices for the PAD districts and subdistricts. All states are assigned the corresponding PAD district or subdistrict estimated price. State general sales taxes are added to the state estimated prices.

For 2013 forward, refiner commercial sales prices from EIA-782A are not compatible with prices from earlier years because some refiners sold their retail businesses. As an interim measure, the annual growth rates of the refiner wholesale (sales for resale) prices for the PAD districts and subdistricts are applied to the previous year's refiner commercial retail prices, which are then used as independent variables in the regression equations to derive the current year commercial propane prices.

Physical unit prices: 1994 through 2010

For 1994 through 2010, commercial sector prices for LPG are estimated from PAD district or subdistrict prices for consumer grade propane sold to commercial and institutional consumers published in cents per gallon in the EIA *Petroleum Marketing Annual.* PAD district or subdistrict prices are assigned to all states within each PAD district or subdistrict and general state sales taxes are added.

Btu prices: 1994 forward

The physical unit prices are converted to dollars per million Btu using 42 gallons per barrel and the approximate heat content of 3.836 million Btu per barrel for propane.

Physical unit prices: 1970 through 1993

For 1970 through 1993, state physical unit prices from the industrial sector are assigned to the commercial sector.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

1994-2010: EIA, *Petroleum Marketing Annual,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 38, column titled, "Commercial/Institutional Consumers" (1994-2006) and Table 34 (2007-2009), and on the EIA website at http://www.eia.gov/dnav/pet/pet_pri_prop_a_EPLLPA_PCS_dpgall_a.htm.

1970-1993: EIA, industrial sector LPG prices from the State Energy Data System.

Taxes

An annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

Consumption

1970 forward: EIA, State Energy Data System, commercial sector LPG consumption.

Conversion factors: all years

3.836 million Btu per barrel.

Industrial sector

From 1985 forward, industrial sector LPG prices are estimated as the average of propane prices to industrial customers, petrochemicals, and other end users; to manufacturing firms; to farmers; or refiner and gas plant operator sales to end users, depending on the data sources for the different years. Prices for 1985 through 2009 are based on data from the EIA *Petroleum Marketing Annual (PMA)*. For 2010, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. For 2011 forward, industrial sector LPG prices are estimated by EIA.

Prices for 1978 through 1981 are taken from the U.S. Department of Commerce, Census Bureau, *Annual Survey of Manufactures (ASM)* or the *Census of Manufactures (CM)* and prices for 1970 through 1977 and 1982 through 1984 are derived from *Agricultural Prices* and scaled to the *ASM/CM*

prices by using the ratio of *ASM/CM to Agricultural Prices* LPG prices for the years 1978 through 1981, when both price series were available. Taxes are included in the industrial sector prices for all years.

Physical unit prices: 2011 forward

Before 2011, SEDS based industrial propane price estimates on data from survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report." Both EIA-782A and EIA-782B were used because refiners, gas plant operators, resellers, and retailers all reported sales to the industrial sector on these forms. Form EIA-782B was discontinued in 2011, and an adjustment to the estimation methodology was required. To estimate industrial propane prices, regression equations are developed for the Petroleum Administration for Defense (PAD) districts and subdistricts, using EIA-782A historical refiner industrial sales prices for propane as the independent variables and the combined EIA-782A and EIA-782B historical prices for industrial propane prices as the dependent variables. These regression equations are used to estimate the current industrial propane prices for the PAD districts and subdistricts. All states are assigned the corresponding PAD district or subdistrict estimated price. State general sales taxes are added to the state estimated prices.

For 2013 forward, refiner industrial sales prices from EIA-782A are not compatible with prices from earlier years because some refiners sold their retail businesses. As an interim measure, the annual growth rates of the refiner wholesale (sales for resale) prices for the PAD districts and subdistricts are applied to the previous year's refiner industrial retail prices, which are then used as independent variables in the regression equations to derive the current year industrial propane prices.

Physical unit prices: 1994 through 2010

For 1994 through 2010, industrial sector physical unit prices are reported by PAD district or subdistrict, but not by state. Consumer grade propane prices are reported for three industrial sector categories—petrochemical plants, other end users (agricultural consumers), and industrial consumers. For petrochemicals, withheld and out-of-range prices are assigned the U.S. average petrochemical price or other estimate in the calculations.

Physical unit prices: 1985 through 1993

Industrial sector LPG physical unit state prices for 1985 forward are estimated by using physical unit annual prices in *PMA* for consumer grade propane sales to end users and state general sales taxes are added. Where prices are not available, the PAD district or subdistrict price is assigned to the state, as shown in Table TN4.14. One exception is Arkansas for 1992 and 1993. Because the neighboring states in PAD District 3 are LPG producers, the PAD District 3 price is uncharacteristically lower than previously reported prices for Arkansas. Therefore, the 3 monthly prices available for Arkansas in 1992 are averaged to derive an annual price. In 1993, the Missouri price is assigned to Arkansas.

When a PAD district or subdistrict price is not available, a consumption-weighted average price is calculated by using available prices for states within the district and the SEDS industrial sector LPG consumption for those states. PAD District 5 price for 1985 is calculated as a consumption-weighted average of AK, CA, OR, and WA prices; PAD Subdistrict 1A price for 1986 uses the average of CT and NH prices; and PAD Subdistrict 1A prices for 1987 through 1988 use the average of CT and MA prices.

When a PAD district or subdistrict price is not available and there are no state data within the PAD district or subdistrict to develop a consumption-weighted average, a different methodology is used. The source table also contains sales for resale prices. To estimate the missing sales to end-users PAD district or subdistrict price, a ratio of the end-users price to the sales for resale price for an adjacent PAD district or subdistrict is calculated and applied to the known sales for resale price for the PAD district or subdistrict that does not have an end-user price. PAD district and subdistrict prices used in the estimations are shown in Table TN4.15.

Physical unit prices: 1982 through 1984, 1970 through 1977

Industrial sector LPG physical unit prices for 1982 through 1984 and 1970 through 1977 are estimated on the basis of the relationship between state-level LPG prices from *Agricultural Prices* and the prices calculated from *Annual Survey of Manufactures (ASM)* or *Census of Manufactures (CM)* for 1978 through 1981.

1. Before the adjustment factor that relates *Agricultural Prices* and *ASM/CM* data is computed, monthly *Agricultural Prices* data are converted into annual prices and missing data are estimated.
   a. Annual LPG prices are calculated as simple averages of the monthly prices from *Agricultural Prices* for the years 1977 through 1984. The only states missing data are WV in 1977 through 1981 and AK, DC, and HI in 1977 through 1984. WV is assigned the simple average of the KY, MD, OH, PA, and VA prices. AK, DC, and HI prices are discussed below.
   b. The average ratio of *ASM/CM*-based final prices for 1978 through 1981 and the 1978 through 1981 *Agricultural Prices* annual prices is

Table TN4.14. LPG industrial sector PAD district and subdistrict price assignments, 1985 through 1993

State	Years	Assignments
AK	1986–1988, 1990–1993	District 5
AL	1985–1988	District 3
AZ	1985–1993	District 5
CA	1990–1993	District 5
CO	1991	District 4
CT	1990–1993	Subdistrict 1A
DC	1985–1993	Subdistrict 1B
DE	1986–1993	Subdistrict 1B
FL	1990–1993	Subdistrict 1C
GA	1985, 1990–1993	Subdistrict 1C
HI	1985–1993	District 5
IA	1986, 1991–1993	District 2
ID	1986, 1990–1993	District 4
IN	1990	District 2
KS	1986–1989, 1992	District 2
MA	1986, 1990–1993	Subdistrict 1A
MD	1988, 1990–1993	Subdistrict 1B
ME	1986–1993	Subdistrict 1A
MI	1985–1988, 1990	District 2
MN	1985, 1986, 1988–1991, 1993	District 2
MS	1990–1993	District 3
MT	1990–1993	District 4
NC	1991, 1992	Subdistrict 1C
ND	1985, 1986, 1991–1993	District 2
NE	1986–1992	District 2
NH	1987–1993	Subdistrict 1A
NM	1993	District 3
NV	1985–1988, 1990–1993	District 5
NY	1990–1993	Subdistrict 1B
OH	1990	District 2
OK	1986, 1987	District 2
OR	1986, 1990–1993	District 5
PA	1990–1993	Subdistrict 1B
RI	1986–1993	Subdistrict 1A
SC	1992	Subdistrict 1C
SD	1985–1993	District 2
TN	1990–1993	District 2
UT	1986–1988, 1990–1993	District 4
VT	1986–1993	Subdistrict 1A
WA	1986–1993	District 5
WI	1985, 1986, 1990	District 2
WV	1989–1993	Subdistrict 1C
WY	1987, 1988	District 4

calculated for 48 states (excluding AK, DC, and HI) as the simple average of the ratio over the 4 years. This average ratio is used as an adjustment factor.

Table TN4.15. LPG industrial sector, PAD district and subdistrict price estimates, 1990 through 1993

Year	Missing prices	Prices used in estimation
1990	Subdistrict 1A	District 1
	Subdistrict 1B	District 1
	District 5	U.S.
1991	Subdistrict 1A	Subdistrict 1B
	District 5	U.S.
1992	Subdistrict 1A	Subdistrict 1C
	Subdistrict 1B	Subdistrict 1C
1993	Subdistrict 1A	Subdistrict 1C
	Subdistrict 1B	Subdistrict 1C

2. Final industrial sector LPG prices for 1982 through 1984 and 1970 through 1977 are estimated by using the state-level adjustment factors and annual average LPG prices from *Agricultural Prices* for these years.
   a. Annual average LPG prices are calculated for 1982 through 1984 and 1970 through 1977 as the simple average of the monthly prices.
   b. *Agricultural Prices* published annual average prices in dollars per gallon for all states in 1975 and 1976. For DE in 1970 through 1974, MD in 1970 through 1974, VA in 1970 through 1974, and WV in 1970 through 1972, only prices for small volume purchases in cents per pound were published. These are converted to cents per gallon by multiplying by 1.96, the average ratio of cents per gallon to cents per pound for the United States for 1970 through 1974.
   c. For 1970 through 1972, *Agricultural Prices* are converted from cents per gallon to dollars per gallon.
   d. For 1971 through 1973, the New England price per gallon reported by *Agricultural Prices* is assigned to CT, MA, ME, NH, RI, and VT.
   e. MD prices are assigned to DC in 1970 through 1972, 1974 through 1977, and 1982 through 1984. The combined MD/DE price in 1973 is assigned to MD, DE, and DC.
   f. Excluding AK and HI, states missing *Agricultural Prices* LPG prices are assigned the simple average price of adjacent states. The states with missing data and the adjacent state assignments are shown in Table TN4.16.
   g. Industrial sector LPG physical unit prices for 1970 through 1977 and 1982 through 1984 for all states (except AK, DC, and HI) are calculated by using the estimated annual *Agricultural Prices* data for the respective year and the state-level average ratios as adjustment factors.
3. AK prices for 1970 through 1977 and 1982 through 1984 and HI prices

Table TN4.16. LPG industrial sector price assignments, 1970 through 1976

State	Years	State prices used in the estimation
CT	1974	NY
MA	1974	NY
ME	1974	NY
NH	1974	NY
NV	1970–1971	AZ, CA, ID, UT
	1973–1974	AZ, CA, ID
OR	1970–1974	CA, ID
RI	1974	NY
	1975–1976	CT, MA, NY
UT	1972	AZ, CO, ID, NV, WY
	1973–1974	AZ, CO, ID, WY
VT	1974	NY
WA	1970–1974	CA, ID

for 1970 through 1977 and 1982 through 1984 are estimated by using the relationship between *ASM/CM* based prices for these states and the U.S. price reported by *Agricultural Prices* (1979 through 1981 for AK and 1978 through 1981 for HI). The average ratio for the available years for the two states is calculated and used with the *Agricultural Prices* U.S. prices for the years to be estimated.

Physical unit prices: 1978 through 1981

For 1978 through 1981, the industrial sector LPG prices are either calculated directly from cost and quantity data from the *ASM* or the *CM* or are estimated by using the relationship of *ASM/CM* data to LPG price data from *Agricultural Prices*.

1. For 1978 through 1981, industrial sector physical unit prices for LPG are calculated as the average cost per unit from cost and quantity data published in *ASM/CM*. Since sales are reported in pounds, the prices are converted to dollars per gallon. The conversion factor of 4.5 pounds per gallon is from *ASM/CM*.
2. The AK price for 1978 is the consumption-weighted average Census division price. In addition, four states have prices estimated as the simple average of the prices of adjacent states, and DC is assigned the MD price, as shown in Table TN4.17.

Btu prices: all years

Btu prices for the states are calculated from the physical unit prices and the conversion factors shown in Table TN4.18. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS, adjusted for process fuel and intermediate product consumption.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

1994-2010: EIA, *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, prices from Table 38, columns titled "Industrial Consumers," "Petrochemical," and "Other End Users" (1994-2006) and Table 34 (2007-2009) and on the EIA website at http://www.eia.gov/dnav/pet/pet_pri_prop_a_EPLLPA_pin_dpgal_a.htm, and unpublished associated volumes are used to calculate consumption-weighted average prices.

1985-1993: EIA, *Petroleum Marketing Annual,* Table 21 (1985), Table 33 (1986-1988), and Table 35 (1989-1993), columns titled "Propane (Consumer Grade)," "Sales to End Users," and "Sales for Resale."

1970-1984: Crop Reporting Board, U.S. Department of Agriculture, *Agricultural Prices,* tables titled "Average Price Paid by Farmers for Lawn Mowers and Petroleum Products, Specified Dates, by State," column titled "L.P. Gas," (1970-1976); "Household Supplies: Average Price Paid by Farmers" (1977-1979); "L.P. Gas: Average Price Paid by States" (1980); and "L.P. Gas: Average Price Paid by Months by States" (1981-1984).

1981: Census Bureau, U.S. Department of Commerce, *1982 Census of Manufactures, Fuels and Electric Energy Consumed, Part 2, States and Standard Metropolitan Statistical Areas by Major Industry Groups,* Table 3, state-level quantity and cost of liquefied petroleum gases.

1978-1980: Census Bureau, U.S. Department of Commerce, *Annual Survey of Manufactures, Fuels and Electric Energy Consumed, States by Industry Group and Standard Metropolitan Statistical Areas by Major Industry Group*, Table 3, state-level quantity and cost of liquefied petroleum gases.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

Table TN4.17. LPG industrial sector price assignments, 1978 through 1981

State	Years	State prices used
AR	1978	LA, MO, MS, OK, TX
DC	1978–1981	MD
LA	1980	AR, MS, TX
NM	1979–1981	AZ, CO, OK, TX
WY	1978–1981	CO, ID, MT, ND, NE, SD, UT

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review,* Volume 54, No. 31, map titled "State Gasoline, Sales and Cigarette Tax Rates as of July 1, 1993."

1985-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* table titled "State Government Excises on General Sales, Motor Fuel, and Cigarettes, Beginning and End of Fiscal Year," column "Percentage rate, Sept. 1."

Consumption

1994 forward: EIA, unpublished volume data for "Industrial Consumers," "Petrochemical," and "Other End Users"collected on Form EIA-782B for consumption-weighted average industrial sector price calculations.

1970 forward: EIA, State Energy Data System, industrial sector LPG consumption.

Conversion factors: all years

1970 forward: EIA, State Energy Data System, Consumption Technical Notes, Table B1, as shown in Table TN4.18.

Transportation sector

Physical unit prices: 2011 forward

The survey that provides reseller and retailer sales prices for propane by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," was discontinued in 2011. As a result, data for propane prices by sales type, which are based on Form EIA-782B as well as Form EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," are no longer available. To estimate transportation propane prices, regression equations are developed for the Petroleum Administration for Defense (PAD) districts and subdistricts using historical refiner residential and/or commercial sales prices for propane from EIA-782A as the independent variables and the historical prices for consumer grade propane sold through retail outlets as the dependent variables. These regression equations are used to estimate the current transportation propane prices for the PAD districts and subdistricts. All states are assigned the corresponding PAD district or subdistrict estimated price. State motor fuel taxes are added to the state estimated prices.

Table TN4.18. LPG Btu conversion factors for the industrial sector, 1970 forward

Year	Conversion factor	Year	Conversion factor	Year	Conversion factor
1970	3.736	1985	3.546	2000	3.539
1971	3.724	1986	3.591	2001	3.544
1972	3.708	1987	3.613	2002	3.547
1973	3.691	1988	3.606	2003	3.561
1974	3.670	1989	3.640	2004	3.554
1975	3.645	1990	3.566	2005	3.553
1976	3.640	1991	3.554	2006	3.544
1977	3.590	1992	3.571	2007	3.524
1978	3.579	1993	3.543	2008	3.511
1979	3.640	1994	3.585	2009	3.466
1980	3.633	1995	3.571	2010	3.473
1981	3.594	1996	3.552	2011	3.440
1982	3.562	1997	3.559	2012	3.467
1983	3.549	1998	3.557	2013	3.488
1984	3.546	1999	3.553	2014	3.460

For 2013 forward, refiner retail prices from EIA-782A are not compatible with prices from earlier years because some refiners sold their retail businesses. As an interim measure, the annual growth rates of the refiner wholesale (sales for resale) prices for the PAD districts and subdistricts are applied to previous year's refiner residential and commercial retail prices, which are then used as independent variables in the regression equations to derive the current year transportation propane prices.

Physical unit prices: 1970 through 2010

For 1994 through 2010, transportation sector prices are estimated from PAD district or subdistrict prices for consumer grade propane sold through retail outlets published in the EIA *Petroleum Marketing Annual* or from unpublished data collected on Forms EIA-782A and EIA-782B. Physical unit PAD district or subdistrict prices are assigned to all states within a PAD district or subdistrict

and state motor fuel taxes are added.

For 1985 through 1993, state physical unit prices from the industrial sector are assigned to the transportation sector and LPG motor fuel taxes are added.

For 1970 through 1984, state physical unit prices from the industrial sector, including taxes, are assigned to the transportation sector.

Btu prices: all years

The physical unit prices are converted to dollars per million Btu using 42 gallons per barrel and the approximate heat content of 3.836 million Btu per barrel for propane.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

1994-2010: EIA, Forms EIA-782A "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B "Resellers'/Retailers' Monthly Petroleum Product Sales Report," propane prices, sales to end-users through retail outlets, for the PAD districts and subdistricts.

Taxes

1985 forward: Federal Highway Administration, U.S. Department of Transportation, *Highway Statistics*, Table MF-121T for state tax rates on liquefied petroleum gases as motor fuel, supplemented with information from state revenue offices.

Consumption

1970 forward: EIA, State Energy Data System, transportation sector LPG consumption.

Conversion factors: all years

3.836 million Btu per barrel.

Lubricants

Lubricant prices are developed for the industrial sector and are assigned to the transportation sector. State-level prices are not available for either sector; national-level prices are assigned to all states and do not include end-user taxes paid at the time of sale. Estimates of lubricant consumption by the industrial and transportation sectors are taken from the State Energy Data System (SEDS).

Physical unit prices: 1983 forward

Prices of lubricants are estimated by applying the annual growth rate of the producer price index for finished lubricants, compiled by the U.S. Department of Labor, Bureau of Labor Statistics, to the lubricant price estimate from the previous year.

The method of estimating shipment prices using U.S. Census Bureau data (see *Physical unit prices: 1970 through 1982*) could not be used after 1982 because the volume of product shipments is no longer available. Earlier attempts of replacing the volume of shipments with an adjusted SEDS consumption estimate was not satisfactory, as variations caused by incompatibility of two different sources would be reflected in the resultant price estimates.

Physical unit prices: 1970 through 1982

Prices of lubricants are estimated from U.S. Department of Commerce, Census Bureau, data for three product categories:

1. Lubricating oils made in refineries (SIC 29117.21) and not made in refineries (SIC 29920.21).
2. Lubricating greases made in refineries (SIC 29117.31) and not made in refineries (SIC 29920.31).
3. Lubricating oils and greases, not specifically known (n.s.k.), made in refineries (SIC 29117.00) and not made in refineries (SIC 29920.00 for establishments with 10 employees or more and SIC 29920.02 for establishments with fewer than 10 employees).

For the years where *Census of Manufactures (CM)* data are available (1967, 1972, 1977, and 1982), total shipments are calculated by adding the shipments for the three product categories. Shipments for the third product category are withheld and estimated by dividing their value of shipments sum by the weighted average cost of the product categories SIC 29920.21 and 29920.31.

Total shipments in each year for which *CM* data are available is divided by the estimated SEDS total lubricants consumption (in physical units) for that

year to establish a shipments-to-consumption ratio. Ratios for the years not covered by the *CM* (i.e., 1968 through 1971, 1973 through 1976, and 1978 through 1981) are estimated by linear interpolation. Total shipments for the years not covered by the *CM* are estimated by multiplying SEDS consumption data by the appropriate shipment-to-consumption ratio.

Estimated shipment prices are calculated by dividing the value of shipments shown in the *CM* (for 1972, 1977, and 1982) or the *Annual Survey of Manufactures* (for all other years) by the estimated shipments for each product category. The shipment prices are assumed to represent wholesale prices.

End-user prices in dollars per barrel are estimated by multiplying the shipment (wholesale) prices by trade ratio factors that represent the wholesale-to-retail markup. The trade ratio factors are developed from Bureau of Economic Analysis (BEA) data for 1972 and 1977. For 1972, the sum of data called "purchasers value" for the three product categories is divided by the sum of the "producers value" for the three categories to derive a trade ratio. A similar calculation is made for 1977, but the terms "purchase value" and "basic value" are used in the source data.

The 1972 ratio is used for 1970 through 1972, and the 1977 ratio is used for 1977 forward. The values for 1973 through 1976 are estimated by linear interpolation by using the 1972 and 1977 values. The trade ratio for 1982 is not used because the range of petroleum products included in the ratio was expanded by BEA and the ratio would no longer represent the specific markup for lubricants.

Btu prices: all years

Btu prices are obtained by dividing the prices in dollars per barrel by the conversion factor (6.065 million Btu per barrel).

Data sources

Prices

1983 forward: U.S. Department of Labor, Bureau of Labor Statistics, Producer Price Indexes, Commodity Data, Item 0576 Finished Lubricants, not seasonally adjusted (series ID: WPU0576), available at http://www.bls.gov/ppi/data.htm.

1970, 1971, 1973 through 1976, and 1978 through 1981: Census Bureau, U.S. Department of Commerce, *Annual Survey of Manufactures; Lubricating Oils and Greases* (SIC 29117 and 29920).

1972, 1977, and 1982: Census Bureau, U.S. Department of Commerce, *Census of Manufactures, Petroleum Refining; Lubricating Oils and Greases* (SIC 29117 and 29920).

1972 and 1977: Bureau of Economic Analysis, U.S. Department of Commerce, Input-Output Table Work Tapes for (SIC Codes 29117 and 29920).

Consumption

1970 forward: EIA, State Energy Data System, lubricants consumption.

Conversion factor: all years

6.065 million Btu per barrel.

Motor Gasoline

Motor gasoline prices are developed for the transportation sector, and the transportation sector prices are assigned to the commercial and industrial sectors. Motor gasoline consumed in privately-owned vehicles is accounted for in the transportation sector. Estimates of motor gasoline consumed by the transportation, commercial, and industrial sectors used in calculating expenditures are taken from SEDS. Prices in this series are retail prices, including federal and state motor fuel taxes. Due to the lack of uniformity in application, state general sales taxes and local fuel and sales taxes are not included. Finished motor gasoline includes conventional gasoline, all types of oxygenated gasoline including gasohol, and reformulated gasoline, but excludes aviation gasoline.

Physical unit prices: 2011 forward

The survey form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," which was the main source of motor gasoline prices, was suspended after data year 2010. For 2011 forward, motor gasoline physical unit prices for CA, CO, FL, MA, MN, NY, OH, TX, and WA are estimated by applying the annual average growth rates derived from the U.S. Energy Information Administration's (EIA) survey form EIA- 878, "Motor Gasoline Price Survey" for those states. The remaining state prices are estimated by applying the annual average growth rate of the corresponding Petroleum Administration for Defense (PAD) district or subdistrict price to the previous year's state prices.

Physical unit prices: 2000 through 2010

For 2000 through 2010, motor gasoline physical unit prices are based on the average annual sales prices (excluding taxes) of finished motor gasoline to end users through retail outlets contained in Table 28 of the U.S. Energy Information Administration's (EIA) *Petroleum Marketing Annual (PMA).* This series reflects data collected from refiners, resellers, and retailers in the industry (survey forms EIA-782A and EIA-782B), and provides more comprehensive coverage. Data are available for all states except the District of Columbia, which has prices withheld for some years. In these instances, the price is estimated by applying the change in price for sales for resale (a type of wholesale sales) over the previous year to the previous year's price for sales to end users through retail outlets.

State and federal motor gasoline tax rates are added to the prices from the *PMA.* State tax information and annual federal tax information are taken from Table EN1 of *PMM.* EIA updates this table twice a year, reporting the tax rates effective January 1 or July 1. To compile the average tax rates for the year, information on the effective date of rate changes is collected from additional sources. These include State Department of Revenue offices, the U.S. Department of Defense, Defense Energy Support Center, annual report entitled *Compilation of United States Fuel Taxes, Inspection Fees and Environmental Taxes and Fees,* and the U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* report. They are combined with the federal tax rate to adjust the *PMA* prices.

Physical unit prices: 1983 through 1999

For 1983 through 1999, motor gasoline physical unit prices are based on the average annual refiner motor gasoline prices (excluding taxes) for sales to end users through retail outlets, published in the *PMA.* When the state-level prices are not available, the PAD district or subdistrict price is assigned to the state, except for certain states and years, as noted in Table TN4.19, that are derived from sales for resale prices or from the Bureau of Labor Statistics' *Consumer Prices: Energy (CPI).*

State and federal motor gasoline taxes are added to the prices from the *PMA.* Monthly state tax information and annual federal tax information are taken from the U.S. Department of Transportation's *Highway Statistics.* The monthly state taxes are averaged to create an average annual tax for each state, which is combined with the federal tax to adjust the *PMA* price. Due to the lack of uniformity in application, state and local general sales taxes are not included.

Motor gasoline prices for sales to end users through retail outlets are withheld for Maryland and unavailable for the District of Columbia in all years. To derive end-user prices for Maryland each year, the ratio of the prices for sales for resale (a type of wholesale sales) to the prices for sales to end users (retail sales) through company outlets in the neighboring states of Delaware, Pennsylvania, Virginia, and West Virginia are averaged and that average ratio is applied to the sales for resale prices for Maryland. End-user prices for the District of Columbia are derived using the ratio of Virginia's sales for resale prices to end-user prices.

Motor gasoline prices for Hawaii are not available in the *PMA* prior to 1991. They are also not collected or published in the *CPI* after December 1986. The following method is used to derive Hawaii prices for 1987 through 1990. The monthly Hawaii *CPI* prices are used to calculate annual averages for 1983 through 1986. The annual averages are divided by the *PMA* PAD District 5 price (with Hawaii state and federal taxes added) for each year to develope annual ratios of the two prices. The four ratios for 1983 through 1986 are averaged to give one ratio that is multiplied by the *PMA* PAD District 5 prices for 1987 through 1990 to estimate Hawaii prices for those years. State and

Table TN4.19. Motor gasoline price assignments, 1983 through 1999

State	Year	Source
AK	1983–1986	CPI
CT	1989–1999	PMA, PAD Subdistrict 1A
DC	1983–1999	PMA, Wholesale/retail adjustment
DE	1991–1993	PMA, PAD Subdistrict 1B
HI	1983–1986	CPI
	1987–1990	PMA, PAD District 5 adjustment
ID	1993, 1994	PMA, PAD District 4
MD	1985–1999	PMA, Wholesale/retail adjustment
ME	1985–1988, 1990–1999	PMA, PAD Subdistrict 1A
MT	1991–1999	PMA, PAD Subdistrict 4
ND	1996	PMA, PAD District 2
NH	1995	PMA, PAD Subdistrict 1A
SD	1987, 1991, 1992	PMA, PAD District 2
WY	1985	PMA, PAD District 4

federal taxes are added to the estimates.

In the states and years (shown in Table TN4.19) where prices are derived from the *CPI*, monthly *CPI* city prices are weighted by monthly consumption from *Highway Statistics*. All taxes are included in the *CPI* data.

Physical unit prices: 1982

Monthly physical unit motor gasoline prices for 1982 are taken from the *Platt's Oil Price Handbook and Oilmanac (Platt's)* table "AAA 'Fuel Gauge' Report," the *CPI*, or both. Table TN4.20 summarizes price data availability by source. The *Platt's* prices are reported for both leaded and unleaded motor gasoline and for both full-service and self-service for all states except AK and HI. All available *Platt's* prices for 1982 are used in the calculation of motor gasoline prices. The continuity of these prices with prices published by *Platt's* in previous years suggests that taxes are included.

The available *CPI* monthly physical unit motor gasoline prices for 1982 are for all types of motor gasoline and cover 25 states, as shown in Table TN4.21. The *CPI* prices are assigned to any state that has a county included in the Standard Metropolitan Statistical Area (SMSA) definitions used by the Bureau of Labor Statistics. These "all types" prices cover leaded regular, unleaded regular, and leaded premium and include taxes. All the available *CPI* prices for 1982 are also used in the calculation of motor gasoline prices. Complete monthly data exist for the 25 states covered by the *CPI*. The *CPI* Detailed Report of April 1986 explicitly states that federal, state, and local taxes are included.

To combine the product-specific Platt's prices with the "all types" prices published in the *CPI*, the *Platt's* prices are weighted into "all types" prices by using annual U.S. data from the *Monthly Energy Review (MER)* to calculate shares for leaded and unleaded motor gasoline (no breakdowns for regular and premium are possible because of data limitations).

Motor gasoline price data reported by *Platt's* for 1982 cover the following months: February, April, June, August, November, and December. The missing six months are assigned prices as follows: January is assigned the February price, and the other missing months are assigned the average price of the preceding and succeeding months. A missing February price for MO is assumed to be equal to the April price, and a missing price for OR is assumed to be equal to the average of the April and August prices.

For states with data from *Platt's* only, prices by product type (leaded and unleaded) are first calculated as the simple average of full-service and self-service prices for that product for each month and state. The resulting prices are then weighted into monthly composite prices by using U.S. leaded and unleaded shares of motor gasoline product supplied from the *MER*. The following 26 states have data only from *Platt's*: AL, AR, AZ, CT, DE, IA, ID, LA, ME, MS, MT, NC, ND, NE, NH, NM, NV, OK, RI, SC, SD, TN, UT, VT, WV, and WY.

Platt's reports two prices for each motor gasoline product for each year: one full-service price and one self-service price. These two prices are combined by using a simple average into a single product price for each state for each month.

The unleaded U.S. share of total motor gasoline consumption is reported in the *MER* as 52.1% in 1982. Assuming that the remaining motor gasoline consumption is leaded, the leaded portion of total consumption is 47.9%. These shares are used for all states and months to calculate the composite prices from the leaded and unleaded prices.

For AK and HI, the only states with data only from the *CPI*, the "all types" monthly prices reported are used directly as monthly composite prices.

For states with price data from both *Platt's* and the *CPI*, the *Platt's* data are first combined into product type prices and weighted with the *MER* shares. The resulting combined prices for all motor gasoline types are averaged together, with the combined *CPI* city prices assigned to the respective month and state. The following 23 states have monthly composite prices computed in this way: CA, CO, DC, FL, GA, IL, IN, KS, KY, MA, MD, MI, MN, MO, NJ, NY, OH, OR, PA, TX, VA, WA, and WI.

1. Leaded and unleaded gasoline prices are calculated as simple averages of full-service and self-service prices from *Platt's* and are then weighted

Table TN4.20. Summary of motor gasoline price data by year, 1970 through 1982

Years	Source	Grades covered	Composite price	Missing states all sources
1982	Platt's	leaded	no	none
		unleaded	no	
	CPI	leaded regular	yes	
		leaded premium	yes	
		unleaded regular	yes	
1979–1981	Platt's	leaded regular	no	AR, DE, ME, MS,
		leaded premium	no	MT, ND, NH, OK,
		unleaded regular	no	RI, SC, SD, VT,
		unleaded premium	no	WV, WY
	CPI	leaded regular	yes	
		leaded premium	yes	
		unleaded regular	yes	
1978	Platt's	leaded regular	no	none
	CPI	leaded regular	yes	
		leaded premium	yes	
		unleaded regular	yes	
1976, 1977	Platt's	leaded regular	no	AK
	CPI	leaded regular	no	
		leaded premium	no	
		unleaded regular	no	
1974, 1975	Platt's	leaded regular	no	AK
	CPI	leaded regular	no	
		leaded premium	no	
1970–1973	Platt's	leaded regular	no	AK, HI

into a composite price by using *MER* shares of leaded and unleaded motor gasoline consumption.

2. Monthly "all types" motor gasoline prices covering leaded regular, leaded premium, and unleaded regular are taken directly from the *CPI*. If there is more than one *CPI* price observation for a month and state, the *CPI* prices are simple averages.

3. Using a simple average, the composite *Platt's* prices are combined with the "all types" *CPI* prices for each state. The resulting prices are the monthly composite prices for 1982.

Annual physical unit prices for all states are calculated from the monthly motor gasoline prices calculated above and weighted by the monthly motor gasoline consumption volumes for states from *Highway Statistics*.

Physical unit prices: 1979 through 1981

For 1979 through 1981, *Platt's* monthly motor gasoline prices are taken from a table titled "Platt's/Lundberg Summary." Prices are available for cities by product-type, by grade, and by type of service (full service, self service). Four products and grades of motor gasoline are covered: leaded regular, unleaded regular, leaded premium, and unleaded premium. These data cover 37 states and taxes are included. The *CPI* reports "all types" prices, including taxes, for the cities listed in Table TN4.21. *Platt's* city price assignments to states for 1979 through 1981 are shown in Table TN4.22.

The computation of monthly composite prices for 1979 through 1981 varies, depending on the available data sources for each state. Monthly composite prices are estimated for the 14 states which do not have reported price data from either data source. If both *Platt's* and the *CPI* report prices for a city, the *CPI* price is used.

1. For states with city price observations only from *Platt's*, prices for leaded and unleaded motor gasoline are combined by use of simple averaging, regardless of the type of service, and are converted to dollars per gallon. The leaded and unleaded prices are then weighted together into a monthly composite price. The following 12 states have prices only from *Platt's* for 1979 through 1981: AL, AZ, CT, IA, ID, LA, NC, NE, NM, NV, TN, and UT.
   a. The *Platt's* prices for 1981 end in September of that year; monthly prices by grade and service type for October, November, and December are assumed to be equal to the corresponding September prices.
   b. Leaded and unleaded prices are calculated for each state by using a simple average of all prices available for each product (leaded, unleaded), regardless of service type or grade of motor gasoline (regular, premium). All city prices for each state are averaged together.
   c. Leaded and unleaded shares of total motor gasoline consumption for the United States are calculated from the *MER* for each year 1979 through 1981. The monthly product type prices are weighted into composite prices by using the national leaded and unleaded shares as weights.

2. For states with city price observations only from the *CPI*, the monthly "all types" prices are used directly for states with only one price observation per month. For states with multiple observations, monthly prices are combined by simple averaging. States with *CPI* data only are: AK, CO, DC, GA, HI, IL, KS, MA, MD, MI, MN, MO, NJ, OH, OR, PA, and WI.

3. For the eight states with price observations from both Platt's and the *CPI*

Table TN4.21. Motor gasoline price assignments from consumer prices: energy, 1978 through 1982

State	City price assignments
AK	Anchorage
CA	Los Angeles-Long Beach-Anaheim, San Dego, San Francisco, Oakland
CO	Denver-Boulder
DC	Washington
FL	Miami
GA	Atlanta
HI	Honolulu
IL	Chicago-Northwestern Indiana, St. Louis
IN	Chicago-Northwestern Indiana, Cincinnati
KS	Kansas City
KY	Cincinnati
MA	Boston
MD	Baltimore, Washington
MI	Detroit
MN	Minneapolis-St. Paul
MO	St. Louis, Kansas City
NJ	New York-Northeastern NJ, Philadelphia
NY	New York-Northeastern NJ, Buffalo
OH	Cincinnati, Cleveland
OR	Portland
PA	Philadelphia, Northeastern PA, Pittsburgh
TX	Dallas-Ft. Worth, Houston
VA	Washington
WA	Seattle-Everett, Portland
WI	Milwaukee, Minneapolis-St. Paul

Note: All types of motor gasoline are included.

(CA, FL, IN, KY, NY, TX, VA, and WA), monthly composite prices for 1979 through 1981 are calculated by using three steps:

a. The *Platt's* prices are combined into single "all types" prices as described above by using leaded and unleaded grades of motor gasoline shares as weights.
b. The *CPI* prices are combined by state.
c. Using simple averaging, the composite *Platt's* price for each state is combined with the "all types" *CPI* price for that state. The resulting prices are the monthly composite prices for 1979 through 1981.

4. Fourteen states are not covered by price data from either *Platt's* or the *CPI* in 1979 through 1981. These states are AR, DE, ME, MS, MT, ND, NH, OK, RI, SC, SD, VT, WV, and WY. Monthly composite prices for these states are estimated by using the monthly state-level composite prices for 1982 and Census region monthly prices from the *CPI* for 1979 through 1982.
   a. The ratio between the 1982 state prices and the 1982 *CPI* Census region prices corresponding to each state is calculated for use as an adjustment factor in 1979, 1980, and 1981.

Table TN4.22. Motor gasoline price assignments from Platt's, 1979 through 1981

State	City price assignments
AL	Birmingham
AZ	Phoenix, Tucson
CA	Bakersfield, Fresno, Los Angeles, Sacramento, San Diego, San Francisco, Stockton
CO	Denver
CT	New Haven
DC	Washington
FL	Miami, Tampa- St. Petersburg
GA	Atlanta
IA	Des Moines
ID	Boise
IL	Chicago
IN	Indianapolis
KY	Louisville
LA	New Orleans
MA	Boston
MD	Baltimore
MI	Detroit
MN	Minneapolis
MO	Kansas City, St. Louis
NE	Omaha
NJ	Newark
NM	Albuquerque
NV	Las Vegas, Reno
NY	Long Island, Rochester
OH	Cincinnati
OR	Portland
PA	Philadelphia, Pittsburgh
TN	Memphis
TX	El Paso, Houston
UT	Salt Lake City
VA	Norfolk
WA	Seattle, Spokane
WI	Milwaukee

b. The monthly price for each of the 14 missing states is assumed to be the product of the 1982 Census region adjustment factor for that state times the monthly motor gasoline price for that Census region from the *CPI*.

Annual physical unit prices for all states are calculated from the monthly motor gasoline prices calculated above and weighted by the monthly motor gasoline consumption volumes for states from *Highway Statistics*.

Physical unit prices: 1978

The *Platt's* monthly leaded regular motor gasoline prices cover all states except AK and HI. The *Platt's* city assignments to states are shown in Table TN4.23. In 1978, the *CPI* motor gasoline coverage was expanded from 21 states to 25 states (28 SMSAs) and an "all types" price was published that covers leaded regular, leaded premium, and unleaded regular. The *CPI* SMSA assignments to states for 1978 through 1982 are shown in Table TN4.21 on page 74. Both the *CPI* and the *Platt's* prices include taxes.

Since both sources report a single price for each city or SMSA, product weights are not needed to compute monthly composite prices. Instead, city price observations are assigned to states, as shown in Table TN4.21 and Table TN4.23. Price observations are combined by using simple averaging by state and month. If both *Platt's* and the *CPI* cover a city/SMSA, the *CPI* price is used. *Platt's* prices are converted to dollars per gallon; the *CPI* prices are already expressed in dollars. All states are covered by the data sources, so no imputation is required for 1978. The following 26 states have prices only from *Platt's*: AL, AR, AZ, CT, DE, IA, ID, LA, ME, MS, MT, NC, ND, NE, NH, NM, NV, OK, RI, SC, SD, TN, UT, VT, WV, and WY. The following 19 states are covered only by the CPI: AK, CA, CO, DC, FL, GA, HI, IL, MA, MD, MI, MN, MO, NJ, NY, OH, OR, PA, and WI. Six states have price data from both sources: IN, KS, KY, TX, VA, and WA.

Annual physical unit prices for all states are calculated from the monthly motor gasoline prices calculated above and weighted by the monthly motor gasoline consumption volumes for states from *Highway Statistics*.

Physical unit prices: 1976, 1977

The calculation of monthly composite state prices for 1976 and 1977 depends upon the source of data. Different procedures are used for states with only *Platt's* data, states with only *CPI* data, and states with both *Platt's* and *CPI* data. If both data sources cover a city, only the *CPI* price is used for that city. City price assignments to states are given in Table TN4.23 for *Platt's* and in Table TN4.24 for the *CPI*. Prices from both sources include taxes. AK is the only state for which prices need to be estimated.

For states with data from *Platt's* only, the monthly prices reported in *Platt's* are used either directly or combined by simple averaging if there is more than one price observation for a state in a given month. The reported prices in cents per gallon are converted to dollars per gallon.

Prices for the following 29 states are calculated by using this procedure and cover only leaded regular motor gasoline: AL, AR, AZ, CO, CT, DE, FL, IA, ID, LA, ME, MS, MT, NC, ND, NE, NH, NM, NV, OK, OR, RI, SC, SD, TN, UT, VT, WV, and WY.

If state-level motor gasoline prices for 1976 and 1977 are available only from the *CPI*, monthly composite prices are calculated as weighted averages of leaded and unleaded prices. Prices for 15 states are calculated by using data only from the *CPI*: CA, DC, GA, HI, IL, MA, MD, MI, MN, MO, NJ, NY, OH, PA, and WI.

1. The weights used in this process are national-level shares of leaded and unleaded motor gasoline product supplied. For 1977, the leaded and unleaded share of 0.725 and 0.275, respectively, are taken from the *MER*. For 1976, *MER* data for 1977 through 1984 are used to estimate the unleaded share by using simple regression. The unleaded percentages for 1977 through 1984 are converted to shares and used to estimate leaded and unleaded shares of motor gasoline. The resulting 1976 leaded share is 0.744 and the unleaded share is 0.256.
2. The next step is to calculate monthly composite leaded and unleaded prices for each state. If more than one *CPI* price observation is available for a particular grade of motor gasoline (leaded or unleaded) for a state in a given month, the *CPI* observations are combined by grade by using simple averaging. Regular and premium prices are averaged for an estimate of state-level leaded prices.
3. Final monthly composite prices for 1976 and 1977 are calculated by using the leaded and unleaded composite prices calculated above and the *MER*-based leaded and unleaded shares as volume weights.

For states with price data from both *Platt's* and the *CPI,* all price observations are averaged together by product type. If both sources report prices for a city, the *CPI* price is used. Once composite leaded and unleaded prices have been calculated separately for each state, the leaded and unleaded consumption shares are used to weight the product-type prices into the final monthly composite motor gasoline prices. Six states are calculated with data from both *Platt's* and the CPI: IN, KS, KY, TX, VA, and WA.

1. Monthly leaded composite prices are calculated by combining *Platt's* prices with the *CPI* prices for leaded regular and premium motor gasoline by month, since the *Platt's* prices cover only regular leaded fuel. If both

Table TN4.23. Motor gasoline price assignments from Platt's, 1970 through 1978

State	City price assignments
AL	Birmingham
AR	Little Rock
AZ	Phoenix
CA	Los Angeles, San Francisco
CO	Denver
CT	Hartford
DC	Washington
DE	Wilmington
FL	Miami
GA	Atlanta
IA	Des Moines
ID	Boise
IL	Chicago
IN	Indianapolis
KS	Wichita
KY	Louisville
LA	New Orleans
MA	Boston
MD	Baltimore
ME	Portland
MI	Detroit
MN	Twin Cities
MO	St. Louis
MS	Jackson
MT	Great Falls
NC	Charlotte
ND	Fargo
NE	Omaha
NH	Manchester
NJ	Newark
NM	Albuquerque
NV	Reno
NY	Buffalo, New York
OH	Cincinnati, Cleveland
OK	Tulsa
OR	Portland
PA	Philadelphia
RI	Providence
SC	Charleston
SD	Huron
TN	Memphis
TX	Dallas, El Paso, Houston
UT	Salt Lake City
VA	Norfolk
VT	Burlington
WA	Seattle, Spokane
WI	Milwaukee
WV	Charleston
WY	Cheyenne

Table TN4.24. Motor gasoline price assignments from consumer prices: energy, 1974 through 1977

State	City price assignments
CA	Los Angeles-Long Beach, San Diego, San Francisco-Oakland
DC	Washington
GA	Atlanta
HI	Honolulu
IL	Chicago, St. Louis
IN	Cincinnati, Chicago
KS	Kansas City
KY	Cincinnati
MA	Boston
MD	Baltimore, Washington
MI	Detroit
MN	Minneapolis-St. Paul
MO	St. Louis, Kansas City
NJ	New York-Northeastern NJ, Philadelphia
NY	Buffalo, New York-Northeastern NJ
OH	Cincinnati, Cleveland
PA	Philadelphia, Pittsburgh
TX	Dallas, Houston
VA	Washington
WA	Seattle
WI	Milwaukee, Minneapolis-St. Paul

Note: Prices are available separately for leaded regular, leaded premium, and unleaded regular (1976, 1977); "all types" prices are not available.

data sources cover a city, the *CPI* prices are used.

2. Since the *CPI* is the only source of unleaded gasoline price data for 1976 through 1977, monthly unleaded composite prices are calculated from *CPI* data only.
3. Final monthly composite prices for the six states with price data from both *Platt's* and the *CPI* are calculated by using annual U.S. leaded and unleaded shares and leaded and unleaded monthly composite prices.

Prices for 1976 and 1977 for AK, the only state not covered by price data from either data source, are estimated on the basis of the average relationship between the state and the national average price for years in which data are available. The national average price used for these estimations is a simple average of the prices of the 49 states for which data are available in all years (i.e., excluding AK and HI for all years). Annual prices for AK are estimated on the basis of the average AK-to-U.S. price relationship for 1978 and 1979.

Annual physical unit prices (excluding AK) are calculated from the monthly

motor gasoline prices calculated above and weighted by the monthly motor gasoline consumption volumes for states from *Highway Statistics.*

Physical unit prices: 1974, 1975

The *Platt's* price data for 1974 through 1975 cover only leaded regular motor gasoline. Beginning in 1974, motor gasoline price data are also available from the CPI for selected SMSAs. An SMSA price is assigned to each state with counties included in the definition of that SMSA; for the years 1974 through 1977, prices for 23 SMSAs cover 21 states. The state assignments of SMSA prices for 1974 through 1977 are given in Table TN4.24. For 1974 and 1975, *CPI* prices are reported separately for leaded regular and leaded premium motor gasoline. According to the April 1986 *CPI Detailed Report*, these prices include taxes; the *Platt's* prices also include taxes. AK is the only state not covered by either of these two data sources; prices for AK are imputed for 1974 and 1975.

The *Platt's* regular leaded prices and the CPI regular and premium leaded motor gasoline prices, including taxes, are assigned to their respective states, as shown in Table TN4.23 and Table TN4.24. If both sources cover a city, the CPI price is used. The following 29 states are covered only by *Platt's*: AL, AR, AZ, CO, CT, DE, FL, IA, ID, LA, ME, MS, MT, NC, ND, NE, NH, NM, NV, OK, OR, RI, SC, SD, TN, UT, VT, WV, and WY. The following 15 states are covered only by CPI: CA, DC, GA, HI, IL, MA, MD, MI, MN, MO, NJ, NY, OH, PA, and WI. The following six states have both *Platt's* and *CPI* data for a particular city: IN, KS, KY, TX, VA, and WA.

All price observations assigned to a state, regardless of grade or data source, are added together and divided by the number of observations. As part of this calculation, *Platt's* prices are converted from cents per gallon to dollars per gallon.

Neither *Platt's* nor the *CPI* reports price data for AK. The methodology of the estimation of annual AK prices is the same as used in 1976 and 1977.

Annual physical unit prices for the remaining 50 states (excluding AK) are calculated from the monthly motor gasoline prices calculated above and weighted by the monthly motor gasoline consumption volumes for states from *Highway Statistics*.

Physical unit prices: 1970 through 1973

Monthly motor gasoline physical unit prices for 1970 through 1973 are available only from *Platt's*, where city prices covering 49 states are reported in a table titled "Service Station Prices: Gasoline (Including Taxes)." These prices, as shown in Table TN4.20, are for leaded regular gasoline only and include taxes.

Monthly average city prices from *Platt's* are assigned to the state in which the city is located. *Platt's* city price assignments to states are given in Table TN4.23.

Monthly composite prices for 1970 through 1973 are equal to the reported monthly *Platt's* prices or, if more than one city is available for a given state in a certain month, are a simple average of the assigned city prices. The reported prices are converted from cents to dollars per gallon.

Platt's does not report data for either AK or HI for 1970 through 1973. The methodology of the estimation of AK and HI prices is the same as that used for 1976 and 1977.

Annual physical unit prices (excluding AK and HI) are calculated from the monthly motor gasoline prices weighted by the monthly motor gasoline consumption volumes for states from *Highway Statistics*.

Btu prices: all years

Btu prices for states are computed by converting the physical unit prices in dollars per gallon to dollars per barrel (42 gallons per barrel). The prices are then converted to dollars per million Btu by using the factor 5.253 million Btu per barrel from 1970 through 1992 and a variable annual factor from 1993 forward. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2011 forward: EIA, Petroleum & Other Liquids data website, Weekly Retail Gasoline and Diesel Prices, Gasoline – All Grades, http://www.eia.gov/dnav/pet/pet_pri_gnd_a_epm0_pte_dpgal_a.htm .

2010: EIA, Petroleum & Other Liquids data website, Gasoline Prices by Formulation, Grade, Sales Type, Sales to End Users, Average, Through Retail Outlets,http://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_dpgal_a.htm.

2000-2009: EIA, *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table 31 (2000-2006), and Table 28 (2007-2009), columns titled "All Grades, Sales to End Users, Through Retail Outlets."

1986-1999: EIA, *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.

html, Table 29 (1986-1988) and Table 30 (1989-1993), columns titled "All Refiners, Sales to End Users, Through Company Outlets" and "All Refiners, Sales for Resale," and Table 35 (1994-1999), columns titled "All Grades, Sales to End Users, Through Retail Outlets" and "All Grades, Sales for Resale."

1983-1985: EIA, *Petroleum Marketing Annual 1985*, Volume 1, Table 16, columns titled "All Refiners and Gas Plant Operators, Sales to End Users, Through Company Outlets" and "All Refiners and Gas Plant Operators, Sales for Resale."

1974-1986: Bureau of Labor Statistics, U.S. Department of Labor, *Consumer Prices: Energy*, computer printouts of monthly gasoline prices.

1983-1986: Federal Highway Administration, U.S. Department of Transportation, *Highway Statistics*, Tables MF-26 (1983-1993) and MF-33GA (1994 and 1995).

1970-1982: McGraw-Hill, Inc., *Platt's Oil Price Handbook and Oilmanac*, table titled "AAA 'Fuel-gauge' Report" (1982); table titled "Platt's/Lundberg Summary," (1979-1981); and table titled "Service Station Prices: Gasoline (Including Taxes)," (1970-1978).

1974-1982: Bureau of Labor Statistics, *CPI Detailed Report*, April 1986, Technical Notes, page 110.

1982: EIA, Form EIA-25, "Prime Supplier Monthly Report," computer tape, unpublished data.

1976 through 1984: EIA, *Monthly Energy Review*, January 1985, table titled "Petroleum: Finished Motor Gasoline Supply and Disposition."

Taxes

2000-2010: EIA, *Petroleum Marketing Monthly*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pmm.html, Table EN1, column titled "Motor Gasoline," supplemented with information from state revenue offices and the Federal Highway Administration, U.S. Department of Transportation, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-121T (2000-2006), and Table 8.4.6 (2007—2010).

1983-1999 (State Taxes): Federal Highway Administration, U.S. Department of Transportation, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-121T, supplemented with information from state revenue offices.

1991-2010 (Federal Taxes): EIA, *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table EN1.

1983-1990 (Federal Taxes): EIA, *Petroleum Marketing Annual*, 1990, Table EN1.

Consumption

1970 forward: EIA, State Energy Data System, transportation sector, motor gasoline consumption.

Conversion factors: all years

1970 forward: EIA, State Energy Data System Consumption Technical Notes, Table B1.

Petroleum Coke

In the State Energy Data System price and expenditure tables, petroleum coke is included in the category "other petroleum products" (see descriptions beginning on page 93).

Petroleum coke is consumed in the commercial, industrial, and electric power sectors. Petroleum refineries used about half of the petroleum coke consumed in the United States. Refinery use is removed from expenditure calculations for all years based on the assumption that the costs are passed on in the prices of the refined petroleum products. (See the discussion in Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm.)

Commercial sector

Since 1992, small quantities of petroleum coke have been used for combined-heat-and-power generation in the commercial sector by the University of Northern Iowa. Prices in dollars per million Btu are calculated from data provided by the university and include taxes.

Data Source

Price

1992 forward: University of Northern Iowa, http://www.vpaf.uni.edu/fp/services/powerplant.shtml.

Industrial sector

Petroleum coke is used for combined-heat-and-power (CHP) generation and in manufacturing processes in the industrial sector. The quantities used for CHP are assigned the electric power sector petroleum coke prices in each state. When a state has no electric power petroleum coke consumption, the Census division price or a neighboring state's price is assigned as shown in Table TN4.25.

Petroleum coke used in manufacturing is marketed to industrial consumers in two forms, calcined and uncalcined. Calcined coke is about four times as expensive as uncalcined. A quantity-weighted U.S. average price is calculated by using U.S. Department of Commerce exports data and is assigned to all states with industrial petroleum coke consumption. The weighted average price is calculated by dividing the sum of the values of calcined and uncalcined petroleum coke exports by the sum of the two quantities exported. The exports, reported in metric tons, are converted to short tons by dividing by 0.9071847; are converted from short tons to barrels by multiplying by 5; and are converted from barrels to Btu by multiplying by 6.024. The prices do not include taxes.

Table TN4.25. Industrial sector petroleum coke for CHP price assignments, 1989 forward

State	Years	State or Census division prices assigned
AR	2005	West South Central
	2006	West North Central
CA	1989	West North Central
DE	1993–2003	PA
GA	1990	AL
	1991	East North Central
	1992	West North Central
	1993	KY
	1994–2002, 2011–2015	South Atlantic
	2003–2005	FL
	2006, 2007	South Atlantic (FERC)
	2008–2010	South Atlantic (EIA-923 Sch 2)
IA	2013–2015	West South Central
IL	1990	IN
	2000, 2001	East North Central
LA	2007	East North Central (FERC)
MI	1989, 1990	IN
	1991–1993	East North Central
MT	1990	West North Central
NJ	2011–2015	East North Central
OK	2010	West South Central (EIA-923 Sch 2)
OH	1989, 1990	IN
	1998, 1999	East North Central
PA	2010	East North Central (EIA-923 Sch 2)
	2011–2015	East North Central
TX	1990–1992	West North Central
	2014, 2015	West South Central
WI	1990	IN

Data sources

Price

2013 forward: Census Bureau, U.S. Department of Commerce, domestic exports of Petroleum Coke, Not Calcined, commodity code 2713110000 and Petroleum Coke, Calcined, commodity code 2713120000, extracted from the

U.S. International Trade Commission's Interactive Tariff and Trade DataWeb database, http://dataweb.usitc.gov.

1989-2012: Census Bureau, U.S. Department of Commerce, December issues of EM-545, *Foreign and Domestic Exports*, for Petroleum Coke, Not Calcined, commodity code 2713110000 and Petroleum Coke, Calcined, commodity code 2713120000.

1986-1988: Census Bureau, U.S. Department of Commerce, December issue of EM-546 (1986), EM-622 (1987), EM-522 (1988), *U.S. Exports, Schedule B, Commodity by Country,* Petroleum Coke, Except Calcined, commodity code 5213150, and Petroleum Coke, Calcined, commodity code 5175120.

1978-1985: Census Bureau, U.S. Department of Commerce, FT-446, *U.S. Exports, Schedule B, Commodity by Country*, Petroleum Coke, Except Calcined, commodity code 5213150, and Petroleum Coke, Calcined, commodity code 5175120.

1970-1977: Census Bureau, U.S. Department of Commerce, December issues of FT-410, *U.S. Exports, Schedule B, Commodity by Country*, Petroleum Coke, Except Calcined, commodity code 3329420, and Petroleum Coke, Calcined, commodity code 3329410.

Electric power sector

Petroleum coke is also used for electricity generation in the electric power sector. Estimates of the annual consumption of petroleum coke by the electric power sector are taken from the State Energy Data System (SEDS). The electric power prices for petroleum coke are the average delivered cost of petroleum coke receipts at electric plants. For 1983 through 2009, these data are available from the U.S. Energy Information Administration (EIA) *Cost and Quality of Fuels for Electric Plants (C&Q)*. For 2010 forward, the *C&Q* report is no longer available, but data on the cost of petroleum coke delivered to the electric utilities and/or the electric power sector are available from the Office of Electricity, Renewables, and Uranium Statistics (ERUS). The prices include all taxes, transportation, and other charges paid by the electric plants.

Btu prices: 2002 forward

Electric power sector petroleum coke prices are taken from the EIA *C&Q* or are available from ERUS. From 2008 forward, the data are compiled from the EIA-923, "Power Plant Operations Report." Prior to 2008, the data are compiled from the Federal Energy Regulatory Commission (FERC) Form 423, "Cost and Quality of Fuels for Electric Plants," a survey of electric utilities and the EIA Form-423 "Cost and Quality of Fuels for Electric Plants," a survey of non-utility power producers. The combined information from the Form EIA-423 and FERC Form 423 is used to calculate average delivered costs of petroleum coke used by the entire electric power industry.

Some states have petroleum coke consumption in the electric power sector in SEDS but no deliveries or price data in the C&Q or the ERUS data file. Those states are assigned Census division average prices, or, if the Census division average is not available, they are assigned prices from neighboring states or Census division. For 2003 through 2010, plant-level data from the EIA-923 Schedule 2 data files or the FERC Form 423 data files are also used to calculate prices for a state. If there are no plant data for the state, the plant-level data are used to calculate a price for the Census division. The state level price assignments are shown in Table TN4.26, and the Census division level price assignments are shown in Table TN4.27.

Btu prices: 1972 through 2001

Estimates of the average delivered cost of petroleum coke are based on delivery and cost data from FERC Form 423 data files. From 1972 through 1982, steam plants with a maximum capacity of 25 megawatts were included in the survey. For 1983 and subsequent years, the reporting threshold was raised to 50 megawatts capacity. The FERC Form 423 data files show quantity in short tons, estimated Btu per pound, and price in cents per million Btu. The data are presented by plant, by state, and by month. The Btu price by state is calculated as the annual sum of the unit prices, weighted by the total Btu in each reported delivery, divided by the annual sum of the Btu delivered to all electric plants within the state.

In addition to the computer data files, the data also are published for some years in the EIA *C&Q*. From 1978 through 1982, *C&Q* was published monthly and annually; data for calculating petroleum coke prices are in only the monthly reports. For 1983 through 2001, *C&Q* was published annually and includes petroleum coke prices for individual states and for the nation (the 1994 edition is the last hard copy; all later years are available electronically only).

Some states have petroleum coke consumption in the electric power sector in SEDS but no deliveries or price data in the *C&Q*. Those states are assigned Census division average prices from the *C&Q* or, if the Census division average is not available, they are assigned prices from neighboring states or Census division, as shown in Table TN4.26 and Table TN4.27.

Btu prices: 1970, 1971

For the years 1970 and 1971, prices are estimated by using the gross domestic

Table TN4.26. Petroleum coke electric power sector state price assignments, 1972 through 2010

State	Years	State prices assigned
DE	1981–1992	PA
IA	2008, 2009	EIA-923 Sch 2 data for IA
IN	2009	EIA-923 Sch 2 data for IN
KY	2003	FERC plant data for KY
KS	1975	MO
LA	1990	AL
	1996	FL
	1993–1995, 1997–2002	TX
	2004	FERC plant data for LA
	2008, 2009	EIA-923 Sch 2 data for LA
ME	1996–2000	PA
MI	2004, 2005, 2007	FERC plant data for MI
	2010	EIA-923 Sch 2 data for MI
MO	1983, 1985	MN
	2008	EIA-923 Sch 2 data for MO
MT	1999	UT
	2001	AZ
NC	1997, 1998	FL
NY	1974, 1996, 1998–2000	PA
TX	2004	FERC plant data for TX
WI	1985	MN
	2003–2007	FERC plant data for WI
	2008, 2009	EIA-923 Sch 2 data for WI

product implicit price deflator. The deflator for 1970 or 1971 is divided by the 1972 deflator and the quotient is multiplied by the 1972 price for each state to develop the price estimates for 1970 and 1971. The deflators are 35.1 in 1970, 37.1 in 1971, and 38.8 in 1972.

Although SEDS has a consumption estimate for New Jersey in 1971, there are no NJ price data for any year in the FERC Form 423 data files. Form 423 data for Pennsylvania in 1972 are used to estimate a PA price for 1971, which is assigned to NJ. The Form 423 PA prices for 1972 and 1971 are not used in SEDS because the consumption data source has no petroleum coke consumption in PA for those years.

U.S. Btu prices: all years

U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Table TN4.27. Petroleum coke electric power sector Census division price assignments, 1972 forward

State	Year	Census division prices assigned
CA	1990–2009	West North Central
	2012–2014	United States
IA	2012	West South Central
IL	2006, 2007	FERC plant data for East North Central
IN	2013	East North Central
KY	2005–2007	FERC plant data for East North Central
	2008	EIA-923 Sch 2 data for East North Central
LA	1992	West North Central
	2005	West South Central
	2006, 2007	West North Central
ME	1994, 1995	Middle Atlantic
MI	2006	FERC plant data for East North Central
	2008, 2009	EIA-923 Sch 2 data for East North Central
	2011, 2012	East North Central
MN	2009	EIA-923 Sch 2 data for West North Central
MO	2005	West North Central
MT	1995–1998, 2000,	West North Central
	2003–2007, 2011	
	2008–2010	EIA-923 Sch 2 data for West North Central
	2012–2015	West South Central
NY	2001, 2002, 2009,	East North Central
	2011	
	2003, 2005–2008	Mid Atlantic
	2010	EIA-923 Sch 2 data for East North Central
OH	2004–2007	FERC plant data for East North Central
	2008, 2010	EIA-923 Sch 2 data for East North Central
	2009, 2011–2015	East North Central
PA	2001–2003, 2009,	East North Central
	2010	
	2005, 2006, 2008	Mid Atlantic
SC	2008, 2011	EIA-923 Sch 2 data for South Atlantic
TX	2005, 2008–2013	West South Central
	2006, 2007	West North Central

Data sources

Prices

2011 forward: EIA Office of Electricity, Renewables, and Uranium Statistics, data on average delivered cost of petroleum coke by state, electric utilities

and electric power sector.

2010: EIA Office of Electricity, Renewables, and Uranium Statistics, data on average delivered cost of petroleum coke by state, all sectors, and Form EIA-923, "Power Plant Operations Report," http://www.eia.gov/electricity/data/eia923/index.html , Schedule 2.

2008-2009: EIA, *Cost and Quality of Fuels for Electric Plants*, Table 9, and Form EIA-923, "Power Plant Operations Report," http://www.eia.gov/electricity/cost_quality/, Schedule 2.

2002-2007: EIA, *Cost and Quality of Fuels for Electric Plants*, Table 9, and FERC Form 423, "Cost and Quality of Fuels for Electric Plants," http://www.eia.gov/electricity/cost_quality/.

1972-2001: EIA, computer data files from FERC Form 423, "Cost and Quality of Fuels for Electric Plants," http://www.eia.gov/electricity/cost_quality/, as published compiled by plant in the following reports:

- 1983-2001: EIA, *Cost and Quality of Fuels for Electric Plants*, Table 20 (1983, 1984), Table 12 (1985-1989), Table 40 (1990, 1991), and Table 28 (1992-2001).
- 1978-1982: EIA, *Cost and Quality of Fuels for Electric Plants,* table titled "Wood Chips, Refuse, and Petroleum Coke Used as Fuel by Steam Electric Units."

1970-1971: EIA, *Annual Energy Review 1992*, Appendix C. Gross Domestic Product and Implicit Price Deflator.

Consumption

1970 forward: EIA, State Energy Data System, electric power sector petroleum coke consumption.

Conversion factors: all years

No conversion factors are required; Btu prices are calculated directly from data sources.

Residual Fuel Oil

Residual fuel oil prices are developed for the industrial, commercial, transportation, and electric power sectors. Estimates of the amount of residual fuel oil consumed by sector are taken from State Energy Data System (SEDS) and are adjusted for process fuel consumption in the industrial sector. (See Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm.)

Commercial sector

Commercial sector residual fuel oil prices are estimated by using several different data sources and estimation methodologies, depending on the years involved. For 2011 forward, prices are estimated using regional-level regression equations (see below). For 1984 through 2009, state-level commercial sector residual fuel oil prices are developed from refiner/reseller/retailer prices of residual fuel oil to end users published in the *PMA*. For 2010, PMA is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website. For 1970 through 1983, commercial sector residual fuel oil prices are estimated for all states from national-level residual fuel oil prices and the state-level electric power sector residual fuel oil prices. State taxes are included in the final prices for all years.

Physical unit prices: 2011 forward

The survey that provides reseller and retailer prices for sales of residual fuel oil to end users, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," was discontinued in 2011. As a result, data for residual fuel oil prices, which are based on survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B, are no longer available. To estimate residual fuel oil prices, regression equations are developed for each Petroleum Administration for Defense (PAD) district and subdistrict using historical refiner retail sales prices for residual fuel oil from EIA-782A as the independent variable and the historical prices for residual fuel prices for sales to end users as the dependent variable. These regression equations are used to estimate the current residual fuel oil prices for the PAD districts and subdistricts and for states that have historical refiner/reseller/retailer prices and sizable sales volume—CA, DE, LA, MA, MD, NC, NH, NJ, NY, OR, PA, SC, TX, VA, VT, and WA, provided that they have refiner prices. All other states are assigned the corresponding PAD district or subdistrict estimated price. They are shown in Table TN4.28, with the exception of Alaska. Alaska commercial residual fuel oil prices for 1984 forward are based on the Washington commercial residual fuel oil prices and

Table TN4.28. Residual fuel oil commercial sector PAD district and subdistrict price assignments, 1984 forward

State	Years	Assignments
AL	1995, 2006	District 3
AR	1996, 2004	District 3
AZ	1984, 1985, 1988, 1991, 1996	District 5
CO	1986, 1992, 1993, 1998, 1999	District 4
CT	2011–2015	Subdistrict 1A
DC	1998–2001	Subdistrict 1B
DE	2014, 2015	Subdistrict 1B
FL	2009, 2011–2015	Subdistrict 1C
GA	2001, 2003, 2014	Subdistrict 1C
HI	2002, 2004–2007	District 5
IA	1996, 1998, 2005, 2006, 2010, 2012	District 2
ID	1985, 1986, 1989–1992, 1994–1998, 2010–2012	District 4
IL	2003, 2008, 2010–2011, 2014	District 2
IN	2009, 2014, 2015	District 2
KS	2009–2011	District 2
KY	1999–2001, 2005	District 2
MA	2014, 2015	Subdistrict 1A
MD	2014, 2015	Subdistrict 1B
ME	2007, 2011–2015	Subdistrict 1A
MI	2008–2015	District 2
MN	1995–1997, 2002–2009, 2011–2015	District 2
MO	1995, 2007, 2009, 2010, 2012	District 2
MS	1988, 1991, 1992, 2001, 2003, 2008	District 3
MT	1992, 1994, 1995, 1997–2000, 2003, 2009, 2010–2014	District 4
NC	2007, 2014, 2015	Subdistrict 1C
ND	1988, 1989–1992, 1995–2002, 2005–2009, 2011–2015	District 2
NE	1995, 1998–2000, 2004–2006, 2008–2010, 2012, 2014	District 2
NH	2014, 2015	Subdistrict 1A
NM	1984, 1985, 1996	District 3
NV	1986, 1988, 1991, 1992, 1997–2000, 2007, 2011	District 5
OH	2011, 2012	District 2
OK	1992, 1995, 2002, 2004	District 2
OR	1989	District 5
RI	2011–2015	Subdistrict 1A
SC	1993–1995, 1998–2002, 2005–2008, 2014, 2015	Subdistrict 1C
SD	1990–1995, 1997–2002, 2004–2013	District 2
TN	1995, 2007–2009, 2013	District 2
UT	1989–1992, 1998–2001, 2004–2006, 2010, 2014	District 4
VA	2014	Subdistrict 1C
VT	2004, 2010, 2014, 2015	Subdistrict 1A
WA	2002	District 5
WI	1994, 1995, 1998, 2006–2009	District 2
WV	1984, 2013	Subdistrict 1C
WY	1989–1991, 1994–1998, 2012	District 4

the ratio of the AK-to-WA commercial distillate fuel oil prices for each year where there is consumption. State general sales taxes are added to the state estimated prices.

Physical unit prices: 1984 through 2010

Commercial sector residual fuel oil physical unit prices are based on refiner/reseller/retailer prices to end users. States that do not have refiner/reseller/retailer prices are assigned their PAD district or subdistrict price (Table TN4.28), with the exception of AK. The AK commercial residual fuel oil prices, for years where there is consumption, are based on the WA commercial residual fuel oil price and the ratio of the AK-to-WA commercial distillate fuel oil prices for each year. Tax data are added to develop final prices.

In 2010, refiner/reseller/retailer price for PAD District 4 is not available. It is estimated by calculating the change in price for District 3 from 2009 to 2010 and applying it to the 2009 District 4 price.

Physical unit prices: 1976 through 1983

The commercial sector residual fuel oil physical unit prices for 1976 through 1983 are estimated from the electric power sector residual fuel oil prices and the U.S. average retail residual fuel oil prices (with taxes added) for each year. The resulting price estimates implicitly include taxes that reflect individual state differences.

1. The first step in the estimation of the commercial residual fuel oil physical unit state prices is to convert the state-level tax rates reported in the U.S. Census Bureau publications into the volume-weighted average U.S. sales tax rate by using commercial residual consumption data from SEDS.
2. A preliminary U.S. residual fuel oil price, including taxes, is computed by using the average U.S. tax rate estimated above and the annual average U.S. residual fuel oil price to end users (average retail price excluding taxes) from the *Monthly Energy Review* (MER).
3. Commercial sector physical unit residual fuel oil prices for states are computed by using the electric power sector residual fuel oil prices. To do this calculation, the ratio of the state-level and U.S. prices in the commercial sector is assumed to be the same as the ratio of state and U.S. prices in the electric power sector. Some states are missing electric power sector prices for 1976 through 1983; these are estimated by using adjacent states' average prices (Table TN4.29).

Physical unit prices: 1970 through 1975

Table TN4.29. Residual fuel oil commercial sector price assignments, 1970 through 1983

State	Years	State prices used in the estimation
AL	1970–1974, 1980, 1982, 1983	FL, GA, MS
ID	1980, 1981, 1983	CA, CO
	1982	CA
IN	1980–1983	IL, MI, OH
KY	1980–1983	IL, MO, OH, VA
MT	1980, 1983	CO, MN
	1982	MN
NC	1981, 1983	GA, VA
ND	1980, 1983	MN, SD
	1981, 1982	MN
OR	1975–1983	CA
TN	1970–1978, 1980–1983	AR, GA, MO, MS, VA
VT	1980–1983	ME, NH, NY
WI	1982, 1983	IL, MI, MN
WV	1980–1983	MD, OH, PA, VA
WY	1980	CO, NE, SD, UT
	1981, 1983	CO
	1982	MN

Because no national or state-level retail residual prices are available from published data sources, commercial sector residual prices for 1970 through 1975 are estimated. The estimation method is based on the assumption that the average ratio of state-to-U.S. prices is the same in the commercial and electric power sectors. The average ratio for 1976 through 1979 of the *MER* U.S. tax-adjusted prices to the electric power sector U.S. prices is calculated and used as an adjustment factor with state-level electric power sector prices for 1970 through 1975. The resulting price estimates implicitly include taxes that reflect individual state differences.

1. The average ratio of the *MER* tax-adjusted U.S. prices and the electric power sector U.S. prices is calculated for 1976 through 1979.
2. State-level commercial sector residual fuel oil prices are calculated by using the electric power sector physical unit price series for 1970 through 1975 and the average ratio computed above. Price assignments for states missing electric power sector data are shown in Table TN4.29.

Btu prices: all years

Btu prices for states are calculated from the physical unit prices and the conversion factor. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

2010: EIA, Petroleum & Other Liquids data website, Residual Fuel Oil Prices by Sales Type, Sales to End Users, http://www.eia.gov/dnav/pet/pet_pri_resid_a_eppr_pta_dpgal_a.htm.

1984-2009: EIA, *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table A3, column titled "Residual Fuel Oil-Sales to End Users."

1984-1988: Commercial sector distillate fuel oil price estimates from SEDS (AK and WA only).

1978-1983: EIA, *Monthly Energy Review, December 1988*, table titled "Refiner Sales Prices of Residual Fuel Oil," column titled "Average Sales to End Users."

1976, 1977: EIA, *Monthly Energy Review, December 1983*, table titled "Average No. 6 Residual Fuel Oil Prices," column titled "Average, Retail."

1970-1983: Electric power sector residual fuel oil price estimates (in physical units) from SEDS.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and

1996-97, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review,* Volume 54, No. 31, map titled "State Gasoline, Sales, and Cigarette Tax Rates as of July 1, 1993," sales tax rates.

1987-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* Table 8, column titled "Percentage rate, September 1."

1976-1986: Census Bureau, U.S. Department of Commerce, *Statistical Abstract of the United States,* table titled "State Government Tax Collections and Excise Taxes," column titled "Excise Taxes, General sales and gross receipts."

Consumption

1970 forward: EIA, State Energy Data System (SEDS), commercial sector residual fuel oil consumption.

Conversion factor: all years

6.287 million Btu per barrel.

Electric power sector

The electric power price for residual fuel oil (heavy oil) is the average delivered cost of No. 6 fuel oil receipts at electric plants. For 1973 forward, Btu prices are developed directly from the data sources. For 1970 through 1972, prices are estimated by using simple regression analysis. All taxes, transportation, and other charges paid by the power plants are included in the prices for all years.

Btu prices: 2011 forward

Data on the cost of residual fuel oil delivered to the electric utilities are no longer published, but they are available from the Office of Electricity, Renewables, and Uranium Statistics (ERUS). Not all state-level prices are available. Missing state prices are estimated by applying the growth rate of the U.S. price to the previous year's state prices (Table TN4.30).

Btu prices: 1973 through 2010

Electric power sector residual fuel oil prices for 1973 through 2009 are taken from the U.S. Energy Information Administration (EIA) Cost and Quality of Fuels for Electric Plants (*C&Q*). For 2010, *C&Q* is no longer available, but data on the cost of residual fuel oil delivered to the electric utilities are available from ERUS.

Table TN4.30. Residual fuel oil electric power U.S. growth assignments, 2011 forward

State	Years	State	Years
AK	2013–2015	ME	2011–2015
AR	2011–2015	MI	2011–2015
CA	2011, 2015	MS	2011, 2012, 2014
CT	2011–2015	NE	2011, 2012
DE	2011–2015	NH	2011, 2012
GA	2011, 2015	NJ	2011–2015
LA	2012–2015	PA	2011–2014
MA	2011, 2013–2015	TX	2011, 2012
MD	2011–2015	VT	2011, 2012

For 1973 through 1979, British thermal unit (Btu) prices are calculated as the weighted average of contract and spot prices for No. 6 fuel oil. For 1980 through 1982, *C&Q* prices cover all reporting plants of 25 megawatts capacity or greater. For 1983 forward, *C&Q* reports prices for steam electric plants of 50 megawatts capacity or greater.

Not all state-level prices are available from the source. The corresponding Census division price, either available from source or estimated as described in Table TN4.31, is assigned as the state prices. Table TN4.32 lists the states and years for which Census division prices are assigned as the state prices.

Alaska: 1973 through 2007

C&Q does not have prices for AK from 1973 through 2007. For 1973 through 1993, prices are estimated by calculating the ratio of the AK price to the U.S. price from the *Statistical Yearbook of the Electric Utility Industry* and multiplying the ratio by the *C&Q* U.S. price for each year. AK prices for 1973, 1975, and 1978 are not published in the *Statistical Yearbook* and are estimated by calculating an average of the ratios of the AK to U.S. prices in adjacent years. The 1973 estimated price is based on the average ratio for 1972 and 1974; the 1975 price is based on the average ratio for 1974 and 1976; and the 1978 price is based on the average ratio for 1977 and 1979. The average ratio is then applied to the U.S. *C&Q* price for the missing year. Beginning with 1994 data, the *Statistical Yearbook* table was discontinued. Alaska prices for 1994 through 2007 are obtained from direct contact with the only Alaskan power plant reporting use of residual fuel oil.

Hawaii: 1973 through 1982, and 2007

C&Q does not have prices for HI from 1973 through 1982. Prices are estimated

Table TN4.31. Residual fuel oil electric power Census division price estimation methods, 1970 through 2010

Census division/subdivision	Years	Estimation method
West North Central	2007, 2010	Growth rate of U.S. price
Mountain	1996–2002	Average difference between Mountain and Pacific Noncontinguous prices for 1991-1995 applied to 1996-2002 Pacific Noncontiguous prices
	2007–2010	Growth rate of U.S. price
Pacific Contiguous	1995, 1996	1994 California price
	1997–2000	Average prices for California electric power plants reported on FERC Form 1
	2004	Growth rate of Mountain price
	2007, 2010	Growth rate of U.S. price
Pacific	2002, 2003	Growth rate of Pacific Continguous price
Noncontiguous	2004–2006	Growth rate of Mountain price
	2007	Growth rate of U.S. price

by calculating the ratio of the HI price to the U.S. price from the *Statistical Yearbook of the Electric Utility Industry* and multiplying the ratio by the *C&Q* U.S. price for each year. In 2007, plant data from FERC Form 1 are used to calculate the state price.

Btu prices: 1970 through 1972

State-level Btu prices for 1970 through 1972 are estimated by using regression techniques and price data from the *Statistical Yearbook*. The regression equations use *Statistical Yearbook* state-level prices for 1973 through 1980 as the independent variable and the state-level prices calculated above (including the estimations for AK and HI) as the dependent variable. Pacific regional price averages are assigned for the missing WA prices in 1970 and 1971. The average of 1970 and 1972 AK *Statistical Yearbook* prices is substituted for the missing 1971 AK price.

U.S. Btu prices: all years

U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2010 forward: EIA, Office of Electricity, Renewables, and Uranium Statistics, data on average delivered cost of residual fuel oil to regulated electric power plants.

Table TN4.32. Residual fuel oil electric power Census division price assignments, 1970 through 2010

State	Years of Assigned Prices	Census division
AL	1975–1979	East South Central
AR	1987, 1992, 1993, 1996–2003, 2005, 2007	West South Central
AZ	1984, 1985, 1991–1997, 1999–2001	Mountain
CA	2007, 2010	Pacific Contiguous
CO	1982, 1987, 1989–1992, 1994, 1995–2001, 2009	Mountain
CT	2001–2010	New England
DC	1982–2001	South Atlantic
DE	2007–2010	South Atlantic
GA	1991, 1998–2002, 2007–2008	South Atlantic
HI	2002–2006	Pacific Non-Contiguous
IA	1970–1985	West North Central
IL	2000, 2003–2010	East North Central
IN	1970–1979, 1995, 2001–2002	East North Central
KS	1980, 1981, 1985–1987, 1989–1992, 1995	West North Central
KY	1970–1979	East South Central
MD	2001–2007	South Atlantic
ME	2001–2010	New England
MN	1984, 1985, 1987–1990, 1992, 1993, 1996–2002, 2007	West North Central
MO	1999, 2001, 2002, 2004	West North Central
MT	1970–1979	Mountain
NC	1976, 1977, 1979, 1980, 1982, 1984	South Atlantic
ND	1970–1979, 2002	West North Central
NE	1981–1983, 1990, 1991, 1994, 1998–2007, 2010	West North Central
NM	1979–1982, 1989–1997, 2001, 2004	Mountain
NV	1983, 1985, 1996–2002, 2007	Mountain
OH	1992–1994, 2001, 2002, 2004	East North Central
OK	1977, 1978, 1980, 1982–1987, 1989, 1991–1997, 1999, 2001, 2002, 2006, 2007	West South Central
OR	1970, 1973, 1974	Pacific
PA	2002–2010	Mid-Atlantic
RI	1995	New England
SC	1983, 1985–2002, 2007–2010	South Atlantic
SD	1981–1988	West North Central
TN	1979	East South Central
TX	1992–1997, 1999–2002, 2007, 2008	West South Central
UT	1982, 1983, 1986	Mountain
VT	1970–1979, 2008, 2009	New England
WA	1970, 1971, 1975–1978, 1981–1983, 1986–1988	Pacific
WA	1992, 1993	Pacific Contiguous
WI	2001	East North Central
WV	1970–1977, 1979	South Atlantic
WY	1970–1979	Mountain

1973-2009: EIA, *Cost and Quality of Fuels for Electric Plants,* Table 6 (1973-1979), Table 45 (1980-1982), Table 51 (1983, 1984), Table 41 (1985-1989), Table 14 (1990, 1991), and Table 8 (1992-2001), Table 7.D (2002, 2003), Table 7.C (2004-2008), and Table 11 (2009). Data from 1990 forward are also available at http://www.eia.gov/electricity/cost_quality/.

1994-2007: Alaska prices are obtained from the Golden Valley Electric Association.

1970-1993: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, Table 43 (1970-1979), Table 26 (1980-1983), Table 28 (1984-1986), and Table 29 (1987-1993).

Consumption

1970 forward: EIA, State Energy Data System, electric power sector residual fuel oil consumption.

Conversion factors: all years

Because Btu prices are available directly from the data sources, no conversion factors are used, with the exception of Alaskan prices for 1994 forward, which use 6.287 million Btu per barrel.

Industrial sector

Industrial sector residual fuel oil prices are estimated by using several different data sources and estimation methodologies, depending on the years involved. For 2011 forward, prices are estimated using regional-level regression equations (see below). Prices for 1984 through 2009 are developed from refiner/reseller/retailer prices of residual fuel oil as published in the *Petroleum Marketing Annual (PMA)*. For 2010, *PMA* is no longer available, but the same set of physical unit prices in dollars per gallon (excluding taxes) are available on the EIA website**.** Residual fuel oil prices for 1970 through 1983 are calculated or estimated by using average costs of residual fuel oil to manufacturing firms published in two U.S. Census Bureau reports and *Platt's Oil Price Handbook and Oilmanac*. Price data in these sources are available for the years 1971 and 1974 through 1981; prices for 1970, 1972, 1973, 1982, and 1983 are estimated. Prices for all years include taxes.

Physical unit prices: 2011 forward

The survey that provides reseller and retailer prices for sales of residual fuel oil to end users, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," was discontinued in 2011. As a result, data for residual fuel oil prices, which are based on survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA-782B, are no longer available. To estimate residual fuel oil prices, regression equations are developed for each Petroleum Administration for Defense (PAD) district and subdistrict using historical refiner retail sales prices for residual fuel oil from EIA-782A as the independent variable and the historical prices for residual fuel prices for sales to end users as the dependent variable. These regression equations are used to estimate the current residual fuel oil prices for the PAD districts and subdistricts and for states that have historical refiner/reseller/retailer prices and sizable sales volume—CA, DE, LA, MA, MD, NC, NH, NJ, NY, OR, PA, SC, TX, VA, VT, and WA, provided that they have refiner prices. All other states are assigned the corresponding PAD district or subdistrict estimated price. They are shown in Table TN4.33, with the exception of Alaska. Alaska industrial residual fuel oil prices for 1984 forward are based on the Washington industrial residual fuel oil prices and the ratio of the AK-to-WA industrial distillate fuel oil prices for each year where there is consumption. State general sales taxes are added to the state estimated prices.

Physical unit prices: 1984 through 2010

Residual fuel oil industrial sector physical unit prices are calculated by using refiner/reseller/retailer prices to end users. The states that do not have refiner/reseller/retailer prices are assigned their PAD district or sub-district price as shown in Table TN4.33, with the exception of Alaska. Alaska industrial residual fuel oil prices for 1984 forward are based on the Washington industrial residual fuel oil prices and the ratio of the AK-to-WA industrial distillate fuel oil prices for each year where there is consumption. State general sales taxes are added.

In 2010, refiner/reseller/retailer price for PAD District 4 is not available. It is estimated by calculating the change in price for District 3 from 2009 to 2010 and applying it to the 2009 District 4 price.

Physical unit prices: 1982, 1983

After 1981, the U.S. Department of Commerce's *Annual Survey of Manufactures* and the *Census of Manufactures (ASM/CM)* ceased publication of fuel-specific state-level residual fuel oil data from which prices can be calculated. Prices for 1982 and 1983 are estimated from the average relationship between the *ASM/CM*-based prices generated for 1978 through 1981 and the assigned *Platt's* No. 6 fuel oil prices for 1978 through 1981 (Table TN4.34). These average ratios are calculated at the state-level for all states except AK, which shows no industrial sector residual fuel oil use reported in SEDS for 1982 and 1983. Physical unit residual fuel oil industrial prices for 1982 and 1983 are calculated

Table TN4.33. Residual fuel oil industrial sector PAD district and subdistrict price assignments, 1984 forward

State	Years	Assignments
AL	1995, 1997, 1998, 2005–2015	District 3
AR	1985, 1996, 1997–2015	District 3
AZ	1984–1993, 1995–2002, 2005–2007, 2011	District 5
CO	1986, 1988, 1990–1995, 1997–1999, 2001, 2006, 2008	District 4
DC	1994, 1995, 2000	Subdistrict 1B
DE	2015	Subdistrict 1B
FL	2009, 2011–2015	Subdistrict 1C
GA	2001–2004, 2011–2015	Subdistrict 1C
HI	2002–2008, 2011–2013, 2015	District 5
IA	1995–1999, 2005–2008, 2010–2014	District 2
ID	1985, 1986, 1989–1992, 1994, 1995–2003, 2005–2007, 2009–2012	District 4
IL	2003–2004, 2007–2015	District 2
IN	2009–2015	District 2
KS	2007–2015	District 2
KY	1998–2010, 2013–2015	District 2
MA	2014, 2015	Subdistrict 1A
MD	2014, 2015	Subdistrict 1B
ME	2007, 2011–2015	Subdistrict 1A
MI	2007–2015	District 2
MN	1995–1997, 2002–2009, 2011–2015	District 2
MO	1995, 2007, 2010–2015	District 2
MS	1988, 1991, 1992, 1995, 1998, 2001–2004, 2006–2015	District 3
MT	1992, 1994, 1995, 1997–1999, 2001–2006, 2009	District 4
NC	2007, 2014, 2015	Subdistrict 1C
ND	1988–1992, 1995–2002, 2005–2009, 2011, 2012, 2014, 2015	District 2
NE	1995, 1996, 1998–2000, 2002, 2005–2009, 2014	District 2
NH	2014, 2015	Subdistrict 1A
NM	1984–1986, 1990–2010	District 3
NV	1986, 1988, 1991–1999, 2002–2006	District 5
OH	2011–2015	District 2
OK	1992–2015	District 2
OR	1989	District 5
RI	2011–2015	Subdistrict 1A
SC	1993–1995, 1998–2002, 2005–2008, 2014, 2015	Subdistrict 1C
SD	1990–2009, 2011, 2013–2015	District 2
TN	1995, 2000, 2002, 2007–2009, 2011–2015	District 2
UT	1989–1992, 1998–2000, 2002, 2005, 2006, 2008, 2010, 2014, 2015	District 4
VA	2014, 2015	Subdistrict 1C
VT	2010, 2014, 2015	Subdistrict 1A
WA	2002	District 5
WI	1994, 1995, 1998, 2006–2015	District 2
WV	1984, 1998, 2002–2015	Subdistrict 1C
WY	1989–1999, 2001–2010	District 4

by using the assigned *Platt's* prices for 1982 and 1983 (Table TN4.34) and the state-level average ratios. The resulting estimates implicitly include taxes that reflect individual state differences.

Physical unit prices: 1971, 1974 through 1981

For the years 1971 and 1974 through 1981, industrial sector residual prices are calculated directly from cost and quantity data reported by the *ASM/CM*. For all states with available cost and quantity data, prices are equal to the average cost of residual fuel oil to manufacturers. Taxes are included in the published cost data. Missing data for these years are assigned from the average prices of adjacent states, as shown in Table TN4.35.

Physical unit prices: 1970, 1972, 1973

Since *ASM/CM* data are not available for 1970, 1972, or 1973, prices for these years must be estimated. Physical unit prices are based on the ratio of the 1971 *CM* prices to the 1971 assigned No. 6 fuel oil prices from *Platt's Oil Price Handbook and Oilmanac* (Table TN4.34). The estimated 1971 *CM* prices for NM and WY are used in the calculations. The resulting ratios for each state are used with the *Platt's* assigned prices for 1970, 1972, and 1973 to estimate prices. The final estimates implicitly include state-specific taxes.

Btu prices: all years

Btu prices for states are calculated from the physical unit prices and the conversion factor of 6.287 million Btu per barrel. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS, which are adjusted for process fuel consumption.

Data sources

Prices

2011 forward: Unpublished price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

2010: EIA, Petroleum & Other Liquids data website, Residual Fuel Oil Prices by Sales Type, Sales to End Users, http://www.eia.gov/dnav/pet/pet_pri_resid_a_eppr_pta_dpgal_a.htm.

1984 forward: EIA, *Petroleum Marketing Annual,* http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html, Table A3, column titled "Residual Fuel Oil-Sales to End Users."

1984 forward: Industrial sector distillate fuel oil price estimates from *SEDS* (AK and WA only).

Table TN4.34. No. 6 Fuel oil price assignments from Platt's, 1970 through 1983

State	Years	City or state prices assigned
AK	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973–1974, 1976,	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
AL	1970–1983	Savannah, GA
AR	1970–1983	Arkansas
AZ	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973–1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
CA	1970–1972, 1975, 1977–1980	Los Angeles
	1973–1974, 1976	Los Angeles/San Francisco
	1981–1983	Los Angeles; San Francisco
CO[1]	1970–1983	Minneapolis/St. Paul, MN
CT	1970–1983	New Haven
DC	1970–1983	Baltimore, MD
DE	1970–1983	Baltimore, MD
FL	1970–1972	Jacksonville; Miami; Tampa;
		Port Everglades
	1973–1975	Jacksonville; Miami; Tampa
	1976–1983	Jacksonville/Miami
GA	1970–1983	Savannah
HI	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
IA[1]	1970–1983	Chicago, IL
ID	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
IL[1]	1970–1983	Chicago
IN[1]	1970–1983	Chicago, IL
KS	1970	Baton Rouge, LA; New Orleans, LA
	1971–1983	New Orleans, LA
KY	1970	Baton Rouge, LA; New Orleans, LA
	1971–1983	New Orleans, LA
LA	1970	Baton Rouge; New Orleans
	1971–1983	New Orleans
MA	1970–1983	Boston
MD	1970–1983	Baltimore
ME	1970–1983	Portland
MI[1]	1970–1983	Detroit
MN[1]	1970–1983	Minneapolis/St. Paul
MO[1]	1970–1973	Chicago, IL
	1974–1983	St. Louis
MS	1970	Baton Rouge, LA; New Orleans, LA
	1971–1983	New Orleans, LA
MT	1970–1983	Minneapolis/St. Paul, MN
NC	1970–1983	Wilmington
ND[1]	1970–1983	Minneapolis/St. Paul, MN
NE	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
NH	1970–1983	Portland, ME
NJ	1970–1972	New Jersey
	1974, 1975	New York, NY; Albany, NY; Buffalo, NY
	1976–1983	New York, NY; Albany, NY
NM	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
NV	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
NY	1970–1975	New York; Albany; Buffalo
	1976–1983	New York; Albany
OH[1]	1976–1983 1970	Toledo
	1971–1983	Detroit, MI
OK[2]	1970–1977, 1979	Group 3 (Oklahoma)
	1978, 1980–1983	New Orleans, LA
OR	1970–1972, 1975, 1977–1980	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1981–1983	Los Angeles, CA; San Francisco, CA
PA	1970–1983	Philadelphia
RI	1970–1975	Providence
	1976–1983	New Haven, CT
SC	1970–1983	Charleston
SD[1]	1970–1983	Minneapolis/St. Paul, MN
TN	1970	Baton Rouge, LA; New Orleans, LA
	1971–1983	New Orleans, LA
TX	1970–1972	New Mexico/West Texas
	1973–1983	New Orleans, LA
UT[1]	1970–1983	Minneapolis/St. Paul, MN
VA	1970–1983	Norfolk
VT	1970–1983	Portland, ME
WA	1970–1972, 1975, 1978, 1979	Los Angeles, CA
	1973, 1974, 1976	Los Angeles/San Francisco, CA
	1980–1983	Seattle/Tacoma
WI[1]	1970–1983	Chicago, IL
WV	1970–1983	Norfolk, VA
WY[1]	1970–1983	Minneapolis/St. Paul, MN

[1]Data from Platt's are converted from cents per gallon to dollars per barrel.

[2]As shown in Platts.

1970-1983: McGraw-Hill, Inc., *Platt's Oil Price Handbook and Oilmanac*, refinery and terminal prices for No. 6 fuel oil, average of highs and lows.

1971, 1977, 1981: Census Bureau, U.S. Department of Commerce, *Census of Manufactures, Fuels and Electric Energy Consumed*, Part 2, Table 3. (Dates shown on the report covers are, respectively, 1972, 1977, and 1982.)

1974-1976 and 1978-1980: Census Bureau, U.S. Department of Commerce, *Annual Survey of Manufactures, Fuels and Electric Energy Consumed, States by Industry Group*, Table 3.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales, and Cigarette Tax Rates as of July 1, 1993," sales tax rates.

1987-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* Table 8, column titled "Percentage rate, September 1."

1984-1986: Census Bureau, U.S. Department of Commerce, *Statistical Abstract of the United States*, table titled "State Government Tax Collections and Excise Taxes," column titled "Excise Taxes, General sales and gross receipts."

Consumption

Table TN4.35. Residual fuel oil industrial sector price assignments, 1971, 1974 through 1981

State	Years	State prices used
AK	1980, 1981	HI, WA
DC	1979–1981	MD, VA
MT	1974–1979	ID, ND, SD
ND	1980	MN, MT, SD
NM	1971, 1974–1981	AZ, CO, TX
NV	1974–1978	AZ, CA, ID, OR, UT
OK	1974–1978, 1980	AR, CO, KS, MO, TX
SD	1981	IA, MN, MT, ND, NE
WY	1971, 1974–1981	CO, NE, UT

1970 forward: EIA, State Energy Data System, industrial sector residual fuel oil consumption.

Conversion factor: all years

6.287 million Btu per barrel.

Transportation sector

Residual fuel oil is consumed in the transportation sector for vessel bunkering, military use, and railroads. In 1970, vessels consumed 74% of the transportation use of residual fuel oil, and the military and railroads accounted for 24% and 2%, respectively. By the mid-1990s, vessel use had grown to over 99% of all transportation consumption. Prices are developed for vessel bunkering, and electric power sector prices are assigned to the military and railroad uses for all years. Tax adjustments are made as described below. The transportation sector average price for each state and year is the consumption-weighted average of the prices of the three uses.

Physical unit prices: all years

Vessel bunkering. Physical unit prices are calculated from actual or estimated U.S. average bunker C prices and electric power sector state and U.S. residual fuel oil prices for each year. The ratio of U.S. bunker C price to U.S. residual fuel oil electric power price is multiplied by the state electric power residual fuel oil price to obtain the estimated state bunker C price. Taxes are calculated for all years, as described for the commercial sector in 1976 through 1983, and added to the U.S. bunker C price, so that final state vessel bunkering price implicitly estimates taxes. Other procedures are described separately by

groups of years:

1. For 1982 forward, national average prices for residual fuel oil with sulfur content greater than 1% are taken from the *Annual Energy Review* and are used as proxies for bunker C prices.
2. For 1975 through 1981, national average bunker C prices are available from the *Monthly Petroleum Product Price Report (MPPPR)*. Annual average U.S. prices for 1975 and 1976 are calculated as the simple average of the monthly prices for each respective year because annual average prices are not shown in the *MPPPR*.
3. For 1970 through 1974, no U.S. bunker C prices are available. To estimate state-level prices for these years, the average ratio of published bunker C prices and electric power sector prices for 1975 through 1979 is calculated and multiplied by the state-level electric power prices for 1970 through 1974.

Missing state prices are assigned adjacent states' average prices from 1970-1986, as shown in Table TN4.36.

Military and railroad use. For all years, electric power sector residual fuel oil prices are assigned to military and railroad uses. The electric power prices include taxes. Since the military does not pay state taxes, the electric power prices are adjusted to remove taxes.

In some cases, states have no residual fuel oil price reported for the electric power sector. Electric power Census division prices are assigned to those states that need prices for use in the transportation sector for 1987 forward and for OR in 1971.

Average prices. Transportation sector prices are the average of bunker fuel, military, and railroad prices weighted by each category's share of total transportation consumption from SEDS.

Btu prices: all years

Btu prices for states are calculated from the physical unit prices and the residual fuel oil conversion factor. U.S. Btu prices are calculated as the average of the state Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2011 forward: EIA, *Petroleum Market Monthly, April issues,* Table 16, column titled "Sulfur Greater Than 1%, Sales to end users." Also available at http://www.eia.gov/dnav/pet/pet_pri_refoth_dcu_nus_a.htm.

Table TN4.36. Residual fuel oil transportation sector price assignments, 1970 through 1986

State	Years	State prices used in the estimation
AL	1970–1974, 1980–1986	FL, GA, MS
CO	1986	KS, NM, UT
CT	1978	NH, VT
DC	1975	MD
	1978	PA
GA	1978	KY, MS
ID	1970, 1979	CA, CO
IL	1975	IA, IN, WI
IN	1980–1986	IL, MI, OH
KS	1975	MO, NE
KY	1980–1984	IL, MO, OH, VA
MD	1978	DE, PA
ME	1975	VT
MN	1986	IL, MI
MT	1983–1985	CO, MN, SD
NC	1975	GA
	1978	KY
	1981, 1983, 1985, 1986	GA, VA
ND	1982–1984	MN, SD
	1986	SD
NH	1975	VT
NM	1983, 1984	CO
NV	1975, 1978	CA
OH	1975	IN, MI
OK	1975	MO, TX
OR	1972	CA, WA
	1975–1986	CA
SC	1975, 1984	GA
	1978	AL, FL
SD	1975, 1978	MN, ND
TN	1970, 1971, 1973, 1974, 1976,	AR, GA, MO, MS, VA
	1977, 1980–1982	
	1975	AR, GA, MO, MS
	1978	AR, MO, MS
UT	1984	AZ, CO, NV
	1975	CO
VA	1975	GA
	1978	KY
WA	1984, 1985	CA
WI	1978, 1982–1985	IL, MI, MN
	1986	IL, MI
WV	1985	MD, OH, PA, VA
WY	1981, 1982, 1985	CO, MN, SD

1982-2010: EIA, *Annual Energy Review,* http://www.eia.gov/aer/contents.html, Table 5.22, row titled "Sales Prices to End Users, Residual Fuel Oil, Greater Than 1% Sulfur Content."

1970 forward: Electric power sector residual fuel oil price estimates (in physical units) from SEDS.

1976-1981: EIA, *Monthly Petroleum Product Price Report*, Table 3.

1975: Federal Energy Administration, *Monthly Petroleum Product Price Report*, Table 3.

Taxes

For 1992 forward, an annual average general sales tax is calculated for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Prior to 1992, the state general sales tax as of September 1 of each year is used.

For 2009, the Federation of Tax Administrators did not publish state general sales tax data, but did publish state general sales tax data for 2010. Therefore, the 2009 tax rates were estimated by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each respective state. If no change occurred between 2008 and 2010, it has been assumed the rate remained constant in 2009. If a rate did change between those years, the State Department of Revenue was consulted to determine the effective date of the rate change to be used in the 2009 estimates accordingly.

1996 forward: Federation of Tax Administrators, http://www.taxadmin.org/current-tax-rates.

1995: The Council of State Governments, *The Book of the States 1994-95* and *1996-97*, Table 6.21.

1994: U.S. Advisory Committee on Intergovernmental Relations, *Significant Features of Fiscal Federalism,* Tables 14 and 26.

1993: Census Bureau, U.S. Department of Commerce, *State Tax Review*, Volume 54, No. 31, map titled "State Gasoline, Sales, and Cigarette Tax Rates as of July 1, 1993," sales tax rates.

1987-1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* Table 8, column titled "Percentage rate, September 1."

1976-1986: Census Bureau, U.S. Department of Commerce, *Statistical*

Abstract of the United States, table titled "State Government Tax Collections and Excise Taxes," column titled "Excise Taxes, General sales and gross receipts."

Consumption

1970 forward: EIA, State Energy Data System, transportation sector residual fuel oil consumption, including the subcategories for vessel bunkering, military, and railroad uses.

Conversion factor: all years

6.287 million Btu per barrel.

Other Petroleum Products

Sixteen separate products are included in the category called "other petroleum products." Of the 16 products, prices are developed for the 7 noted with asterisks (*) below and described in the following paragraphs. All of these products, except for a small amount of petroleum coke, are used in the industrial sector.

1. Aviation gasoline blending components
2. Crude oil
3. Miscellaneous products (*)
4. Motor gasoline blending components
5. Natural gasoline, including isopentane (1970–1983)
6. Pentanes plus (1984 forward)
7. Petrochemical feedstocks, naphtha (*)
8. Petrochemical feedstocks, other oils (*)
9. Petrochemical feedstocks, still gas (1970–1985) (*)
10. Petroleum coke (*)
11. Plant condensate (1970–1983)
12. Special naphthas (*)
13. Still gas
14. Unfinished oils
15. Unfractionated streams (1970–1983)
16. Waxes (*)

Compilation of petroleum coke prices is described in the petroleum coke section on page 79. For the other six products, only national-level prices are developed because state-level price information is not available, and taxes are not included in any of the estimates. Consumption for the other nine products are completely removed as process fuel or intermediate products. (See Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm.)

Starting in 1984, three products—natural gasoline, plant condensate, and unfractionated streams—are dropped, and pentanes plus is added in the U.S. Energy Information Administration (EIA) reporting system that is the basis of the consumption estimates. Natural gasoline (including isopentane) and plant condensate are reported together as the new product, pentanes plus. Unfractionated streams is dropped because its components are reported separately as liquefied petroleum gases.

Miscellaneous products

Physical unit prices: all years

The products in this category vary from inexpensive (absorption oils similar to kerosene) to very expensive (hydraulic fluids). The price estimates are based on the evidence presented in the Bureau of Mines *Minerals Yearbooks* of the 1970's indicating that the greater part of the miscellaneous product line consists of finished petrochemicals, especially the aromatic hydrocarbons: benzene, toluene, and the xylenes.

Price estimates for 1972, 1977, 1982, 1987, and 1992 are taken from *Census of Manufactures (CM)* data on quantity and value of "aromatics" and "other finished petroleum products" shipped by petroleum refining industries, i.e., Standard Industrial Classification (SIC) 2911. The ratio of miscellaneous-products-to-crude-oil price for these 5 years varies widely. The following ratios, shown rounded, are used to estimate miscellaneous products' prices for the years indicated:

1970–1974:	1.91 times the crude oil price
1975–1979:	2.42 times the crude oil price
1980–1984:	1.56 times the crude oil price
1985–1989:	1.99 times the crude oil price
1990 forward:	1.86 times the crude oil price

Quantity data for 1992 are published in pounds and are converted to barrels by use of the conversion factors of 7.282 pounds per gallon and 42 gallons per barrel.

Data from the subsequent U.S. Census Bureau *Economic Censuses* cannot be used to derive the ratio because only the value of shipments are published. The quantity data are not published because they are reported in various units (pounds, barrels, etc.) and cannot be summed.

Data sources

2008 forward: EIA, Petroleum Marketing Annual, Table 1, column titled "Refiner Acquisition Cost of Crude Oil, Composite" (2008 and 2009), and on EIA website at http://www.eia.gov/dnav/pet/pet_pri_rac2_dcu_nus_a.htm.

1970-2007: EIA, *Annual Energy Review,* http://www.eia.gov/aer/contents.

html, Table 5.21, column titled "Composite, Nominal."

1972, 1977, 1982, 1987, 1992: Census Bureau, U.S. Department of Commerce, *Census of Manufactures*, data for Standard Industrial Classification (SIC) 2911 on "Quantity and Value of Shipments by All Producers" as shown in Table 6a from MC77-I-29A, Product Codes 2911054, 2911056 (1972 and 1977); Table 6a-1 from MC87-I-29A, Product Codes 2911D55 and 2911D57 (1982 and 1987); and Table 6a-1 from MC92-I-29A, Product Codes 2911D 55 and 2911D 57 (1992).

Physical unit conversion factors

1992: Gas Processors Suppliers Association in cooperation with the Gas Processors Association, *Engineering Data Book*, 9th Edition, 4th Revision, 1979, pages 16-2 and 16-3, lines 42-47.

Petrochemical feedstocks, naphtha

Physical unit prices: all years

Naphthas for petrochemical feedstock use are those oils with boiling points less than 401°F. Consumer prices for 1978 through 1980 are derived from the special *Annual Survey of Manufactures (ASM)* series on "Hydrocarbon, Coal, and Coke Materials Consumed" by using data for industries in SIC 2869 (industrial organic chemicals) and SIC 2821 (plastics materials, synthetic resins, and nonvulcanizable elastomers). A price estimate for 1982 is obtained from the *CM* and is based on data for SIC 2869 only. Since the ratio of petrochemical-naphtha-to-crude-oil price is reasonably constant in 1978, 1979, 1980, and 1982, the simple average of the four ratios, 1.23, is used to estimate prices for petrochemical feedstocks and naphthas, for all other years.

Data sources

2008 forward: EIA, *Petroleum Marketing Annual*, Table 1, column titled "Refiner Acquisition Cost of Crude Oil, Composite" (2008 and 2009), and on EIA website at http://www.eia.gov/dnav/pet/pet_pri_rac2_dcu_nus_a.htm.

1970-1977, 1981, 1983-2007: EIA, *Annual Energy Review*, http://www.eia.gov/aer/contents.htm, Table 5.21, column titled "Composite, Nominal."

1982: Census Bureau, U.S. Department of Commerce, *1982 Census of Manufactures*, M82-I-28F-3(P), page 6, SIC 2869.

1980: Census Bureau, U.S. Department of Commerce, *1980 Annual Survey of Manufactures*, M80(AS)-4.3, page 9, SIC 2821.

1978, 1979: Census Bureau, U.S. Department of Commerce, *1979 Annual Survey of Manufactures*, M79(AS)-4.3, page 8, SIC 2821 and 2869.

Petrochemical feedstocks, other oils

Physical unit prices: all years

Petrochemical feedstocks referred to as "other oils" or "gas oils" are those oils with boiling points equal to or greater than 401°F. Consumer prices for 3 years are obtained from the data on gas oils presented in the special *ASM* series on hydrocarbons consumed by using data for industries in SIC 2865 (cyclic crudes and intermediates). The other-oils-to-crude-oil price ratio is quite stable, and the average ratio for the 3-year period, 1.607, is used to estimate prices for petrochemical feedstocks, other oils, for all other years.

Data sources

2008 forward: EIA, Petroleum Marketing Annual, Table 1, column titled "Refiner Acquisition Cost of Crude Oil, Composite" (2008 and 2009), and on EIA website at http://www.eia.gov/dnav/pet/pet_pri_rac2_dcu_nus_a.htm.

1970-1977, 1981-2007: EIA, *Annual Energy Review,* http://www.eia.gov/aer/contents.htm, Table 5.21, column titled "Composite, Nominal."

1979, 1980: Census Bureau, U.S. Department of Commerce, *1980 Annual Survey of Manufactures*, M80(AS)-4.3, page 9, SIC 2865.

1978: Census Bureau, U.S. Department of Commerce, *1979 Annual Survey of Manufactures*, M79(AS)-4.3, page 8, SIC 2865.

Petrochemical feedstocks, still gas (1970 through 1985)

Physical unit prices: all years

The source data for still gas is a mixture of consumer prices and producer prices for industries in SIC 2869 and SIC 2911 (petroleum refining). The still-gas-to-crude-oil price ratio is somewhat variable because still gas is a highly variable gaseous mixture. Value and quantity are available for 1972, 1977 through 1980, and 1982. In imputing prices for years when data from the *CM* or *ASM* are not available, the average still-gas-to-crude-oil price ratio, 0.759, is used. After 1985, EIA data series no longer report feedstock and refinery use of still gas separately and all SEDS industrial consumption is removed from the price and expenditure tables. (See Section 7, "Consumption Adjustments for Calculating Expenditures," at http://www.eia.gov/state/seds/sep_prices/

notes/pr_consum_adjust.pdf.)

Data sources

1970, 1971, 1981, 1983-1985: EIA, *Annual Energy Review,* Table 5.21, "Composite, Nominal."

1982: Census Bureau, U.S. Department of Commerce, *1987 Census of Manufactures*, MC87-I-29A, Table 6a, SIC 2911.

1979, 1980: Census Bureau, U.S. Department of Commerce, *1980 Annual Survey of Manufactures*, M80(AS)-4.3, page 9, SIC 2869.

1978: Census Bureau, U.S. Department of Commerce, *1979 Annual Survey of Manufactures*, M79(AS)-4.3, page 28, SIC 2869.

1972, 1977: Census Bureau, U.S. Department of Commerce, *1977 Census of Manufactures*, MC77-1-29A, page 29A-20, SIC 2911.

Petroleum coke

Physical unit prices: all years

Petroleum coke is consumed in the commercial, industrial, and electric power sectors. See the **petroleum coke** section on page 79.

Special naphthas

Physical unit prices: all years

Prices for special naphthas are developed as the simple averages of the city prices for "varnish makers and painters naphtha" and two types of "solvent naphtha" that are published in the *Chemical Marketing Reporter*. For 1984 through 1990, the prices are averaged from the first issue of each month; for 1974, 1979, and 1980, when petroleum prices were increasing rapidly, prices are averaged from 10 randomly selected issues; and for all other years, prices are averaged from at least 5 randomly selected issues. For 1991 forward, prices for special naphthas are estimated by applying the year-on-year growth rate of the average U.S. price of motor gasoline to the previous year's special naphtha price.

Data sources

1991 forward: EIA, State Energy Data System, U.S. motor gasoline price estimates.

1970 through 1990: Schnell Publishing Co., Inc., *Chemical Marketing Reporter,* selected monthly issues.

Waxes

Physical unit prices: all years

Waxes data include fully refined crystalline wax, other refined crystalline wax, and microcrystalline wax. Price estimates for 1970 through 1973 and 1986 forward are calculated using the U.S. Department of Commerce, Census Bureau, data and dividing the value of exports by the quantity exported. For 1974 through 1985, prices are estimated by applying price indices to a representative base price. Producer prices for 1967 for the three waxes are available from data in the 1967 *Census of Manufactures*. A weighted-average price for 1967 of $15.75 per barrel is obtained by summing the values of shipments of the three waxes and dividing the sum by the total quantity shipped. An annual composite price index for these three waxes is listed in the Bureau of Labor Statistics publication *Producer Prices and Producer Price Indexes* for April 1974 through June 1985. Price estimates for 1975 through 1984 are derived by multiplying the published price indices by the estimated 1967 base price. The indices for 1974 and 1985 are estimated as the simple average of monthly price indices that are available for that year. The physical unit conversion factors for wax are 280 pounds per barrel; and 1 pound equals 0.45359237 kilograms.

Data sources

2013 forward: Census Bureau, U.S. Department of Commerce, domestic exports of Paraffin Wax, Containing Less Than 0.75 Percent Oil, commodity code 2712200000 and Microcrystalline Petroleum Wax, commodity code 2712900000, extracted from the U.S. International Trade Commission's Interactive Tariff and Trade DataWeb database, http://dataweb.usitc.gov.

1989-2012: Census Bureau, U.S. Department of Commerce, December issues of Report No. EM-545, titled *Foreign and Domestic Exports* for Paraffin Wax Less Than 0.75% Oil (commodity code 2712200000) and Other Mineral Waxes NESOI (commodity code 2712900000).

1987, 1988: Census Bureau, U.S. Department of Commerce, December issues of Report No. EM-546 (1987) and EM-522 (1988), titled *U.S. Exports, Schedule B, Commodity by Country* for "Paraffin Wax and Other Petroleum Waxes Unblended incl Microcrystalline Wax (commodity code 4925200)."

1986: Census Bureau, U.S. Department of Commerce, December issue of EM-546, *U.S. Exports, Schedule B, Commodity by Country* for "Paraffin Wax, Crystalline, Fully Refined (Commodity 4925210)," "Paraffin Wax, Crystalline,

Except Fully Refined (commodity code 4925220)," and "Petroleum Waxes, NSPF incl Microcrystalline Wax (commodity code 4925240)."

1974-1985: Bureau of Labor Statistics, U.S. Department of Labor, *Producer Prices and Producer Price Indexes, Annual Supplement*, commodity code 0577.

1974-1985: Census Bureau, U.S. Department of Commerce, *Census of Manufactures*, 1967, page 29 A-15, quantity and value of shipments of waxes in 1967.

1970-1973: Census Bureau, U.S. Department of Commerce, December issues of FT-410, *U.S. Exports, Schedule B, Commodity by Country* for Paraffin Wax, Crystalline, Fully Refined (commodity code 3326220), Paraffin Wax, Crystalline, Except Fully Refined (commodity code 3326230), and Microcrystalline Wax (commodity code 3326210).

All products

Btu prices: all years

Btu prices for petroleum coke are discussed in the **petroleum coke** section on page 79. Btu prices for the other six petroleum products are calculated by converting physical unit prices from dollars per barrel to dollars per million Btu by using the conversion factors shown in Table TN4.37. The U.S. average price that is developed for each product is assigned to the industrial sector of states in years where there is consumption. The state-level and U.S. "other petroleum" average prices are the average of the seven petroleum products, weighted by SEDS consumption data. The variable state average prices reflect the different mix of products consumed.

Table TN4.38 shows national-level estimated prices and expenditures for the other petroleum product components for selected years from 1970 forward.

Additional Calculations

A few petroleum products are combined for display in the "Other Petroleum" column in tables on price and expenditure estimates for the industrial sector and for total. They include asphalt and road oil, aviation gasoline (total energy only), kerosene, lubricants, and the "other petroleum products" category described in this Section. Expenditures are the sum of the expenditures of the components, and prices are calculated by dividing expenditures by the sum of the adjusted consumption of the components.

Table TN4.37. Other petroleum products Btu conversion factors

Petroleum product	Million Btu per barrel
Miscellaneous products	5.796
Petrochemical feedstocks	
Naphtha	5.248
Other oils	5.825
Still gas	6.000
Special naphthas	5.248
Waxes	5.537

Table TN4.38. Other petroleum price and expenditure estimates for the industrial sector, United States, selected years, 1970 through 2015

Year	Petrochemical Feedstocks			Petroleum Coke	Special Naphthas	Waxes	Miscellaneous Products	Average Price	Total Expenditure
	Naphtha	Other Oils	Still Gas [a]						
	Prices in Nominal Dollars per Million Btu								
1970	0.80	0.94	0.43	0.53	1.96	4.14	1.12	1.07	– –
1975	2.43	2.86	1.31	1.42	3.12	4.95	3.85	2.70	– –
1980	6.68	7.64	4.04	2.19	10.48	12.01	7.57	7.32	– –
1985	6.27	7.38	3.39	1.86	10.87	13.38	9.17	7.16	– –
1990	5.21	6.13	– –	1.73	9.71	14.74	7.13	5.80	– –
1991	4.47	5.26	– –	1.50	9.51	16.33	6.12	5.18	– –
1992	4.32	5.08	– –	1.18	9.55	24.75	5.91	5.01	– –
1993	3.85	4.53	– –	0.97	9.44	19.10	5.27	4.67	– –
1994	3.65	4.30	– –	1.02	9.54	24.75	5.00	4.51	– –
1995	4.04	4.75	– –	1.15	9.81	23.89	5.53	4.87	– –
1996	4.85	5.71	– –	1.51	10.48	22.95	6.65	5.65	– –
1997	4.46	5.25	– –	1.37	10.44	24.62	6.11	5.30	– –
1998	2.93	3.45	– –	1.27	9.00	20.11	4.02	3.63	– –
1999	4.10	4.83	– –	1.31	9.91	20.54	5.62	4.66	– –
2000	6.62	7.80	– –	1.39	12.66	21.33	9.07	7.10	– –
2001	5.38	6.33	– –	1.55	12.07	19.26	7.36	5.76	– –
2002	5.65	6.65	– –	1.28	11.38	16.53	7.73	5.92	– –
2003	6.69	7.87	– –	1.29	13.15	15.76	9.16	6.91	– –
2004	8.67	10.20	– –	1.46	15.66	17.35	11.87	8.44	– –
2005	11.78	13.86	– –	1.82	19.12	18.25	16.12	11.43	– –
2006	14.12	16.62	– –	2.06	21.70	23.88	19.33	13.63	– –
2007	15.92	18.74	– –	2.44	23.73	26.71	21.80	15.35	– –
2008	22.20	26.14	– –	4.11	27.67	33.64	30.40	21.02	– –
2009	13.90	16.36	– –	2.40	20.16	24.35	19.03	13.14	– –
2010	17.97	21.16	– –	3.40	24.05	32.76	24.61	18.27	– –
2011	23.88	28.10	– –	4.55	30.41	34.70	32.69	24.54	– –
2012	23.66	27.84	– –	3.43	31.32	34.76	32.39	22.96	– –
2013	23.55	27.72	– –	2.72	30.46	33.37	32.25	24.04	– –
2014	21.57	25.39	– –	2.60	R 29.27	33.91	29.53	22.65	– –
2015	11.34	13.35	– –	2.40	21.52	32.88	15.53	12.47	– –
	Expenditures in Millions of Nominal Dollars								
1970	239	171	32	70	323	106	96	– –	1,038
1975	683	793	124	213	450	166	729	– –	3,159
1980	3,173	6,564	371	215	2,022	395	1,799	– –	14,539
1985	1,478	3,729	256	241	1,733	420	1,308	– –	9,166
1990	1,811	4,622	– –	400	1,040	491	983	– –	9,347
1991	1,335	4,350	– –	311	837	574	933	– –	8,341
1992	1,629	4,141	– –	341	998	922	592	– –	8,624
1993	1,348	3,821	– –	189	987	764	499	– –	7,609
1994	1,455	3,607	– –	221	773	1,004	530	– –	7,591
1995	1,506	3,808	– –	245	695	970	537	– –	7,760
1996	2,327	4,169	– –	347	781	1,117	592	– –	9,333
1997	2,394	4,524	– –	279	755	1,077	597	– –	9,625
1998	1,714	2,828	– –	413	965	852	478	– –	7,249
1999	2,060	3,918	– –	521	1,441	769	629	– –	9,338
2000	4,064	5,630	– –	357	1,232	706	1,081	– –	13,070
2001	2,656	4,194	– –	502	947	700	920	– –	9,919
2002	3,291	4,202	– –	396	1,165	532	1,038	– –	10,624
2003	4,099	5,505	– –	367	1,058	489	1,153	– –	12,671
2004	6,495	7,952	– –	537	799	534	1,346	– –	17,663
2005	8,227	9,813	– –	602	1,195	572	1,818	– –	22,228
2006	8,879	13,140	– –	762	1,520	624	2,630	– –	27,555
2007	8,956	13,947	– –	870	1,851	585	2,910	– –	29,119
2008	10,596	16,930	– –	1,462	2,349	644	4,318	– –	36,299
2009	6,557	6,948	– –	687	931	298	2,889	– –	18,309
2010	8,818	9,574	– –	587	628	560	3,906	– –	24,072
2011	11,635	10,919	– –	613	688	523	5,385	– –	29,763
2012	10,738	7,998	– –	623	461	532	5,233	– –	25,585
2013	12,196	6,208	– –	353	3,046	550	5,519	– –	27,873
2014	9,546	6,276	– –	302	3,106	501	5,396	– –	25,127
2015	4,855	3,058	– –	346	2,136	406	2,934	– –	13,735

[a] Consumption data for this series are not available after 1985.
– – = Not applicable.
Where shown, R = Revised data and (s) = Value less than 0.5 million nominal dollars.

Note: Expenditure totals may not equal sum of components due to independent rounding.
Source: State Energy Data System.