State Energy Data System 2023
Price and Expenditure Technical Notes

Contents

Introduction to the technical notes

Purpose

The U.S. Energy Information Administration (EIA) develops, maintains, and operates the State Energy Data System (SEDS). The goal of SEDS is to provide historical time series of energy production, consumption, prices, expenditures, indicators, and carbon dioxide emissions from energy consumption by state that are defined as consistently as possible over time and across sectors. SEDS provides these estimates for Members of Congress, federal and state agencies, the general public, and as inputs for EIA's energy models.

The report

SEDS provides annual energy price and expenditure estimates for all energy sources by major economic sectors for the 50 states, District of Columbia, and United States. These data are available on the EIA website at https://www.eia.gov/state/seds/seds-data-complete.php. Companion tables with state-level consumption data can also be found at the same website. In addition, SEDS publishes the most recent year of data tables for state-level production, consumption, price, expenditure, indicator, and carbon dioxide emissions from energy consumption estimates by energy source as they are updated at https://www.eia.gov/state/seds/seds-data-fuel.php?sid=US.

Due to page-size constraints, most of the PDF time series tables show estimates for only selected years. However, SEDS estimates price and expenditure data for 1970 forward and publishes the data in the HTML tables and CSV, XLSX, and ZIP data files on EIA's website. The documentation in this report covers the estimates for all years.

In the published SEDS tables, all estimates with revisions since the last SEDS report that are large enough to be seen are preceded with an "R."

Price estimates

All SEDS price estimates are in current dollars per million Btu (British thermal units) to facilitate comparison across energy sources. EIA uses gross heat content values to convert prices in physical units to prices in million Btu. See Appendix B of the SEDS consumption technical notes at https://www.eia.gov/state/seds/sep_use/notes/use_b.pdf. There is no adjustment for general inflation over time.

Sections 2 through 6 of the technical notes describe how SEDS develops the price estimates, including sources, methods, and conversion factors.

Reliable data for state-level prices rarely exist, especially as consistent series over a long period. SEDS applies estimates and assumptions to fill data gaps and maintain consistent definitions in the data series over time. SEDS incorporates the most consistent series and procedures possible for these estimates and assumptions. However, users should recognize the limitations imposed on the system due to changing and inadequate data sources. SEDS selects its sources and methods based on the availability, applicability as indicators, continuity over time, and consistency among the various energy commodities. The original source documents (cited in this documentation) include the collection of methods, imputation, or adjustment techniques, and errors associated with the individual processes. Due to the many collection forms and procedures associated with these reports, it is not possible to develop a meaningful numerical estimate of the statistical errors of the material published in the SEDS price and expenditure tables.

It is also important to note that, even within a state, a single average price may have limited meaning because it represents a consumption-weighted average over a whole state. For example, urban and rural electricity prices can vary significantly, and prices in one region of a state may differ from those in another because of access to less expensive hydroelectricity. Differences within a state may also be greater than differences among adjacent states. Thus, the principal value of the estimates in these tables lies in general comparisons among the states, interstate comparisons for a given year, and the analysis of trends over time.

Estimation methods

Most sources report fuel prices in physical units. SEDS uses the appropriate EIA conversion factors to create the Btu prices. SEDS only uses estimated prices when specific state-level prices are not available for a given energy source and sector. In some cases, SEDS assigns prices for energy consumed in one sector in a state to another sector in the same state. Examples include: industrial steam coal prices assigned to the commercial and transportation sectors' steam coal use;

industrial lubricants prices assigned to transportation lubricants uses; and transportation motor gasoline prices assigned to commercial and industrial use of motor gasoline.

In addition, there are a few cases where state-level prices could not be identified for any economic sector for a given energy source for some or all years. In these instances, SEDS uses a national-level price for all states, as described in these technical notes. For example, SEDS assigns a national-level price to all states for: transportation use of aviation gasoline; industrial and transportation use of lubricants; and industrial use of some other petroleum products.

Finally, within a given energy source and sector where price data are usually available, there are some cases of missing prices for certain years. SEDS uses two general approaches to estimate prices in cases where consumption occurs but no price is directly available from the data sources. The first approach is to assign an adjacent state price, a simple average of adjacent states' prices, or the price of the region (such as Census division, Census region, or Petroleum Administration for Defense district or subdistrict) that the state is located. The second approach is to apply the growth rate of the price of another state, the corresponding region, or the United States to the state's previous year price, if it is available.

SEDS uses three state groupings—U.S. Census regions and divisions, federal regions, and Petroleum Administration for Defense districts—as shown in Figures TN1, TN2, and TN3, on the following pages. SEDS identifies states by their two-letter postal code abbreviations shown in the map legends. Throughout the technical notes, the term "state" includes the District of Columbia.

Expenditure estimates

All SEDS expenditure estimates are in millions of current dollars. There is no adjustment for general inflation over time. All expenditures are consumer expenditures; that is, they represent estimates of money spent directly by consumers to purchase energy, generally including taxes (see box on page 4).

SEDS calculates expenditure estimates as the product of SEDS Btu consumption estimates at the most detailed level and the corresponding price estimates. SEDS adjusts the Btu consumption estimates for the expenditure calculations to remove process fuels and intermediate products (such as refinery fuels and biofuels blended into petroleum products) that are not purchased directly by end users to avoid double counting.

SEDS excludes electricity exported to Canada and Mexico from the expenditure calculations. SEDS removes use of hydroelectric, geothermal, wind, and solar energy sources from SEDS expenditure calculations because there are no direct fuel costs for those energy sources. SEDS also removes consumption of wood and waste that were obtained at no cost.

See Section 7 of the technical notes for further explanation of the adjusted consumption for expenditure estimates at: https://www.eia.gov/state/seds/sep_prices/notes/pr_consum_adjust.pdf.

In the SEDS tables with primary energy, electricity, and total energy expenditure estimates, SEDS displays energy expenditures for the electric power sector as negative values to indicate that they are subtracted from primary energy expenditures to remove double-counting in the calculation of total energy expenditures.

Energy-consuming sectors

SEDS estimates price and expenditure estimates for five energy-consuming sectors:

- **Residential sector:** An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include: space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters.
- **Commercial sector:** An energy-consuming sector that consists of service-providing facilities and equipment of: businesses; federal, state, and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include: space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment. *Note*: This sector includes generators that produce electricity and/or useful thermal output primarily to support commercial activities.
- **Industrial sector:** An energy-consuming sector that consists of all facilities and equipment used for producing, processing,

or assembling goods. The industrial sector encompasses the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, fishing and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products. *Note:* This sector includes generators that produce electricity and/or useful thermal output primarily to support industrial activities.

- **Transportation sector:** An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Included are automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse tractors and forklifts) are classified in the sector of their primary use. In this report, natural gas used in the operation of natural gas pipelines is included in the transportation sector.
- **Electric power sector:** An energy-consuming sector that consists of electricity-only and combined-heat-and-power plants within the NAICS (North American Industry Classification System) 22 category whose primary business is to sell electricity, or electricity and heat, to the public. *Note:* This sector includes electric utilities and independent power producers.

The first four energy-consuming sectors—residential, commercial, industrial, and transportation sectors—are also called end-use sectors.

Sector definition discrepancies and other price issues

Although end-use allocations of energy consumption and expenditures follow those guidelines as closely as possible, some data sources collect information using different classifications. For example, electric utilities often classify commercial and industrial users by the quantity of electricity purchases rather than by the business activity of the purchaser. Agricultural use of natural gas is collected and reported in the commercial sector through 1995 and in the industrial sector for 1996 forward. Because agricultural use of natural gas cannot be identified separately, the discrepancy cannot be reconciled. Another example is master-metered condominiums, apartments, and buildings with a combination of residential and commercial units. In many cases, billing and metering practices cause residential energy usage of electricity, natural gas, or fuel oil to be included in the commercial sector. In those cases, there is no basis for separating residential from commercial use. Readers are advised to consult the SEDS consumption technical notes for specific assumptions regarding the consumption estimates.

Except where specified, it is generally not possible to describe the SEDS price estimates as entirely “wholesale” or “retail.” The prices paid in each consuming sector are usually a combination of both sets of prices, depending on a number of closely interrelated factors. Almost all residential sector prices are close to retail prices, reflecting the relatively small quantities of individual purchases and the increased costs of extensive, multilayered distribution systems. Similarly, in the transportation sector more consumers pay the same retail-like price for motor gasoline, regardless of volume purchased or location of purchase. Conversely, residual fuel oil prices in the transportation sector are certainly more wholesale-like as a result of large deliveries to bulk facilities in major ports. In the same manner, most large industrial and many large commercial expenditures can be thought of as near wholesale, frequently involving direct access to a producer or bulk distribution facility for very large quantities. Many smaller industrial and commercial facilities pay something much closer to retail prices as a result of the small quantities involved and their institutional distance from primary suppliers. Notable exceptions to these relationships include natural gas and electricity suppliers, which typically establish fixed rates for each of several classes of service, depending on representative quantities, service factors, and distribution expenses.

Taxes in the price and expenditure data

The goal of SEDS state energy price is to provide estimates that include all taxes, but data sources often do not treat taxes uniformly. When the source data include taxes, SEDS includes them in the price and expenditure estimates. When the source doesn't include taxes, but SEDS can separately estimate them, SEDS includes them, with some exceptions listed below. In many cases, states and localities provide tax exemptions for various activities or groups of end users. SEDS does not include these complex exemptions into the state energy prices. EIA continues to analyze these cases to improve its estimates. A comprehensive and detailed study of taxes in EIA data is available in the report *End-Use Taxes: Current EIA Practices,* DOE/EIA-0583 (Washington, DC, August 1994). The report is available from EIA's Internet site at https://www.eia.gov/finance/archive/0583.pdf.

The status of tax data in the price and expenditure tables is summarized below and described more fully in the sections for each energy source and sector.

Energy sources consumed by the end-use sectors

Coal. All steam coal and coking coal prices include taxes in all years. Appropriately, coal imports and exports in the industrial sector do not include end-user taxes.

Natural gas. Natural gas prices are intended to include all federal, state, and local taxes, surcharges, and adjustments billed to consumers. Although the EIA data collection form states that taxes are to be included in the reported gross revenues, it is most likely that respondents would not consider sales taxes as part of their companies' gross revenues, and some may not be reporting them. As a result, consumer sales taxes may not be covered in full. For more information see *End-Use Taxes: Current EIA Practices*, page 23 of 134 in the PDF file, https://www.eia.gov/finance/archive/0583.pdf.

Petroleum. Prices of motor gasoline, diesel fuel, and propane used for transportation include excise and other per-gallon taxes. Due to the lack of uniformity in application, SEDS does not include state general sales taxes and local fuel and sales taxes. Other hydrocarbon gas liquids, distillate fuel oil, kerosene, and residual fuel oil prices include sales taxes in all years. Jet fuel, aviation gasoline, asphalt and road oil, lubricants, industrial petroleum coke, and other petroleum products (such as petrochemical feedstocks, special naphthas, and waxes) do not include taxes.

Wood and waste. Wood and waste prices for the residential, commercial, and industrial sectors include taxes.

Electricity. SEDS assumes that taxes paid directly by the electric power sector (rather than end users) are part of the operating costs and passed on to the end users as part of the price. Sales and other use taxes are included in the prices.

Fuels consumed by the electric power sector

Coal, natural gas, petroleum coke, nuclear, and wood and waste prices include all taxes, transportation, and handling costs. There are no direct fuel costs (or taxes) for hydroelectric, geothermal, solar, or wind energy. Capital, operation, and maintenance costs and related taxes associated with these energy sources are included indirectly because electricity prices reflect their presence in the rate base.

Figure TN1. U.S. Census regions and divisions

Region 1 Northeast	Region 2 Midwest		Region 3 South		Region 4 West	
Division 1 (New England)	**Division 3 (East North Central)**	**Division 4 (West North Central)**	**Division 5 (South Atlantic)**	**Division 6 (East South Central)**	**Division 8 (Mountain)**	**Division 9 (Pacific)**
Connecticut (CT)	Illinois (IL)	Iowa (IA)	Delaware(DE)	Alabama (AL)	Arizona (AZ)	Alaska (AK)
Maine (ME)	Indiana (IN)	Kansas (KS)	District of Columbia (DC)	Kentucky (KY)	Colorado (CO)	California (CA)
Massachusetts (MA)	Michigan (MI)	Minnesota (MN)	Florida (FL)	Mississippi (MS)	Idaho (ID)	Hawaii (HI)
New Hampshire (NH)	Ohio (OH)	Missouri (MO)	Georgia (GA)	Tennessee (TN)	Montana (MT)	Oregon (OR)
Rhode Island (RI)	Wisconsin (WI)	Nebraska (NE)	Maryland (MD)		Nevada (NV)	Washington (WA)
Vermont (VT)		North Dakota (ND)	North Carolina (NC)	**Division 7 (West South Central)**	New Mexico (NM)	
Division 2 (Middle Atlantic)		South Dakota (SD)	South Carolina (SC)		Utah (UT)	
			Virginia (VA)	Arkansas (AR)	Wyoming (WY)	
New Jersey (NJ)			West Virginia (WV)	Louisiana (LA)		
New York (NY)				Oklahoma (OK)		
Pennsylvania (PA)				Texas (TX)		

Figure TN2. Federal regions

Region 1
New England

Connecticut (CT)
Maine (ME)
Massachusetts (MA)
New Hampshire (NH)
Rhode Island (RI)
Vermont (VT)

Region 2
New York/New Jersey

New Jersey (NJ)
New York (NY)

Region 3
Mid Atlantic

Delaware (DE)
District of Columbia (DC)
Maryland (MD)
Pennsylvania (PA)
Virginia (VA)
West Virginia (WV)

Region 4
South Atlantic

Alabama (AL)
Florida (FL)
Georgia (GA)
Kentucky (KY)
Mississippi (MS)
North Carolina (NC)
South Carolina (SC)
Tennessee (TN)

Region 5
Midwest

Illinois (IL)
Indiana (IN)
Michigan (MI)
Minnesota (MN)
Ohio (OH)
Wisconsin (WI)

Region 6
Southwest

Arkansas (AR)
Louisiana (LA)
New Mexico (NM)
Oklahoma (OK)
Texas (TX)

Region 7
Central

Iowa (IA)
Kansas (KS)
Missouri (MO)
Nebraska (NE)

Region 8
North Central

Colorado (CO)
Montana (MT)
North Dakota (ND)
South Dakota (SD)
Utah (UT)
Wyoming (WY)

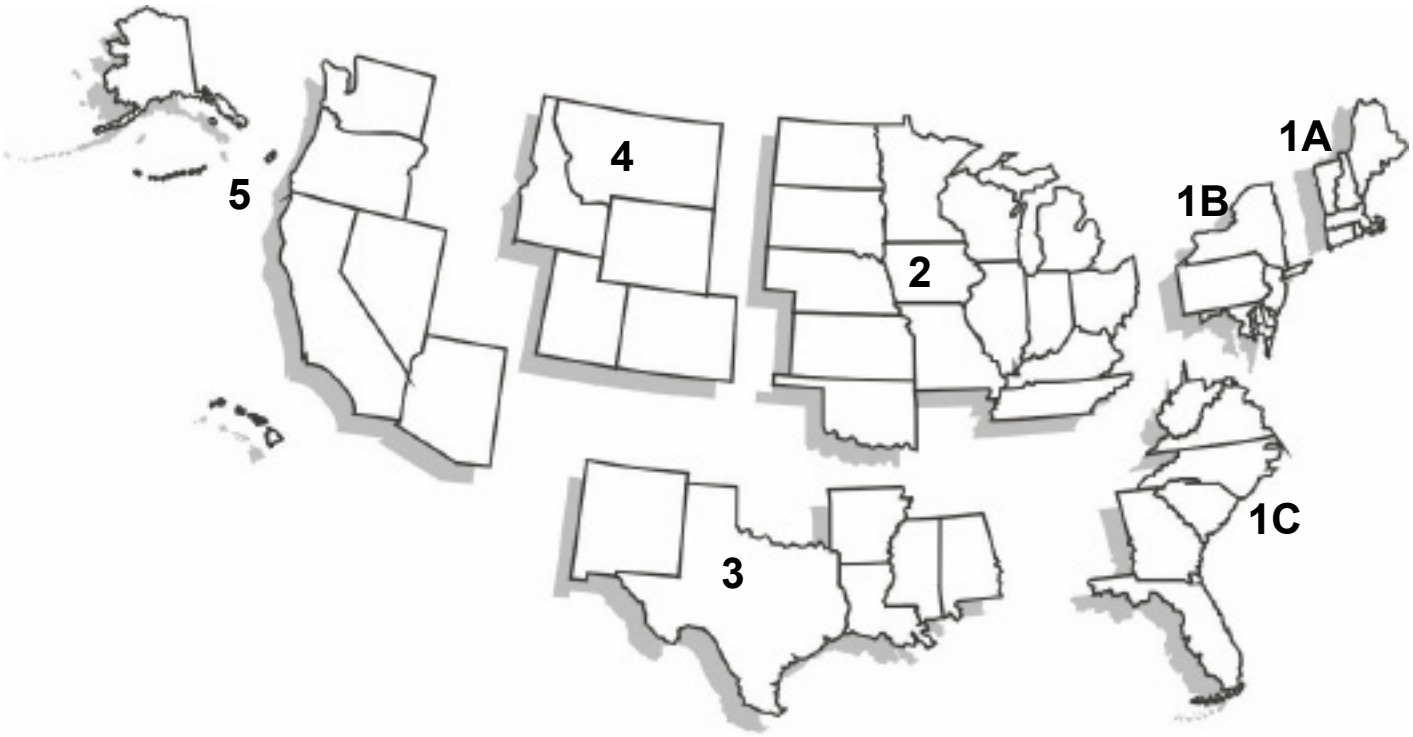
Region 9
West

Arizona (AZ)
California (CA)
Hawaii (HI)
Nevada (NV)

Region 10
Northwest

Alaska (AK)
Idaho (ID)
Oregon (OR)
Washington (WA)

Figure TN3. Petroleum Administration for Defense districts and subdistricts



Subdistrict 1A

Connecticut (CT)
Maine (ME)
Massachusetts (MA)
New Hampshire (NH)
Rhode Island (RI)
Vermont (VT)

Subdistrict 1B

Delaware (DE)
District of Columbia (DC)
Maryland (MD)
New Jersey (NJ)
New York (NY)
Pennsylvania (PA)

Subdistrict 1C

Florida (FL)
Georgia (GA)
North Carolina (NC)
South Carolina (SC)
Virginia (VA)
West Virginia (WV)

District 2

Illinois (IL)
Indiana (IN)
Iowa (IA)
Kansas (KS)
Kentucky (KY)
Michigan (MI)
Minnesota (MN)
Missouri (MO)
Nebraska (NE)
North Dakota (ND)
Ohio (OH)
Oklahoma (OK)
South Dakota (SD)
Tennessee (TN)
Wisconsin (WI)

District 3

Alabama (AL)
Arkansas (AR)
Louisiana (LA)
Mississippi (MS)
New Mexico (NM)
Texas (TX)

District 4

Colorado (CO)
Idaho (ID)
Montana (MT)
Utah (UT)
Wyoming (WY)

District 5

Alaska (AK)
Arizona (AZ)
California (CA)
Hawaii (HI)
Nevada (NV)
Oregon (OR)
Washington (WA)

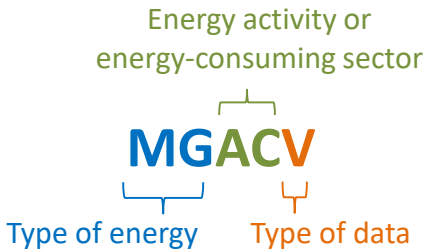
Section 1. Documentation guide

This section describes the common data identification codes used in the State Energy Data System (SEDS). Sections 2 through 6 provide information for each of the major energy sources: coal, natural gas, petroleum, renewable energy, and electricity. Section 7 describes adjustments for consumption of industrial process fuel, intermediate products, and other uncosted energy sources that SEDS removes to calculate expenditures.

The energy indicators technical notes provides the degree day data, electric net summer capacity data, resident population data used in per capita calculations, and current-dollar gross domestic product (GDP) used to calculate energy expenditures per dollar of GDP. Appendix A is an alphabetical listing of all the variable names and formulas used in the price and expenditure module. Appendix B provides metric and other physical conversion factors for measures used in energy analyses. Appendix C summarizes the changes in SEDS content made since the last complete release of data.

There are about 1,000 variables in SEDS, each identified by a unique five-character mnemonic series name, or MSN. All published MSNs are listed in the Codes and Descriptions file on the SEDS website here: https://www.eia.gov/state/seds/CDF/Codes_and_Descriptions.xlsx.

In the following example, MGACV is the identifying code for motor gasoline expenditures in the transportation sector in million dollars:



The first two characters in the SEDS variable names represent energy sources and products:

AR = asphalt and road oil
AV = aviation gasoline
B1 = renewable diesel
BD = biodiesel
BF = biofuels
BO = other biofuels
BT = battery storage
BX = total biofuels (excluding fuel ethanol)
CC = coal coke
CL = coal
DF = distillate fuel oil
EL = electricity
EM = fuel ethanol, excluding denaturant
ES = electricity sales
FN = petrochemical feedstocks, naphtha less than 401°F
FO = petrochemical feedstocks, other oils equal to or greater than 401°F
FS = petrochemical feedstocks, still gas
HL = hydrocarbon gas liquids
HP = hydroelectric pumped storage
JF = jet fuel
KS = kerosene
LU = lubricants
MG = motor gasoline
MS = miscellaneous petroleum products
NG = natural gas, including supplemental gaseous fuels
NU = nuclear electric power
OH = other hydrocarbon gas liquids
OJ = other gases
OP = other petroleum products
P1 = asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and other petroleum products
P5 = other intermediate products (petroleum only)
PA = all petroleum products
PC = petroleum coke
PE = primary energy
PQ = propane
RF = residual fuel oil
SN = special naphtha
SU = product supplied
TE = total energy
TN = end-use energy consumption
WD = wood

WW = wood and waste
WX = waxes

SEDS assumes that there are no direct fuel costs for hydroelectric (HY), geothermal (GE), solar thermal and photovoltaic (SO), and wind (WY) energy. There are no price and expenditure MSNs for these energy sources. SEDS also assumes that all biofuels are consumed as a mixture with finished petroleum products, and therefore there are not separate price or expenditure data for biofuels.

The third and fourth characters in the SEDS variable names have several meanings and some are specific to only certain energy sources. First, many represent the energy-consuming sectors:

AC = transportation sector
CC = commercial sector
EG = electric power sector (generation)
EI = electric power sector (consumption)
ET = total cost of electricity generation (nuclear only)
IC = industrial sector
RC = residential sector
TC = total consumption of all energy-consuming sectors
TX = total end-use consumption

"TP" in the third and fourth characters represents per capita expenditures.

The third and fourth characters in the SEDS variable names also indicates activities such as trade and subsectors that SEDS uses to calculate prices and expenditures. Examples are:

EX = exports
GB = generating units net summer capacity total (all sectors)
IM = imports
IS = industrial consumption, costed
KC = coke plants (coal only)
NI = net imports
OC = industrial consumption, excluding coke plants
SU = product supplied

Lastly, the third and fourth characters in the SEDS variable names identify the activities used to calculate adjusted consumption for the expenditure calculations. Examples are:

AS = transportation sector adjusted consumption
CS = commercial sector adjusted consumption
IS = industrial sector adjusted consumption
RS = residential sector adjusted consumption

Table TN1.1. Geographic area codes used in the State Energy Data System

Code	State	Code	State
AK	Alaska	MT	Montana
AL	Alabama	NC	North Carolina
AR	Arkansas	ND	North Dakota
AZ	Arizona	NE	Nebraska
CA	California	NH	New Hampshire
CO	Colorado	NJ	New Jersey
CT	Connecticut	NM	New Mexico
DC	District of Columbia	NV	Nevada
DE	Delaware	NY	New York
FL	Florida	OH	Ohio
GA	Georgia	OK	Oklahoma
HI	Hawaii	OR	Oregon
IA	Iowa	PA	Pennsylvania
ID	Idaho	RI	Rhode Island
IL	Illinois	SC	South Carolina
IN	Indiana	SD	South Dakota
KS	Kansas	TN	Tennessee
KY	Kentucky	TX	Texas
LA	Louisiana	UT	Utah
MA	Massachusetts	VA	Virginia
MD	Maryland	VT	Vermont
ME	Maine	WA	Washington
MI	Michigan	WI	Wisconsin
MN	Minnesota	WV	West Virginia
MO	Missouri	WY	Wyoming
MS	Mississippi	US	United States

SC = total adjusted consumption, all sectors
SS = total adjusted consumption, all end-use sectors

Section 7 describes all the variables used in the calculation of adjusted consumption and Appendix A2 lists the MSNs and the formulas.

The fifth character of the SEDS variable name identifies the units or type of data:

B = consumption in British thermal units (Btu)
D = price in dollars per million Btu
K = factor for converting data from physical units to Btu
P = data in standardized physical units

S = share or ratio expressed as a fraction
V = expenditure in million dollars

There are a few variables that do not follow the convention, including most energy indicators variables, such as:

GDPRV = current-dollar gross domestic product (GDP)
TEGDS = total energy expenditures as percent of current-dollar GDP
TPOPP = resident population
ZWCDP = cooling degree days (CDD)
ZWHDP = heating degree days (HDD)

Throughout the technical notes, SEDS often describes the variables with a geographic identification attached to them. Geographic areas used in SEDS are the 50 states, the District of Columbia (represented by the U.S. Postal Service state abbreviations), and the United States as a whole. In SEDS, the term “state” includes the District of Columbia.

Table TN1.1 shows the geographic area codes used in SEDS prices and expenditures variables.

Section 2. Coal

The State Energy Data System (SEDS) estimates coal prices for: coking coal; steam coal (all noncoking coal); and coal coke imports and exports.

Coking coal is a high-quality bituminous coal used to make coal coke in the industrial sector. Steam coal can be used by all sectors, and includes anthracite, bituminous coal, subbituminous coal, and lignite. In the industrial sector, coal consumption is the sum of coking coal and steam coal. SEDS calculates the industrial coal price as the consumption-weighted average price of those two components.

Imports and exports of coal coke are available only at the national level and SEDS assumes all of them are accounted for in the industrial sector. SEDS reports imports and exports of coal coke separately and does not average them with other coal prices or expenditures.

Coking coal

Coking coal is usually more expensive than steam coal. Coking coal prices are those paid at coke plants for coal received and include insurance, freight, and taxes. SEDS uses data from Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users" (and previous survey forms on coke plants), published in the *EIA Annual Coal Report*.

Physical unit prices: 2005 forward

For 2005 forward, coking coal prices are available only for the United States, the East North Central Census Division, and for some states. SEDS assigns the East North Central price to the states in that division, except for states with published data (Indiana for 2007, 2014, and 2015 and Ohio for 2011 forward). SEDS calculates a consumption-weighted price for the states in all other Census divisions using the U.S. data excluding the East North Central data.

Physical unit prices: 1970 through 2004

Source publications contain physical unit prices for states, groups of states, or Census divisions. Individual state prices are used directly for their respective states. Where individual state prices are not available, the associated group or Census division prices are assigned. Wherever individual state, group, or Census division prices are unavailable, prices are assigned from adjacent or nearby states or Census divisions or from states with similar coal use patterns as shown in Table TN2.1.

Btu prices: all years

SEDS converts state-level coal coke prices from physical unit prices to dollars per million Btu using the state-level conversion factors for coking coal. SEDS calculates U.S. Btu prices as the consumption-weighted average of the state Btu prices, using SEDS consumption data.

Data sources

Prices

2000 forward: U.S. Energy Information Administration (EIA), *Annual Coal Report*, Table 35 (2000), Table 34 (2001 forward), https://www.eia.gov/coal/annual/.

1996 through 1999: EIA, *Coal Industry Annual 2000*, Table 96.

1981 through 1995: EIA, *Quarterly Coal Report*, October-December issue, Table A3 (1981-1991), Table 39 (1992-1994), and Table 31 (1995), https://www.eia.gov/coal/production/quarterly/.

1977 through 1980: EIA, *Coke and Coal Chemicals*, Table 19 (1977), Table 15 (1978), and Table 7 (1979, 1980).

1970 through 1976: Bureau of Mines, U.S. Department of the Interior, *Minerals Yearbook*, "Coke and Coal Chemicals" chapter, Table 22.

Consumption

1970 forward: EIA, State Energy Data System, coking coal consumption.

Conversion factors: all years

EIA, State Energy Data System, consumption technical notes, Appendix B. Data also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Table TN2.1. Coking coal state group price and adjacent state price assignments, 1970 through 2004

State	Years	State or division prices assigned
AL	1999, 2001–2004	East South Central
	2000	U.S.
CA	1970–1982	CA, CO, UT
CO	1970–1982	CA, CO, UT
IL	1986–1998	IN
	1999–2004	East North Central
IN	1997–2000	East North Central
KY	1970–1987	KY, MO, TN, TX
	1988–1998	OH
	1999–2004	East South Central
MD	1970, 1971	MD, NJ, NY
	1983–1991, 1993	PA
MI	1979	MI, MN, WI
	1980–1985, 1987	MI, WI
	1988–1991, 1993–1998	OH
	1999–2004	East North Central
MN	1970–1978	MN, WI
	1979	MI, MN, WI
MO	1970–1987	KY, MO, TN, TX
	1988	AL
NJ	1970, 1971	MD, NJ, NY
NY	1970, 1971	MD, NJ, NY
	1972–1982	MD, NY
	1983–1998	PA
	1999	Middle Atlantic
	2000–2004	East North Central
OH	1997–2004	East North Central
PA	1997–1999	Middle Atlantic
	2000–2004	East North Central
TN	1970–1987	KY, MO, TN, TX
	1988–1991	AL
TX	1970–1987	KY, MO, TN, TX
UT	1970–1982	CA, CO, UT
	1983–1986	TX
	1988–1998	IN
	1999–2001	East North Central
VA	1970, 1971, 1976, 1977	WV
	1978–1982	VA, WV
	1983–1986	KY
	1987–1998	OH
	1999–2004	East North Central
WI	1970–1978	MN, WI
	1979	MI, MN, WI
	1980–1985, 1987	MI, WI
WV	1978–1982	VA, WV
	1983–1986	KY
	1987–1998	OH
	1999–2004	East North Central

Steam coal

Steam coal is used in all sectors. Price data are usually available for the electric power and industrial sectors. However, no price data are available for the commercial sector before 2008 and the transportation sector, which reported coal consumption through 1977. SEDS assigns the industrial sector steam coal prices to those two sectors for those time periods. Described below are the methods and data sources used to estimate coal prices by sector. SEDS also adjusts the amount of industrial steam coal consumption to account for intermediate process fuels and avoid double counting (see the discussion in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php).

Residential sector

SEDS residential sector steam coal price estimates represent the average prices of coal purchased by residential customers and include taxes. For 2008 forward, EIA assumes there is zero residential sector coal consumption in the United States, and SEDS does not estimate a price.

Physical unit prices: 1979 through 2007

Residential steam coal Btu prices for 1979 forward are not available. State-level spot prices for coal paid by the electric power sector are used in a regression equation to estimate state-level residential steam coal prices for 1979 forward. The residential steam coal prices calculated for 1974 through 1978 from the American Gas Association *Gas Househeating Survey* (GHS) and the average Btu spot prices from the EIA *Cost and Quality of Fuels for Electric Utility Plants* (C&Q) for 1974 through 1978 are used to develop the regression equation. Electric power coal spot prices from the C&Q for 1979 forward are converted from cents per million Btu to dollars per million Btu.

Some states have GHS residential prices during the 1974 through 1978 period to use in the regression analysis, but are missing electric power sector prices in the 1979 forward data used to calculate prices. For these missing data, spot prices are assigned from other states for use in the regression, as shown in Table TN2.2. C&Q prices for ND and MT for some years result in a negative price when used in the regression; therefore MN spot prices are assigned to ND for use in the regression and the WY final residential sector steam coal price is assigned to MT as shown in Table TN2.2 and Table TN2.3.

Table TN2.2. Residential sector: electric power coal spot price assignments, 1979 through 2007

State	Years	State prices assigned	State	Years	State prices assigned
CO	1979, 1981	KS	NH	1974, 1975, 1981, 1983	VT
CT	1975	NY		1984, 1985	MA
	1976–1979, 2001–2007	NH	NJ	2007	NY
	1980–1987, 1993–1995, 2000	MA	NV	1975–1978, 1983–1989, 1992, 1993, 1995	CO
DC	1976–1999	MD		2006	UT
	2001–2005, 2007	VA	PA	2006, 2007	OH
DE	2006, 2007	VA	RI	1974	CT
ID	1974, 1979–1982, 1996–2005	NV		1975	VT
	1975–1977	SD		1976–1979, 2001–2007	NH
	1978	ND		1980–2000	MA
	1983–1995	CO	SD	1978, 1984	ND
	2006, 2007	UT		1979–1983, 1986, 1987, 1989,	MN
MA	1975	VT		1991–2001	
	1976–1979, 2001, 2007	NH		2005, 2007	IA
MD	2001–2007	VA	UT	1975–1978, 1980, 1983, 2000	CO
ME	1974, 1975, 1981, 1983	VT		1979	NV
	1976–1980, 1982, 1986, 1996–2007	NH	VT	1976, 1980, 2001–2007	NH
	1984, 1985	MA		1984–2000	MA
MN	2005, 2006	IA	WA	1970, 2001–2007	OR
MT	1974, 1975, 1978	ND		1974–1978, 1983–1985	CO
	1976, 1977	SD		1979–1982	NV
	1979–1982	NV	WY	1974–1976, 1978, 1982, 1985,	CO
ND	1976, 1977	SD		2005-2007	
	1979–2001	MN			

Price estimates for 1974 through 1978 for some states are not available be-cause there was no consumption. To calculate prices for 1979 forward, these states are assigned the final prices from selected states as shown in Table TN2.3. In addition, several states are assigned the simple average of the final prices of adjacent states as shown in Table TN2.3. Alaska residential coal prices are estimated by using a different methodology, described below.

Physical unit prices: 1971 through 1978

For 1971 through 1978, Btu steam coal prices are calculated by using data from GHS. The price for a state is equal to the simple average of the city/utility price observations for that state. For 1971 and 1972, GHS reports physical unit prices rather than Btu prices (as published for 1973 through 1978) and, therefore, the state-level conversion factors for this sector from SEDS are used to convert to Btu prices for those years. AK residential coal prices are estimated by using a different methodology, described below.

A simple average of price observations in CT, MA, ME, NH, RI, and VT is assigned to each of these states. To impute other missing prices in the 1971 through 1978 period, states are assigned simple averages of adjacent state prices or are directly assigned the single price of an adjacent or nearby state as listed in Table TN2.4.

Physical unit prices: 1970

Because state-level coal price data for 1970 are not available from either GHS or C&Q, the 1970 residential sector coal prices are calculated by using the 1971 through 1978 data from the Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, for the 39 states, with some reported coal use from 1971 through 1983 and regression analysis.

Table TN2.3. Residential sector coal final price assignments, 1979 through 2007

State	Years	State and averaged final prices assigned
AR	1980, 1982, 1984, 1985,	AL
	1987–1995, 1998, 2002, 2004–2007	
	1999	MO
	1981	MO, OK, TN, TX
	1983	MO, MS, OK, TN
AZ	1982, 1984, 1985	CA, NM, NV, UT
	1987, 1988, 1990–1995, 1998–2007	UT
CA	1979–1985	NV
	1987–2004	WA
	2005, 2006	UT
FL	1980–1996, 1998, 1999–2002	GA
	2003–2007	AL
LA	1980, 1982, 1984, 1986, 1988,	AL
	1991, 1993, 1995, 1997, 2000, 2007	
MS	1979, 1980, 1983, 1984, 1986–1995,	AL
	1997	
	1985	AL, AR, TN
MT	1986–2002	WY
NM	1979–2007	CO
OK	1979–1999, 2001–2007	CO
OR	1979, 1980, 1982–2000	WA
	1981	CA, ID, NV, WA
TX	1980–1982, 1985–2007	CO

For estimating the 1970 prices, states missing *Statistical Yearbook* data are assigned prices as follows: ID for 1970 through 1978 from MT; MA for 1976 through 1978 from CT; ME for 1970 through 1978 from NH; RI for 1973 and 1975 through 1978 from CT; and WA for 1970 through 1972 from OR. DC, DE, and MD are all assigned the combined *Statistical Yearbook* price for those states. Wherever individual state prices are unavailable, prices are assigned from an adjacent or nearby state as follows: CA from NV; NM from CO; OK from CO; OR from WA; and TX from CO. AK residential coal prices are estimated by using a different methodology, described as follows.

Alaska prices: all years

For 1994 through 2007, SEDS estimates Alaska's residential coal prices using an informal survey of the state's only coal supplier. For 1978 through 1993, SEDS estimates Alaska's residential prices as the product of the Washington residential prices and the average ratio of Alaska-to-Washington prices during 1970 through 1977. For 1970 through 1977, SEDS estimates Alaska's residential prices using the ratio of Alaska-to-

Table TN2.4. Residential sector spot coal price assignments, 1971 through 1978

State	Years	State assigned or averaged prices
AL	1971	TN
AR	1977, 1978	AL
CA	1971, 1972, 1974, 1978	NV
DC	1971–1978	MD
DE	1971, 1972, 1974, 1976, 1977	MD
GA	1971	NC, TN
	1972	AL, NC, TN
ID	1977	MT, UT, WY
KS	1971, 1972	CO, MO
MN	1971	IA, ND, WI
	1972	IA, WI
MS	1978	AL
MT	1971	ID, ND, WY
	1972, 1973	ID, WY
ND	1972	IA, WI
	1973	MN, SD
	1974	MN, MT, SD
NE	1971, 1972	CO, IA, MO, WY
	1975	CO, IA, KS, MO, SD, WY
NJ	1971, 1972, 1974, 1977, 1978	DE, NY, PA
NM	1971	CO
NV	1971, 1972, 1975	ID, UT
	1973	ID, OR, UT
OK	1971–1978	CO
OR	1971–1978	WA
SC	1971, 1972	NC
SD	1971	IA, ND, WY
	1972	IA, WY
TX	1971–1974, 1977	CO
UT	1974, 1978	CO, ID, NV, WY
WA	1971, 1972, 1974	ID
	1977	MT, UT, WY
WV	1971, 1972	KY, MD, OH, PA, VA

U.S.-total electric utility sector prices.

Btu prices: all years

SEDS converts state-level residential coal prices from physical unit prices to dollars per million Btu using the state-level conversion factors for coal consumed by the residential and commercial sectors. SEDS calculates U.S. Btu prices as the consumption-weighted average of the state Btu prices, using SEDS consumption data.

Data sources

Prices

1974 through 2007: EIA, *Cost and Quality of Fuels for Electric Plants*, average spot coal prices, Table 2 (1974-1979), Table 44 (1980 through 1982), Table 49 (1983, 1984), Table 39 (1985-1989), Table 8 (1990, 1991), and Table 3 (1992 through 2007), https://www.eia.gov/electricity/data/eia423/ and https://www.eia.gov/electricity/data/eia923/eia906u.html.

1994 through 2007: Alaska price estimated from informal discussions with Usibelli Coal Mine Co., the only coal supplier in Alaska.

1971 through 1978: American Gas Association, *Gas Househeating Survey*, table titled "Competitive Fuel Prices."

1970 through 1978: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, Table 43S.

Consumption

1970 through 2007: EIA, State Energy Data System, residential sector coal consumption.

Conversion factors: 1971, 1972

EIA, State Energy Data System, consumption technical notes, Appendix B. Data also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Commercial sector

Physical unit prices: 2008 forward

For 2008 forward, SEDS uses commercial coal prices from Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users," published in EIA's *Annual Coal Report*. Prices include insurance, freight, and taxes.

Table TN2.5. Commercial sector final price assignments, 1970 through 2007

State	Years	State prices assigned
CT	1980	NY
	1995–2004, 2006, 2007	MA
DC	1980–2005, 2007	MD
NH	1994, 1996–2007	MA
NJ	2007	NY
OK	1970	KS
OR	1999, 2000	WA
RI	1982, 1983, 1991–2007	MA
VT	1993–1997, 2000, 2005–2007	MA

SEDS estimates prices for states that have withheld or unavailable data by applying the ratio between the U.S. commercial steam coal price and the U.S. industrial steam coal price to the state's industrial steam coal price. For the District of Columbia, which does not have any commercial or industrial steam coal prices, SEDS uses Maryland's industrial steam coal prices for 2008 through 2015 and Virginia's commercial steam coal prices for 2016 forward.

Btu prices: 2008 forward

SEDS converts state-level commercial coal prices from physical unit prices to dollars per million Btu using the state-level conversion factors for coal consumed by the commercial sector. SEDS estimates the Alaska prices using an informal survey from the state's only coal supplier. SEDS calculates U.S. Btu prices as the consumption-weighted average of the state Btu prices, using SEDS consumption data.

Btu prices: 1970 through 2007

Commercial sector prices are assigned industrial steam coal prices. States without Btu industrial steam coal prices are assigned the prices from adjacent states, as shown in Table TN2.5. The Alaska prices for 1994 through 2007 are estimated from an informal survey of the single coal supplier in the state. U.S. Btu prices are calculated as the average of all states' Btu prices, weighted by consumption data from SEDS.

Data sources

Prices

2008 forward: EIA, *Annual Coal Report*, Table 34, https://www.eia.gov/

coal/annual/. Also available at the Coal Data Browser at https://www.eia.gov/coal/data/browser/ for 2008 forward.

1970 through 2007: Assigned industrial steam coal prices.

Consumption

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

Conversion factors: 2008 forward

EIA, State Energy Data System, consumption technical notes, Appendix B. Data also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Industrial sector

For 1980 forward, SEDS uses quarterly industrial coal prices from Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users" and predecessor forms, which collects manufacturers' coal stocks, receipts, prices, and consumption. From 1980 through 1988, all manufacturers that consumed coal were required to respond to Form EIA-3. For 1989 forward, EIA only collects data from manufacturers that consumed 1,000 or more tons per year. Data prior to 1980 are based on the monthly average cost of coal sold to manufacturing firms.

Physical unit prices: 1980 forward

For 1984 forward, EIA's *Annual Coal Report* and predecessor publications publish state prices, including insurance, freight, and taxes. For 1980 through 1983, SEDS uses data directly from Form EIA-3, and predecessor forms.

SEDS usually estimates industrial prices for states that have withheld or unavailable data using available growth rates, simple averages of the published data for adjacent states, or published Census division prices. Table TN2.6 shows the adjacent state and Census division price assignments.

The source withholds Washington's prices for 1999 forward. Usually Washington prices are higher than the Census division price. For 1999 forward, SEDS estimates the Washington prices as the product of the Pacific Division prices and the average ratio of Washington-to-Pacific Division prices for 1995 through 1998. In 2002, the price for the Pacific Division is withheld and SEDS uses the average Pacific Division price from 1999 through 2001.

North Dakota has the largest coal consumption among the states in the West North Central Division, but the source withholds its price data for 1984 through 2000. SEDS estimates North Dakota's prices by subtracting the calculated expenditure (the product of consumption and price) of the states in the West North Central Division with reported prices from the Division's calculated expenditure. SEDS divides this difference with the consumption of the remaining states.

For 2013 forward, SEDS estimates the price for Maryland as the product of the U.S. price and the previous year's ratio of the Maryland price to U.S. price. For 2019, SEDS derives the price for New York by subtracting the calculated expenditure of Pennsylvania from that of the Middle Atlantic Division and dividing it by New York's consumption. For 2020, SEDS estimates the price for West Virginia using the growth rate of the South Atlantic Census Division price.

For 1998 through 2000 and 2002, the source withholds prices for the New England Division. SEDS estimates the New England Division prices as the average ratio of the New England to the East North Central price from 1995 through 1997 applied to the East North Central prices for those years. The source also withholds the New England Division prices for 2006 and 2008 through 2011. SEDS estimates the New England Division prices as the average ratio of the New England to the East North Central price from 2003 through 2005 applied to the East North Central prices for those years. For 2013 forward, the source also withholds the New England Division prices. SEDS calculates a consumption-weighted annual percent change for the New England Division using the annual percent changes for Massachusetts and Maine, which are available in the *Annual Coal Report*, and applies it to the previous year's New England Division price.

Physical unit prices: 1971, 1974 through 1979

For 1971, and 1974 through 1979, available cost and quantity of bituminous coal, lignite, and anthracite from the *Annual Survey of Manufactures* (ASM) or *Census of Manufactures* (CM) are used to calculate prices as average cost per unit of sales for covered states. (States with undisclosed data are not considered covered.) Although it is not clear from the data sources, the prices probably include taxes.

For states with industrial steam coal use and for which ASM or CM data are not available in 1971 and 1974 through 1979, adjacent state simple averages of available ASM/CM data are used to impute prices. The assigned prices from adjacent states are shown in Table TN2.7.

Table TN2.6. Industrial sector steam coal price assignments, 1980 forward

State	Years	Prices used in the assignment	State	Years	Prices used in the assignment
AR	2010, 2012–2014	TX		1982, 1983, 1987–1990, 1992	CO, IA, KS, MO, WY
	2015–2023	MO, OK, TN, TX		1991, 1993–1999	CO, IA, KS, MO, SD, WY
AZ	1980	CA, UT		2000	IA, MO, SD, WY
	1981, 1984–1986	CA, CO, UT	NH	1980–1983	NY
	2013–2018	CA, CO, NV, UT		1984–1993, 1995	New England
	2019–2023	CA, NV, UT	NJ	1980–1997, 2000–2006	NY, PA
CO	1980	KS, UT		1998, 1999	PA
	2000	UT, WY	NM	1980, 2013, 2014	TX, UT
	2001	KS, NE, OK, UT, WY		1981	CO, OK, TX
	2002, 2003	KS, NE, UT, WY		1982, 1983	AZ, CO, OK, TX
	2004–2007	AZ, KS, NE, OK, UT, WY		1984–1986, 2015–2018	CO, OK, TX, UT
	2008	AZ, NE, OK, UT, WY		1987	AZ, CO, OK, TX, UT
	2009–2011	AZ, NE, UT, WY		1988–1999	AZ, CO, TX, UT
	2019–2023	Mountain		2000, 2002, 2003, 2009–2012	AZ, TX, UT
CT	1981–1994, 2005, 2006	New England		2001, 2004–2008	AZ, OK, TX, UT
DC	1980, 1981	MD		2019–2023	OK, TX, UT
DE	1980–2003	MD	NV	1980, 1981, 1984–1986	CA, ID, UT
	2004–2009	MD, PA		1983, 1987–1998, 2000–2011	AZ, CA, ID, UT
	2016	PA		1999	AZ, CA, UT
FL	1980	AL, GA	NY	1998, 1999	PA
	2023	AL	OK	1980	AR, KS, MO, TX
GA	2023	AL, NC, SC, TN		1984–1999	AR, CO, KS, MO, TX
HI	1982, 1983, 1987–2016	CA		2000	AR, MO, TX
ID	1999	UT, WY	OR	1980, 1981, 1983–1998	CA, ID, WA
	2016–2021	MT, NV, UT, WY		1982	CA, ID, NV, WA
IL	2022, 2023	IA, IN, KY, MO, WI		2002–2014	CA, ID
KS	2000, 2008–2014	MO		2015, 2023	CA, ID, NV
	2015–2018	CO, MO, NE, OK		2017–2022	CA, NV
	2019–2023	MO, NE, OK	RI	1980, 1981	NY
LA	1980–2009	AR, TX		1984–1990	New England
	2010–2023	TX	SD	1980	IA, MN, MT
MA	1980–1983	NY		1981	IA, MN, MT, NE
	1984–2019	New England		1982	IA, MN, MT, WY
ME	1980–1983	NY		1983, 1987–1990, 1992–1995	IA, MN, WY
	1984–2020	New England		1984–1986	IA, MN, NE
MS	1980–2009	AL, AR, TN		2003–2014	IA, MN, NE, WY
	2010–2015, 2019–2023	AL, TN		2015–2023	IA, MN, MT, ND, NE, WY
MT	1983, 1987–1990, 1992, 2003–2011	ID, WY	VT	1980–1983	NY
	1984–1986	ID		1984–1992, 1997–1999	New England
	1991, 1993–1998, 2000–2002	ID, SD, WY	WV	1980	KY, MD, OH, PA, VA
	1999	SD, WY	WY	1980	ID, MT, UT
ND	1980–1982	MN, MT		1981	CO, ID, MT, NE, UT
	1983	MN		1984–1986	CO, ID, NE, UT
NE	1980	IA, KS, MO			

Table TN2.7. Industrial sector steam coal price assignments for 1971 and 1974 through 1979

State	Years	State prices used in the assignment	State	Years	State prices used in the assignment
AR	1971, 1974, 1975	MO, TN	NE	1979	IA, MO
	1979	MO, TN, TX	NH	1971, 1974–1979	MA
AZ	1971	CA, NV, UT	NM	1971	CO, OK, TX, UT
	1974–1978	CA, UT		1974, 1976–1978	KS, UT
CO	1974–1978	KS, NE, UT		1979	UT
	1979	UT	NV	1974	CA, OR, UT
CT	1974–1978	MA, NY		1975–1979	CA, UT
	1979	NY	OK	1974, 1975	KS, MO
DC	1971, 1974–1979	MD, VA		1976–1978	AR, KS, MO
DE	1971, 1974–1979	MD, NJ, PA		1979	MO, TX
FL	1979	AL, GA	OR	1975–1978	CA
ID	1974	OR, UT		1979	CA, WA
	1975–1978	UT	RI	1971, 1974–1978	MA
	1979	UT, WA		1979	NY
KS	1979	MO	SD	1971, 1974	IA
LA	1978	AR		1975–1978	IA, MN, NE
	1979	TX		1979	IA, MN
MA	1979	NY	TX	1974, 1975	KS
ME	1975–1978	MA		1976–1978	AR, KS
	1979	NY	VT	1971, 1974–1978	MA
MS	1971, 1974, 1975, 1979	AL, TN		1979	NY
	1976–1978	AL, AR, TN	WA	1974	CA, OR
MT	1974–1978	MN, NE, UT		1975–1978	CA
	1979	MN, UT	WY	1974–1978	NE, UT
ND	1974–1979	MN		1979	UT

Physical unit prices: 1970, 1972, 1973

Steam coal industrial sector prices for 1970, 1972, and 1973 (years for which no ASM/CM prices are available) are estimated by using regression techniques. Values for the independent variable are steam coal electric utility sector physical unit prices, and values for the dependent variable are the steam coal industrial physical unit prices (from ASM or estimated, as described above) for 1971 and 1974 through 1977. A few states are assigned electric utility prices for the dependent variable in the regression, as shown in Table TN2.8. Wherever individual state prices remain unavailable after the estimation that used the above regression techniques, prices are assigned from adjacent or nearby states, as shown in Table TN2.9.

Physical unit prices: Alaska, all years

For 1994 and 1996 forward, SEDS estimates the Alaska steam coal industrial sector prices using an informal survey from the state's only coal supplier. There is no steam coal consumption reported for Alaska's industrial sector for 1995. For all other years with industrial steam coal use in Alaska (1993, and 1970 through 1977), SEDS assumes the ratio of industrial Alaska to the U.S. prices are the same as the ratio of the Alaska and U.S. prices in the electric power sector.

Btu prices: all years

SEDS converts state-level commercial coal prices from physical unit prices to dollars per million Btu using the conversion factors for steam coal consumed by the industrial sector. SEDS calculates the U.S. Btu

Table TN2.8. Industrial sector price assignments used in the regression equation for 1971 and 1974 through 1979

State	Years	State prices assigned
AR	1973–1977	MO
CA	1970–1977	NV
CT	1975–1977	NY
DC	1976, 1977	MD
ID	1970–1977	MT
MA	1976, 1977	NH
ME	1970–1977	NH
OK	1973–1975	KS
OR	1973–1977	WA
TX	1970	NM
WA	1970–1972	OR

prices as the consumption-weighted average of all states' Btu prices, adjusted for process fuel and coking coal consumption.

Data sources

Prices

2000 forward: EIA, *Annual Coal Report*, Table 35 (2000), Table 34 (2001 forward), https://www.eia.gov/coal/annual/. Also available at the Coal Data Browser at https://www.eia.gov/coal/data/browser/ for 2001 forward.

1991, 1996 through 1999: EIA, *Coal Industry Annual 2000*, Table 94.

1988, 1993 through 1995: EIA, *Coal Industry Annual 1997*, Table 94.

1987 and 1992: EIA, *Coal Industry Annual 1996*, Table 94.

1985 and 1990: EIA, *Coal Industry Annual 1994*, Table 94.

1984 and 1989: EIA, *Coal Industry Annual 1993*, Table 94.

1986: EIA, *Coal Industry Annual 1995*, Table 94.

1980 through 1983: Form EIA-3, "Quarterly Coal Consumption Report-Manufacturing Plants," Table 25 (1980), Table 11 (1981 and 1982), and Table 2 (1983).

1971, 1974 through 1979: Census Bureau, U.S. Department of Commerce, *Annual Survey of Manufactures and Census of Manufactures*, Table 4 (1971) and Table 3 (1974-1979).

1970, 1972, 1973: Steam coal electric utility sector physical unit prices used in a regression equation with industrial sector prices from 1971 and 1974 through 1979.

Table TN2.9. Industrial sector final price assignments for 1970, 1972, and 1973

State	Years	State prices assigned
AR	1972	MO, TN
NH	1970, 1972, 1973	MA
RI	1970, 1972, 1973	MA
SD	1970, 1972, 1973	IA
VT	1970, 1972, 1973	MA

Consumption

1970 forward: EIA, State Energy Data System, industrial (other than coke plants) coal consumption.

Conversion factors: all years

EIA, State Energy Data System, consumption technical notes, Appendix B. Data also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Transportation sector

In 1970, transportation use of coal accounted for 298 of the 523,231 thousand short tons of total coal consumed in the United States and no coal was used for transportation after 1977. For all years, SEDS assumes transportation sector steam coal prices are the same as industrial sector steam coal prices. SEDS calculates U.S. Btu prices as the consumption-weighted average of the state Btu prices, using SEDS consumption data.

Electric power sector

Btu prices: 2002 forward

SEDS estimates most state Btu prices, including insurance, freight, and taxes, using unpublished cost data from Form EIA-923, "Power Plant Operations Report," and predecessor forms. When the source does not have state prices for the electric power sector, then SEDS uses the state's electric utility sector coal prices or the Census division prices, as shown in Table TN2.10. See the "Alaska prices: all years" section below for how SEDS estimates Alaska prices.

For 2016 forward, the source does not have prices for New Jersey or New York. Instead of assigning the Middle Atlantic Division price, SEDS estimates New Jersey and New York prices using the annual growth rate of the Middle Atlantic Division price applied to the 2015 price.

Table TN2.10. Electric power sector price assignments, 2002 forward

State	Years	Prices assigned	State	Years	Prices assigned
AL	2002, 2005, 2008–2011	Electric utility	MN	2005, 2008, 2009	Electric utility
AR	2010–2023	Electric utility	MS	2002, 2005–2023	Electric utility
CA	2005–2010	Electric power sector, Pacific	MT	2002, 2005–2021	Electric utility
	2011	Electric power sector, Pacific Contiguous		2022, 2023	Electric power sector, Mountain
	2012–2014	Electric utility, Pacific Contiguous	NC	2002, 2005, 2006, 2016,	Electric utility
CO	2008, 2010	Electric utility		2019, 2021	
CT	2002, 2005–2012, 2015	Electric power sector, New England	NV	2008–2023	Electric utility
	2013, 2014, 2016–2020	Electric utility, New England	OH	2002, 2005, 2012–2015,	Electric utility
DE	2002, 2005–2023	Electric power sector, South Atlantic		2018, 2022	
FL	2013–2017	Electric utility	OK	2002, 2005–2018	Electric utility
HI	2002, 2005–2010	Electric power sector, Pacific	PA	2019, 2020, 2022, 2023	Electric power sector, Middle Atlantic
	2011, 2015–2022	Electric utility, Pacific Noncontiguous		2021	Electric utility
	2012–2014	Electric utility, Pacific	SC	2008–2012, 2019–2023	Electric utility
IL	2016, 2017, 2019–2021, 2023	Electric utility	TX	2005–2009, 2019–2023	Electric utility
IN	2002, 2005–2007, 2009–2023	Electric utility	UT	2005–2011	Electric utility
KY	2005–2008	Electric utility	VA	2011, 2012, 2016–2019	Electric utility
LA	2002, 2005–2023	Electric utility	WA	2002, 2005–2010	Electric power sector, Pacific
MA	2005, 2010–2012, 2015	Electric power sector, New England		2011	Electric power sector, Pacific Contiguous
	2013, 2014, 2016, 2017	Electric utility, New England		2012–2020	Electric utility, Pacific Contiguous
MD	2020–2023	Electric power sector, South Atlantic	WI	2005–2009	Electric utility
ME	2002, 2005–2012, 2015	Electric power sector, New England	WV	2007–2010	Electric utility
	2013, 2014, 2016–2020	Electric utility, New England	WY	2006–2023	Electric utility
MI	2002, 2005–2023	Electric utility			

For 2021 forward, the source does not have prices for Connecticut, Maine, New Hampshire, or the New England Division. Where necessary, SEDS estimates prices for these states using the annual growth rate of the United States price applied to the 2020 New England Division price. For 2021 forward, the source does not have a price for Washington or the Pacific Contiguous Division. SEDS estimates the Washington price using the annual growth rate of the United States price applied to the 2020 Pacific Contiguous Division price.

Btu prices: 1973 through 2001

State Btu prices, including insurance, freight, and taxes, are taken from the EIA *Cost and Quality of Fuels for Electric Utility Plants* for 1973 through 2001 and are converted from cents to dollars per million Btu. Where individual state prices are withheld or unavailable, quantity-weighted Census division prices are assigned as shown in Table TN2.11. Price estimates for Alaska are explained below.

Btu prices: 1970 through 1972

Btu prices for states are taken from the Edison Electric Institute's *Statistical Yearbook* and are converted from cents to dollars. Delaware, DC, and Maryland are each assigned the combined price for the three states. The steam coal electric utility sector Alaska price for 1971 is estimated as discussed below.

Alaska prices: all years

For 2008 through 2011 and for 2015 forward, the EIA-923 source has prices for Alaska, as published in Table 6 of EIA's *State Electricity Profiles*. For 2012 through 2014, SEDS applies the annual price growth rate provided by the state's only coal supplier (Usibelli Coal Mine) to the previous year price.

Before 2008, the sources do not have prices for Alaska. For 1994 through 2007, SEDS estimates the Alaska prices using an unpublished informal

Table TN2.11. Electric power sector price assignments, 1973 through 2001

State	Years	State/Census division prices assigned
CA	1989–2001	Pacific
CT	1975–1979,2000, 2001	New England
DC	1976	MD, VA
HI	1990–2001	Pacific
MA	2001	New England
MD	2001	South Atlantic
ME	1990–2001	New England
OK	1973, 1974	West South Central
	1975	CO, KS, MO, NM, TX
OR	1983, 1989	Pacific
RI	1974	MA
VT	1980, 1983–1986	New England
WA	2001	Pacific

survey from Usibelli Coal Mine. For 1970 through 1993, SEDS estimates the Alaska Btu prices using data from the Edison Electric Institute's *Statistical Yearbook*. For 1970, 1972, 1974, 1976, 1977, and 1979 through 1993, SEDS directly uses prices from the *Statistical Yearbook*. SEDS estimates the 1971, 1973, 1975, and 1978 prices using the average ratio of Alaska to U.S. prices applied to the *Statistical Yearbook* prices. SEDS uses the 1970 and 1972 average ratio to estimate the 1971 and 1973 prices; the 1974 and 1976 average ratio for the 1975 price; and the 1977 and 1979 average ratio for the 1978 price.

U.S. prices: all years

SEDS calculates the U.S. Btu prices as the consumption-weighted average of the state Btu prices, using SEDS consumption data.

Data sources

Prices

2002 forward: For all states except Alaska, unpublished data from EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

2008 through 2011 and for 2015 forward: Alaska price data from EIA-923, *State Electricity Profiles*, Table 6.

1994 through 2007 and 2012 through 2014: Alaska price estimated from informal discussions with Usibelli Coal Mine Co., the only coal supplier in Alaska.

2001: FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," database, available via the EIA website at https://www.eia.gov/electricity/data/eia423/.

1973 through 2000: EIA, *Cost and Quality of Fuels for Electric Utility Plants*, https://www.eia.gov/electricity/data/eia923/eia906u.html, Table 3 (1973-1979), Table 51 (1980-1982), Table 50 (1983, 1984), Table 40 (1985-1989), Table 7 (1990, 1991), and Table 2 (1992 through 2000).

1970 through 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), Table 29 (1989-1993).

Consumption

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

Conversion factors: all years

SEDS directly uses Btu prices from the data sources; no explicit conversion factors are used.

Coal coke imports and exports

Imports and exports of coal coke are components of total U.S. energy consumption and are accounted for in the industrial sector. Prices and values of imports and exports are developed only for the United States; no attempt is made to estimate state-level prices or expenditures. The quantities of U.S. coal coke imports and exports are taken from SEDS.

Physical unit prices: all years

For 1980 forward, the EIA *Coke Plant Report*, the EIA *Quarterly Coal Report*, and the U.S. Census Bureau provide physical unit coal coke import and export prices in dollars per short ton. For 1970 through 1979, *Coke and Coal Chemicals, International Coal*, and the *Minerals Yearbook* provide coal coke import and export physical unit quantities and values in short tons and dollars, respectively. Values are equivalent to expenditures.

Btu prices: all years

For 1980 forward, Btu prices are computed by dividing the physical unit prices by the conversion factor to calculate prices in dollars per million Btu. For 1970 through 1979, physical unit prices are computed by dividing the import and export values by their respective quantities, and Btu prices are computed by dividing the physical unit prices by the conversion factor.

Data sources

Prices

2012 forward: EIA, Coal Data Browser, total world price for coke exports https://www.eia.gov/coal/data/browser/#/topic/42?agg=2,1,0&rank=ok&linechart=~COAL.EXPORT_PRICE.COK-TOT-TOT.A&columnchart=COAL.EXPORT_PRICE.TOT-TOT-TOT.A&map=COAL.EXPORT_QTY.TOT-TOT-TOT.A&freq=A&start=2000&end=2022&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin= and imports https://www.eia.gov/coal/data/browser/#/topic/40?agg=2,1,0&rank=ok&linechart=~COAL.IMPORT_PRICE.COK-TOT-TOT.A&columnchart=COAL.IMPORT_PRICE.TOT-TOT-TOT.A&map=COAL.EXPORT_QTY.TOT-TOT-TOT.A&freq=A&start=2000&end=2022&ctype=linechart&ltype=pin&rtype=s&pin=&rse=0&maptype=0. Calculated using data from the Census Bureau, U.S. Department of Commerce, “Monthly Report IM 145” and “Monthly Report EM 545.”

1989 through 2011: Calculated by EIA using data from the Census Bureau, U.S. Department of Commerce, “Monthly Report IM 145” and “Monthly Report EM 545.”

1981 through 1988: EIA, *Quarterly Coal Report*, October-December issues, Tables A11 and A13 (1981-1985) and Tables A10 and A12 (1986-1988).

1980: EIA, *Coke Plant Report*, Tables 7 and 8.

1978 through 1979: EIA, *Coke and Coal Chemicals 1979*, Tables 5 and 6.

1977: National Coal Association, *International Coal 1980*, tables titled “U.S. Imports of Solid Fuels and Customs Value” and “U.S. Exports of Coke and Value.”

1976: EIA, *Coke and Coal Chemicals*, Tables 19 and 20.

1970 through 1975: Bureau of Mines, U.S. Department of the Interior, *Minerals Yearbook*, “Coke and Coal Chemicals” chapter, Tables 19 and 20.

Consumption

1970 forward: EIA, State Energy Data System, U.S. imports and exports of coal coke.

Conversion factors: all years

24.8 million Btu per short ton.

Section 3. Natural gas

The State Energy Data System (SEDS) estimates natural gas prices for the residential, commercial, industrial, transportation, and electric power sectors.

Natural gas prices for the end-use sectors are delivered prices to customers and are intended to include all federal, state, and local taxes, surcharges, and adjustments billed to consumers. For more information see *End-Use Taxes: Current EIA Practices*, page 18, https://www.eia.gov/finance/archive/0583.pdf.

SEDS calculates expenditures for natural gas as the product of the price estimates and the SEDS consumption estimates. SEDS adjusts the industrial sector consumption estimates to remove estimated refinery consumption and lease and plant use of natural gas. SEDS adjusts the transportation sector consumption estimates to remove pipeline fuel in each state. (See Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

The SEDS consumption estimates are for natural gas including supplemental gaseous fuels (SGF). SGF are introduced into or commingled with natural gas, and increase the volume available for disposition. Because SGF are mostly derived from fossil fuels, which are already accounted for in EIA's consumption data, SEDS removes SGF from total energy consumption in British thermal units (Btu) (see Sections 6 and 7 of the consumption technical notes) to eliminate any double counting. However, because there are no reliable data to estimate the price of SGF, SEDS does not remove SGF from the total energy expenditures estimates.

Residential, commercial, and industrial sectors

Physical unit prices: 1987 forward

All natural gas physical unit prices by state for the residential, commercial, and industrial sectors are taken from data collected on the Form EIA-176, "Annual Report of Natural and Supplemental Gas Supply and Disposition." Prices for deliveries to consumers are calculated using only "onsystem" sales data. The percentage of onsystem sales varies by state and by sector. In general, it is higher in the residential sector (see https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_VRX_pct_a.htm) and lower in the industrial sector (see https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_VFA_pct_a.htm).These prices are available on the U.S. Energy Information Administration's (EIA) website at https://www.eia.gov/naturalgas/data.php and published in the State Summaries tables of the EIA *Natural Gas Annual.*

Physical unit prices: 1970 through 1986

All natural gas physical unit prices for the residential, commercial, and industrial sectors are calculated from value and quantity of sales data from the *EIA Natural Gas Annual (*NGA*), Historical Natural Gas Annual (*HNGA*),* or its predecessor report, *Natural Gas Production and Consumption*. State prices are calculated directly from the data sources as average revenue per unit of sales by natural gas utilities. Prices for each of the three sectors are calculated by dividing the value of natural gas, reported in thousands of dollars, by the quantity of natural gas sold, as reported in million cubic feet.

For 1970 through 1979, both the value and quantity of sales data from the HNGA are reported as composites for Maryland and the District of Columbia, and for Maine, New Hampshire, and Vermont. In each case, the combined prices are assigned to each of the states in the composite.

Btu prices: all years

SEDS calculates state Btu prices for all years using the physical unit price series and the state-level average conversion factors for sectors other than electric power. The U.S. Btu price is the consumption-weighted average of the state Btu prices, adjusted for intermediate process fuel consumption in the industrial sector.

Data sources

Prices

1997 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PRS_DMcf_a.htm, https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PCS_DMcf_a.htm, and https://www.eia.gov/dnav/ng/ng_pri_ sum_a_EPG0_PIN_DMcf_a.htm.

1989 through 1996: Residential and Commercial—EIA website, at https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PRS_DMcf_a.htm and https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PCS_DMcf_a.htm. Industrial—EIA, *Historical Natural Gas Annual, 1930 Through 2000*, https://www.eia.gov/naturalgas/annual/archive/, Tables 31 and 32.

1987 and 1988: EIA, *Historical Natural Gas Annual, 1930 Through 2000*, https://www.eia.gov/naturalgas/annual/archive/, Table 26 (residential), Table 28 (commercial), and Table 31 (industrial).

1980 through 1986: Calculated from quantity and value data published in the EIA *Natural Gas Annual, Volume 1*, Table 11 (1980), Table 14 (1981 through 1985), and Table 15 (1986). Comparable price data are available in the EIA *Historical Natural Gas Annual*, *1930 Through 2000,* Table 26 (residential), Table 28 (commercial), and Table 31 (industrial).

1970 through 1979: Calculated from quantity and value data published in the Bureau of Mines, U.S. Department of the Interior, *Natural Gas Production and Consumption*, Table 6 (1970 and 1979) and Table 7 (1971 through 1978). Comparable price data are available in the EIA *Historical Natural Gas Annual*, 1930 Through 2000, Table 26 (residential), Table 28 (commercial), and Table 31 (industrial).

Consumption

1970 forward: EIA, State Energy Data System, residential, commercial, and industrial natural gas consumption.

Conversion factors: all years

EIA, State Energy Data System, consumption technical notes, Appendix B. Data also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Transportation sector

Physical unit prices: all years

SEDS transportation sector natural gas prices are estimates of vehicle fuel, mostly compressed natural gas (CNG), excluding natural gas pipeline use. SEDS transportation sector natural gas consumption includes natural gas used to move natural gas through pipelines and a relatively small amount of vehicle fuel. SEDS considers fuels used for pipeline operations to be intermediate process fuels, and therefore we remove SEDS removes that consumption for the energy expenditures calculation. See discussion in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php. Beginning in 1990, data for natural gas vehicle fuel use are available.

Before 1990, any natural gas used as vehicle fuel are included in the commercial sector. Much of the natural gas vehicle fuel data represent deliveries to fueling stations for fleet vehicles. For 1990 through 2012, SEDS natural gas vehicle fuel prices come from published data in EIA's *Natural Gas Annual*, based on data collected from survey EIA-176. After 2012, EIA no longer publishes the vehicle fuel prices collected from survey EIA-176 because of data quality concerns.

For 2013 forward, SEDS estimates natural gas vehicle fuel prices using historical EIA natural gas vehicle fuel prices and compressed natural gas (CNG) price data from the U.S. Department of Energy's Alternative Fuels Data Center (AFDC) quarterly *Clean Cities and Communities Alternative Fuel Price Reports*. To estimate, first SEDS calculates simple annual average CNG prices by state and by Petroleum Administration for Defense District (PADD) region using unpublished state data and published PADD region-level data, including taxes. Then, SEDS estimates its final state transportation sector natural gas vehicle prices by applying the annual average growth rate of the AFDC CNG price data to the previous year price, using the corresponding AFDC state data, when available, or PADD region data if no state data are available. Hawaii, Iowa, and South Dakota require special estimations because they have natural gas vehicle fuel consumption after 2012 and either lack 2012 EIA *Natural Gas Annual* prices or lack previous year SEDS price estimates. For Hawaii, SEDS assigns the commercial sector price to the transportation sector. For Iowa and South Dakota, SEDS assigns the average transportation sector price of the surrounding states (Illinois, Missouri, Minnesota, and Wisconsin for Iowa; Minnesota, Montana, North Dakota, and Wyoming for South Dakota).

For 1992 through 2012, SEDS assigns the average price of neighboring states for any state with missing vehicle fuel prices, as shown in Table TN3.1. The South Carolina price in 1998 is out of range and SEDS assigns it the Georgia price.

Btu prices: all years

SEDS calculates state Btu prices for all years using the physical unit price series and the state-level average conversion factors for sectors other than electric power. The U.S. Btu price is the vehicle fuel consumption-weighted average of the state Btu prices.

Table TN3.1. Natural gas vehicle fuel price assignments, 1992 through 2012

State	Year	State prices used
AK	1997–2012	WA
AL	2000–2005	FL, TN
	2006, 2007	FL, GA, TN
AR	2008–2011	OK, LA, MO, TN, TX
DE	1994	MD, NJ, PA
GA	1999	AL, FL, SC, TN
	2000–2005	FL, NC, SC, TN
HI	2005–2007	CA
IA	2001–2006	IL, MO, MN, WI
ID	2003–2005	MT, NV, OR, UT, WA, WY
KS	2004–2010	CO, MO, OK
KY	2004–2006	IL, IN, OH, MO, TN, VA
	2007–2012	IL, IN, MO, TN, VA
MD	2012	VA
ME	1992–2002, 2008–2012	MA
MI	2000–2006	IN, OH
	2007–2012	IN
MS	2002–2007	AR, LA, TN
	2008–2012	AL, LA, TN
NC	1996, 1997, 1999	SC, TN, VA
	1998	TN, VA
	2008	GA, SC, TN, VA
NE	1992, 1993	CO, IA, SD, WY
	1995–2000	CO, IA, KS, MO, SD, WY
	2001–2003	CO, KS, MO, WY
	2004–2006, 2008–2010	CO, MO, WY
	2007	CO, IA, MO, WY
NH	1996–2012	MA
NJ	2002	DE, NY, PA
	2007–2012	NY, PA
NM	1992, 1993, 2008	AZ, CO, OK, TX
OH	2007–2012	IN, PA
SC	1998	GA
SD	2001, 2003, 2004, 2006, 2010–2012	MN, MT, ND, WY
VT	1992–2012	MA
WV	2000–2011	MD
	2012	VA

Data sources

Prices

2013 forward: U.S. Department of Energy, Alternative Fuels Data Center, quarterly *Clean Cities and Communities Alternative Fuel Price Reports* Compressed Natural Gas (CNG) prices in gallons gasoline equivalent, including taxes. Unpublished state-level data. Published PADD region-level data from Table 5. https://afdc.energy.gov/publications?keyword=alternative%20fuel%20price%20report.

1990 through 2012: EIA, *Natural Gas Annual*, State Summaries tables, also available at https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PDV_DMcf_a.htm. Comparable price data through 1996 are available in the *Historical Natural Gas Annual 1930 Through 2000*, https://www.eia.gov/naturalgas/annual/archive/, Table 34.

Consumption

1990 forward: EIA, State Energy Data System, natural gas vehicle consumption.

Conversion factors: all years

EIA, State Energy Data System, consumption technical notes, Appendix B. Data also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Table TN3.2. Natural gas electric power sector price assignments, 1973 forward

State	Years	Price source	State	Years	Price source
AK	1973–1990	HNGA	NE	2008–2010	EIA-923 Sch 2 data
	2008–2010	EIA-923 Sch 2 data	NH	1973, 1974, 1987–1989	HNGA
AL	2011, 2013–2023	EIA-923 Sch 2 data		1983, 1996, 1998	C&Q, New England
AR	2011, 2013–2023	EIA-923 Sch 2 data		2003, 2004	MA, ME
AZ	2011, 2016, 2017, 2019–2021	EIA-923 Sch 2 data		2005–2007	MA, VT
CA	2023	EIA-923 Sch 2 data		2008–2020	EIA-923 Sch 2 data
CO	2012, 2013, 2016–2023	EIA-923 Sch 2 data		2021–2023	EIA-923 Sch 2 data, New England
CT	1974–1976	HNGA	NM	2003–2007	AZ, CO, OK, TX
	1973, 2000, 2001	C&Q, New England		2009–2012	EIA-923 Sch 2 data
	2003, 2004	MA, NY, RI	NV	2013, 2014	EIA-923 Sch 2 data
DC	2012	VA	OH	2011	EIA-923 Sch 2 data
	2016	MD	OK	2011, 2014–2023	EIA-923 Sch 2 data
DE	2003–2007, 2011	MD, NJ, PA	OR	1983, 1984, 1986, 1989, 1990	C&Q, Pacific
	2008–2010	EIA-923 Sch 2 data		2011–2023	EIA-923 Sch 2 data
	2012–2023	NJ, PA	PA	1973	HNGA
FL	2018, 2020, 2023	EIA-923 Sch 2 data	RI	1976, 1980	HNGA
GA	2021, 2023	EIA-923 Sch 2 data		1999–2001	C&Q, New England
IA	2008–2011	EIA-923 Sch 2 data		2014, 2016	CT, MA
ID	1983–1986	HNGA		2023	CT
	1974, 1987, 1996–2001	C&Q, Mountain	SC	1977	HNGA
	2003–2005	NV, OR, WA, WY		2003, 2004	GA, NC
	2006, 2007	NV, OR, WA		2005	GA
	2008–2014	EIA-923 Sch 2 data		2009–2017	EIA-923 Sch 2 data
IL	2011–2015, 2019–2020, 2023	EIA-923 Sch 2 data	SD	1983–1990	HNGA
IN	2011–2017	EIA-923 Sch 2 data		1997, 1999–2001	C&Q, West North Central
KY	2003–2005	IL, IN, OH, VA, WV		2005	GA
	2007	IL, IN, OH, VA		2009, 2010	EIA-923 Sch 2 data
	2008–2023	EIA-923 Sch 2 data	TN	1976, 1980, 1981, 1983, 1988–1996	HNGA
LA	2011,2013–2015, 2017–2023	EIA-923 Sch 2 data		1997–2001	C&Q, East South Central
MD	1973, 1974, 1983–1985	HNGA		2003, 2004	AL, AR, GA, MS, NC, VA
	2001	C&Q, South Atlantic		2005–2007	AL, AR, GA, MS, VA
	2012	PA, VA		2008	EIA-923 Sch 2 data
	2023	EIA-923 Sch 2 data	UT	1988, 1989	HNGA
ME	1997–2001	C&Q, New England		2003–2005	AZ, CO, NV, WY
	2005–2021, 2023	MA		2006, 2007	AZ, CO, NV
	2022	EIA-923 Sch 2 data, New England		2008–2011, 2014–2016	EIA-923 Sch 2 data
MN	2003–2007	IA, ND, WI	VA	2011, 2016	EIA-923 Sch 2 data
	2009–2023	EIA-923 Sch 2 data	VT	1983–1985, 1989, 1990	HNGA
MO	2003–2007	AR, IA, IL, KS, NE, OK		1986	C&Q, New England
	2008–2021, 2023	EIA-923 Sch 2 data		2003, 2004, 2013–2021	MA, NY
	2022	EIA-923 Sch 2 data, West North Central		2022, 2023	NY
MS	2009–2023	EIA-923 Sch 2 data	WA	1978, 1983–1985, 1988, 1989	HNGA
MT	1997, 2006, 2007	C&Q, Mountain		1986, 1987, 1990, 1997, 1999–2001	C&Q, Pacific
	2003–2005	ND, WY		2002	OR
	2008–2023	EIA-923 Sch 2 data		2011–2023	EIA-923 Sch 2 data
NC	1983–1990	HNGA	WI	2014–2017, 2019, 2020, 2023	EIA-923 Sch 2 data
	2005	GA, VA	WV	2007	OH, MD, PA, VA
	2006, 2007	GA, SC, VA		2011, 2013–2018, 2021–2023	EIA-923 Sch 2 data
	2009–2017, 2023	EIA-923 Sch 2 data	WY	2006, 2007	CO, NE
ND	1973, 1974, 1976–1986	HNGA		2008–2023	EIA-923 Sch 2 data
	2008, 2009	EIA-923 Sch 2 data			

Electric power sector

Physical unit prices: 2002 forward

All natural gas physical unit prices by state for the electric power sector are taken from the State Summaries tables of EIA's *Natural Gas Annual*. Before 2008, for any state with missing prices, SEDS assigns it the average price of all available surrounding states. For 2008 forward, SEDS uses the average delivered cost of natural gas to regulated electric power plants, compiled from Schedule 2 of Form EIA-923, "Power Plant Operations Report," to supplement missing *Natural Gas Annual* prices. If prices from both sources are not available, then SEDS uses the average price of all available surrounding states or region. Table TN3.2 lists the price assignments by state and year.

Physical unit prices: 1973, 1974, 1983 through 2001

Natural gas prices by state are reported in the EIA *Cost and Quality of Fuels for Electric Plants* (C&Q) for gas consumed at steam-electric plants only. Btu prices are taken from the C&Q, and converted from cents to dollars per million Btu.

Where individual state prices are unavailable from C&Q, they are developed from physical unit prices published in Tables 26 through 76 of the NGA (from 1997 forward), or the *Historical Natural Gas Annual, 1930 Through 2000* (HNGA, from 1987 through 1996). Physical unit prices prior to 1987 are calculated by dividing the value of natural gas, reported in thousands of dollars, by the quantity of natural gas sold, reported in million cubic feet.

Prices are not available from either C&Q or the NGA and HNGA for some years. In these cases, quantity-weighted Census division prices from C&Q are assigned. In addition, prices for Montana in 1997, Vermont in 1986, and Washington in 1986, 1987, 1990, and 1997 use quantity-weighted Census division prices from C&Q for more consistent prices than those available from the HNGA or more consistent with values in previous and later years. Table TN3.2 lists the states and years for which HNGA or C&Q Census division prices are used.

Physical unit prices: 1980 through 1982

State-level Btu and physical unit prices for 1980 through 1982 are taken from C&Q for all reporting plants. Physical unit prices are taken directly from the data source, while Btu prices are converted from cents to dollars per million Btu. Where individual state prices are unavailable from C&Q, they are computed from value and quantity of sales data from HNGA.

Table TN3.3. Tables from EIA *Cost and Quality of Fuels for Electric Plants* used as data sources, 1973 through 2001

Years	Price data	Volume data
1973, 1974	Table 10	Table 9
1975–1979	Table 10, 16	Table 9, 15
1980–1982	Table 48	–
1983, 1984	Table 53	–
1985–1987	Table 43	–
1988, 1989	Table 44	–
1990–1994	Table 12 (1994 edition)	–
1995–1996	Table 12 (1999 edition)	–
1997–2001	Table 12 (2001 edition)	–

Physical unit prices: 1973 through 1979

State-level prices are reported separately by C&Q for gas consumed at steam-electric plants and gas consumed at combustion turbine and internal combustion units. Weighted-average Btu prices are calculated by using the two C&Q prices and the respective gas deliveries for steam-electric and combustion use. Where individual state prices are unavailable from C&Q, they are computed from value and quantity of sales data from HNGA. For the New Hampshire price in 1977 a combined price is computed from value and quantity of sales data from the HNGA data for Maine, New Hampshire, and Vermont.

Physical unit prices: 1970 through 1972

State-level prices for 1970 through 1972 are taken from *Natural Gas Production and Consumption* and are calculated similarly to the way prices for the residential, commercial, and industrial sectors are calculated. Prices, as average revenue per unit of sales, are computed from value and quantity of sales data from the source reports. A combined price is reported for New Hampshire and Vermont for 1971 and 1972, and each of these states is assigned the combined price. State Btu prices are calculated from the physical unit prices by using the state-level electric power conversion factors.

U.S. prices: all years

The U.S. Btu prices are the consumption-weighted average of the state Btu prices.

Data sources

Prices

Primary sources:

2002 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PEU_DMcf_a.htm.

1973 through 2001: EIA, *Cost and Quality of Fuels for Electric Plants*, https://www.eia.gov/electricity/cost_quality/ (table numbers shown in Table TN3.3).

Secondary sources:

2008 forward: EIA Office of Energy Production, Conversion & Delivery, data on average delivered cost of natural gas to regulated electric power plants by State from EIA-923, "Power Plant Operations Report," https://www.eia.gov/electricity/data/eia923/, Schedule 2.

2002 through 2007: EIA, *Cost and Quality of Fuels for Electric Power Plants*, https://www.eia.gov/electricity/cost_quality/, Table 13.

1997 through 2001: EIA, *Natural Gas Annual*, State Summaries tables, also available at https://www.eia.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm.

1990 through 1996: EIA, *Historical Natural Gas Annual 1930 Through 2000*, https://www.eia.gov/naturalgas/annual/archive/, Table 31 and Table 32.

1980 through 1989: EIA, *Natural Gas Annual 1992, Volume 2*, Table 23.

1976 through 1979: EIA, Energy Data Reports, *Natural Gas Production and Consumption*, Table 7 (1976 through 1978) and Table 6 (1979). Comparable price data are available in the *Historical Natural Gas Annual, 1930 Through 2000*, Table 35.

1970 through 1975: Bureau of Mines, U.S. Department of the Interior, *Natural Gas Production and Consumption*, Table 6 (1970) and Table 7 (1971 through 1975). Comparable price data are available in the *Historical Natural Gas Annual, 1930 Through 2000*, Table 35.

Consumption

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

Conversion factors: all years

Btu prices that are calculated directly from *Cost and Quality of Fuels for Electric Plants (*C&Q*)*, or from EIA-923, "Power Plant Operations Report," require no conversion factors. When the *Natural Gas Annual* is the primary source, SEDS uses the natural gas thermal conversion factors for electric power consumption to calculate prices in Btu. The data are published in EIA's State Energy Data System, consumption technical notes, Appendix B and also available in CSV format at https://www.eia.gov/state/seds/sep_update/use_convfac_update.csv.

Section 4. Petroleum

Petroleum overview

All the petroleum products included in the State Energy Data System (SEDS) are explained in this section. SEDS describes the method for estimating 10 of these products in individual sections. The 10 petroleum products are:

- Asphalt and road oil
- Aviation gasoline
- Distillate fuel oil
- Hydrocarbon gas liquids
- Jet fuel
- Kerosene
- Lubricants
- Motor gasoline
- Petroleum coke
- Residual fuel oil

SEDS combines the remaining petroleum products in the category called "other petroleum products." Of the 12 "other petroleum products," SEDS develops prices for 6 products. All of these six 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

SEDS calculates expenditures for each petroleum product as the product of the price estimates and the SEDS consumption estimates. SEDS adjusts the consumption estimates to remove intermediate petroleum products. (See Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.) SEDS also estimates average prices and total expenditures for total petroleum.

Additional note

Beginning in the 2016 SEDS data cycle, "hydrocarbon gas liquids" (which covers propane, ethane, normal butane, isobutane, natural gasoline, propylene, ethylene, butylene, and isobutylene) replaces "liquefied petroleum gases" (which includes all hydrocarbon gas liquids except natural gasoline) as a petroleum product. SEDS revised the definition of "other petroleum products" to exclude petroleum coke and natural gasoline (formerly pentanes plus). SEDS reports petroleum coke as a separate product and includes natural gasoline in hydrocarbon gas liquids.

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 SEDS prices are prices of asphalt binder or asphalt cement used in road construction. The prices do not include taxes 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

SEDS develops asphalt physical unit prices for 2009 forward using individual state Department of Transportation data. SEDS calculates a simple average of the reported weekly or monthly prices to estimate the average annual price. For states that do not report prices, SEDS assigns simple average prices of neighboring states according to Table TN4.1. Arkansas does not have reported data for 2009 through 2015, and SEDS estimates the missing prices using the growth rates of the average Kentucky and Tennessee prices. Hawaii does not have reported data for 2009 through 2011, and SEDS estimates the missing prices using the growth rates of the average Alaska, Oregon, and Washington prices. Nebraska does not have reported data for 2009 through 2011, and SEDS estimates the missing prices using the growth rate of the South Dakota prices.

Physical unit prices: 1970 through 2008

SEDS develops physical unit prices using the simple average annual prices from monthly reports in the *Engineering News-Record*, published by McGraw-Hill, Inc. The source data include reports from 20 U.S. cities with prices 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, SEDS uses the tank car price, or if it is not available, the drum price. For 1970 through 1985, SEDS uses a simple average of tank car and drum prices, or whichever one is available.

SEDS calculates simple average annual prices from the monthly prices for each city and assigns the city prices to the appropriate states. When a state has more than one city price, SEDS uses the simple average price of the cities. For states with no city prices, SEDS assigns the Census division simple average price, or if not available, another Census division price from the same Census region.

Table TN4.1. Asphalt and road oil price assignments, 2009 forward

State	State prices used in the estimation
CA	AK, OR, WA
CO	NM
DC	MD, VA
MI	IN, OH
MN	IA, KS, MO, NE, SD
ND	NE, SD
TX	KS, LA, OK
WI	IL, IN, OH

SEDS estimates state average asphalt prices as the quantity-weighted average prices of the three products for each state. For 1970 through 1980, SEDS uses quantity data from the Bureau of Mines and U.S. Energy Information Administration (EIA) reports on sales of asphalt. For 1981 forward, SEDS uses data from the Asphalt Institute's *Asphalt Usage Survey for the United States and Canada*.

For 1970 through 1982, asphalt and road oil are estimated as separate data series. SEDS estimates asphalt prices as discussed above. SEDS assumes road oil prices are equal to asphalt emulsion prices.

Btu prices: all years

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

Before 2009, SEDS converts asphalt prices, in dollars per short ton, 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. SEDS converts road oil physical unit prices, in dollars per short ton, to dollars per million Btu 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.

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

Data sources

Prices

2009 forward: State Department of Transportation websites.

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

Quantities for calculating weighted average prices through 2008

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

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

1970 through 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

The State Energy Data System (SEDS) develops aviation gasoline price estimates for the transportation sector. SEDS uses its estimates of aviation gasoline consumption to calculate expenditure estimates. Aviation gasoline prices are national averages, excluding taxes. In all cases, physical unit prices are converted to Btu prices. Federal and state excise taxes, as well as state and local sales taxes, are not included.

Physical unit prices: 2022 forward

In 2021, the U.S. Energy Information Administration (EIA) discontinued its survey EIA-782 that provided aviation gasoline prices to end users and as a result the data are no longer available. For 2022 forward, SEDS estimates U.S.-level aviation gasoline prices with a multiple linear regression model, using historical SEDS aviation gasoline prices as the dependent variable and EIA premium gasoline retail prices and Refinitiv crude oil spot prices as the independent variables. SEDS assigns all states the same annual U.S.-level price.

Physical unit prices: 2008 through 2021

For 2008 through 2021, SEDS assumes aviation gasoline prices for all states are equal to the national average refiners sales prices to end users, published in EIA's *Petroleum Marketing Annual* (through 2009) and on the EIA website. For 2015 through 2019, EIA withholds the national average refiners sales price to end users. To estimate aviation gasoline prices, SEDS calculates EIA's annual U.S. aviation gasoline sales price for resale growth rate and applies it to the previous year's refiner sales price to end users.

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 in any source material. SEDS estimates aviation gasoline prices 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

SEDS calculates aviation gasoline Btu prices 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

2022 forward:

- EIA, Form EIA-878 "Motor Gasoline Price Survey," U.S. premium all formulations retail gasoline prices, https://www.eia.gov/dnav/pet/PET_PRI_GND_A_EPMP_PTE_DPGAL_A.htm.
- Refinitiv, an LSEG business, as re-published on EIA's Petroleum & Other Liquids data website, Cushing, OK WTI crude oil spot price FOB, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=A.
- EIA, historical SEDS estimates of U.S. aviation gasoline prices.

2010 through 2021:

- EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, "End Users—Aviation Gasoline", https://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPV_PTG_dpgal_a.htm.
- If needed, EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, "Resale—Aviation Gasoline", https://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPV_PWG_dpgal_a.htm.

2008, 2009: EIA, *Petroleum Marketing Annual,* https://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 https://www.eia.gov/dnav/pet/pet_pri_refoth_dcu_nus_a.htm.

1978 through 2007: EIA, *Annual Energy Review,* https://www.eia.gov/totalenergy/data/annual/, 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 https://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 through 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

The State Energy Data System (SEDS) estimates distillate fuel oil prices for all sectors. SEDS uses its distillate fuel oil consumption estimates to calculate expenditure estimates for each sector. For the industrial sector expenditure calculations, SEDS adjusts the amount of industrial distillate fuel oil consumption to remove intermediate refinery fuels and avoid double counting. For the residential, commercial, and transportation sectors expenditure calculations, SEDS adjusts the amount of distillate fuel oil consumption to include the volumes of biodiesel and renewable diesel product supplied in those sectors, which are all assumed to be consumed as mixed with petroleum distillate fuel oil during end-use consumption. Therefore, all volumes of biodiesel and renewable diesel in those sectors are assigned distillate fuel oil prices for those sectors and included in the distillate fuel oil expenditures data. (See the discussion in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

Residential sector

SEDS estimates residential distillate fuel oil prices using different data sources and estimation methods, depending on the year. In all years, SEDS first estimates physical unit prices by state. Then, SEDS converts the physical unit prices into Btu prices using the conversion factor. Residential distillate fuel oil prices are the retail prices paid by consumers for residential heating oil, including taxes.

Physical unit prices: 2019 forward

SEDS estimates residential distillate fuel oil prices using data from the U.S. Energy Information Administration's (EIA) *Heating Oil and Propane Update*. First, SEDS calculates a simple annual average price from the weekly heating oil price data for each available state and Petroleum Administration for Defense (PAD) district and subdistrict, as well as at the U.S. level. Then SEDS estimates state residential distillate fuel oil prices by applying the annual heating oil price growth rate to the previous year residential distillate fuel oil price estimate. If state-level prices are not available, SEDS assigns the corresponding PAD district or subdistrict growth rate. If PAD district- or subdistrict-level prices are not available, SEDS assigns the U.S. growth rate. SEDS adds state general sales taxes to the state estimates.

Physical unit prices: 2011 through 2018

EIA discontinued its survey that provided reseller and retailer sales prices for distillate fuel oil by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," 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, SEDS develops regression equations for each Petroleum Administration for Defense (PAD) district and subdistrict. SEDS uses 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 residential distillate fuel oil prices as the dependent variable. SEDS uses these regression equations 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. SEDS assigns the corresponding PAD district or subdistrict prices to all other states. See Figure TN3 in "Introduction," at https://www.eia.gov/state/seds/sep_prices/notes/pr_intro.pdf. SEDS adds state general sales taxes to the state estimated prices.

For 2013 through 2018, refiners' prices for PAD subdistricts 1A and 1B are not available and SEDS estimates them 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 and SEDS assigns the corresponding PAD district or subdistrict estimated price to those states.

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 TN4.2.

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.

Table TN4.2. 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

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 TN4.2.

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 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-M-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 https://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 TN4.3 The assigned state-level *Platt's* prices for states are

Table TN4.3. 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

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. Because 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 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 TN4.3. 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. Because 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

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 TN4.3. 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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the conversion factors calculated by EIA and presented in SEDS consumption technical notes, Table B1. SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2019 forward: Weekly residential heating oil price data from EIA's *Heating Oil and Propane Update*, https://www.eia.gov/petroleum/heatingoilpropane/#itn-tabs-2.

2011 through 2018: 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, https://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_PRT_dpgal_a.htm.

1983 through 2009: EIA, *Petroleum Marketing Annual 1985*, Volume 1, Table 25 (1983-1985) and annual issues of the *Petroleum Marketing Annual*, https://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 through 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 through 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 through 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 through 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 through 1982: EIA, *Annual Energy Review 1988*, Table 67, "Motor Gasoline and Residential Heating Oil Prices, 1949-1988."

Taxes

For 1992 forward, SEDS calculates an annual average general sales tax for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, https://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 through 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

SEDS estimates commercial sector distillate fuel oil prices using different data sources and estimation methodologies, depending on the year. For 2022 forward, SEDS estimates commercial distillate prices using state-level regression equations. For 2011 through 2021, SEDS estimates commercial distillate prices using regional-level regression equations (see below). For 1983 through 2009, SEDS uses retail prices paid by commercial/institutional establishments (excluding taxes) for No. 2 distillate fuel oil from EIA's *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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. SEDS adds state general sales taxes from the U.S. Census Bureau and successor sources. For 1970 through 1982, SEDS estimates commercial distillate prices based on refinery and terminal (wholesale) prices from *Platt's* and markups from Fostor Associates, Inc. *Energy Prices*: 1960-73 that include taxes. SEDS converts from physical unit prices to Btu prices using the conversion factor.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS commercial price for 2010 through 2021 as the Y dependent variable and the appropriate regional Refinitv Ultra-Low Sulfur No. 2 Diesel (ULSD) spot price as the X independent variable. SEDS assigns each Petroleum Administration for Defense District (PADD) region to its closest Refinitiv ULSD spot price—PADDs 1A and 1B use New York Harbor; PADDs 1C, 3, and 4 use the Gulf Coast; PADD 2 uses Chicago; and PADD 5 uses Los Angeles. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 2011 through 2021

EIA discontinued its survey that provided reseller and retailer sales prices for distillate fuel oil by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," 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, SEDS develops regression equations for each Petroleum Administration for Defense (PAD) district and subdistrict. SEDS uses historical refiner commercial sales prices for No. 2 diesel fuel from EIA-782A as the independent variable and the historical commercial distillate fuel oil prices as the dependent variable. SEDS uses these regression equations 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. For 2019 through 2021, an independent variable in the equation for PAD Subdistrict 1A price is missing. SEDS estimates it by applying the U.S. growth rate to the previous year PAD Subdistrict 1A price. SEDS assigns the corresponding PAD district or subdistrict prices to all other states, as shown in Table TN4.4. SEDS adds state general sales taxes to the state estimated prices.

Table TN4.4. Distillate fuel oil commercial sector PAD district and subdistrict price assignments, 1983 through 2021

States	Years	Assignments	States	Years	Assignments
AK	2019, 2020	District 5	MS	1983–2021	District 3
AL	1983–2021	District 3	MT	1983–2021	District 4
AR	1983–2021	District 3	NC	1983–2021	Subdistrict 1C
AZ	1983–2021	District 5	ND	1983–2021	District 2
CA	1983–2021	District 5	NE	1983–2021	District 2
CO	1983–2021	District 4	NH	2015–2021	Subdistrict 1A
CT	2014–2021	Subdistrict 1A	NJ	2019, 2020	Subdistrict 1B
DC	2011–2021	Subdistrict 1B	NM	1983–2021	District 3
DE	2019, 2020	Subdistrict 1B	NV	1983–2021	District 5
FL	1983–2021	Subdistrict 1C	NY	2019, 2020	Subdistrict 1B
GA	1983–2021	Subdistrict 1C	OH	2019, 2020	District 2
HI	1983–2021	District 5	OK	1983–2021	District 2
IA	1983–2021	District 2	OR	2019, 2020	District 5
IL	2019, 2020	District 2	RI	2011–2021	Subdistrict 1A
IN	2019, 2020	District 2	SC	1983–2021	Subdistrict 1C
KS	1983–2021	District 2	SD	1983–2021	District 2
KY	1983–2021	District 2	TN	1983–2021	District 2
LA	1983–2021	District 3	TX	1983–2021	District 3
MA	2018–2021	Subdistrict 1A	UT	1983–2021	District 4
MD	2018–2021	Subdistrict 1B	VT	2019, 2020	Subdistrict 1A
ME	2011–2021	Subdistrict 1A	WI	2019, 2020	District 2
MI	2019, 2020	District 2	WV	2019, 2020	Subdistrict 1C
MO	1983–2021	District 2	WY	1983–2021	District 4

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 TN4.4. 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, because 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 TN4.3) 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

Table TN4.5. 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		

the nine available states are assigned, as shown in Table TN4.5.

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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the conversion factors calculated by EIA and presented in SEDS consumption technical notes, Table B1. SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward: Regression equations using historical SEDS commercial prices and Refinitiv, an LSEG business, New York Harbor Ultra-Low

Sulfur No. 2 Diesel (ULSD) spot price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_Y35NY_DPG&f=A, U.S. Gulf Coast ULSD spot price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_RGC_DPG&f=A, Los Angeles ULSD CARB spot price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DC_PF4_Y05LA_DPG&f=A as republished on the EIA website, and unpublished Chicago ULSD spot price.

2011 through 2021: 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, https://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_PCS_dpgal_a.htm.

1983 through 2009: EIA, *Petroleum Marketing Annual 1985, Volume 1,* Table 25 (1983-1985) and annual issues of the *Petroleum Marketing Annual*, https://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—Commercial/Institutional Consumers."

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

Taxes

For 1992 forward, SEDS calculates an annual average general sales tax for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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. SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 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

SEDS estimates the price of distillate fuel oil used for electric power as the average delivered cost of No. 2 distillate fuel oil receipts at electric plants. For 1973 through 2009, SEDS takes these prices directly from EIA's *Cost and Quality of Fuels for Electric Plants Report* (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 EIA's Office of Energy Production, Conversion & Delivery (EPCD). For 1970 through 1972, SEDS uses prices from Edison Electric Institute's *Statistical Yearbook of the Electric Utility Industry* with regression analysis. The data sources provide Btu prices that include all applicable taxes.

Prices: 1973 forward

Contiguous 48 states

EIA produces Btu prices for 1973 forward. For 1973, 1974, and 1980 forward, SEDS converts the Btu prices from cents per million Btu to dollars per million Btu. For 1975 through 1979, SEDS calculates consumption-weighted average Btu prices from prices and consumption reported separately for steam-electric plants and for combustion turbine

Table TN4.6. 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
	2013–2023	
CO	1996–1998	Mountain
CT	1973, 2000–2007, 2011, 2013–2023	New England
DC	1973, 2002–2012	South Atlantic
DE	1973, 2006, 2007, 2011–2023	South Atlantic
HI	2002–2004	Pacific Contiguous
	2005–2007	Pacific Noncontiguous
ID	1973, 1974, 1976, 1980–2009, 2011–2023	Mountain
MA	2011	New England
MD	1973, 2002–2007, 2011–2023	South Atlantic
ME	1973, 1974, 1999–2007, 2011–2023	New England
MT	1973–1975, 1977, 1983, 2000, 2001,	Mountain
	2007, 2012–2020, 2023	
NH	1973, 1974, 2021–2023	New England
NJ	1973, 1974, 2011–2023	Middle Atlantic
NM	2023	Mountain
NV	2007	Mountain
NY	2002	Middle Atlantic
OK	2011	West South Central
OR	1987, 1988	Pacific
	1996, 2018, 2020–2022	Pacific Contiguous
PA	2007, 2011–2023	Middle Atlantic
RI	1976–1994, 1997–2007, 2011–2023	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,	
	2013–2023	
WA	1973–1977	Pacific
	2002–2005, 2007	Pacific Contiguous
WV	1973	South Atlantic
WY	1973	Mountain

and internal combustion units. Wherever individual state prices are unavailable, SEDS assigns the corresponding quantity-weighted Census division price, as shown in Table TN4.6.

Alaska

The source provides Alaska Btu prices for 2005, 2006, 2008 through 2012, and for 2015 forward. For 2013 and 2014, SEDS assigns the corresponding quantity-weighted Census division price, as shown in Table TN4.6. For 1994 through 2010, SEDS estimates the missing prices as the consumption-weighted averages of prices reported by power plants in FERC Form 1, Form EIA-412 (1994-2000), and the Alaska Energy Authority's *Statistical Report of the Power Cost Equalization Program*.

Prior to 1994, SEDS estimates prices as the product of the annual Alaska-to-U.S. price ratio from the *Statistical Yearbook* and the C&Q U.S. price. The *Statistical Yearbook* doesn't have Alaska prices for 1973, 1975, and 1978. SEDS estimates the prices using the following average Alaska-to-U.S. price ratios 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. SEDS applies the average ratio to the U.S. C&Q price for each missing year.

Hawaii

The C&Q does not have prices for Hawaii from 1973 through 1982, 1992 through 1996, and 2002 through 2007. Table TN4.6 shows the price assignments for 2002. For 1994 through 1996, SEDS estimates prices as the consumption-weighted averages of prices reported by power plants in FERC Form 1 and Form EIA-412.

Prior to 1994, SEDS estimates prices as the product of the annual Hawaii-to-U.S. price ratio from the *Statistical Yearbook* and the C&Q U.S. price.

U.S. prices

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

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 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 Energy Production, Conversion & Delivery, data on average delivered cost of distillate fuel oil to regulated electric power plants.

1973 through 2009: EIA, *Cost and Quality of Fuels for Electric Plants*, https://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 through 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,") https://www.eia.gov/electricity/data/eia412/ (1994-2000), and Alaska's *Statistical Report of the Power Cost Equalization Program*, https://www.akenergyauthority.org/What-We-Do/Power-Cost-Equalization/PCE-Reports-Publications.

1970 through 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

The data sources provide Btu prices for all states, except for Alaska for 1994 through 2004. SEDS uses the conversion factor of 5.825 million Btu per barrel in these instances.

Industrial sector

SEDS estimates industrial sector distillate fuel oil prices using different data sources and estimation methods, depending on the year. For 2022 forward, SEDS estimates industrial distillate prices using state-level regression equations. For 2011 through 2021, SEDS estimates industrial distillate fuel oil prices using regional-level regression equations (see below). For 1983 through 2009, SEDS uses prices of No. 2 distillate fuel oil (excluding taxes) from EIA's *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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. SEDS adds state general sales taxes from the U.S. Census Bureau and successor sources. For 1970 through 1982, SEDS estimates prices as the average cost of distillate to manufacturing firms, which include taxes.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS industrial price for 2010-2021 as the Y dependent variable and two X independent variables—the appropriate regional Refinitv Ultra-Low Sulfur No. 2 Diesel (ULSD) spot price and the U.S. Cost of Distillate Fuel Receipts at Electric Generating Plants. SEDS assigns each Petroleum Administration for Defense District (PADD) region to its closest Refinitiv ULSD spot price—PADDs 1A and 1B use New York Harbor; PADDs 1C, 3, and 4 use the Gulf Coast; PADD 2 uses Chicago; and PADD 5 uses Los Angeles. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 2011 through 2021

EIA discontinued its survey that provided reseller and retailer sales prices for distillate fuel oil by sales type, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," 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

Table TN4.7. Distillate fuel oil industrial sector PAD district and subdistrict price assignments, 1983 through 2021

State	Years	Assignments	State	Years	Assignments
AK	2019, 2020	District 5	MT	1983–2021	District 4
AL	1983–2021	District 3	NC	1983–2004, 2007–2021	Subdistrict 1C
AR	1983–2021	District 3		2005, 2006	District 1
AZ	1983–2021	District 5	ND	1983–2021	District 2
CA	1983–2021	District 5	NE	1983–2021	District 2
CO	1983–2021	District 4	NH	2011–2021	Subdistrict 1A
CT	2011–2021	Subdistrict 1A	NJ	2015–2020	Subdistrict 1B
DC	1994, 1997–2001, 2003–2021	Subdistrict 1B	NM	1983–2021	District 3
DE	2018–2020	Subdistrict 1B	NV	1983–2021	District 5
FL	1983–2004, 2007–2021	Subdistrict 1C	NY	1987, 2017, 2019, 2020	Subdistrict 1B
	2005, 2006	District 1	OH	1983, 2011–2021	District 2
GA	1983–2004, 2007–2021	Subdistrict 1C	OK	1983–2021	District 2
	2005, 2006	District 1	OR	2011–2021	District 5
HI	1983–2021	District 5	PA	2019, 2020	Subdistrict 1B
IA	1983–2021	District 2	RI	2003, 2011–2021	Subdistrict 1A
ID	2019, 2020	District 4	SC	1983–2004, 2007–2021	Subdistrict 1C
IL	2005, 2006	District 2		2005, 2006	District 1
IN	2019, 2020	District 2	SD	1983–2021	District 2
KS	1983–2021	District 2	TN	1983–2021	District 2
KY	1983–2021	District 2	TX	1983–2021	District 3
LA	1983–2021	District 3	UT	1983–2021	District 4
MA	2010–2021	Subdistrict 1A	VA	2014–2020	Subdistrict 1C
MD	2014–2020	Subdistrict 1B	VT	2011–2021	Subdistrict 1A
ME	1997, 2011–2021	Subdistrict 1A	WA	2016, 2019, 2020	District 5
MI	2001, 2011–2021	District 2	WI	2011–2021	District 2
MO	1983–2021	District 2	WV	2011–2021	Subdistrict 1C
MS	1983–2021	District 3	WY	1983–2021	District 4

distillate fuel oil prices, SEDS develops regression equations for each Petroleum Administration for Defense (PAD) district and subdistrict. SEDS uses 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 industrial distillate fuel oil prices as the dependent variable. SEDS uses these regression equations 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. Occasionally but more common since 2019, the independent variables in some PAD District 1 subdistricts are missing. SEDS estimates them by applying the PAD District 1 growth rate (when available) or the U.S. growth rate to the previous year subdistrict prices. SEDS assigns the corresponding PAD district or subdistrict prices to all other states, as shown in Table TN4.7. SEDS adds state general sales taxes 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 TN4.7, 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,

Table TN4.8. 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

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. 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 TN4.8.

Physical unit prices: 1970, 1972, 1973

Because 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 TN4.3). The resulting ratios for each state are used with the *Platt's* assigned prices for 1970, 1972, and 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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the conversion factors calculated by EIA and presented in SEDS consumption technical notes, Table B1. SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data that have been adjusted for process fuel consumption.

Data sources

Prices

2022 forward: Regression equations using historical SEDS industrial price estimates; EIA-923 U.S. cost of distillate fuel receipts at electric generating plants, as published in EIA's *Monthly Energy Review* Table 9.9 https://www.eia.gov/totalenergy/data/browser/index.php?tbl=T09.09#/?f=A&start=1973&end=2022&charted=3; and Refinitiv, an LSEG business, New York Harbor Ultra-Low Sulfur No. 2 Diesel (ULSD) spot price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_Y35NY_DPG&f=A, U.S. Gulf Coast ULSD spot price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_RGC_DPG&f=A, Los Angeles ULSD CARB spot price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DC_PF4_Y05LA_DPG&f=A as republished on the EIA website, and unpublished Chicago ULSD spot price.

2011 through 2021: 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, https://www.eia.gov/dnav/pet/pet_pri_dist_a_EPD2_pin_dpgal_a.htm.

1983 through 2009: EIA, *Petroleum Marketing Annual 1985, Volume 1,*

Table 25 (1983-1985), and annual issues of the *Petroleum Marketing Annual*, https://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 through 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 through 1976 and 1978 through 1980: Census Bureau, U.S. Department of Commerce, *Annual Survey of Manufactures,* Table 3.

Taxes

For 1992 forward, SEDS calculates an annual average general sales tax for each State as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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. SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 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 for on-highway, vessel bunkering, military, and railroad use. Because on-highway diesel fuel use accounts for the largest portion of this sector, SEDS estimates transportation sector distillate fuel oil prices using diesel fuel prices.

For 2011 forward, SEDS estimates physical unit transportation sector distillate fuel oil prices for states other than Alaska and Hawaii using retail prices of ultra-low sulfur diesel from Form EIA-888, "*On-Highway Diesel Fuel Price Survey*." For 1986 to 2010, SEDS estimates prices using sales to end users through retail outlets from EIA's *Petroleum Marketing Annual* (PMA). For 1983 to 1985, SEDS estimates prices using 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, SEDS estimates prices using agricultural prices from the *Agriculture Prices* publication.

Through 2010, SEDS adds state and federal excise taxes on diesel fuel to the PMA prices. In cases where the tax rate is not constant throughout the year, SEDS estimates an annual average tax using monthly rates. Due to the lack of uniformity in application, SEDS doesn't include state sales taxes in the price estimates through 2009. In 2010, SEDS adds sales taxes for California, Georgia, Illinois, Indiana, Michigan, New York, and Virginia (states identified by EIA's *Petroleum Marketing Monthly* (PMM) that charge state sales taxes on diesel) to their price estimates to make them more compatible to the Form EIA-888 retail prices for ultra-low sulfur diesel prices. For 2011 forward, SEDS assumes all taxes are included in the Form EIA-888 retail prices.

For all years, SEDS calculates Btu prices using the physical unit prices and the distillate fuel oil conversion factor.

Physical unit prices: 2011 forward

For 2011 forward, SEDS estimates diesel fuel physical unit prices using 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 California, Hawaii, and Alaska, SEDS estimates the physical unit price as the product of the 2010 state price and the corresponding district or subdistrict growth rate since 2010. SEDS directly uses the California price from Form EIA-888. For Hawaii, SEDS estimates diesel prices using monthly data available from Hawaii's Department of Business, Economic Development & Tourism website. For Alaska, SEDS estimates diesel prices as the product of the average 2001 through 2010 Alaska-to-U.S. price ratio and the Form EIA-888 U.S. price.

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 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 https://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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the conversion factors calculated by EIA and presented in SEDS consumption technical notes, Table B1. SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2011 forward: EIA, Weekly Retail Gasoline and Diesel Prices, Ultra Low Sulfur Diesel, annual averages, https://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, https://dbedt.hawaii.gov/economic/energy-trends-2/.

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

1986 through 2009: EIA, *Petroleum Marketing Annual,* https://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 through 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 https://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_dpgal_a.htm, for refiner/reseller/retailer motor gasoline prices.

1986 through 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 through 1985: EIA, *Petroleum Marketing Annual 1985*, Volume 1, Table 25, column titled "Sales to End Users, Sales Through Company-Operated Retail Outlets."

1970 through 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 through 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,* https://www.eia.gov/petroleum/marketing/monthly/, 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,* https://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-121T.

2010 (state sales taxes): EIA, *Petroleum Marketing Monthly,* https://www.eia.gov/petroleum/marketing/monthly/, Table EN1, footnote 3.

1970 through 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.

Hydrocarbon gas liquids

Hydrocarbon gas liquids (HGL) include natural gas liquids (ethane, propane, normal butane, isobutane, and natural gasoline) and refinery olefins (ethylene, propylene, butylene, and isobutylene). Refinery olefins are olefins produced at the refineries and do not include olefins produced by the manufacturing industries. The State Energy Data System (SEDS) assumes that, except for propane, all other HGL products are consumed only by the industrial sector. HGL prices for the residential, commercial, and transportation sectors are consumer grade propane prices.

For 2010 forward, SEDS develops industrial sector prices for two components: propane and other HGL. Industrial sector HGL prices are the consumption-weighted average prices of the two series. Prior to 2010, industrial sector HGL prices are consumer grade propane prices, with a few exceptions in the early period.

For expenditure calculations, SEDS uses its propane and other HGL products consumption estimates for each sector. For the industrial sector expenditure calculations before 2010, SEDS adjusts the amount of consumption to remove process fuel and intermediate products, including propane used as refinery fuel and natural gasoline (pentanes plus), to avoid double counting (see the discussion under Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.) For 2010 through 2020, natural gasoline is included in industrial sector HGL expenditures because natural gasoline product supplied does not cover products blended with motor gasoline and fuel ethanol. For 2021 forward, EIA assumes natural gasoline product supplied is equal to zero, because EIA added the "Transfers to Crude Oil Supply" column to the petroleum and other liquids "Supply and Disposition" table.

Residential sector

For 1994 forward, SEDS develops residential sector HGL prices using unpublished data on consumer grade propane prices collected from EIA surveys. SEDS adds general sales taxes to the physical unit prices. SEDS converts the physical unit prices into Btu prices using the propane conversion factor. For 1994 through 2010, SEDS bases residential propane price estimates on data from survey forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report." SEDS used both EIA-782A and EIA-782B 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. SEDS uses a new method to estimate residential propane prices for 2011 forward.

For 1973 through 1993, residential sector HGL prices are the average reported prices of propane delivered to residential consumers in areas where natural gas is also available as a competing fuel, as reported by natural gas suppliers to the American Gas Association. For 1970 through 1972, the prices are from the U.S. Department of Agriculture and converted to Btu prices by SEDS using the propane conversion factor. Taxes are included in the prices for 1970 through 1993. For 1970 through 1993, SEDS estimates prices for Alaska and Hawaii using a different method (see page 53).

Physical unit prices: 2011 forward

To estimate residential propane prices, SEDS develops state-level regression equations using residential propane prices for heating from EIA-877 "Winter Heating Fuels Telephone Survey" (published in EIA's *Heating Oil and Propane Update*) as the independent variable and the combined EIA-782A and EIA-782B historical state prices for residential sector propane as the dependent variable through 2010. From the weekly EIA-877 price data, SEDS calculates simple annual averages at the state, Petroleum Administration for Defense (PAD) district, PAD subdistrict, and U.S. levels. For individual states that have historical EIA-877 data before 2010, SEDS uses state-level prices. For states in PAD District 1 that do not have historical EIA-877 data before 2010, SEDS uses PAD subdistrict-level prices. For states in PAD District 2 that do not have historical EIA-877 data before 2010, SEDS uses the PAD district-level prices. For states in PAD Districts 3, 4, and 5, SEDS uses the U.S.-level EIA-877 prices.

For 2011 forward, SEDS applies the appropriate EIA-877 prices to the regression equation coefficients to estimate residential propane prices for each state. No EIA-877 price is reported for the District of Columbia, so SEDS assigns it as the average residential propane price of Maryland and Virginia. SEDS adds state general sales taxes to calculate the final state prices.

Physical unit prices: 1994 through 2010

For 1994 through 2010, residential HGL 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.

Table TN4.9. HGL 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

Btu prices: 1994 forward

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using EIA's propane conversion factor (3.841 million Btu per barrel).

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 TN4.9. 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 HGL prices from SEDS to estimate 1991 prices for the contiguous 48 states and the

District of Columbia. Prices for HGL in Alaska and Hawaii are developed by using the methodology described on page 55.

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 HGL 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 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

Because AGA did not publish propane prices prior to 1971, the residential sector HGL 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 TN4.10.
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 HGL residential prices.

Table TN4.10. HGL 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

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 3.841 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: Weekly residential propane price data from EIA, *Heating Oil and Propane Update*, https://www.eia.gov/petroleum/heatingoilpropane/#itn-tabs-1.

1994 through 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 through 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, *Petroleum Marketing Annual,* Table 35 (1990 and 1991), columns titled "Propane (Consumer Grade)."

1970 through 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

SEDS calculates an annual average general sales tax 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, https://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 HGL consumption.

Conversion factors

1970 through 1972, 1994 forward: 3.841 million Btu per barrel.

1970 through 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

For 1994 forward, SEDS develops commercial sector HGL prices using various data for consumer grade propane prices. SEDS adds general sales taxes to the physical unit prices. SEDS converts the physical unit prices into Btu prices using the propane conversion factor.

For 1994 through 2010, SEDS bases commercial propane price estimates on data from survey forms EIA-782A, "Refiners'/ Gas Plant Operators' Monthly Petroleum Product Sales Report," and EIA782B, "Resellers'/ Retailers' Monthly Petroleum Product Sales Report." SEDS used both EIA-782A and EIA-782B 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. For 2011 through 2016, SEDS uses regressions with EIA-782A data to estimate commercial propane prices. For 2017 forward, SEDS uses historical price margins, propane spot prices, and average U.S. Consumer Price Index (CPI) inflation rate to estimate commercial propane prices.

Physical unit prices: 2017 forward

The EIA-782A price data are no longer available, so SEDS uses a new method to estimate commercial sector propane price data by state. For each state, SEDS calculates the average difference (margin) between the historical SEDS commercial propane price (before tax) and Refinitiv's Mont Belvieu, Texas propane spot price for 2015 through 2016. Then for 2017 forward, SEDS multiplies each 2015 through 2016 state margin by the U.S. Bureau of Labor Statistics' annual average CPI inflation growth rate. SEDS sums each state margin (with inflation) to the annual propane spot price to calculate state prices (before tax). Lastly, SEDS adds individual state general sales taxes to calculate the final state prices.

Physical unit prices: 2011 through 2016

To estimate commercial propane prices, SEDS develops regression equations for the Petroleum Administration for Defense (PAD) districts and subdistricts. Regression equations use PAD-level EIA-782A wholesale prices as the independent variable and the combined EIA-782A and EIA-782B historical PAD-level prices for commercial and institutional consumer's propane prices as the dependent variable. SEDS uses the regression equation coefficients and annual EIA-782A wholesale prices to estimate commercial propane prices for the PAD districts and subdistricts. All states are assigned the corresponding PAD district or subdistrict estimated price. Lastly, SEDS adds individual state general sales taxes to calculate the final state prices.

Physical unit prices: 1994 through 2010

For 1994 through 2010, commercial sector prices for HGL 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* (PMA). 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 3.841 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

2017 forward: Historical SEDS commercial sector propane prices; Refinitiv, an LSEG business, Mont Belvieu, TX propane spot price FOB, as re-published on the EIA website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPLLPA_PF4_Y44MB_DPG&f=A; and U.S. Department of Labor, Bureau of Labor Statistics Consumer Price Index (CPI) 12-month percentage change for December each year https://www.bls.gov/charts/consumer-price-index/consumer-price-index-by-category-line-chart.htm.

2011 through 2016: Unpublished wholesale propane (consumer grade) price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

1994 through 2010: EIA, *Petroleum Marketing Annual,* https://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 https://www.eia.gov/dnav/pet/pet_pri_prop_a_EPLLPA_PCS_dpgall_a.htm.

1970 through 1993: EIA, industrial sector HGL prices from the State Energy Data System.

Taxes

SEDS calculates an annual average general sales tax 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, https://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 HGL consumption.

Conversion factor: all years

3.841 million Btu per barrel.

Industrial sector

For 2010 forward, SEDS develops industrial sector prices for two components: propane and other HGL. Industrial sector HGL prices are the consumption-weighted average Btu prices of the two series. Prior to 2010, industrial sector HGL prices are consumer grade propane prices, with a few exceptions in the early period.

For 1985 through 2009, SEDS estimates industrial sector HGL prices 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).

Prices for 1978 through 1981 are from the U.S. Department of Commerce, Census Bureau, *Annual Survey of Manufactures* (ASM) or the *Census of Manufactures* (CM). For 1970 through 1977 and 1982 through 1984, SEDS calculates prices from *Agricultural Prices* that are scaled to the ASM/CM prices by using the ratio of ASM/CM to *Agricultural Prices* L.P. Gas prices for the years 1978 through 1981, when both price series were available. The industrial sector prices include taxes for all years.

Other HGL Btu prices: 2010 forward

To estimate prices of HGL other than propane (including propylene, ethane, ethylene, normal butane, and butylene, isobutane, isobutylene, and natural gasoline) used by the industrial sector for 2010 forward, SEDS uses the following daily Bloomberg price series:

- Propylene — Generic 1st polymer grade propylene future, supplemented by U.S. Gulf Coast propylene spot price before December 2010
- Ethane — Mont Belvieu ethane
- Ethylene — Ethylene delivered pipeline Gulf
- Normal butane and butylene — Mont Belvieu butane non-LDH
- Isobutane and isobutylene — North American spot LPG iso-butane price/Mont Belvieu Texas non-LST
- Natural gasoline — Mont Belvieu natural gasoline spot

SEDS calculates simple annual averages for each Bloomberg price series. SEDS adds a 10 cent per gallon delivery charge to each annual price series to account for the average cavern-to-consumer delivery charge passed on to end users. The annual prices are converted to Btu prices, in dollars per million Btu, using EIA's conversion factor for each fuel. SEDS calculates state-level average annual prices using each state's consumption. Lastly, SEDS adds individual state general sales taxes to calculate the final state prices.

Propane physical unit prices: 2017 forward

The EIA-782A price data are no longer available, so SEDS uses a new method to estimate industrial sector propane price data by state. For each state, SEDS calculates the average difference (margin) between the historical SEDS industrial propane price (before tax) and Refinitiv's Mont Belvieu, Texas propane spot price for 2015 through 2016. Then for 2017 forward, SEDS multiplies each 2015 through 2016 state margin by the U.S. Bureau of Labor Statistics' annual average CPI inflation growth rate. SEDS sums each state margin (with inflation) to the annual propane spot price to calculate state prices (before tax). Lastly, SEDS adds individual state general sales taxes to calculate the final state prices.

Propane physical unit prices: 2011 through 2016

To estimate industrial propane prices, SEDS develops regression equations for the Petroleum Administration for Defense (PAD) districts and subdistricts. Regression equations use PAD-level EIA-782A wholesale prices as the independent variable and the combined EIA-782A and EIA-782B historical PAD-level prices for three industrial sector categories—industrial consumers, petrochemical plants, and other end users (agricultural consumers)—propane prices as the dependent variable. SEDS uses the regression equation coefficients and annual EIA-782A wholesale prices to estimate industrial propane prices for the PAD districts and subdistricts. All states are assigned the corresponding PAD district or subdistrict estimated price. Lastly, SEDS adds individual state general sales taxes to calculate the final state prices.

Propane physical unit prices: 2010

Each state is assigned the corresponding PAD district or subdistrict propane price from the combined EIA-782A and EIA-782B prices for

three industrial sector categories—industrial consumers, petrochemical plants, and other end users (agricultural consumers). For petrochemicals, withheld and out-of-range prices are assigned the U.S. average petrochemical price or other estimate in the calculations. Individual state general sales taxes are added to the PAD-level estimated prices to calculate the final state prices.

Propane Btu prices: 2010 forward

SEDS converts the physical unit prices, in dollars per barrel, to Btu prices, in dollars per million Btu, using EIA's propane conversion factor (3.841 million Btu per barrel).

Physical unit prices: 1994 through 2009

Each state is assigned the corresponding PAD district or subdistrict propane price from the combined EIA-782A and EIA-782B prices for three industrial sector categories—industrial consumers, petrochemical plants, other end users (agricultural consumers). For petrochemicals, withheld and out-of-range prices are assigned the U.S. average petrochemical price or other estimate in the calculations. Individual state general sales taxes are added to the PAD-level estimated prices to calculate the final state prices.

Physical unit prices: 1985 through 1993

Industrial sector HGL 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 TN4.11. One exception is Arkansas for 1992 and 1993. Because the neighboring states in PAD District 3 are HGL 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 HGL 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

Table TN4.11. HGL 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

Table TN4.12. HGL 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

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 TN4.12.

Physical unit prices: 1982 through 1984, 1970 through 1977

Industrial sector HGL physical unit prices for 1982 through 1984 and 1970 through 1977 are estimated on the basis of the relationship between state-level L.P. Gas 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 HGL 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 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.
2. Final industrial sector HGL prices for 1982 through 1984 and 1970 through 1977 are estimated by using the state-level adjustment factors and annual average L.P. Gas prices from *Agricultural Prices* for these years.
   a. Annual average HGL 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* L.P. Gas prices are assigned the simple average price of adjacent states. The states with missing data and the adjacent state assignments are shown in Table TN4.13.
   g. Industrial sector HGL 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 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

Table TN4.13. HGL 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 1978 through 1981, the industrial sector HGL 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 HGL price data from *Agricultural Prices*.

1. For 1978 through 1981, industrial sector physical unit prices for HGL are calculated as the average cost per unit from cost and quantity data published in ASM/CM. Because 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 TN4.14.

Btu prices: 1970 through 2009

Btu prices for the states are calculated from the physical unit prices and the conversion factors shown in SEDS consumption technical notes, Appendix B. 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

2017 forward: Historical SEDS industrial sector propane prices; Refinitiv, an LSEG business, Mont Belvieu, TX propane spot price FOB, as re-published on the EIA website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPLLPA_PF4_Y44MB_DPG&f=A; and U.S. Department of Labor, Bureau of Labor Statistics Consumer Price Index (CPI) 12-month percentage change for December each year https://www.bls.gov/charts/consumer-price-index/consumer-price-index-by-category-line-chart.htm.

Table TN4.14. HGL 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

2011 through 2016: Unpublished wholesale propane (consumer grade) price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report" and daily ethane, ethylene, isobutane, normal butane, and propylene prices from *Bloomberg*, https://www.bloomberg.com/professional/product/pricing-data/.

1994 through 2010: EIA, ***Petroleum Marketing Annual,*** https://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 https://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 through 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 through 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 through 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, SEDS calculates an annual average general sales tax 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, https://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."

1985 through 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 HGL consumption.

1994 through 2010: 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.

Conversion factors: all years

Conversion factors for the HGL products are published in EIA, State Energy Data System, consumption technical notes, Appendix B, https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Transportation sector

For 1994 forward, SEDS develops transportation sector HGL prices of consumer grade propane sold through retail outlets. SEDS adds general sales taxes to the physical unit prices and converts to Btu prices using the propane conversion factor.

For 1994 through 2010, SEDS bases transportation 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." SEDS used both EIA-782A and EIA-782B because refiners, gas plant operators, resellers, and retailers all reported sales to the transportation sector on these forms. Form EIA-782B was discontinued in 2011. For 2011 through 2021, SEDS uses regional regression models using EIA-782A data. Form EIA-782A was suspended in 2021. SEDS uses a new method for 2022 forward.

Physical unit prices: 2022 forward

The EIA-782A price data are no longer available, so SEDS uses a new regression model method to estimate transportation sector propane price data by state. For each state, SEDS develops a simple linear regression model that uses the 2013 through 2021 historical transportation propane price data (before tax) as the dependent Y variable and both the annual average EIA U.S. propane wholesale/resale price and Refinitiv Mont Belvieu, Texas propane spot price as the independent X variables. After the regression output, SEDS adds state motor fuel taxes for propane to calculate the final state prices.

Physical unit prices: 2011 through 2021

To estimate transportation propane prices, SEDS develops regression equations for the Petroleum Administration for Defense (PAD) districts and subdistricts. Regression equations use PAD-level EIA-782A wholesale prices as the independent variable and the combined EIA-782A and EIA782B historical PAD-level prices for retail outlet propane prices as the dependent variable. SEDS uses the regression equation coefficients and annual EIA782A wholesale prices to estimate transportation propane prices for the PAD districts and subdistricts. All states are assigned the corresponding PAD district or subdistrict estimated price. Lastly, SEDS adds state motor fuel taxes for propane to calculate the final state 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* (PMA) 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 HGL 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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using EIA's propane conversion factor (3.841 million Btu per barrel).

Data sources

Prices

2022 forward: Historical SEDS transportation sector propane prices; EIA-877 U.S. propane Wholesale/Reale price (annual average calculated by SEDS) https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EPLLPA_PWR_NUS_DPG&f=M; and Refinitiv, an LSEG business, Mont Belvieu, TX propane spot price FOB, as re-published on the EIA website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPLLPA_PF4_Y44MB_DPG&f=A.

2011 through 2021: Unpublished wholesale propane (consumer grade) price data from EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report."

1994 through 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 HGL consumption.

Conversion factor: all years

3.841 million Btu per barrel.

Jet fuel

The State Energy Data System (SEDS) estimates jet fuel prices in the transportation sector for all years and in the electric power sector for 1972 through 1982.

Transportation sector

SEDS develops prices for kerosene-type jet fuel and uses them as the price for both kerosene and naphtha-type jet fuels. Since 1997, almost all jet fuel used for transportation is kerosene-type. The prices do not include taxes.

Physical unit prices: 2022 forward

In 2021, the U.S. Energy Information Administration (EIA) discontinued its survey EIA-782 that provided jet fuel prices to end users and as a result the data are no longer available. For 2022 forward, SEDS estimates state-level jet fuel prices with a simple linear regression model for each state, using historical SEDS state-level jet fuel prices as the dependent variables and the Refinitiv U.S.-level jet fuel spot price as the independent variable.

Physical unit prices: 1983 through 2021

SEDS uses data from EIA's *Petroleum Marketing Annual* (PMA) and *Petroleum Marketing Monthly* (PMM) to estimate transportation sector jet fuel prices for 1983 forward. Annual refiner prices of sales to end users are available for most states. SEDS converts the prices to dollars per gallon. SEDS assigns states without prices the adjacent state or PAD district or subdistrict price, as shown in Table TN4.15.

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

Table TN4.15. Jet fuel transportation sector price assignments, 1983 through 2021

State	Years	Assignment
AK	2015–2017, 2019–2021	PAD District 5
AR	2001–2003, 2007–2021	PAD District 3
AZ	2019, 2020	PAD District 5
CT	2008–2021	PAD Subdistrict 1A
DC	1983–1988, 1990, 1993	MD
DE	1987, 2003–2021	PAD Subdistrict 1B
FL	2021	PAD Subdistrict 1C
GA	2015–2021	PAD Subdistrict 1C
HI	2000–2012, 2015, 2017–2021	PAD District 5
IA	2015, 2016, 2018, 2019	PAD District 2
ID	2007–2011, 2014–2021	PAD District 4
KS	1996, 2006–2021	PAD District 2
KY	2006–2008, 2014–2017, 2020, 2021	PAD District 2
MA	1996, 2003–2010, 2013, 2014, 2016–2018, 2021	PAD Subdistrict 1A
MD	2012, 2014–2021	PAD Subdistrict 1B
ME	1985, 1990, 1991, 1993–2021	PAD Subdistrict 1A
MI	2015, 2016, 2018–2020	PAD District 2
MN	2020, 2021	PAD District 2
MO	2007, 2010, 2013–2021	PAD District 2
MS	2002, 2007, 2009–2012	PAD District 3
MT	2009–2011, 2013–2021	PAD District 4
NC	2013–2016, 2018, 2021	PAD Subdistrict 1C
ND	2002–2021	PAD District 2
NE	2004, 2006, 2007, 2012, 2014–2021	PAD District 2
NH	1987, 1995, 2000, 2004–2021	PAD Subdistrict 1A
NM	2007, 2008, 2012–2021	PAD District 3
NV	2016, 2017, 2019–2021	PAD District 5
NY	2014–2016	PAD Subdistrict 1B
OK	2016–2021	PAD District 2
PA	2015–2019	PAD Subdistrict 1B
RI	1983–1988, 1998–2000, 2002–2021	PAD Subdistrict 1A
SC	2014, 2015, 2017–2021	PAD Subdistrict 1C
SD	2009–2011, 2013, 2017–2021	PAD District 2
TN	2009–2021	PAD District 2
VT	1984–1988, 1991, 1992, 1999, 2003–2021	PAD Subdistrict 1A
WI	2003, 2008–2017, 2020	PAD District 2
WV	1993–2000, 2003–2010, 2012–2021	PAD Subdistrict 1C
WY	2003, 2005–2007, 2009–2015, 2017–2020	PAD District 4

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.

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

SEDS converts the state physical unit prices, in dollars per gallon, to Btu prices, in dollars per million Btu, using EIA's jet fuel Btu conversion factor (5.670 million Btu per barrel). The U.S. Btu prices are the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward:

- Refinitiv, an LSEG business, as re-published on EIA's Petroleum & Other Liquids data website, U.S. Gulf Coast kerosene-type jet fuel spot price, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPJK_PF4_RGC_DPG&f=A.
- EIA, historical SEDS estimates of state-level jet fuel prices.

2010 through 2021: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Kerosene-type Jet Fuel, https://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPJK_PTG_dpgal_a.htm.

1985 through 2009: EIA, *Petroleum Marketing Annual,* https://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 https://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 through 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 through 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

SEDS estimates jet fuel consumption in the electric power sector for 1972 through 1982. 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 44). The prices include all applicable taxes.

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

Kerosene

The State Energy Data System (SEDS) estimates kerosene prices for the residential, commercial, and industrial sectors. For 2022 forward, SEDS estimates prices for the residential, commercial, and industrial sectors using historical regression equations. For 1983 through 2021, SEDS estimates prices using data from the survey EIA-782, as published in EIA's former *Petroleum Marketing Annual* and *Petroleum Marketing Monthly* reports, where the residential and commercial sectors use end-user prices, and the industrial sector uses resale prices. For 1970 through 1982, SEDS develops prices for the residential and industrial sectors, and assigns the industrial sector prices to the commercial sector. SEDS uses its kerosene consumption estimates to calculate expenditure estimates for each sector.

Residential sector

SEDS estimates residential sector kerosene prices using different data sources and estimation methods, depending on the year. For 1970 through 1982, SEDS estimates residential kerosene prices using data from the U.S. Bureau of Labor Statistics *Producer Prices and Price Indexes* (PPI) and the U.S. Department of Agriculture *Agricultural Prices* publications. For 1983 through 2009, SEDS directly uses prices of kerosene sales to end users (excluding taxes) from the U.S. Energy Information Administration's (EIA) *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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 2022 forward, EIA suspended its survey EIA-782 and no physical unit prices are available, so SEDS estimates using regression equations. SEDS adds state general sales taxes from the U.S Census Bureau and successor sources. For all years, SEDS calculates physical unit prices from the data sources, and converts them to Btu prices using the kerosene conversion factor.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS residential price for 2010 through 2021 as the Y dependent variable and three X independent variables—the annual average U.S. No. 2 residential heating oil price, the annual average NYSERDA New York "statewide" retail kerosene price, and the Refinitiv crude

oil Cushing, OK WTI spot price FOB. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 2018 through 2021

SEDS estimates residential kerosene prices as the prices of kerosene sold to end users by refiners, published on the EIA website. If a state has no published price, SEDS assigns the corresponding published Petroleum Administration for Defense (PAD) district or subdistrict price. If no PAD district or subdistrict price is available, SEDS assigns the U.S. price to those states. In 2018, refiner prices are available for Minnesota, New York, Pennsylvania, and PAD Subdistrict 1B and PAD District 2. For 2019 forward, refiner prices are available for Pennsylvania only, and not the U.S. or PAD district or subdistrict levels. SEDS estimates the U.S. end-user price by applying the growth rate of the U.S. sales for resale price to previous year's U.S. end-user price. SEDS assigns the U.S. price to all states except Pennsylvania. SEDS adds state general sales taxes to the state estimated prices.

Physical unit prices: 2015 through 2017

In 2015, the source withholds all kerosene end-user prices. For 2016 and 2017, no U.S. or PADD-level end-user prices are available. For 2015 through 2017, SEDS estimates the U.S. end-user price by applying the growth rate of the U.S. sales for resale price to previous year's U.S. end-user price. SEDS assigns the U.S. price to all states. SEDS adds state general sales taxes to the state estimated prices.

Physical unit prices: 1983 through 2014

Prices of kerosene sold to end users, published in PMA and/or available on the EIA website are 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 TN4.16.

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 district or subdistrict 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.

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

Table TN4.16. 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

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.

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. Because 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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the kerosene conversion factor (5.670 million Btu per barrel). SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward: Regression equations using historical SEDS residential price estimates; EIA annual average U.S. No. 2 residential heating oil prices https://www.eia.gov/dnav/pet/pet_pri_wfr_a_EPD2F_PRS_dpgal_m.htm; annual average NYSERDA "New York State" retail kerosene prices https://www.nyserda.ny.gov/Energy-Prices/Kerosene/Average-Kerosene-Prices; annual Refinitiv, an LSEG business, crude oil Cushing, OK WTI spot price FOB, as republished on EIA's website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=A.

2010 through 2021: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Kerosene, https://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, https://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm.

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

1975 through 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 through 1981: EIA, *Retail Sales and Inventories of Fuel Oil,* Table 2.

1970 through 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, SEDS calculates an annual average general sales tax for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 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

SEDS estimates commercial sector kerosene prices using different data sources and estimation methods, depending on the year. For 1970 through 1982, SEDS assumes commercial sector kerosene prices are equal to the industrial sector prices. For 1983 through 2009, SEDS directly uses prices of kerosene sales to end users (excluding taxes) from EIA's *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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 2022 forward, EIA suspended its survey EIA-782 and no physical unit prices are available, so SEDS estimates using regression equations. SEDS adds state general sales taxes from the U.S. Census Bureau and successor sources.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS commercial price for 2010 through 2021 as the Y dependent variable and three X independent variables—the annual average U.S. No. 2 residential heating oil price, the annual average NYSERDA New York "statewide" retail kerosene price, and the Refinitiv crude oil Cushing, OK WTI spot price FOB. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 2018 through 2021

SEDS estimates commercial kerosene prices as the prices of kerosene sold to end users by refiners, published on the EIA website. If a state has no published price, SEDS assigns the corresponding published Petroleum Administration for Defense (PAD) district or subdistrict price. If no PAD district or subdistrict price is available, SEDS assigns the U.S. price to those states. In 2018, refiners prices are available for Minnesota, New York, Pennsylvania, and PAD Subdistrict 1B and PAD District 2. For 2019 forward, refiner prices are available for Pennsylvania only, and not the U.S. or PAD district or subdistrict levels. SEDS estimates the U.S. end-user price by applying the growth rate of the U.S. sales for resale price to previous year's U.S. end-user price. SEDS assigns the U.S. price to all states except Pennsylvania. SEDS adds state general sales taxes to the state estimated prices.

Physical unit prices: 2015 through 2017

In 2015, the source withholds all kerosene end-user prices. For 2016 and 2017, no U.S. or PADD-level end-user prices are available. For 2015 through 2017, SEDS estimates the U.S. end-user price by applying the growth rate of the U.S. sales for resale price to previous year's U.S. end-user price. SEDS assigns the U.S. price to all states. SEDS adds state general sales taxes to the state estimated prices.

Physical unit prices: 1983 through 2014

Prices of kerosene sold to end users, published in 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 TN4.16.

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 district or subdistrict 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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the kerosene conversion

factor (5.670 million Btu per barrel). SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward: Regression equations using historical SEDS commercial price estimates; EIA annual average U.S. No. 2 residential heating oil prices https://www.eia.gov/dnav/pet/pet_pri_wfr_a_EPD2F_PRS_dpgal_m.htm; annual average NYSERDA "New York State" retail kerosene prices https://www.nyserda.ny.gov/Energy-Prices/Kerosene/Average-Kerosene-Prices; annual Refinitiv, an LSEG business, crude oil Cushing, OK WTI spot price FOB, as republished on EIA's website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=A.

2010 through 2021: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, End Users—Kerosene, https://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, https://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm.

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

1970 through 1982: Industrial sector kerosene prices from SEDS.

Taxes

For 1992 forward, SEDS calculates an annual average general sales tax for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 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

SEDS estimates industrial sector kerosene prices using different data sources and estimation methods, depending on the year. For 1983 through 2009, SEDS directly uses prices of kerosene sold for resale (excluding taxes) from EIA's *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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 2022 forward, EIA suspended its survey EIA-782 and no physical unit prices are available, so SEDS estimates using regression equations. SEDS adds state general sales taxes from the U.S. Census Bureau and successor sources.

For 1970 through 1982, SEDS estimates industrial sector kerosene prices using producer price and price index data, and the historical SEDS industrial sector distillate fuel oil prices. The methods are slightly different for 1970 through 1974 and 1975 through 1982. For 1970 through 1982, SEDS first calculates physical unit prices; then SEDS converts to Btu prices using the kerosene conversion factor. Taxes are included in the distillate fuel oil prices and are, therefore, reflected in the kerosene price

Table TN4.17. Kerosene industrial sector PAD district and subdistrict price assignments, 1983 through 2021

State	Years	Assignments	State	Years	Assignments
AK	1983–2021	District 5	NC	2013–2016	Subdistrict 1C
AL	2007, 2012–2021	District 3	ND	1983–1993, 1997, 1999–2021	District 2
AR	1997, 1998, 2002, 2006–2021	District 3	NE	1988, 1991, 2000, 2001, 2007–2021	District 2
AZ	1983–2021	District 5	NH	1983, 1990, 1992, 1993, 1995–1998, 2000,	Subdistrict 1A
CA	1992, 1993, 2002, 2003, 2005–2021	District 5		2002, 2005, 2007–2021	
CO	1985–1997, 1999, 2000, 2006–2021	District 4	NJ	2021	Subdistrict 1B
CT	1995, 1998, 1999, 2000, 2006, 2010–2021	Subdistrict 1A	NM	1994, 1995, 1997–1999, 2004–2006, 2009–2021	District 3
DC	1983, 1986, 1988, 1991, 1996, 1997, 1999, 2016, 2021	Subdistrict 1B	NV	1983–2021	District 5
DE	1995–1998, 2003–2021	Subdistrict 1B	NY	2015–2017	Subdistrict 1B
FL	2006–2021	Subdistrict 1C	OH	2005, 2006, 2009, 2010, 2012–2020	District 2
GA	2009, 2010, 2012–2018, 2020, 2021	Subdistrict 1C	OK	2006–2021	District 2
HI	1983–2018, 2021	District 5	OR	1983–1993, 1999–2021	District 5
IA	2008, 2010–2021	District 2	PA	2019, 2021	Subdistrict 1B
ID	1983–1997, 1999–2021	District 4	RI	1990–1992, 1995, 1998–2003, 2005–2008,	Subdistrict 1A
IL	2008, 2012–2021	District 2		2011–2016, 2019–2021	
IN	2009, 2012, 2014–2016	District 2	SC	2010, 2012, 2014–2016, 2018, 2020, 2021	Subdistrict 1C
KS	2007–2009, 2012, 2016–2021	District 2	SD	1983–1993, 2000–2021	District 2
KY	2000, 2006–2021	District 2	TN	2010–2016, 2018, 2021	District 2
LA	2003, 2007, 2008, 2010, 2013–2021	District 3	TX	2003–2006, 2010, 2013–2016, 2018, 2021	District 3
MA	2001, 2004–2021	Subdistrict 1A	UT	1983–2021	District 4
MD	2010–2021	Subdistrict 1B	VA	2012–2016, 2018–2021	Subdistrict 1C
ME	1989, 2007–2021	Subdistrict 1A	VT	1992, 1993, 1995, 1998, 2000–2002, 2004–2021	Subdistrict 1A
MI	2001, 2003–2006, 2008–2021	District 2	WA	1983–1991, 1993, 1999–2021	District 5
MN	2000–2002, 2006, 2010, 2012, 2013, 2015, 2019, 2021	District 2	WI	2010, 2012, 2014, 2016, 2019–2021	District 2
MO	2008–2021	District 2	WV	2008–2021	Subdistrict 1C
MS	1987–1994, 1997–2005, 2009, 2011, 2012, 2014–2021	District 3	WY	1983–2001, 2003–2021	District 4
MT	1983–1993, 1998–2008, 2010–2021	District 4			

estimates.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS industrial price for 2010 through 2021 as the Y dependent variable and three X independent variables—the annual average U.S. No. 2 residential heating oil price, the annual average NYSERDA New York "statewide" retail kerosene price, and the Refinitiv crude oil Cushing, OK WTI spot price FOB. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 1983 through 2021

SEDS estimates industrial kerosene prices as the prices of kerosene sold for resale. The prices, in dollars or cents per gallon (excluding taxes), are generally available for 7 to more than 30 states, depending on the year. If a state has no published price, SEDS assigns the corresponding Petroleum Administration for Defense (PAD) district or subdistrict price, as shown in Table TN4.17. In 2003, the source withholds the PAD District 5 sales for resale price and SEDS estimates it as the average of the 2001, 2002, and 2004 PAD District 5 sales for resale prices. For 2007 forward, SEDS estimates withheld PAD District 4 (2007-2010 and 2012 forward) and District 5 (2007 forward) prices by applying the year-on-year percentage increases of the U.S. sales for resale prices to the previous year's district price. SEDS estimates withheld PAD Subdistrict 1A (2008, 2010, and 2012 forward) prices by applying the year-on-year percent increase of the PAD District 1 sales for resale price to the previous year's subdistrict price. SEDS then adds state general sales taxes.

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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the prices to Btu prices, in dollars per million Btu, using the kerosene conversion factor (5.670 million Btu per barrel). SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward: Regression equations using historical SEDS industrial price estimates; EIA annual average U.S. No. 2 residential heating oil prices https://www.eia.gov/dnav/pet/pet_pri_wfr_a_EPD2F_PRS_dpgal_m.htm; annual average NYSERDA "New York State" retail kerosene prices https://www.nyserda.ny.gov/Energy-Prices/Kerosene/Average-Kerosene-Prices; annual Refinitiv, an LSEG business, crude oil Cushing, OK WTI spot price FOB, as republished on EIA's website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=A.

2010 through 2021: EIA, Petroleum & Other Liquids data website, Refiner Petroleum Product Prices by Sales Type, Resale—Kerosene, https://www.eia.gov/dnav/pet/pet_pri_refoth_a_EPPK_PWG_dpgal_a.htm.

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

1970 through 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 through 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, SEDS calculates an annual average general sales tax for each State as an average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 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 kerosene consumption.

Conversion factor: all years

5.670 million Btu per barrel.

Lubricants

The State Energy Data System (SEDS) estimates lubricant prices for the industrial and transportation sectors. State-level prices are not available for either sector. SEDS assigns annual national-level prices to all states. These prices do not include end-user taxes paid at the time of sale. SEDS uses its lubricant consumption estimates to calculate expenditure estimates for each sector.

Physical unit prices: 1983 forward

SEDS estimates lubricant prices for all sectors 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 SEDS original lubricant price estimation method using U.S. Census Bureau data (see Physical unit prices: 1970 through 1982) could not be used after 1982 because the source no longer provided volume of product shipments.

Physical unit prices: 1970 through 1982

SEDS estimates lubricant prices for all sectors using shipment data for three product categories from the U.S. Department of Commerce, Census Bureau:

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).

SEDS uses two sources from the Census Bureau. The *Census of Manufactures* (CM) reports value and volume of shipments by detailed product categories every five years. The *Annual Survey of Manufactures* (AM) reports annual value of shipments but does not have volume data.

For the years where CM data are available (1967, 1972, 1977, and 1982), SEDS calculates the total shipment volume as the sum of the three product categories. The source withholds shipment volumes for the third product category. SEDS estimates these volumes by dividing

its shipment values by the weighted average cost of SIC 29920.21 and 29920.31.

Next, SEDS estimates shipment volumes for the years not covered by CM. For the years where CM data are available, SEDS calculates an annual shipment-to-consumption ratio by dividing the total shipment volume by the estimated SEDS total lubricants consumption (in thousand barrels) for each year. SEDS estimates shipment-to-consumption ratios for the years not covered by CM (1968 through 1971, 1973 through 1976, and 1978 through 1981) using linear interpolation. SEDS estimates total shipment volume for the years not covered by CM as the product of the SEDS consumption data and the annual shipment-to-consumption ratio.

SEDS estimates shipment prices by dividing the total value of shipments for the three product categories shown in CM (for 1972, 1977, and 1982) or AM (for all other years) by the estimated shipment volume. SEDS assumes the shipment prices represent wholesale prices.

SEDS estimates end-user prices, in dollars per barrel, as the product of the shipment (wholesale) prices and the trade ratio factors that represent the wholesale-to-retail markup. SEDS develops the trade ratio factors using Bureau of Economic Analysis (BEA) data for 1972 and 1977. For 1972, SEDS calculates a trade ratio as the sum of data called "purchasers value" for the three product categories divided by the sum of the "producers value" for the three categories. SEDS uses a similar calculation for 1977, but the source data uses the terms "purchase value" and "basic value" instead.

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

Btu prices: all years

SEDS converts the physical unit prices, in dollars per barrel, to Btu prices by dividing the physical unit prices by the lubricants 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 https://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

The State Energy Data System (SEDS) estimates motor gasoline prices for the transportation sector. SEDS assigns the transportation sector prices to the commercial and industrial sectors. SEDS assumes motor gasoline consumed by privately-owned vehicles is in the transportation sector. SEDS uses its estimates of motor gasoline consumption by sector to calculate expenditures. Prices in this series are retail prices and include federal and state motor fuel taxes. Because of the lack of uniformity in application, the prices do not include state general sales taxes, local fuel taxes, and local sales taxes. 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 U.S. Energy Information Administration (EIA) suspended the survey form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," which was the main source of motor gasoline prices, after data year 2010. For 2011 forward, SEDS estimates physical unit motor gasoline prices for California, Colorado, Florida, Massachusetts, Minnesota, New York, Ohio, Texas, and Washington by applying the annual average growth rates derived from the EIA survey form EIA-878, "Motor Gasoline Price Survey." SEDS estimates the remaining state prices 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. The prices include state and federal motor gasoline taxes.

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 EIA's *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.

Table TN4.18. 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

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 TN4.18, 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 develop 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 federal taxes are added to the estimates.

In the states and years (shown in Table TN4.18) 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 TN4.19 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 TN4.18. 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

Table TN4.19. 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

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

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 TN4.20. *Platt's* city price assignments to states for 1979 through 1981 are shown in Table TN4.21.

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.

Table TN4.20. 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.

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

Table TN4.21. 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

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

   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 TN4.22. 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 TN4.20. Both the CPI and the *Platt's* prices include taxes.

Because 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 TN4.20 and Table TN4.22. 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,

Table TN4.22. 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

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 TN4.22 for *Platt's* and in Table TN4.23 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

Table TN4.23. 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.

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, because the *Platt's* prices cover only regular leaded fuel. If both data sources cover a city, the CPI prices are used.
2. Because 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 TN4.23. 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 TN4.22 and Table TN4.23. 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 TN4.19, 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 TN4.22.

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

First, SEDS converts the physical unit prices, in dollars per gallon, to dollars per barrel (42 gallons per barrel). Then SEDS converts the physical unit prices to Btu prices, in dollars per million Btu, using the factor 5.253 million Btu per barrel from 1970 through 1992 and a variable annual factor from 1993 forward. The U.S. Btu prices are the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2011 forward: EIA, Petroleum & Other Liquids data website, Weekly Retail Gasoline and Diesel Prices, Gasoline - All Grades, https://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, https://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_dpgal_a.htm.

2000 through 2009: EIA, *Petroleum Marketing Annual*, https://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 through 1999: EIA, *Petroleum Marketing Annual*, https://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 through 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 through 1986: Bureau of Labor Statistics, U.S. Department of Labor, *Consumer Prices: Energy*, computer printouts of monthly gasoline prices.

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

1970 through 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 through 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 through 2010: EIA, *Petroleum Marketing Monthly*, https://www.eia.gov/petroleum/marketing/monthly/, 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*, https://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-121T (2000-2006), and Table 8.4.6 (2007-2010).

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

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

1983 through 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

The State Energy Data System (SEDS) estimates petroleum coke prices for the commercial, industrial, and electric power sectors. Petroleum refineries use about half of the petroleum coke consumed in the United States. For the industrial sector expenditure calculations, SEDS adjusts the amount of industrial petroleum coke consumption to remove refinery use because it is a process fuel. SEDS assumes the prices of the final petroleum products cover the costs of process fuels. (See the discussion in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

Commercial sector

For 1992 forward, SEDS includes in the commercial sector small amounts of petroleum coke for combined-heat-and-power generation reported by the University of Northern Iowa. SEDS estimates prices, in dollars per million Btu, using data provided by the university, including taxes.

Data source

Price

1992 forward: University of Northern Iowa, https://fm.uni.edu/power-plant.

Industrial sector

Combined-heat-and-power (CHP) plants and manufacturing facilities use petroleum coke in the industrial sector. SEDS assumes industrial CHP petroleum coke prices to be equal to the electric power sector petroleum coke prices in each state. When a state has no electric power petroleum coke consumption, SEDS uses the Census division or neighboring state price, as shown in Table TN4.24.

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. SEDS calculates a consumption-weighted U.S. average price using U.S. Department of Commerce exports data and assigns it to all states with industrial petroleum coke consumption. SEDS calculates the weighted average price 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; from short tons to barrels by multiplying by 5; and from barrels to Btu by multiplying by 6.024 (before 2004) or 5.719 (for 2004 forward). The prices do not include taxes.

Table TN4.24. 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
	2016	West South Central
DE	1993–2003	PA
GA	1990	AL
	1991	East North Central
	1992	West North Central
	1993	KY
	1994–2002, 2011–2023	South Atlantic
	2003–2005	FL
	2006, 2007	South Atlantic (FERC)
	2008–2010	South Atlantic (EIA-923 Sch 2)
IA	2013–2023	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	2011–2020	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, 2017–2019	East North Central
TX	1990–1992	West North Central
	2014–2023	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 DataWeb, https://dataweb.usitc.gov.

1989 through 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 through 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 through 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 through 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

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 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 Energy Production, Conversion & Delivery (EPCD). The prices include all taxes, transportation, and other charges paid by the electric plants.

Btu prices: 2002 forward

SEDS uses electric power sector petroleum coke prices from C&Q or EPCD. For 2008 forward, the data are from Form EIA-923, "Power Plant Operations Report." Prior to 2008, the data are from the Federal Energy Regulatory Commission (FERC) Form 423, "Cost and Quality of Fuels for Electric Plants," (a survey of electric utilities) and Form EIA-423, "Cost and Quality of Fuels for Electric Plants," (a survey of nonutility power producers). SEDS uses the combined information from Form EIA-423 and FERC Form 423 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 from the C&Q or EPCD. For those states, SEDS uses the Census division neighboring state, or neighboring Census division price, as shown in Tables TN4.25 and TN4.26. For 2003 through 2010, SEDS uses plant-level data from Form EIA-923 Schedule 2 or FERC Form 423 to calculate prices for a state. If there are no plant data for the state, SEDS uses an average of the plant-level prices for the Census division. The state-level price assignments are shown in Table TN4.25, and the Census division-level price assignments are shown in Table TN4.26.

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 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 TN4.25 and Table TN4.26.

Btu prices: 1970, 1971

Table TN4.25. 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

For the years 1970 and 1971, prices are estimated by using the gross domestic 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 TN4.26. 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
	2012–2023	West South Central
NY	2001, 2002, 2009,	East North Central
	2011	
	2003, 2005–2008	Middle 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, 2011–2023	East North Central
PA	2001–2003, 2009,	East North Central
	2010, 2016	
	2005, 2006, 2008	Middle 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 Energy Production, Conversion & Delivery, data on average delivered cost of petroleum coke by state, electric utilities and electric power sector.

2010: EIA Office of Energy Production, Conversion & Delivery, data on average delivered cost of petroleum coke by state, all sectors, and Form EIA-923, "Power Plant Operations Report," https://www.eia.gov/electricity/data/eia923/index.html, Schedule 2.

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

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

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

- 1983 through 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 through 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 through 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 needed. The data sources provide Btu prices.

Residual fuel oil

The State Energy Data System (SEDS) estimates residual fuel oil prices for the commercial, electric power, industrial, and transportation sectors. For 2022 forward, EIA suspended its survey EIA-782 and no physical unit prices are available, so SEDS estimates prices using regression equations. SEDS uses its residual fuel oil consumption estimates to calculate expenditure estimates for each sector. For the industrial sector expenditure calculations, SEDS adjusts the amount of industrial residual fuel oil consumption to remove intermediate refinery process fuels and avoid double counting. (See Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

Commercial sector

SEDS estimates commercial sector residual fuel oil prices using different data sources and estimation methods, depending on the year. For 2022 forward, EIA suspended its survey EIA-782 and no physical unit prices are available, so SEDS estimates using regression equations. For 2011 through 2021, SEDS estimates prices using regional-level regression equations (see below). For 1984 through 2009, SEDS develops state-level commercial sector residual fuel oil prices from refiner/reseller/retailer prices of residual fuel oil to end users published in EIA's *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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, SEDS estimates commercial sector prices for all states using U.S. residual fuel oil prices and state-level electric power sector residual fuel oil prices. For all years, the final price estimates include state taxes.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS commercial price for 2016 through 2021 as the Y dependent variable and two X independent variables—the annual average EIA-923 U.S. cost of residual fuel receipts at electric generating plants and the annual Refinitiv U.S. Gulf Coast Ultra-Low Sulfur No. 2 diesel spot price. After the regression output, SEDS adds state general sales taxes.

Table TN4.27. Residual fuel oil commercial sector PAD district and subdistrict price assignments, 1984 through 2021

State	Years	Assignments	State	Years	Assignments
AL	1995, 2006, 2018, 2020, 2021	District 3	ND	1988–1992, 1995–2002, 2005–2009, 2011–2015	District 2
AR	1996, 2004	District 3			
AZ	1984, 1985, 1988, 1991, 1996	District 5	NE	1995, 1998–2000, 2004–2006, 2008–2010, 2012, 2014, 2017–2021	District 2
CO	1986, 1992, 1993, 1998, 1999	District 4			
CT	2011–2020	Subdistrict 1A	NH	2014–2021	Subdistrict 1A
DC	1998–2001	Subdistrict 1B	NJ	2018	Subdistrict 1B
DE	2014–2017, 2021	Subdistrict 1B	NM	1984, 1985, 1996	District 3
FL	2009, 2011–2015	Subdistrict 1C	NV	1986, 1988, 1991, 1992, 1997–2000, 2007, 2011	District 5
GA	2001, 2003, 2014, 2016	Subdistrict 1C			
HI	2002, 2004–2007	District 5	NY	2019, 2020	Subdistrict 1B
IA	1996, 1998, 2005, 2006, 2010, 2012, 2016	District 2	OH	2011, 2012	District 2
ID	1985, 1986, 1989–1992, 1994–1998, 2010–2012	District 4	OK	1992, 1995, 2002, 2004, 2020	District 2
			OR	1989	District 5
IL	2003, 2008, 2010, 2011, 2014	District 2	RI	2011–2017, 2019, 2020	Subdistrict 1A
IN	2009, 2014, 2015, 2018–2021	District 2	SC	1993–1995, 1998–2002, 2005–2008, 2014–2021	Subdistrict 1C
KS	2009–2011	District 2			
KY	1999–2001, 2005	District 2	SD	1990–1995, 1997–2002, 2004–2013, 2018–2021	District 2
MA	2014–2021	Subdistrict 1A			
MD	2014–2018, 2021	Subdistrict 1B	TN	1995, 2007–2009, 2013	District 2
ME	2007, 2011–2021	Subdistrict 1A	TX	2020	District 3
MI	2008–2018, 2021	District 2	UT	1989–1992, 1998–2001, 2004–2006, 2010, 2014	District 4
MN	1995–1997, 2002–2009, 2011–2019, 2021	District 2			
MO	1995, 2007, 2009, 2010, 2012	District 2	VA	2014–2016, 2018, 2020, 2021	Subdistrict 1C
MS	1988, 1991, 1992, 2001, 2003, 2008	District 3	VT	2004, 2010, 2014–2021	Subdistrict 1A
MT	1992, 1994, 1995, 1997–2000, 2003, 2009, 2010–2014	District 4	WA	2002	District 5
			WI	1994, 1995, 1998, 2006–2009	District 2
NC	2007, 2014–2016, 2018, 2021	Subdistrict 1C	WV	1984, 2013	Subdistrict 1C
			WY	1989–1991, 1994–1998, 2012	District 4

Physical unit prices: 2011 through 2021

EIA discontinued its survey that provided reseller and retailer prices for sales of residual fuel oil to end users, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," 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, SEDS develops regression equations for each Petroleum Administration for Defense (PAD) district and subdistrict. SEDS uses historical refiner retail sales prices for residual fuel oil from EIA-782A as the independent variable and the historical commercial residual fuel oil prices as the dependent variable. When the independent variables are missing, SEDS estimates them by applying the U.S. growth rate to the previous year prices. SEDS uses these regression equations to estimate the current 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. SEDS assigns the corresponding PAD district or subdistrict prices to all other states, except Alaska, as shown in Table TN4.27. For Alaska, SEDS estimates commercial residual fuel oil prices for 1984 forward using Washington commercial residual fuel oil prices and the ratio of the AK-to-WA prices for each year where there is consumption. SEDS adds state general sales taxes 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 TN4.27), 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 TN4.28).

Physical unit prices: 1970 through 1975

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 TN4.28.

Table TN4.28. 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

Btu prices: all years

SEDS converts the physical unit prices to Btu prices using the residual fuel oil conversion factor. SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward: Regression equations using historical SEDS commercial price estimates; EIA-923 U.S. cost of residual fuel receipts at electric generating plants, as published in EIA's *Monthly Energy Review* Table 9.9 https://www.eia.gov/totalenergy/data/browser/index.php?tbl=T09.09#/?f

=A&start=1973&end=2022&charted=2; annual Refinitiv, an LSEG business, U.S. Gulf Coast Ultra-Low Sulfur No. 2 diesel spot price, as republished on EIA's website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_RGC_DPG&f=A.

2011 through 2021: 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, https://www.eia.gov/dnav/pet/pet_pri_resid_a_eppr_pta_dpgal_a.htm.

1984 through 2009: EIA, *Petroleum Marketing Annual*, https://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 through 1988: Commercial sector distillate fuel oil price estimates from SEDS (AK and WA only).

1978 through 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 through 1983: Electric power sector residual fuel oil price estimates (in physical units) from SEDS.

Taxes

For 1992 forward, SEDS calculates an annual average general sales tax for each State as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* Table 8, column titled "Percentage rate, September 1."

1976 through 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

SEDS estimates the electric power prices for residual fuel oil (heavy oil) as the average delivered cost of No. 6 fuel oil receipts at electric plants. For 1973 forward, the data source provides Btu prices. For 1970 through 1972, SEDS estimates the prices using simple regression analysis. For all years, the prices include all taxes, transportation, and other charges paid by the power plants.

Btu prices: 2011 forward

The PMA no longer publishes data on the cost of residual fuel oil delivered to the electric utilities, but the data are available from the Office of Energy Production, Conversion & Delivery (EPCD). SEDS estimates missing state prices by applying the growth rate of the U.S. price to the previous year's state prices (Table TN4.29).

Table TN4.29. Residual fuel oil electric power U.S. growth assignments, 2011 forward

State	Years	State	Years
AK	2013–2015	MI	2011–2021
AR	2011–2015, 2020	MS	2011, 2012, 2014
CA	2011, 2015	NE	2011, 2012
CT	2011–2023	NH	2011, 2012, 2016, 2017,
DE	2011–2023		2019–2023
FL	2018–2020	NJ	2011–2016
GA	2011, 2015	NY	2020
LA	2012–2016	PA	2011–2014, 2018–2023
MA	2011, 2013–2023	TX	2011, 2012
MD	2011–2023	VA	2021, 2022
ME	2011–2023	VT	2011, 2012

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 EPCD.

For 1973 through 1979, 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 TN4.30, is assigned as the state prices. Table TN4.31 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.

Table TN4.30. 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

Hawaii: 1973 through 1982, and 2007

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

Table TN4.31. 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	Middle 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

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

Data sources

Prices

2010 forward: EIA-923, Office of Energy Production, Conversion & Delivery, data on average delivered cost of residual fuel oil to regulated electric power plants.

1973 through 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 https://www.eia.gov/electricity/cost_quality/.

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

1970 through 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 the data sources directly provide Btu prices, SEDS only uses the residual fuel oil conversion factor of 6.287 million Btu per barrel for Alaska prices for 1994 forward.

Industrial sector

SEDS estimates industrial sector residual fuel oil prices using different data sources and estimation methods, depending on the year. For 2022 forward, EIA suspended its survey EIA-782 and no physical unit prices are available, so SEDS estimates using regression equations. For 2011 through 2021, SEDS estimates prices using regional-level regression equations (see below). For 1984 through 2009, SEDS estimates prices using refiner/reseller/retailer prices of residual fuel oil in EIA's *Petroleum Marketing Annual* (PMA). For 2010 through 2021, 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, SEDS estimates residual fuel oil prices using average costs of residual fuel oil to manufacturing firms published in two U.S. Census

Table TN4.32. Residual fuel oil industrial sector PAD district and subdistrict price assignments, 1984 through 2021

State	Years	Assignments	State	Years	Assignments
AK	2021	District 5	MS	1988, 1991, 1992, 1995, 1998,	District 3
AL	1995, 1997, 1998, 2005–2021	District 3		2001–2004, 2006–2021	
AR	1985, 1996, 1997–2016	District 3	MT	1992, 1994, 1995, 1997–1999, 2001–2006, 2009	District 4
AZ	1984–1993, 1995–2002, 2005–2007, 2011	District 5	NC	2007, 2014–2021	Subdistrict 1C
CA	2019–2021	District 5	ND	1988–1992, 1995–2002, 2005–2009, 2011, 2012,	District 2
CO	1986, 1988, 1990–1995, 1997–1999,	District 4		2014, 2015	
	2001, 2006, 2008		NE	1995, 1996, 1998–2000, 2002, 2005–2009, 2014	District 2
CT	2011–2018	Subdistrict 1A	NH	2014–2021	Subdistrict 1A
DC	1994, 1995, 2000	Subdistrict 1B	NM	1984–1986, 1990–2010	District 3
DE	2015–2017, 2021	Subdistrict 1B	NV	1986, 1988, 1991–1999, 2002–2006	District 5
FL	2009, 2011–2021	Subdistrict 1C	NY	2019, 2020	Subdistrict 1B
GA	2001–2004, 2011–2021	Subdistrict 1C	OH	2011–2021	District 2
HI	2002–2008, 2011–2013, 2015–2019, 2021	District 5	OK	1992–2021	District 2
IA	1995–1999, 2005–2008, 2010–2014,	District 2	OR	1989, 2016–2018, 2021	District 5
	2017–2019, 2021		PA	2019, 2020	Subdistrict 1B
ID	1985, 1986, 1989–1992, 1994, 1995–2003,	District 4	RI	2011–2020	Subdistrict 1A
	2005–2007, 2009–2012, 2016, 2021		SC	1993–1995, 1998–2002, 2005–2008, 2014–2021	Subdistrict 1C
IL	2003, 2004, 2007–2021	District 2	SD	1990–2009, 2011, 2013–2017, 2021	District 2
IN	2009–2021	District 2	TN	1995, 2000, 2002, 2007–2009, 2011–2021	District 2
KS	2007–2021	District 2	TX	2020, 2021	District 3
KY	1998–2010, 2013–2018, 2021	District 2	UT	1989–1992, 1998–2000, 2002, 2005, 2006,	District 4
LA	2019–2021	District 3		2008, 2010, 2014, 2015, 2018, 2021	
MA	2014–2021	Subdistrict 1A	VA	2014–2021	Subdistrict 1C
MD	2014–2019, 2021	Subdistrict 1B	VT	2010, 2014–2021	Subdistrict 1A
ME	2007, 2011–2021	Subdistrict 1A	WA	2002, 2021	District 5
MI	2007–2021	District 2	WI	1994, 1995, 1998, 2006–2021	District 2
MN	1995–1997, 2002–2009, 2011–2021	District 2	WV	1984, 1998, 2002–2016, 2020, 2021	Subdistrict 1C
MO	1995, 2007, 2010–2018, 2020, 2021	District 2	WY	1989–1999, 2001–2010	District 4

Bureau reports and *Platt's Oil Price Handbook and Oilmanac*. The sources provide price data for the years 1971 and 1974 through 1981; SEDS estimates prices for 1970, 1972, 1973, 1982, and 1983. Prices for all years include taxes.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS industrial price for 2016 through 2021 as the Y dependent variable and two X independent variables—the annual average EIA-923 U.S. cost of residual fuel receipts at electric generating plants and the annual Refinitiv U.S. Gulf Coast Ultra-Low Sulfur No. 2 diesel spot price. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 2011 through 2021

EIA discontinued its survey that provided reseller and retailer prices for sales of residual fuel oil to end users, Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report," 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, SEDS develops regression equations for each Petroleum Administration for Defense (PAD) district and subdistrict. SEDS uses historical refiner retail sales prices for residual fuel oil from EIA-782A as the independent variable and the historical industrial prices as the dependent variable. When the independent variables are missing, SEDS estimates them by applying the U.S. growth rate to the previous year prices. SEDS uses these regression equations to estimate the 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. SEDS assigns the corresponding PAD district or subdistrict prices to all other states,

except Alaska, as shown in Table TN4.32. For Alaska, SEDS estimates industrial residual fuel oil prices for 1984 forward using Washington industrial residual fuel oil prices and the ratio of the AK-to-WA prices for each year where there is consumption. SEDS adds state general sales taxes 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 subdistrict price as shown in Table TN4.32, 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 TN4.33). 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 by using the assigned *Platt's* prices for 1982 and 1983 (Table TN4.33) 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 TN4.34.

Physical unit prices: 1970, 1972, 1973

Because 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 TN4.33). 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

SEDS converts the physical unit prices to Btu prices using the residual fuel oil conversion factor of 6.287 million Btu per barrel. SEDS calculates the U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data, that is adjusted for process fuel consumption.

Data sources

Prices

2022 forward: Regression equations using historical SEDS industrial price estimates; EIA-923 U.S. cost of residual fuel receipts at electric generating plants, as published in EIA's *Monthly Energy Review* Table 9.9 https://www.eia.gov/totalenergy/data/browser/index.php?tbl=T09.09#/?f=A&start=1973&end=2022&charted=2; annual Refinitiv, an LSEG business, U.S. Gulf Coast Ultra-Low Sulfur No. 2 diesel spot price, as republished on EIA's website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_RGC_DPG&f=A.

2011 through 2021: 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, https://www.eia.gov/dnav/pet/pet_pri_resid_a_eppr_pta_dpgal_a.htm.

1984 forward: EIA, *Petroleum Marketing Annual,* https://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 TN4.33. No. 6 Fuel oil price assignments from Platt's, 1970 through 1983

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

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

[2]As shown in Platts.

Table TN4.34. 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 through 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 through 1976 and 1978 through 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, SEDS calculates an annual average general sales tax for each state as an average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* Table 8, column titled "Percentage rate, September 1."

1984 through 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, 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 more than 99% of all transportation consumption. For all years, SEDS develops prices for vessel bunkering, and assigns the electric power sector residual fuel oil prices to the military and railroad uses. SEDS adds tax adjustments as described below. For all years, SEDS estimates the transportation sector price as the consumption-weighted average price of the three uses. For 2022 forward, EIA suspended its survey EIA-782 that provided the data and no physical unit prices are available, so SEDS estimates prices using regression equations.

Physical unit prices: 2022 forward

For 2022 forward, EIA suspended its survey EIA-782 that provided the

data and no physical unit prices are available, so SEDS estimates prices using regression equations. The regression equation for each state uses the historical SEDS transportation price for 2010 through 2021 as the Y dependent variable and three X independent variables—the annual average EIA-888 U.S. No. 2 diesel retail price; the annual Refinitiv crude oil Cushing, OK WTI spot price FOB; and the annual average EIA-923 U.S. cost of residual fuel receipts at electric generating plants. After the regression output, SEDS adds state general sales taxes.

Physical unit prices: 1970 through 2021

Vessel bunkering. SEDS calculates annual physical unit prices from actual or estimated U.S. average bunker C prices and electric power sector state and U.S. residual fuel oil prices. First, SEDS adds a weighted average of states' sales taxes to the U.S. bunker C prices, which do not include taxes. Then, SEDS estimates the state bunker C price as the product of the U.S. bunker C-to-electric power price ratio the state electric power residual fuel oil price. SEDS uses these other methods for the following years:

1. For 1982 through 2021, SEDS estimates bunker C prices directly as U.S. average prices for residual fuel oil with sulfur content greater than 1% from EIA's *Annual Energy Review*.
2. For 1975 through 1981, SEDS uses U.S. average bunker C prices from the *Monthly Petroleum Product Price Report* (MPPPR). For 1975 and 1976, SEDS calculates annual average U.S. prices as the simple average of the monthly prices.
3. For 1970 through 1974, no U.S. bunker C prices are available. SEDS estimates the state-level prices, as the product of the average bunker C-to-electric power sector prices ratio for 1975 through 1979 and the state-level electric power prices for 1970 through 1974.

For 1970 through 1986, SEDS assigns missing state prices the adjacent states' average prices, as shown in Table TN4.35.

Military and railroad use. For 1970 through 2021, SEDS assigns the electric power sector residual fuel oil prices to military and railroad uses. The electric power prices include taxes. Because the military does not pay state taxes, the electric power prices are adjusted to remove taxes.

Some states do not have an electric power sector residual fuel oil price, so SEDS assigns the corresponding Census division price.

Average prices. SEDS calculates state transportation sector prices as the consumption-weighted average of the three uses.

Table TN4.35. 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, 1977, 1980–1982	AR, GA, MO, MS, VA
	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

Btu prices: all years

SEDS converts the physical unit prices to Btu prices using the residual fuel oil conversion factor. SEDS calculates U.S. Btu prices as the average of the state Btu prices, weighted by SEDS consumption data.

Data sources

Prices

2022 forward: Regression equations using historical SEDS transportation price estimates; annual EIA-888 U.S. No. 2 diesel retail price https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2D_PTE_NUS_DPG&f=A; annual Refinitiv, an LSEG business, crude oil Cushing, OK WTI spot price FOB, as republished on EIA's website https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=A; and annual EIA-923 U.S. cost of residual fuel receipts at electric generating plants, as published in EIA's *Monthly Energy Review* Table 9.9 https://www.eia.gov/totalenergy/data/browser/index.php?tbl=T09.09#/?f=A&start=1973&end=2022&charted=2.

2011 through 2021: EIA, *Petroleum Market Monthly, April issues,* Table 16, column titled "Sulfur Greater Than 1%, Sales to end users." Also available at https://www.eia.gov/dnav/pet/pet_pri_refoth_dcu_nus_a.htm.

1982 through 2010: EIA, *Annual Energy Review,* https://www.eia.gov/totalenergy/data/annual/, 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 through 1981: EIA, *Monthly Petroleum Product Price Report*, Table 3.

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

Taxes

For 1992 forward, SEDS calculates an annual average general sales tax for each state as a simple average of the 12 monthly values. This method takes into account tax changes during the year. Before 1992, SEDS uses the September 1st state general sales tax for each year.

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, SEDS estimated the 2009 tax rates by comparing the Federation of Tax Administrators' 2008 and 2010 rates for each state. If no change occurred between 2008 and 2010, SEDS assumes the rate remained constant in 2009. If a rate did change between those years, SEDS consulted the State Department of Revenue to determine the effective date of the rate change.

1996 forward: Federation of Tax Administrators, https://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 through 1992: Census Bureau, U.S. Department of Commerce, *State Government Tax Collections,* Table 8, column titled "Percentage rate, September 1."

1976 through 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

The State Energy Data System (SEDS) includes 12 separate products in the category called "other petroleum products." Of the 12 products, SEDS develops prices for the 6 noted with asterisks (*) below. SEDS assumes nearly all of these products are only used in the industrial sector. Only biofuels product supplied is in the transportation sector.

- Aviation gasoline blending components
- Biofuels product supplied
- Crude oil
- Miscellaneous products (*)
- Motor gasoline blending components
- Petrochemical feedstocks, naphtha (*)
- Petrochemical feedstocks, other oils (*)
- Petrochemical feedstocks, still gas (1970-1985) (*)
- Special naphthas (*)
- Still gas
- Unfinished oils
- Waxes (*)

For the six products, SEDS only develops national-level prices because state-level price information is not available. Taxes are not included in any of the estimates. For the industrial sector expenditure calculations, SEDS removes the other five products because they are used as process fuel or intermediate products. For the residential, commercial, and transportation sectors expenditure calculations, SEDS adjusts the amount of distillate fuel oil consumption to include the volumes of biodiesel and renewable diesel product supplied in those sectors, which are all assumed to be consumed as mixed with petroleum distillate fuel oil during end-use consumption. Therefore, all volumes of biodiesel and renewable diesel in those sectors are assigned distillate fuel oil prices for those sectors and included in the distillate fuel oil expenditures data. Due to the lack of individual fuel information, SEDS does not assign prices to the relatively small amount of other biofuels product supplied and removes them. (See Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

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). SEDS estimates the prices using data from the Bureau of Mines 1970s *Minerals Yearbooks*, which include finished petrochemicals, especially the aromatic hydrocarbons: benzene, toluene, and the xylenes.

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

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

CM published the 1992 quantity data in pounds and SEDS converted to barrels using 7.282 pounds per gallon and 42 gallons per barrel.

SEDS cannot calculate a ratio after 1992 because CM only publishes the value of shipments and not the quantity data.

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 https://www.eia.gov/dnav/pet/pet_pri_rac2_dcu_nus_a.htm.

1970 through 2007: EIA, *Annual Energy Review,* https://www.eia.gov/totalenergy/data/annual/, 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 oils with boiling points less than 401°F. SEDS estimates consumer prices for 1978 through 1980 using the *Annual Survey of Manufactures* (ASM) series on "Hydrocarbon, Coal, and Coke Materials Consumed" for SIC 2869 (industrial organic chemicals) and SIC 2821 (plastics materials, synthetic resins, and nonvulcanizable elastomers). SEDS estimates a 1982 price from the CM data for SIC 2869 only. Because the ratio of petrochemical-naphtha-to-crude-oil price is reasonably constant in 1978, 1979, 1980, and 1982, SEDS uses the simple average of the four ratios, 1.23, to estimate prices for petrochemical feedstocks, naphtha, 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 https://www.eia.gov/dnav/pet/pet_pri_rac2_dcu_nus_a.htm.

1970 through 1977, 1981, 1983 through 2007: EIA, *Annual Energy Review*, https://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 oils with boiling points equal to or greater than 401°F. SEDS estimates consumer gas oil prices for 1978 through 1980 using ASM data for SIC 2865 (cyclic crudes and intermediates). The other-oils-to-crude-oil price ratio is stable, and SEDS uses the average ratio for the 3-year period, 1.607, 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 https://www.eia.gov/dnav/pet/pet_pri_rac2_dcu_nus_a.htm.

1970 through 1977, 1981 through 2007: EIA, *Annual Energy Review,* https://www.eia.gov/totalenergy/data/annual/, 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 SIC 2869 and SIC 2911 (petroleum refining). The still-gas-to-crude-oil price ratio varies because still gas is a highly variable gaseous mixture. Value and quantity are available for 1972, 1977 through 1980, and 1982. When CM or ASM data are not available, SEDS uses the average still-gas-to-crude-oil price ratio, 0.759. After 1985, EIA no longer reports feedstock and refinery use of still gas separately and SEDS removes all industrial consumption from the price and expenditure tables. (See Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/sep_prices/notes/pr_consum_adjust.pdf.)

Data sources

1970, 1971, 1981, 1983 through 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.

Special naphthas

Physical unit prices: all years

SEDS develops prices for special naphthas as the simple average of city prices for "varnish makers and painters naphtha" and two types of "solvent naphtha" published in the *Chemical Marketing Reporter*. For 1984 through 1990, SEDS averages the prices from the first issue of each month; for 1974, 1979, and 1980, when petroleum prices increased rapidly, SEDS averaged prices from 10 randomly selected issues. For all other years, SEDS averaged prices from at least 5 randomly selected issues. For 1991 forward, SEDS estimates special naphtha prices 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 include fully refined crystalline wax, other refined crystalline wax, and microcrystalline wax. SEDS calculates wax price estimates for 1970 through 1973 and for 1986 forward using data from the U.S. Department of Commerce, Census Bureau. SEDS divides the value of exports by the quantity exported. For 1974 through 1985, SEDS estimates prices by applying price indices to a representative base price calculated from the *Census of Manufacturers* 1967 producer prices for the three wax categories. SEDS calculates a 1967 weighted-average price of $15.75 per barrel. The Bureau of Labor Statistics' *Producer Prices and Producer Price Indexes* publishes annual composite price indices for these three waxes for April 1974 through June 1985. SEDS calculates prices for 1975 through 1984 as the product of the published price indices and the estimated 1967 base price. For 1974 and 1985, the two years with incomplete annual data, SEDS estimates the indices for 1974 and 1985 as the simple average of monthly price indices 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 DataWeb, https://dataweb.usitc.gov.

1989 through 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 code 4925210)," "Paraffin Wax, Crystalline, Except Fully Refined (commodity code 4925220)," and "Petroleum Waxes, NSPF incl Microcrystalline Wax (commodity code 4925240)."

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

1974 through 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.

Table TN4.36. Other petroleum products Btu conversion factors

Petroleum product	Million Btu per barrel
Miscellaneous products	5.796
Petrochemical feedstocks	
Naphtha < 401°F	5.248
Other oils ≥ 401°F	5.825
Special naphthas	5.248
Still gas	
Through 2015	6.000
For 2016 forward	6.287
Waxes	5.537

1970 through 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

SEDS converts the physical unit prices, in dollars per barrel, to Btu prices, in dollars per million Btu, for the six petroleum products using the conversion factors shown in Table TN4.36. SEDS assigns the U.S. average price for each product 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 six petroleum products, weighted by SEDS consumption data. The variable state average prices reflect the different mix of products consumed.

Table TN4.37 shows national-level estimated prices and expenditures for the other petroleum product components for selected years from 1970 forward.

Additional calculations

SEDS combines a few petroleum products for the "other petroleum" columns displayed in the tables of this report. They include asphalt and road oil, aviation gasoline (total energy only), kerosene, lubricants, petroleum coke, and the industrial sector "other petroleum products" category described in this section. Expenditures are the sum of the expenditures of the components, and SEDS calculates the prices by dividing expenditures by the sum of the adjusted consumption of the components.

Table TN4.37. Other petroleum price and expenditure estimates for the industrial sector, United States, selected years, 1970 through 2023

Year	Petrochemical feedstocks			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	1.96	4.14	1.12	1.16	– –
1975	2.43	2.86	1.31	3.12	4.95	3.85	2.89	– –
1980	6.68	7.64	4.04	10.48	12.01	7.57	7.58	– –
1985	6.27	7.38	3.39	10.87	13.38	9.17	7.76	– –
1990	5.21	6.13	– –	9.71	14.74	7.13	6.48	– –
1995	4.04	4.75	– –	9.84	23.89	5.53	5.44	– –
1996	4.85	5.71	– –	10.50	22.95	6.65	6.32	– –
1997	4.46	5.25	– –	10.46	24.62	6.11	5.80	– –
1998	2.93	3.45	– –	9.02	20.11	4.02	4.09	– –
1999	4.10	4.83	– –	9.93	20.54	5.62	5.49	– –
2000	6.62	7.80	– –	12.69	21.33	9.07	8.02	– –
2001	5.38	6.33	– –	12.10	19.26	7.36	6.75	– –
2002	5.65	6.65	– –	11.40	16.53	7.73	6.90	– –
2003	6.69	7.87	– –	13.16	15.76	9.16	7.94	– –
2004	8.67	10.20	– –	15.67	17.35	11.87	9.93	– –
2005	11.78	13.86	– –	19.14	18.25	16.12	13.41	– –
2006	14.12	16.62	– –	21.73	23.88	19.33	16.22	– –
2007	15.92	18.74	– –	23.79	26.71	21.80	18.35	– –
2008	22.20	26.14	– –	27.78	33.64	30.40	25.42	– –
2009	13.90	16.36	– –	20.20	24.35	19.03	15.92	– –
2010	17.97	21.16	– –	24.10	33.44	24.61	20.52	– –
2011	23.88	28.10	– –	30.44	35.56	32.69	27.05	– –
2012	23.66	27.84	– –	31.33	34.62	32.39	26.76	– –
2013	23.55	27.72	– –	30.47	33.37	32.25	26.73	– –
2014	21.57	25.39	– –	29.27	33.91	29.53	24.99	– –
2015	11.34	13.35	– –	21.53	32.88	15.53	13.98	– –
2016	9.53	11.22	– –	19.21	32.66	13.05	11.92	– –
2017	11.88	13.98	– –	21.57	32.69	16.26	14.47	– –
2018	15.09	17.76	– –	23.98	32.94	20.66	17.90	– –
2019	13.92	16.38	– –	23.01	29.79	19.05	16.68	– –
2020	9.32	10.97	– –	19.18	26.87	12.76	11.66	– –
2021	15.90	18.71	– –	26.41	31.26	21.77	19.07	– –
2022	22.33	26.29	– –	34.51	40.55	30.58	27.25	– –
2023	18.20	21.43	– –	30.91	36.45	24.92	22.51	– –
	Expenditures in millions of nominal dollars							
1970	239	171	32	323	106	96	– –	968
1975	683	793	124	450	166	729	– –	2,946
1980	3,173	6,564	371	2,022	395	1,799	– –	14,324
1985	1,478	3,729	– –	1,733	420	1,308	– –	8,924
1990	1,811	4,622	– –	1,040	491	983	– –	8,947
1995	1,506	3,808	– –	697	970	537	– –	7,517
1996	2,327	4,169	– –	782	1,117	592	– –	8,987
1997	2,394	4,524	– –	756	1,077	597	– –	9,348
1998	1,714	2,828	– –	967	852	478	– –	6,839
1999	2,060	3,918	– –	1,444	769	629	– –	8,820
2000	4,064	5,630	– –	1,235	706	1,081	– –	12,716
2001	2,656	4,194	– –	950	700	920	– –	9,419
2002	3,291	4,202	– –	1,168	532	1,038	– –	10,230
2003	4,099	5,505	– –	1,059	489	1,153	– –	12,305
2004	6,495	7,952	– –	800	534	1,346	– –	17,127
2005	8,227	9,813	– –	1,197	572	1,818	– –	21,627
2006	8,879	13,140	– –	1,522	624	2,630	– –	26,794
2007	8,956	13,947	– –	1,856	585	2,910	– –	28,254
2008	10,596	16,930	– –	2,358	644	4,318	– –	34,846
2009	6,557	6,948	– –	933	298	2,889	– –	17,624
2010	8,818	9,574	– –	629	571	3,906	– –	23,498
2011	11,635	10,919	– –	688	536	5,385	– –	29,164
2012	10,738	7,998	– –	461	529	5,233	– –	24,960
2013	12,196	6,208	– –	3,047	550	5,519	– –	27,521
2014	9,546	6,276	– –	3,106	501	5,396	– –	24,826
2015	4,855	3,058	– –	2,137	406	2,934	– –	13,390
2016	4,003	2,495	– –	1,798	420	2,497	– –	11,212
2017	5,181	3,676	– –	2,164	332	3,233	– –	14,587
2018	6,746	4,246	– –	2,208	409	4,090	– –	17,699
2019	5,521	3,835	– –	2,200	311	3,433	– –	15,299
2020	3,304	2,380	– –	1,660	247	2,177	– –	9,768
2021	5,641	4,059	– –	2,145	369	3,718	– –	15,931
2022	5,930	3,358	– –	3,077	529	5,608	– –	18,501
2023	4,949	2,562	– –	2,758	330	4,393	– –	14,991

[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.
Data source: U.S. Energy Information Administration, State Energy Data System. See technical notes. https://www.eia.gov/state/seds/

Section 5. Renewable energy

Prices and expenditures for renewable energy sources are based on consumption estimates from the State Energy Data System (SEDS), adjusted to remove consumption that occurs at no cost. Renewable energy sources include: biodiesel, renewable diesel, fuel ethanol, other biofuels, hydroelectric power, geothermal, solar, wind, wood, and biomass waste energy. SEDS only estimates renewable energy prices and expenditures for wood and biomass waste (including biodiesel consumption reported as "Other Biomass Liquids" (OBL) on EIA-923 with biomass waste) because all other renewable energy sources are already included in end-user prices for electricity sales to ultimate customers, in blended petroleum products, or obtained at no cost.

Biodiesel and renewable diesel

The price and expenditure estimates for distillate fuel oil and biomass waste cover the biodiesel and renewable diesel blended into distillate fuel oil and included in the biomass waste data. There are no separate biodiesel and renewable diesel prices or expenditures series in SEDS. However, for 2021 forward, SEDS does further adjust distillate fuel oil consumption to include the relatively small amounts of biodiesel and renewable diesel product supplied, which SEDS assumes are all consumed mixed with regular petroleum distillate fuel oil in the residential, commercial, and transportation sectors, for the SEDS distillate fuel oil prices and expenditures estimates. For more details, see Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Fuel ethanol

Beginning in 1993, SEDS includes fuel ethanol blended into motor gasoline in its motor gasoline consumption volumes. Since then, the price and expenditure estimates for finished motor gasoline include the fuel ethanol blended into motor gasoline. Before 1993, SEDS estimates fuel ethanol separately from motor gasoline for calculating total energy expenditures. For those years, SEDS estimates fuel ethanol expenditures by assigning motor gasoline prices to the fuel ethanol quantities blended into motor gasoline.

Other biofuels

The price and expenditure estimates for petroleum products cover any other biofuels blended into the products. There is no separate other biofuels price or expenditure series in SEDS. Due to the lack of individual fuel information, SEDS does not assign prices to the relatively small amount of other biofuels product supplied and removes them. For more details, see Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Hydroelectric, geothermal, solar, and wind energy

In SEDS, it is assumed that there are no direct fuel costs for hydroelectric, geothermal, solar, or wind energy. SEDS consumption values are adjusted by removing these energy sources before calculating energy expenditures, as described in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Wood and biomass waste

The State Energy Data System (SEDS) estimates prices for wood and biomass waste (waste). Wood includes wood and wood-derived fuels. Waste is biomass waste, which includes: municipal solid waste from biogenic sources, landfill gas, sludge waste, and agricultural byproducts. Prior to 2001, waste also includes non-biomass waste (municipal solid waste from non-biogenic sources and tire-derived fuel) that EIA cannot separately estimate. For 2006 forward, waste includes "Other Biomass Liquids" (OBL) consumption, including some estimated biodiesel consumption, in the electric power sector. SEDS assumes that taxes

are included in the prices reported on the U.S. Energy Information Administration (EIA) *Residential Energy Consumption Survey*, the *Manufacturing Energy Consumption Survey*, and the various electric power survey forms that are used as the basis for the SEDS price estimates.

Residential sector

Physical unit prices, all years

State-level wood prices for the residential sector are not available. EIA Form EIA-457, "*Residential Energy Consumption Survey*, Fall-Winter 1980-1981" (RECS 1980) and "1993 *Residential Energy Consumption Survey*" (RECS 1993) provide unpublished data on regional prices of wood, but more recent surveys do not have any wood price data. SEDS uses the U.S. average residential distillate fuel oil prices to estimate regional prices for residential wood for all years.

For 1970 through 1989, SEDS derives annual average residential wood prices for the nine Census divisions using the 1980 unpublished Census division price data from RECS 1980 and adjusting them with the ratio of the U.S. average residential distillate fuel oil price for each year and 1980. The Census division estimated prices are assigned to the states within each Census division for 1970 through 1989. For 1990 forward, SEDS derives annual average residential wood prices for the four Census regions using the 1993 unpublished Census region price data from RECS 1993 and adjusting them with the ratio of the U.S. average residential distillate fuel oil price for each year and 1990. SEDS assigns the estimated Census region wood prices to the states within each Census region for 1990 forward.

Btu prices, all years

SEDS converts prices in dollars per cord to dollars per million Btu using the conversion factor of 20 million Btu per cord.

Data sources

Prices

1990 forward: EIA, unpublished data from Form EIA-457, "1993 *Residential Energy Consumption Survey*," https://www.eia.gov/consumption/residential/index.php, Census region compilation of the answers to questions J-28 and J-33 through J-36.

1970 through 1989: EIA, unpublished data from Form EIA-457, "*Residential Energy Consumption Survey*, Fall-Winter 1980-1981" Census division compilation of data on average prices paid for wood.

1970 forward: EIA, U.S. average residential distillate fuel oil prices (DFRCD) from SEDS.

Consumption

1970 forward: EIA, State Energy Data System, residential wood consumption adjusted as described in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Conversion factor

20 million Btu per cord.

Commercial sector

Btu prices, 1989 forward

SEDS estimates wood consumption in the commercial sector for two groups: (1) commercial combined-heat-and-power (CHP) and electricity-only facilities, and (2) other commercial entities. State-level wood prices are not available for either of these two groups. SEDS uses the U.S. average price of wood consumed by the electric power sector to approximate price of wood used by commercial CHP and electricity-only facilities. SEDS assigns the state-level residential wood prices to the other commercial entities.

Commercial CHP and electricity-only facilities are the only consumers of waste in the commercial sector. SEDS assigns states with commercial waste consumption the electric power sector annual average U.S. price for waste.

The state-level commercial sector wood and waste prices are consumption-weighted averages of the consumption and prices of the individual components. SEDS adjusts the consumption data to account for quantities obtained at no cost. (See the discussion in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Btu prices, 1970 through 1988

Wood and waste consumption and prices are not available for commercial CHP and electricity-only facilities prior to 1989. States with commercial wood consumption are assigned the state-level residential wood price.

Data sources

Prices

1989 forward: EIA, U.S. average consumption-weighted electric power wood and waste prices (WDEID and WSEID) from SEDS.

1970 forward: EIA, state-level residential wood prices (WDRCD) from SEDS.

Consumption

1970 forward: EIA, State Energy Data System, commercial wood and waste consumption adjusted as described in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Industrial sector

SEDS develops the industrial sector price estimates for wood and waste combined by dividing industrial sector consumers into two groups: (1) industrial combined heat and power (CHP) and electricity-only facilities and (2) other industrial entities. Wood and waste consumption and prices for industrial CHP and electricity-only facilities are not available prior to 1989. For 1989 forward, SEDS assigns the electric power sector annual average state prices for wood and for waste to the industrial CHP and electricity-only facilities' consumption of wood and waste.

For the other industries, SEDS estimates wood and waste consumed by the manufacturing sector separately by the types of wood and waste within the NAICS categories based on data from the EIA *Manufacturing Energy Consumption Survey* and the U.S. Census Bureau, economic surveys by industry. The state-level industrial sector wood and waste prices are consumption-weighted averages of the prices of the individual wood and waste components of each of the NAICS categories.

For 2011 forward, SEDS assigns industrial landfill gas the average U.S. prices for waste used in the electric power sector. The state-level industrial wood and waste prices are consumption-weighted averages of the prices of landfill gas and wood and waste used by the manufacturing industries.

SEDS adjusts the consumption data used to calculate expenditures to account for estimated quantities of wood and waste obtained at no cost. (See the discussion in Section 7, "Consumption adjustments for calculating expenditures, at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

Btu prices, 1998 forward

Manufacturing industries

For 1998 forward, wood and waste prices for the manufacturing industries are consumption-weighted averages based on unpublished data from the Form EIA-846, *Manufacturing Energy Consumption Survey* (MECS). Data from the 1998 MECS are used for 1998 through 2001, data from the 2002 MECS are used for 2002 through 2005, data from the 2006 MECS are used for 2006 through 2010, data from the 2010 MECS are used for 2011 through 2013, data from the 2014 MECS are used for 2014 through 2017, and data from the 2018 MECS are used for 2018 forward. MECS collects data on quantities consumed and quantities purchased in million Btu and expenditures in dollars for five types of wood and waste: pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse. SEDS uses the quantities purchased and expenditures to calculate average prices for each type of wood and waste. MECS also identifies consumption of the different types of wood and waste by North American Industry Classification System (NAICS). For each of the NAICS industries (311, 321, 322, 337, and other), SEDS calculates an average wood and waste price by using the consumption of each of the five types of wood and waste to weight the average of their respective NAICS categories prices. These average prices by NAICS code are applied to the SEDS estimates of wood and waste consumption by NAICS code in each state to calculate state-level weighted average prices for 1998 forward.

Landfill gas

For 2011 forward, SEDS assigns prices for landfill gas consumption other than for direct use the average U.S. prices of waste consumed by the electric power sector.

Industrial combined-heat-and-power and electricity-only facilities

The SEDS electric power sector annual average state prices for wood and for waste are assigned to the industrial CHP and electricity-only facilities' consumption each year.

Btu prices, 1994 through 1997

Manufacturing industries

For 1994 through 1997, industrial sector wood and waste prices are consumption-weighted averages based on unpublished data from the Form EIA-846, "1994 *Manufacturing Energy Consumption Survey*" (MECS

1994). MECS 1994 collects data on quantities consumed and quantities purchased in million Btu and expenditures in dollars for five types of wood and waste: pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse. The quantities purchased and expenditures are used to calculate average prices for each type of wood and waste. MECS 1994 also identifies consumption of the different types of wood and waste by Standard Industrial Classification (SIC) categories 20, 24, 25, 26, and other (a subtotal of SIC codes 21 through 23 and 27 through 30). For each of the SIC codes, an average wood and waste price is calculated by using the consumption of each of the five types of wood and waste to weight the average of their respective prices. These average prices by SIC code for 1994 are applied to the SEDS estimates of wood and waste consumption by SIC code in each state to calculate state-level weighted average prices for 1994 and 1995.

For 1996 and 1997, SEDS consumption and price estimates are developed using the 1997 *Economic Census*, which uses the North American Industry Classification System (NAICS). Data for the NAICS industries (311, 321, 322, 337, and other) are used.

Industrial combined-heat-and-power and electricity-only facilities

The SEDS electric power sector annual average state prices for wood and for waste are assigned to the industrial CHP and electricity-only facilities' consumption each year.

Btu prices, 1990 through 1993

Manufacturing industries

For 1990 through 1993, industrial sector wood and waste prices are consumption-weighted averages based on unpublished data from the Form EIA-846, "1991 *Manufacturing Energy Consumption Survey*" (MECS 1991). MECS 1991 collects data on quantities consumed and quantities purchased in million Btu and expenditures in dollars for five types of wood and waste: waste materials, pulping liquor, round wood, wood chips, and biomass. The quantities purchased and expenditures are used to calculate average prices for each type of wood and waste. MECS 1991 also identifies consumption of the different types of wood and waste by Standard Industrial Classification (SIC) categories 20, 24, 26, and other (a subtotal of SIC industries 21 through 25 and 27 through 30). For each of the SIC categories, an average wood and waste price is calculated by using the consumption of each of the five types of wood and waste to weight the average of their respective prices. These average prices by SIC code for 1991 are applied to the SEDS estimates of wood and waste consumption by SIC code in each state to calculate state-level weighted average prices for 1990 through 1993.

Industrial combined-heat-and-power and electricity-only facilities

The SEDS electric power sector annual average state prices for wood and for waste are assigned to the industrial CHP and electricity-only facilities' consumption each year.

Btu prices, 1986 through 1989

Manufacturing industries

For 1986 through 1989, industrial sector wood and waste prices are consumption-weighted averages based on data from the Form EIA-846, "1988 *Manufacturing Energy Consumption Survey*" (MECS 1988). MECS 1988 collects data on inputs of energy for heat, power, and electricity generation and quantities purchased in billion Btu and expenditures in dollars for five types of wood and waste: waste materials, pulping liquor, round wood, wood chips, and biomass. The quantities consumed and expenditures are used to calculate average prices for each type of wood and waste. MECS 1988 also identifies consumption of the different types of wood and waste by Standard Industrial Classification (SIC) categories 20, 24, 26, and other (mainly SIC 25). For each of the SIC codes, an average wood and waste price is calculated by using the consumption of each of the five types of wood and waste to weight the average of the respective prices. These average prices by SIC code for 1988 are applied to the SEDS estimates of wood and waste consumption by SIC code in each state to calculate state-level weighted average prices for 1986 through 1989.

Industrial combined-heat-and-power and electricity-only facilities

Information on industrial combined-heat-and-power (CHP) and electricity-only facilities' use of wood and waste became available beginning in 1989. Although quantities of wood and waste used by industrial CHP and electricity-only facilities are available for 1989, prices are not available. The SEDS electric power sector annual average prices for wood and for waste are assigned to the industrial CHP and electricity-only facilities' consumption in 1989.

Btu prices, 1980 through 1985

For 1980 through 1985, industrial sector wood and waste prices are con-sumption-weighted averages based on data published in the *Manufacturing Energy Consumption Survey: Consumption of Energy, 1985* (MECS 1985), Table 2. MECS 1985 contains data on inputs of energy for heat, power, and electricity generation in trillion Btu for two types of wood and waste: major byproducts and other. MECS 1985 also identifies consumption of the two types of wood and waste by the SIC categories 20, 24, 26, and other (mainly SIC 25). Because no price data were collected on MECS 1985, the average prices for each of the SIC categories developed from MECS 1988 are applied to the MECS 1985 estimates of wood and waste consumption by SIC code in each state to calculate state-level weighted average prices for 1980 through 1985.

Btu prices, 1970 through 1979

There are no data available for estimating industrial prices for wood and waste in 1970 through 1979. Therefore, the 1980 state-level average industrial sector wood and waste prices are used for all states in 1970 through 1979.

Data sources

Prices

2022 forward: EIA, SEDS industrial wood and waste consumption by NAICS categories 311221, 311314, 321113, 321912, 322120, 322130, and 337122, developed from the U.S. Department of Commerce, Census Bureau, 2022 *Economic Census*, Industry Series, https://data.census.gov/cedsci/, data on value of shipments. The number of employees is also used to estimate states that have withheld value of shipments data.

2018 forward: EIA unpublished data from Form EIA-846, "2018 *Manufacturing Energy Consumption Survey*" (MECS), national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by North American Industry Classifications (NAICS) categories.

2017 through 2022: EIA, SEDS industrial wood and waste consumption by NAICS categories 311221, 311314, 321113, 321912, 322121, 322130, and 337122, developed from the U.S. Department of Commerce, Census Bureau, 2017 *Economic Census*, Industry Series, https://data.census.gov/cedsci/, data on value of shipments. The number of employees is also used to estimate states that have withheld value of shipments data.

2014 through 2017: EIA unpublished data from Form EIA-846, "2014 *Manufacturing Energy Consumption Survey*" (MECS), national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by North American Industry Classifications (NAICS) categories.

2011 through 2016: EIA, SEDS industrial wood and waste consumption by NAICS categories 311221, 311314, 321113, 321912, 322121, 322130, and 337122, developed from the U.S. Department of Commerce, Census Bureau, 2012 *Economic Census*, Industry Series, https://data.census.gov/cedsci/, data on value of shipments. The number of employees is also used to estimate states that have withheld value of shipments data.

2011 forward: EIA, SEDS landfill gas consumption other than for direct use, developed from the U.S. Environmental Protection Agency, Landfill Methane Outreach Program database, https://www.epa.gov/lmop/.

1989 forward: EIA, U.S. average consumption-weighted electric power wood and waste prices (WDEID and WSEID) from SEDS.

2011 through 2013: EIA unpublished data from Form EIA-846, "2010 *Manufacturing Energy Consumption Survey*," national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by North American Industry Classifications (NAICS) categories.

2006 through 2010: EIA, SEDS wood and waste consumption by NAICS categories 311221, 311311, 321113, 321912, 322121, 322130, and 337122, developed from the U.S. Department of Commerce, Census Bureau, 2007 *Economic Census*, Industry Series, https://data.census.gov/cedsci/, data on value of shipments. The number of employees from the *2007 Economic Census* is also used.

2006 through 2010: EIA unpublished data from Form EIA-846, "2006 *Manufacturing Energy Consumption Survey*," national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by North American Industry Classifications (NAICS) categories.

2002 through 2005: EIA unpublished data from Form EIA-846, "2002 *Manufacturing Energy Consumption Survey*," national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by North American

Industry Classifications (NAICS) categories.

2001 through 2005: EIA, SEDS wood and waste consumption by NAICS categories 311221, 311311, 321113, 321912, 322121, 322130, and 337122, developed from the U.S. Department of Commerce, Census Bureau, *2002 Economic Census*, Industry Series, https://data.census.gov/cedsci/, Table 2, data on value added in manufacture. The number of employees from the *2002 Economic Census* is also used.

1998 through 2001: EIA, unpublished data from Form EIA-846, "1998 *Manufacturing Energy Consumption Survey*," national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by North American Industry Classifications (NAICS) categories.

1996 through 2000: EIA, SEDS wood and waste consumption by NAICS categories 311221, 311311, 321113, 321912, 322121, 322130, and 337122, developed from the U.S. Department of Commerce, Census Bureau, *1997 Economic Census, Industry Series*, https://data.census.gov/cedsci/, Table 2, data on value added in manufacture. The number of employees from the *1997 Economic Census* is also used.

1994 through 1997: EIA, unpublished data from Form EIA-846, "1994 *Manufacturing Energy Consumption Survey*," national data on quantities purchased, quantities consumed as fuel, and expenditures for pulping liquor, agricultural waste, wood harvested from trees, wood refuse and byproducts from mills, and wood and paper refuse, by Standard Industrial Classifications (SIC) categories.

1990 through 1995: EIA, SEDS wood and waste consumption by SIC categories 20, 24, 25, 26, and other (SIC 21-23 and 27-30) developed from the U.S. Department of Commerce, Census Bureau, *1992 Census of Manufactures, Industry Series*, Table 2, data on value added in manufacture and number of employees.

1990 through 1993: EIA, unpublished data from Form EIA-846, "1991 *Manufacturing Energy Consumption Survey*," national data on quantitiespurchased, quantities consumed as fuel, and expenditures for waste materials, pulping liquor, round wood, wood chips, and biomass.

1986 through 1989: EIA, unpublished data from Form EIA-846, "1988 *Manufacturing Energy Consumption Survey*," national data on inputs of energy for heat, power, and electricity generation, quantities purchased, and expenditures for waste materials, pulping liquor, round wood, wood chips, and biomass by SIC categories.

1986 through 1989: EIA, SEDS wood and waste consumption by Standard Industrial Classification for 1987 developed from the U.S. Department of Commerce, Census Bureau, *1992 Census of Manufactures, Industry Series,* Table 2, revised 1987 data on value added in manufacturing and number of employees.

1980 through 1985: EIA, DOE/EIA-0512(85) *Manufacturing Energy Consumption Survey: Consumption of Energy, 1985*, Table 2. National data on inputs of energy for heat, power, and electricity generation for "Major Byproducts" and "Other" by SIC categories.

1980 through 1985: EIA, SEDS wood and waste consumption by Standard Industrial Classification for 1982 developed from the U.S. Department of Commerce, Census Bureau, *1982 Census of Manufactures, Industry Series,* Table 2, data on value added in manufacturing and number of employees.

1970 through 1979: EIA, SEDS 1980 state-level prices for industrial wood and waste.

Consumption

1970 forward: EIA, State Energy Data System, industrial wood and waste consumption adjusted as described in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Electric power sector

State-level data on the electric power sector wood and waste consumption are taken from SEDS and are collected on Form EIA-923, "Power Plant Operations Report," and predecessor forms. All electric generation facilities (utilities and independent power producers) are required to report consumption on Form EIA-923, but there is no collection of price data for wood and waste. SEDS develops state and national wood and waste prices in dollars per million Btu for electric utilities from data reported on Federal Energy Regulatory Commission (FERC) Form 1 and follow-up correspondence. Prices include taxes for all years. Prices are not available for independent power producers. For 2006 forward, waste includes "Other Biomass Liquids" (OBL) consumption reported on Form EIA-923, including some estimated biodiesel consumption, in the electric power sector.

Btu prices: all years

1989 forward

SEDS calculates state-level prices for wood and waste used by electric power plants, in dollars per million Btu, from data obtained from FERC Form 1, FERC Form 423 (through 2007), and Form EIA-412 (through 2000) and by follow-up correspondence to electric companies that are not required to submit those forms. For states with more than one utility using wood and waste, SEDS calculates a consumption-weighted average price. There are anomalies that are unique to waste used for electric power generation. In some cases of municipal and industrial waste, there is no charge, and in other cases the electric power facilities charge a "tipping fee" for accepting the waste. That is, instead of paying for the fuel, the power plants are paid to take the fuel. For states where all electric power facilities pay nothing for the fuel or charge a fee for receiving it, SEDS assigns a price of zero. Although SEDS includes the corresponding consumption in calculating the average price for all fuels consumed by electric utilities in the United States, the expenditure included is zero.

While information on independent power producers' use of wood and waste is available from 1989 forward, data on prices are not available. SEDS uses the average prices for wood and waste consumed by electric utilities for the electric power sector, which includes both electric utilities and independent power producers.

1983 through 1988

A U.S. average price in dollars per million Btu is cal-culated and assigned to all states. The national price is a consumption-weighted average price based on data obtained from FERC Form 1 and Form EIA-412 and by follow-up telephone correspondence with the electric utilities that report use of wood and waste for generating electricity.

Prices are erratic for wood and waste used at electric utilities. In addition to the anomalies of no charge for the fuel and the "tipping fee" mentioned above, handling refuse-derived fuel is more labor intensive than handling conventional fossil fuels. The labor expenses are included in the plant's operating costs, not the fuel costs. Wood and waste prices are also erratic because the demand is relatively small and the pricing mechanism, even for a single facility, may change from year to year. A price or quantity change by a single major user affects the national price more significantly than for any other fuel.

1978 through 1982

National average prices are derived from data collected on Federal Power Commission (FPC) Form 423 and published monthly by EIA in *Cost and Quality of Fuels for Electric Utility Plants* (C&Q). For these years, fossil-fueled plants with a combined capacity of 25 mega-watts or greater were required to report on FPC Form 423. Annual prices of wood and waste sold to electric utilities are developed as quantity-weighted monthly prices for those plants where wood chips and refuse were used as fuel. Beginning in 1983, the reporting threshold was raised to 50 megawatts, and very few plants reported use of wood and waste on the FPC Form 423 in 1983 and subsequent years.

A detailed review of data in C&Q showed that some entries were in error by factors of 10, 100, or 1,000. Accordingly, the following corrections were made. For 1982, the February, March, and April quantities for the Florida Power Corporation are divided by 1,000 to make them 80, 40, and 60 short tons, respectively. The March, April, and May costs for Northern States Power are multiplied by 100 to make them $0.70 per million Btu. For the five months from November 1979 through March 1980, the reported quantities of wood delivered to Burlington Electric Co. are divided by 10 to place them in the range of 7,980 to 9,390 short tons. For the eight months from June 1978 through January 1979, seed corn delivered to the Logansport Indiana Electric Department are included in the waste. For February 1978, the reported quantity of wood delivered to the United Power Associates is divided by 1,000 to make it 90 short tons.

Table TN5.1. Price deflators used for wood and waste prices, 1970 through 1977

Years	Deflator	Years	Deflator
1970	35.1	1974	44.9
1971	37.1	1975	49.2
1972	38.8	1976	52.3
1973	41.3	1977	55.9

1970 through 1977

The annual prices for wood chips and refuse are derived by deflating the 1978 price by using the gross domestic product implicit price deflator based on 1987 dollars. The deflators are shown in Table TN5.1.

Data sources

Prices

2021 forward: Federal Energy Regulatory Commission (FERC), FERC Form 1, "Electric Utility Annual Report" available at eForms Submission History https://ecollection.ferc.gov/submissionHistory, and follow-up correspondence with the electric utilities that report use of wood and

waste for generating electricity.

2008 through 2020: FERC Form 1, "Electric Utility Annual Report," https://www.ferc.gov/general-information-0/electric-industry-forms/form-1-1-f-3-q-electric-historical-vfp-data, and follow-up correspondence with the electric utilities that report use of wood and waste for generating electricity.

2001 through 2007: FERC Form 1, "Electric Utility Annual Report," https://www.ferc.gov/industries-data/electric/general-information/electric-industry-forms, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants" and EIA, Form EIA-423, "Monthly Cost and Quality of fuels for Electric Plants Report," https://www.eia.gov/electricity/data/eia423/, and follow-up telephone calls to the electric utilities that report use of wood and waste for generating electricity.

1983 through 2000: Data reported on FERC Form 1, "Electric Utility Annual Report," https://www.ferc.gov/industries-data/electric/general-information/electric-industry-forms, Form EIA-412, "Annual Report of Public Electric Utilities," FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," https://www.eia.gov/electricity/data/eia423/, and follow-up telephone calls to the electric utilities that report use of wood and waste for generating electricity.

1978 through 1982: EIA, *Cost and Quality of Fuels for Electric Utility Plants*, table titled "Wood Chips, Refuse, and Petroleum Coke Used as Fuel by Steam-Electric Plants."

1970 through 1978: EIA, *Annual Energy Review 1991*, Appendix C, Gross Domestic Product and Implicit Price Deflator.

Consumption

1970 forward: EIA State Energy Data System, wood and waste consumed by the electric power sector.

Electricity consumed by the end-use sectors

The U.S. Energy Information Administration (EIA) develops annual state-level electricity prices for the residential, commercial, industrial, and transportation sectors. The electricity prices in the State Energy Data System (SEDS) are average prices of electricity sold to ultimate customers in dollars per million British Thermal Unit (Btu). EIA calculates these prices as retail electric revenue divided by the corresponding electricity sales to all customers in each end-use sector. The revenue is the operating revenue and includes all charges and taxes collected.

EIA's electricity consumption data are electricity sales by the electric power sector to ultimate customers in the end use sectors. For the expenditures calculation, SEDS adjusts state-level electricity consumption in the industrial sector to remove estimated refinery use. (See the discussion in Section 7, "Consumption adjustments for calculating expenditures," at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.)

Physical unit prices: 2003 forward

EIA calculates annual state-level physical unit prices for electricity, in dollars per kilowatthour, for the residential, commercial, industrial, and transportation sectors. These prices are the average revenue per kilowatthour of sales by all electric power retailers to a state. In 2003, for Missouri and Tennessee, there are transportation electricity consumption values in SEDS based on U.S. Department of Transportation data, but no comparable transportation sales and revenue in the *Electric Sales and Revenue*. SEDS estimates the prices for each of these states the annual growth rate of the commercial sector price applied to the previous year's transportation sector price.

Physical unit prices: 1990 through 2002

For 1990 through 2002, physical unit prices for states are calculated for all four sectors as the average revenue per kilowatthour of sales by all electric power retailers reporting sales to a state. Revenue and sales data from the Form EIA-861 "Annual Electric Power Industry Report" database, as published in the EIA *Electric Sales and Revenue*, are used to calculate physical unit prices. The prices for the residential and industrial sectors are based directly on the database. Commercial sector prices are calculated as the commercial sector revenues plus the non-transportation portion of "Other" revenues divided by the commercial sales plus the non-transportation portion of "Other" sales. The non-transportation portions of "Other" sales and revenues are estimated using SEDS transportation electricity consumption and the *Electric Sales and Revenue* "Other" sales. The transportation sector prices are based on sales and revenues reported by a non-highway-street-lighting subsector of the "Other" category from the Form EIA-861 database for 1990 through 2000. Transportation electricity prices for 2001 and 2002 are calculated by applying the percentage change in the commercial sector prices between the previous year and the current year to the previous year's transportation sector price.

Transportation electricity prices for Massachusetts and New Jersey in 2000 are out of range and are replaced with prices calculated by applying the percentage change in the commercial sector 1999 and 2000 prices to the 1999 transportation sector price.

Physical unit prices: 1987 through 1989

For 1987 through 1989, state physical unit prices are calculated for all four sectors as the average revenue per kilowatthour of sales by all electric power retailers reporting sales to a state. Revenue and sales data are from the EIA *Electric Power Annual* data files.

The prices for the residential and industrial sectors are based on residential revenues and sales, and industrial revenues and sales, respectively. Commercial sector prices are calculated as the commercial sector revenues plus the non-transportation portion of "Other" revenues divided by the commercial sales plus the non-transportation portion of "Other" sales. The non-transportation portions of "Other" sales and revenues are estimated using SEDS transportation electricity consumption and the *Electric Sales and Revenue* "Other" sales. The transportation sector prices are calculated by dividing the "Other" category revenues by "Other" sales.

Physical unit prices: 1970 through 1986

For 1970 through 1986, preliminary physical unit prices for states are

cal-culated for all four sectors as the average revenue per unit of sales by all electric power facilities reporting sales to a state. The calculation of physical prices is based upon the revenues and sales data from the *Statistical Yearbook* for each year in the series. Data for the residential sector and industrial sector are drawn from their respective columns. The commercial sector is the sum of the columns titled "Commercial," "Street and Highway Lighting," "Other Public Authorities," and "Interdepartmental." The transportation sector is the column titled "Railroads and Railways."

For 1980 through 1986, prices are based on preliminary revenues and sales data in the given year and are replaced with revised data in the following year. The only exception to this rule is the revenues data for AR in 1981; preliminary data are used in this case because of an apparent error in the revised data.

For 1970 through 1981, MD prices are assigned to DC. There are no other missing prices for the residential, commercial, and industrial sectors.

In the transportation sector, many price assignments are made due to the lack of sector-specific price data. Generally, electricity usage in the transportation sector is small; the sector's electricity use ranged from 0.1% to 0.2% of total U.S. electricity consumption in 1970 through 1986. From 1970 through 1986, only 15 states used measurable amounts of electricity in the transportation sector (CA, DC, FL, GA, IL, LA, MA, MD, NJ, NY, OH, PA, TN, VA, and WA). A few individual state prices are unavailable and are assigned the commercial sector prices: LA for 1970 through 1986 and TN for 1970 through 1986. (Prices are available for LA in 1970, 1972, 1973, but those prices are replaced by commercial sector prices to maintain a consistent series for the state.) In addition, MA transportation prices for 1985 and 1986 are estimated by multiplying the MA 1985 and 1986 commercial prices by the average of the ratios of the commercial-to-transportation sector prices for 1980 through 1984. Similarly, the VA 1977 transportation price is estimated by multiplying the VA commercial price in 1977 by the average of the ratios of the commercial-to-transportation sectors prices for 1978 through 1982.

To reconcile national-level electricity prices based on the *Statistical Yearbook* with the EIA national-level electricity prices published in the *Annual Energy Review* (AER), yearly adjustment factors are calculated for the residential, commercial, and industrial sectors as follows: a preliminary U.S. price for each sector is calculated as the average of the state prices, weighted by SEDS consumption. These preliminary U.S. prices are divided by the national-level electricity prices published in the AER, and the quotient is used as an adjustment factor. The preliminary state prices are multiplied by the adjustment factor to produce the final physical unit state prices in those sectors. Because no transportation sector prices are published in the AER, no adjustments are made to that sector and the final physical unit prices are derived solely from the *Statistical Yearbook* sales and revenue data. The annual adjustment factors for the residential, commercial, and industrial sectors are shown in Table TN6.1.

Table TN6.1. Annual electricity price adjustment factors, 1970 through 1986

Year	Residential	Commercial	Industrial
1970	1.05121	1.05712	1.06832
1971	1.05632	1.05926	1.05504
1972	1.05271	1.05514	1.05765
1973	1.06626	1.06188	1.05991
1974	1.09572	1.08098	1.08732
1975	1.09257	1.08098	1.08732
1976	1.07753	1.07755	1.06891
1977	1.06746	1.07675	1.06820
1978	1.06654	1.08273	1.06861
1979	1.06986	1.08349	1.06441
1980	1.04457	1.06109	1.06781
1981	1.05821	1.06943	1.06523
1982	1.06654	1.06351	1.05597
1983	1.05421	1.05301	1.05537
1984	0.99693	1.01924	0.99015
1985	1.00010	1.02008	0.98355
1986	0.99854	1.01518	0.98618

Data source: EIA calculations based on data from the *Annual Energy Review* and the *Statistical Yearbook of the Electric Utility Industry*.

Btu prices: all years

SEDS calculates electricity Btu prices by converting the physical unit price series, in dollars per kilowatthour, to dollars per million Btu using the conversion factor 3,412 Btu per kilowatthour. The U.S. Btu prices are the average of the state Btu prices, weighted by SEDS consumption data that have been adjusted for process fuel consumption in the industrial sector.

Data sources

Prices

1990 forward: Electricity sales to ultimate customers and revenue data

from EIA, as shown in the detailed state data spreadsheets of the *Electric Power Annual*, "Electricity Sales to Ultimate Customers by State by Sector by Provider (EIA-861)" and "Revenue from Electricity Sales to Ultimate Customers by State by Sector by Provider (EIA-861)" at https://www.eia.gov/electricity/data/state/, sector category "Total Electric Industry."

Transportation sector variations:

- 2003 forward: Column labeled "Transportation."
- 2001 and 2002: Prices calculated by EIA.
- 1990 through 2000: Data for non-highway lighting portion of "Other" from the Form EIA-861 database files.
- 1987 through 1989: EIA, *Electric Power Annual 1988*, Tables 19 and 21 (1987 data); *Electric Power Annual*, Tables 27 and 29 (1988 and 1989).

1970 through 1986: Edison Electric Institute (EEI), *Statistical Yearbook of the Electric Utility Industry*, tables titled "Revenues: Total Electric Utility Industry" and "Energy Sales: Total Electric Utility Industry," based on EEI surveys.

1970 through 1986: EIA, *Annual Energy Review 1989*, Table 95, "Retail Prices of Electricity Sold by Electric Utilities, 1960-1989."

Consumption

1970 forward: EIA, State Energy Data System, electricity consumption by end-use sector.

Conversion factor: all years

3,412 Btu per kilowatthour.

Nuclear fuel for generation of electricity

The State Energy Data System (SEDS) develops nuclear fuel prices for the electric power sector. SEDS uses its estimates of electricity generated from nuclear power to calculate expenditures of nuclear fuel.

In the United States, there are two types of nuclear power plants: those that are operated by electric utilities and those that are operated by independent power producers. Each year, regulated electric utility power plants report fuel costs to the Federal Energy Regulatory Commission (FERC). These costs include all taxes, transportation, and handling costs. Independent power plants do not need to report fuel costs to FERC. These costs are estimated by EIA or third-party data sources. Occasionally, the fuel costs at nuclear power plants include small amounts of non-nuclear fuels that are necessary to continue essential plant operations during refueling or maintenance of the reactor.

SEDS estimates state-level nuclear fuel prices in two steps. First, SEDS calculates the total cost of fuels consumed at the plant level as the product of the plant's reported or estimated fuel cost by its net electricity generation. Second, SEDS calculates the total fuel costs at the state level as the sum of all plant costs in a state divided by the sum of their net electricity generation.

SEDS uses the methods described below to estimate prices when there are no plant-level data or, in earlier years, not enough data available to calculate average nuclear fuel prices for a state.

Physical unit prices: 2009 forward

For 2009 forward, SEDS uses the fuel costs of regulated nuclear power plants submitted to FERC, extracted from the power plant dataset maintained by S&P Global Market Intelligence (previously maintained by SNL Financial), to calculate the annual average fuel costs per megawatthour for pressurized water reactors (PWR) and boiling water reactors (BWR). For plants with no reported fuel cost, SEDS calculates a total fuel cost estimate as the product of the U.S. average PWR or BWR fuel cost and its net generation. SEDS sums the plant-level total fuel costs and net generation data to the state level and calculates the average nuclear fuel prices using the method described above.

Physical unit prices: 2007 and 2008

For 2007 and 2008, a complete set of plant-level net electricity generation and nuclear fuel cost estimates is provided by EIA, Office of Electricity,

Renewables, and Uranium Statistics (ERUS) and former Office of Coal, Nuclear, Electric, and Alternate Fuels (CNEAF), extracted from Ventyx Velocity Suite.

Physical unit prices: 2001 through 2006

For 2001 through 2006, when a state has nuclear electricity generation in SEDS, but no fuel cost data are available, a state average physical unit price is estimated by CNEAF, generally based on the average physical unit prices paid by the same type(s) of reactors in other states. For 2001 through 2004, in states where there are nuclear electricity generation and fuel cost data available for only some plants, only those plants with available data are used to calculate the state average price. Occasionally, a plant is excluded from the state price calculation because the cost data are significantly out of range with other plants in the state. The specific states and years with price assignments different than what is outlined above are shown with their price source in Table TN6.2.

Physical unit prices: 1992 through 2000

For 1992 through 2000, in states where there are nuclear electricity generation and fuel cost data for some plants, but not all, available data are used to calculate the state average price. In states where nuclear electricity generation for a specific plant is not available, the plant's fuel cost data also are excluded from the state price calculation. In addition, plants that have no fuel cost data available are excluded from the state price calculation because the cost data are significantly out of range with other plants in the state.

Remaining states with missing cost data are assigned prices using one of the following methods: directly assigning a nearby state or the U.S. price; applying the ratio of the previous year to the current year physical unit nuclear fuel prices for a nearby state to the state's physical unit nuclear fuel price for the previous year; or, assigning the state's average price of the preceding and subsequent year.

When a state has nuclear electricity generation in SEDS, but no fuel cost data are available, the national physical unit nuclear fuel price is used to estimate the state price. The ratio of the current year to the previous year national nuclear fuel price is applied to the state's physical unit nuclear fuel price for the previous year. The national prices used in the estimation are the national averages before missing state prices are assigned.

The states and years estimated using these methodologies are shown in Table TN6.3.

Table TN6.2. Nuclear electricity fuel price estimates, 2001 through 2006

State	Years	Price source
IA	2006	EIA estimate based on 2001–2005 trend of cost decline
IL	2003	Average of 2002 and 2004 Quad Cities cost
	2005, 2006	Quad Cities costs assigned to all plants
MD	2005, 2006	St. Lucie costs assigned
MI	2005	Calvert Cliffs costs assigned
NJ	2002–2004	National year-to-year change
	2005	Oyster Creek assigned St. Lucie costs
	2006	Oyster Creek and Hope Creek assigned St. Lucie costs;
		Salem assigned Callaway costs
NY	2001	Average of Ginna and Nine Mile Point costs
	2002, 2003	Ginna costs assigned
OH	2006	Davis-Besse assigned Perry costs
PA	2005	Susquehanna and Limerick assigned Beaver Valley
		costs; Three Mile Island assigned Oconee costs
	2006	Susquehanna, Limerick, and Peach Bottom assigned
		Beaver Valley costs; Three Mile Island asigned average
		of Oconee, Crystal River, and Arkansas Nuclear One
		costs
TX	2005, 2006	Commanche assigned South Texas costs
WI	2006	Kewaunee assigned average price increase of
		Point Beach and Prairie Island

Physical unit prices: 1970 through 1991

For 1970 through 1991, when a state has nuclear electricity generation in SEDS, but no fuel cost data are available, the national physical unit nuclear fuel price is used to estimate the state price. The ratio of the current year to the previous year national nuclear fuel price is applied to the state's physical unit nuclear fuel price for the previous year. The national prices used in the estimation are the national averages before missing state prices are assigned. The states and years with specific price assignments are shown in Table TN6.3.

Btu prices: all years

SEDS converts nuclear fuel prices from physical unit prices, in dollars per kilowatthour, to dollars per million Btu using the annual nuclear conversion factors listed in SEDS consumption technical notes, Appendix Table B1. SEDS calculates U.S. prices as the average of the state Btu prices, weighted by SEDS consumption data.

Table TN6.3. Nuclear electricity fuel price estimates, 1970 through 2000

State	Years	Price source
AL	1973, 1974, 1976	National year-to-year change
AR	1980	National year-to-year change
AZ	1985	National year-to-year change
CO	1977, 1978, 1982–1984,	
	1986–1989	National year-to-year change
	1985	Assigned zero
CT	1997	Assigned zero
	1998	NH
FL	1997	Excludes Crystal River
GA	1974, 1978	National year-to-year change
	2000	Average of 1999 and 2001
IL	1997	Excludes LaSalle, Zion, and Clinton
	1998	Excludes LaSalle and Clinton
	2000	Excludes Clinton
ME	1972	National year-to-year change
	1997	Assigned zero
MA	1999, 2000	VT
MI	1997	Excludes Big Rock Point
	1998, 1999	Excludes Cook
	2000	Excludes Palisades
MS	1984	National year-to-year change
MO	1984, 1985	National year-to-year change
NC	1982	National year-to-year change
NE	1999, 2000	IA
NJ	2000	Excludes Oyster Creek
NY	1998	Excludes Indian Point 2
OH	1986	National year-to-year change
OR	1975, 1993	Assigned zero
PA	1999	Excludes Three-Mile Island
	2000	Average of Beaver Valley and Peach Bottom
SC	1970	National year-to-year change
	1985	Adjusted for Catawba expenses
TN	1980, 1986, 1987	Assigned zero
WA	1970–1987	U.S.
WI	1970	National year-to-year change

Additional notes

- Nuclear electricity generation levels are negative for Colorado in 1985, Tennessee in 1986 and 1987, Oregon in 1993, and Connecticut in 1997, indicating that the nuclear power plants used more energy than they supplied. In these cases, the fuel prices and expenditures are set to zero.
- For Missouri in 1985, a large credit resulting from litigation is assigned to fuel costs, creating an artificially low price. The 1986 Missouri price, which is in the range of the prices of other nuclear fuel plants, is used to estimate the 1985 price by applying the ratio of the 1985-to-1986 national prices.
- The 1985 U.S. Energy Information Administration (EIA) *Historical Plant Costs and Annual Production Expenses for Selected Electric Plants* has a footnote for the Duke Power Catawba plant in South Carolina stating that the reported production expenses represent only 12.5% of the actual production expenses. The production expenses used in the calculation for the Catawba plant are adjusted accordingly.

Data sources

Prices

2009 forward: EIA, based on data collected on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others," extracted from S&P Global Market Intelligence power plant dataset (previously SNL Financial power plant dataset).

2007 and 2008: EIA, Office of Electricity, Renewables, and Uranium Statistics (ERUS) and former Office of Coal, Nuclear, Electric, and Alternate Fuels (CNEAF), from estimates compiled by Ventyx Velocity Suite, based on data collected on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

2004 through 2006: EIA, CNEAF, from data published in *NuclearFuel*, (a division of Platts, a McGraw-Hill Company). The data are collected on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

2000 through 2003: EIA, CNEAF, from data published in *Nucleonics Week*, (a division of Platts, a McGraw-Hill Company). The data are collected on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others."

1997 through 1999: EIA, CNEAF, from data published in *Nucleonics*

Week, (a division of Platts, a McGraw-Hill Company). The data are collected on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others," and Form EIA-412, "Annual Report of Public Electric Utilities," https://www.eia.gov/electricity/data/eia412/.

1992 through 1996: EIA, CNEAF, from data compiled by the Utility Data Institute, (a McGraw-Hill Company). The data are collected on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others," and Form EIA-412, "Annual Report of Public Electric Utilities," https://www.eia.gov/electricity/data/eia412/.

1988 through 1991: EIA, *Electric Plant Cost and Power Production Expenses*, Table 16 (1988-1990) and Table 14 (1991).

1982 through 1987: EIA, *Historical Plant Costs and Annual Production Expenses for Selected Electric Plants*, Table 18 (1982-1984) and Table 20 (1985-1987).

1979 through 1981: EIA, *Thermal Electric Plant Construction Cost and Annual Production Expenses*, pages 267-279 (1979), Table 11 (1980 and 1981).

1975 through 1978: EIA, *Steam Electric Plant Construction Cost and Annual Production Expenses*, "Section II-Nuclear Plants."

1970 through 1974: Federal Power Commission, *Steam Electric Plant Construction Costs and Annual Production Expenses*, data sheets for Nuclear Plants (1970-1973), and "Section II-Nuclear Plants" (1974).

Consumption

1970 forward: EIA, State Energy Data System, electricity generated by nuclear power.

Conversion factors

1985 forward: EIA, annual U.S. average factors calculated using the heat rate reported on Form EIA-860, "Annual Electric Generator Report" (and predecessor forms), and the generation reported on Form EIA-923, "Power Plant Operations Report" (and predecessor forms). The factors are published in the State Energy Data consumption technical notes, Appendix Table B1, https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

1970 through 1984: EIA, annual U.S. average factors calculated by dividing the total heat content consumed in nuclear generating units by the total (net) electricity generated by those nuclear generating units. The heat content and electricity generation are reported on Form FERC-1 and Form EIA-412, and predecessor forms.

Electricity imports and exports

The State Energy Data System (SEDS) includes electricity transmitted across U.S. borders with Canada and Mexico in the electric power sector. Quantities and value of U.S. electricity imports and exports are available in the foreign trade statistics published by the U.S. Department of Commerce, Census Bureau. SEDS uses the annual U.S. total imports and exports quantities and revenues to calculate U.S. annual average prices. SEDS uses the U.S. prices for any state with electricity trade. For 1989 forward, SEDS converts the physical unit prices, in dollars per megawatthour, to Btu prices in dollars per million Btu using the factor of 3,412 Btu per kilowatthour. Imports and exports quantity and revenue data are not available for calculating prices for 1970 through 1988. SEDS estimates prices for those years by applying annual industrial sector electricity price percent change to the 1989 U.S. average electricity imports and exports prices.

Data sources

Prices

1989 forward: U.S. Department of Commerce, Census Bureau, general import and domestic export data, SITC Number 35100, extracted from the U.S. International Trade Commission's DataWeb, https://dataweb.usitc.gov.

1970 through 1988: EIA, State Energy Data System, industrial sector electricity prices.

Consumption

1970 forward: EIA, State Energy Data System, electricity imports and electricity exports.

Conversion factor, all years

3,412 Btu per kilowatthour.

Section 7. Consumption adjustments for calculating expenditures

The State Energy Data System (SEDS) calculates expenditures as the product of the SEDS price estimates and consumption estimates. The prices estimated by SEDS are end-use prices for the final products purchased by end users and the cost of fuels consumed by the electric power sectors. For the SEDS expenditure calculations, SEDS adjusts its consumption estimates to remove process fuel, intermediate products, and other consumption that has no direct fuel costs to the end-use customer, including: hydroelectric, geothermal, solar, and wind energy sources, and some wood and waste. SEDS also excludes electricity exports to Canada and Mexico from the expenditure calculations.

Almost all aspects of energy production, processing, and distribution consume energy as an inherent part of those activities. SEDS industrial and transportation sector consumption estimates include energy consumed in the process of providing energy to end users, called "process fuel." Common examples include: energy used to drill for oil and gas, to transport petroleum and natural gas by pipeline, and to generate and deliver electricity to end users. Energy products that are later used in another energy product for end-use consumption are called "intermediate products." A common example is intermediate motor gasoline blending components that are later consumed as part of finished motor gasoline sold at gas stations.

Process fuel and intermediate products are not directly purchased by the end user and, therefore, SEDS does not estimate these prices. Although the end user does not consume either process fuel or intermediate products directly, the cost is passed on to the end user in the final end-use product price. If SEDS did not remove the process fuel and intermediate products consumption, there would be double counting, first as paid by the "processor" (producer, processor, or transporter) and again in the final price to the end user.

Some renewable energy sources are not purchased directly. The consumption of hydroelectric, geothermal, wind, solar photovoltaic, and solar thermal energy, which SEDS measures as kilowatthours of electricity produced, are not included in the SEDS expenditure estimates because there are no "fuel costs" involved. These all-electric sources are inherently included in the end-use electricity price to ultimate customers, and therefore are part of the SEDS electricity expenditures. Wood and waste can be purchased or obtained at no cost. SEDS adjusts wood consumption estimates in the residential sector, and wood and waste in the commercial and industrial sectors to remove estimated quantities that were obtained at no cost. For 2021 forward, SEDS adjusts biofuels in two ways. First, SEDS adjusts distillate fuel oil consumption in the transportation sector to include biodiesel product supplied and renewable diesel product supplied, because those fuels are sold together at diesel stations. Second, SEDS removes the relatively small amount of U.S.-level other biofuels product supplied consumption from other petroleum products consumed in the transportation sector, because no individual fuel consumption or price data information are available for any of the other biofuels category.

Process fuel consumption adjustments include:

1. Fuel (petroleum, natural gas, steam coal) and electricity consumed at refineries
2. Crude oil lease, plant, and pipeline fuel
3. Natural gas lease and plant fuel
4. Natural gas pipeline and distribution fuel
5. Electrical system energy losses (energy consumed in the generation, transmission, and distribution of electricity)
6. Energy losses and co-products from the production of biodiesel and fuel ethanol

Intermediate product consumption adjustments include:

1. Aviation gasoline blending components
2. Motor gasoline blending components
3. Natural gasoline (1970 through 1983)
4. Natural gasoline, formerly pentanes plus (1984 through 2009)
5. Plant condensate (1970 through 1983)
6. Unfinished oils
7. Unfractionated streams (1970 through 1983)

For 1984 forward, the U.S. Energy Information Administration (EIA) reports historical natural gasoline (including isopentane) and plant

condensate together as pentanes plus. In the 2016 SEDS cycle, EIA renamed the product natural gasoline and EIA now includes it as part of a group of products called hydrocarbon gas liquids (HGL). For 2010 forward, SEDS includes the price of natural gasoline consumed by the petrochemical industry in the aggregate price for HGL. Before 2010, SEDS assumes natural gasoline to be an intermediate product with no end-use price or expenditures.

Renewable energy consumption adjustments include:

1. Solar energy in the residential, commercial, industrial, and electric power sectors
2. Geothermal energy in the residential, commercial, industrial, and electric power sectors
3. Electricity generated from hydropower in the commercial, industrial, and electric power sectors
4. Electricity generated from wind energy in the commercial, industrial, and electric power sectors
5. Estimated portions of wood consumed in the residential sector, and wood and waste in the commercial and industrial sectors that were obtained at no cost
6. Biodiesel product supplied and renewable diesel product supplied added to distillate fuel oil consumption in the transportation sector (2021 forward)
7. Other biofuels product supplied (U.S.-level only) removed from other petroleum products in the transportation sector

In addition, while SEDS does remove the consumption of supplemental gaseous fuels (SGF) from SEDS total consumption estimates to prevent double-counting in both natural gas and the fossil fuels from which they are derived, prices and expenditures of SGF cannot be separately identified and therefore SEDS does not adjust those products in its expenditure calculations.

Table TN7.1 shows the quantities of energy, by state, added or subtracted from SEDS consumption to calculate expenditures for the most recent year. Table TN7.2 shows the adjustments made to SEDS U.S. consumption estimates to derive the net consumption data used to calculate expenditures for 1970 forward.

State adjustment estimates from 1970 forward are available in the SEDS Internet data file, https://www.eia.gov/state/seds/sep_update/pr_adjust_consum_update.csv.

Adjustment procedures

Hydroelectricity, geothermal, solar, and wind energy. Electricity generated from hydropower and geothermal, solar, and wind energy has no fuel cost. Operation and maintenance costs associated with these energy sources are included indirectly in the prices of the electricity sold by power producers. Therefore, SEDS removes consumption of these renewable sources for electricity generation from its expenditure calculations. Direct use of geothermal and solar thermal energy also have no fuel costs and SEDS omits them from its energy expenditure calculations.

Residential wood. Some residential wood is purchased and some is acquired at no cost. For 1970 through 1989, based on responses to the Form EIA-457, "1980 *Residential Energy Consumption Survey*," SEDS developed Census division-level ratios of wood purchased and applied to residential wood consumption in each state in the divisions. For 1990 forward, SEDS uses the Census region ratios from Form EIA-457, "1993 *Residential Energy Consumption Survey*." Table TN7.3 shows the percentage of purchased wood for each Census division or region.

Commercial wood and waste. Some commercial wood and waste are purchased and some are acquired at no cost. SEDS estimates the ratios of conventional commercial wood purchased using the same percentages used for the residential sector (see Table TN7.3). For 1989 through 2011, SEDS estimates the ratios of wood and waste acquired at no cost by commercial combined heat-and-power facilities using the U.S. annual average percentages of wood and waste acquired at no cost by the electric power sector. For 2012 forward, because of lack of information, SEDS no longer estimates these ratios and assumes that all commercial wood and waste to be purchased.

Industrial wood and waste. The cost of industrial wood and waste products used for energy vary widely from more expensive woods to free waste products. SEDS estimates industrial wood and waste consumption for two categories—manufacturing industries and combined heat and power (CHP) facilities—to estimate the amount of wood and waste used at no cost.

For 1994 forward, SEDS adjusts manufacturing wood and waste consumption using data from Form EIA-846, "1994 Manufacturing Energy Survey (MECS)." For 1980 through 1993, SEDS uses Form EIA-846, "1991 Manufacturing Energy Survey." For 1970 through 1979, SEDS uses the 1980 average ratios for each state. The 1991 and 1994 MECS report the quantities consumed and quantities purchased of five types of wood and waste in each of four (MECS 1991) or five (MECS

Table TN7.1. Energy consumption adjustments for calculating expenditures by state, 2023 (billion Btu)

State	Refinery fuel and intermediate products								
	Distillate fuel oil	Residual fuel oil	Hydrocarbon gas liquids [a]	Petroleum coke	Other petroleum [b, c]	Natural gas [d]	Coal	Electricity [e]	Total [c]
AK	-35	—	—	—	-13,821	-3,107	—	-252	-17,215
AL	2,513	—	-19	—	-11,171	-10,580	—	-1,140	-20,396
AR	1,842	—	-12	-1,327	-7,558	-7,103	—	-771	-14,928
AZ	280	—	—	—	—	—	—	—	280
CA	342,604	—	-2,911	-52,088	-143,001	-149,374	—	-6,708	-11,478
CO	361	—	—	-2,068	-6,201	-4,773	—	-1,061	-13,742
CT	3,264	—	—	—	—	—	—	—	3,264
DC	45	—	—	—	—	—	—	—	45
DE	194	—	—	-7,601	-14,280	-12,193	—	-1,112	-34,993
FL	5,404	—	—	—	—	—	—	—	5,404
GA	3,583	—	—	—	—	—	—	—	3,583
HI	1,215	—	—	—	-7,808	—	—	-143	-6,737
IA	5,467	—	—	—	—	—	—	—	5,467
ID	228	—	—	—	—	—	—	—	228
IL	10,528	-57	-618	-30,611	-87,154	-40,249	—	-11,611	-159,773
IN	3,501	-25	-280	-14,485	-39,208	-20,055	—	-5,063	-75,616
KS	1,964	-19	-242	-6,809	-33,788	-24,565	—	-3,845	-67,305
KY	2,482	-13	-173	-8,481	-24,302	-12,547	—	-3,139	-46,172
LA	2,618	—	-403	-72,653	-244,072	-133,654	—	-30,981	-479,144
MA	1,177	—	—	—	—	—	—	—	1,177
MD	1,247	—	—	—	—	—	—	—	1,247
ME	531	—	—	—	—	—	—	—	531
MI	2,504	-6	-85	-3,426	-11,691	-6,002	—	-1,512	-20,218
MN	9,809	-25	-261	-10,078	-36,745	-18,954	—	-4,746	-61,000
MO	2,705	—	—	—	—	—	—	—	2,705
MS	1,954	—	-54	-5,551	-32,898	-31,091	—	-3,361	-71,002
MT	13	—	—	-5,853	-17,120	-10,679	—	-3,381	-37,020
NC	3,062	—	—	—	—	—	—	—	3,062
ND	891	—	-42	-2,458	-5,929	-3,065	—	-764	-11,368
NE	1,614	—	—	—	—	—	—	—	1,614
NH	319	—	—	—	—	—	—	—	319
NJ	2,134	—	—	-12,813	-35,172	-30,204	—	-2,736	-78,791
NM	1,076	—	-15	-1,892	-9,186	-8,680	—	-938	-19,637
NV	34	—	-4	—	-167	-40	—	-3	-180
NY	8,460	—	—	—	—	—	—	—	8,460
OH	4,227	-25	-315	-12,348	-44,462	-24,994	—	-6,026	-83,942
OK	2,778	-25	-307	-10,675	-43,254	-29,527	—	-5,411	-86,422
OR	27,231	—	—	—	—	—	—	—	27,231
PA	4,098	-75	—	-6,985	-19,569	-11,113	—	-1,522	-35,166
RI	979	—	—	—	—	—	—	—	979
SC	2,247	—	—	—	—	—	—	—	2,247
SD	654	—	—	—	—	—	—	—	654
TN	3,111	-13	-108	-5,445	-15,032	-7,614	—	-1,941	-27,041
TX	16,771	—	-845	-147,311	-514,638	-394,863	—	-39,081	-1,079,967
UT	311	—	—	-5,224	-17,263	-5,825	—	-1,887	-29,889
VA	2,928	—	—	—	—	—	—	—	2,928
VT	162	—	—	—	—	—	—	—	162
WA	10,839	—	-1,102	-13,901	-54,132	-40,488	—	-5,691	-104,474
WI	2,340	—	-15	-880	-2,380	-1,218	—	-307	-2,460
WV	1,245	—	—	—	-1,862	-1,667	—	-143	-2,427
WY	210	—	—	-2,747	-10,510	-8,185	—	-1,798	-23,030
US	505,724	-283	-7,813	-443,711	-1,529,138	-1,052,413	—	-147,078	-2,674,711

See footnotes at end of table.

Table TN7.1. Energy consumption adjustments for calculating expenditures by state, 2023 (billion Btu) (continued)

State	Residential		Commercial		Industrial					Transportation		Electrical system energy losses	Total [c]
	Non-combustible renewable energy [f]	Wood	Non-combustible renewable energy [f]	Wood and waste	Crude oil lease, plant, and pipeline fuel	Natural gas lease and plant fuel	Non-combustible renewable energy [f]	Wood and waste	Biofuels production losses [g]	Biofuels product supplied [c]	Natural gas pipeline fuel		
AK	-147	-1,396	-752	-251	—	-322,355	-1	-37	—	—	-448	-28,837	-371,439
AL	-191	-2,393	-48	-430	—	-10,275	-51	-23,369	-29	2,531	-26,555	-476,154	-559,891
AR	-1,575	-3,942	-568	-709	—	-2,630	-160	-12,249	-108	1,854	-6,459	-278,113	-321,441
AZ	-16,220	-2,310	-3,874	-415	—	-2	-409	-1,018	—	280	-17,545	-450,132	-491,646
CA	-83,923	-11,727	-21,133	-2,108	—	-37,728	-12,346	-6,151	-3,397	342,962	-24,444	-799,269	-1,013,702
CO	-4,985	-3,261	-1,569	-586	—	-73,031	-411	-316	-7,619	361	-8,847	-239,731	-354,097
CT	-3,695	-3,385	-1,350	-608	—	—	-199	-2,817	-51	3,264	-5,934	-137,799	-152,574
DC	-472	—	-255	—	—	—	—	—	—	45	-365	-55,282	-56,329
DE	-950	-418	-143	-75	—	—	-44	-8	—	194	-849	-56,868	-94,348
FL	-47,051	-139	-3,056	-25	—	-212	-230	-6,406	-3	5,404	-17,095	-1,178,161	-1,246,973
GA	-1,260	-3,032	-272	-545	—	—	-923	-21,089	—	3,583	-7,579	-793,249	-824,366
HI	-5,054	-10	-1,715	-2	—	—	-246	-25	-11	1,232	—	-48,560	-62,359
IA	-1,173	-3,273	-1,432	-588	—	—	-52	-8,769	-219,987	5,467	-8,814	-132,966	-371,588
ID	-821	-3,249	-661	-584	—	—	-866	-913	-2,381	228	-7,949	-83,793	-100,988
IL	-5,727	-6,494	-2,814	-1,167	—	-5,963	-19	-3,743	-81,621	10,557	-17,401	-789,762	-1,074,484
IN	-4,474	-5,282	-1,492	-949	—	-241	-48	-10,440	-66,070	3,513	-10,794	-605,846	-781,253
KS	-630	-1,786	-851	-321	—	-8,557	-42	-77	-27,062	1,976	-15,038	-171,305	-292,972
KY	-2,259	-2,803	-967	-504	—	-5,881	-7	-6,923	-1,904	2,488	-30,894	-455,197	-553,510
LA	-1,982	-243	-935	-44	—	-173,570	-42	-22,180	—	3,022	-287,136	-416,233	-1,381,510
MA	-5,479	-4,121	-7,980	-741	—	—	-486	-2,531	-2	1,177	-8,005	-249,846	-278,013
MD	-4,287	-3,421	-1,083	-615	—	—	-104	-362	—	1,247	-28,129	-324,821	-361,575
ME	-595	-3,626	-1,774	-652	—	—	-331	-7,001	-1	531	-2,325	-29,053	-44,826
MI	-5,466	-19,427	-1,233	-3,492	—	-4,938	-51	-13,962	-17,394	2,509	-23,448	-556,173	-665,800
MN	-2,012	-10,330	-365	-1,857	—	—	-275	-1,736	-70,812	9,821	-14,418	-294,548	-457,353
MO	-1,952	-5,792	-742	-1,041	—	—	-52	-2,544	-15,192	2,705	-4,014	-499,333	-527,959
MS	-235	-567	-773	-102	—	-1,622	-44	-2,977	-42	2,006	-43,310	-248,546	-369,219
MT	-338	-2,923	-198	-525	—	-3,300	-70	-352	—	13	-2,396	-62,581	-109,704
NC	-3,147	-4,219	-1,011	-758	—	—	-59	-10,195	-3	3,062	-3,756	-742,247	-762,334
ND	-542	-255	-448	-46	—	-80,827	—	-173	-28,692	891	-38,327	-142,306	-302,984
NE	-639	-1,303	-758	-234	—	-50	-12	-396	-104,131	1,614	-5,307	-170,364	-281,580
NH	-723	-3,395	-360	-610	—	—	-40	-1,550	-11	319	-140	-62,987	-69,497
NJ	-7,847	-2,783	-5,001	-500	—	—	-687	-194	—	2,134	-6,801	-422,593	-525,197
NM	-2,161	-3,212	-566	-577	—	-122,815	-245	-88	—	1,093	-13,785	-97,180	-260,265
NV	-6,498	-1,208	-1,375	-217	—	-4	-695	-101	—	34	-4,046	-121,307	-135,630
NY	-7,862	-8,794	-8,213	-1,580	—	-136	-307	-10,626	-3,043	8,460	-39,115	-617,848	-689,063
OH	-3,514	-16,839	-1,500	-3,026	—	-19,473	-444	-3,769	-36,054	4,244	-55,440	-781,067	-1,005,068
OK	-505	-3,784	-96	-680	—	-103,347	-11	-8,680	-62	2,796	-46,715	-219,589	-469,891
OR	-3,015	-7,226	-1,132	-1,299	—	-4	-238	-10,449	-1,342	27,231	-9,965	-107,007	-114,446
PA	-4,410	-11,278	-1,734	-2,027	—	-280,816	-327	-17,125	-6,377	4,098	-52,195	-749,298	-1,160,753
RI	-724	-687	-1,429	-124	—	—	-23	1	—	979	-3,104	-32,323	-37,434
SC	-2,168	-563	-391	-101	—	—	-159	-19,139	—	2,247	-2,333	-547,451	-570,057
SD	-664	-1,163	-970	-209	—	-8	-251	-322	-69,157	654	-6,096	-21,342	-99,529
TN	-322	-2,990	-177	-537	—	-322	-19	-9,321	-8,430	3,117	-19,350	-612,807	-681,317
TX	-14,841	-4,314	-2,602	-775	—	-533,190	-27	-11,690	-18,756	17,180	-262,178	-2,188,116	-4,116,455
UT	-2,726	-2,021	-1,004	-363	—	-20,697	-400	-133	—	311	-12,277	-182,155	-251,665
VA	-3,199	-12,309	-1,444	-2,212	—	-5,037	-22	-11,245	-2	2,928	-11,618	-731,869	-776,029
VT	-608	-1,848	-323	-332	—	—	-7	-81	—	162	-2	-2,238	-5,276
WA	-2,015	-6,798	-1,013	-1,222	—	—	-5	-14,974	-150	10,972	-19,377	-197,840	-347,867
WI	-1,353	-11,526	-473	-2,072	—	—	-442	-23,629	-29,395	2,340	-3,341	-386,487	-461,178
WV	-201	-3,013	-40	-542	—	-148,515	-1,529	-514	—	1,245	-35,565	-218,846	-411,192
WY	-156	-816	-539	-147	—	-56,702	-68	-51	—	210	-13,965	-103,519	-198,993
US	-272,793	-217,695	-90,632	-39,126	—	-2,022,247	-23,524	-312,438	-819,291	482,528	-1,284,986	-18,920,941	-26,678,384

[a] Mainly propane consumed as refinery fuel.
[b] In this table, "other petroleum" consists of: still gas consumed as refinery fuel; and aviation gasoline blending components and motor gasoline blending components used as intermediate products.
[c] U.S. data include other biofuels product supplied not allocated to the states.
[d] Natural gas including supplemental gaseous fuels.
[e] Electricity is converted at the rate of 3,412 Btu per kilowatthour.
[f] Hydroelectric power, geothermal, solar, and wind energy. Solar thermal energy consumed as heat by the commercial and industrial sectors that cannot be separately identified are included in residential consumption.
[g] Energy losses and co-products from the production of biodiesel and fuel ethanol.
— = No consumption. NA = Not available.
Data source: U.S. Energy Information Administration, State Energy Data System. See technical notes. https://www.eia.gov/state/seds/

Table TN7.2. U.S. energy consumption adjustments for calculating expenditures, selected years, 1970 through 2023 (trillion Btu)

		Adjustments														
		Residential		Commercial		Industrial						Transportation				
Year	Total (gross) consumption [a]	Non-combustible renewable energy [b]	Wood	Non-combustible renewable energy [b]	Wood and waste	Refinery fuel and intermediate products	Crude oil lease, plant, and pipeline fuel	Natural gas lease and plant fuel	Non-combustible renewable energy [b]	Wood and waste	Biofuels production losses [c]	Biofuels product supplied [a]	Natural gas pipeline fuel	Electrical system energy losses	Total [a]	Consumption used in expenditure calculations [a,d]
1970	65,939	—	-298	—	-6	-2,714	—	-1,442	-11	-789	—	—	-740	-9,739	-15,739	50,200
1975	69,810	—	-316	—	-6	-2,881	—	-1,434	-11	-824	—	—	-595	-12,183	-18,249	51,561
1980	76,065	—	-627	—	-16	-3,051	—	-1,058	-11	-1,283	—	—	-650	-15,217	-21,913	54,303
1985	74,341	—	-755	—	-18	-2,045	-128	-1,001	-11	-1,503	-42	—	-521	-16,121	-22,145	52,321
1986	74,451	—	-688	—	-20	-2,285	-103	-954	-11	-1,478	-48	—	-501	-16,017	-22,106	52,458
1987	77,113	—	-634	—	-22	-2,485	-72	-1,194	-11	-1,472	-55	—	-538	-16,733	-23,216	53,996
1988	81,077	—	-676	—	-24	-2,695	-85	-1,134	-11	-1,531	-55	—	-633	-17,866	-24,711	56,464
1989	82,703	-57	-684	-3	-73	-2,710	-59	-1,103	-11	-684	-56	—	-650	-18,842	-24,929	57,879
1990	82,278	-60	-337	-3	-59	-2,802	-51	-1,269	-12	-716	-49	—	-682	-19,100	-25,141	57,255
1991	82,213	-62	-353	-3	-60	-2,668	-39	-1,164	-12	-685	-56	—	-621	-19,299	-25,023	57,296
1992	83,843	-65	-371	-4	-66	-2,954	-27	-1,208	-12	-689	-64	—	-608	-19,442	-25,510	58,446
1993	85,220	-67	-308	-4	-68	-2,877	-21	-1,199	-12	-642	-74	—	-643	-20,043	-25,959	59,375
1994	87,080	-68	-292	-5	-66	-2,991	-19	-1,153	-23	-662	-82	—	-706	-20,512	-26,580	60,606
1995	88,732	-69	-292	-5	-66	-2,915	-15	-1,253	-21	-445	-86	—	-723	-20,989	-26,878	61,959
1996	91,474	-70	-303	-6	-77	-3,204	-14	-1,280	-23	-495	-61	—	-734	-21,427	-27,695	63,884
1997	92,106	-70	-233	-6	-80	-3,197	-5	-1,251	-23	-493	-80	—	-781	-21,656	-27,875	64,330
1998	92,615	-69	-207	-8	-71	-3,043	—	-1,212	-21	-493	-86	—	-657	-22,822	-28,689	64,022
1999	94,213	-69	-213	-8	-66	-3,051	—	-1,103	-21	-495	-90	—	-663	-23,410	-29,187	65,119
2000	96,686	-66	-229	-8	-67	-2,951	—	-1,181	-19	-459	-99	—	-661	-24,426	-30,165	66,606
2001	94,391	-64	-210	-9	-46	-3,152	—	-1,139	-16	-437	-108	—	-641	-24,039	-29,859	64,611
2002	95,582	-63	-213	-9	-43	-3,028	—	-1,135	-18	-312	-130	—	-683	-24,277	-29,911	65,733
2003	95,807	-64	-225	-12	-46	-3,141	—	-1,147	-18	-316	-168	—	-609	-24,113	-29,859	66,012
2004	98,045	-65	-230	-13	-46	-3,123	—	-1,123	-15	-537	-201	—	-582	-24,656	-30,589	67,510
2005	98,109	-65	-249	-14	-49	-3,130	—	-1,138	-15	-336	-227	—	-601	-25,167	-30,994	67,162
2006	97,231	-70	-221	-15	-46	-3,211	—	-1,171	-14	-278	-280	—	-602	-24,768	-30,676	66,584
2007	98,988	-75	-244	-16	-46	-3,180	—	-1,257	-10	-293	-369	—	-640	-25,623	-31,754	67,261
2008	96,658	-82	-273	-17	-47	-2,983	—	-1,250	-11	-282	-519	—	-667	-25,151	-31,283	65,420
2009	R 91,631	-89	-292	-19	-48	-2,922	—	-1,304	-11	-457	-603	—	-689	-23,515	-29,950	R 61,790
2010	R 95,129	-96	-313	-23	-45	-2,972	—	-1,316	-11	-392	-727	NA	-692	-24,481	-31,067	64,164
2011	R 93,969	-102	-304	-27	-45	-3,052	—	-1,355	-12	-370	-756	—	-705	-23,650	-30,378	R 63,670
2012	R 91,664	-106	-254	-31	-34	-3,105	—	-1,433	-15	-357	-711	—	-751	-22,894	-29,690	R 62,053
2013	R 94,234	-111	-332	-35	-40	-3,175	—	-1,522	-19	-361	-714	—	-857	-22,862	-30,027	R 64,251
2014	R 95,322	-119	-336	-39	R -40	-3,070	—	-1,562	-13	-370	-766	—	-726	-22,920	-29,962	R 65,408
2015	R 94,463	-126	-288	-41	R -39	-3,057	—	-1,633	-14	-369	-791	—	-707	-22,249	-29,318	R 65,187
2016	R 94,073	-139	R -253	-44	R -39	-3,242	—	-1,599	-16	-366	-821	—	-715	-21,737	-28,975	R 65,130
2017	R 93,893	-152	-243	-49	R -39	-3,290	—	-1,632	-17	-366	-847	—	-751	-20,947	-28,339	R 65,585
2018	R 97,392	-163	R -299	-56	R -39	-3,293	—	-1,743	-18	-324	-855	—	-910	-21,366	-29,071	R 68,348
2019	R 96,565	-176	R -310	-60	R -39	-3,321	—	-1,879	-19	-320	-835	—	-1,058	-20,359	-28,382	R 68,155
2020	R 88,858	-191	R -197	-67	R -39	-3,195	—	-1,907	-20	-318	-735	—	-1,059	-19,058	-26,791	R 62,031
2021	93,350	-208	R -203	-75	R -39	-3,153	—	-1,903	-21	-315	-789	262	-1,173	R -19,598	-27,215	R 65,922
2022	R 94,832	-239	R -256	-84	R -39	-3,217	—	R -1,930	-22	-312	-808	312	R -1,296	R -19,672	-27,553	R 67,004
2023	93,557	-273	-218	-91	-39	-3,182	—	-2,022	-24	-312	-819	483	-1,285	-18,921	-26,678	66,479

[a] U.S. data include other biofuels not allocated to the states.

[b] Hydroelectric power, geothermal, solar, and wind energy. Solar thermal energy consumed as heat by the commercial and industrial sectors that cannot be separately identified are included in residential consumption.

[c] Energy losses and co-products from the production of biodiesel and fuel ethanol.

[d] Includes adjustments of supplemental gaseous fuels and processed fuels not shown on this table.

Where shown, R = Revised data and — = No consumption.

NA = Not available.

Note: · Totals may not equal sum of components due to independent rounding. · All data are available via the full-precision data file (CSV) at https://www.eia.gov/state/seds/seds-data-fuel.php?sid=US.

Data source: U.S. Energy Information Administration, State Energy Data System. See technical notes. https://www.eia.gov/state/seds/

Table TN7.3. Percentage of purchased wood in residential wood consumption

1960–1989 Census division	Percent	1990 forward Census region	Percent
New England	40%	Northeast	61%
MIddle Atlantic	29%	Midwest	32%
East North Central	18%	South	39%
West North Central	17%	West	42%
South Atlantic	30%		
East South Central	18%		
West South Central	38%		
Mountain	12%		
Pacific	31%		

1994) SIC categories of industries. SEDS uses the two quantity series to calculate SIC category average ratios of wood and waste obtained at no cost. SEDS applies these SIC ratios to the estimated consumption for each category in each state to estimate the state's manufacturing wood and waste consumption at no cost.

For 1989 through 2011, SEDS estimates the amount of wood and waste consumed at no cost by industrial CHP facilities using the U.S. annual average percentages of wood and waste used at no cost by the electric power sector. For 2012 forward, because of lack of information, SEDS no longer estimates these ratios and assumes all industrial CHP wood and waste consumption to be purchased.

Each state's industrial wood and waste consumption quantities acquired at no cost are the sum of the estimated manufacturing and CHP facilities' quantities for each year.

Biodiesel and renewable diesel product supplied. For 2021 forward, SEDS adds biodiesel product supplied and renewable diesel product supplied to distillate fuel oil consumption in the transportation sector, because those fuels are sold as a mixture at diesel stations. SEDS allocates state-level biodiesel and renewable diesel product supplied proportionally to SEDS estimates of biodiesel and renewable diesel consumption. See explanations of methods and data sources in the petroleum and renewable energy sections of the SEDS consumption technical notes.

Other biofuels product supplied. For 2021 forward, SEDS removes the relatively small amount of other biofuels product supplied consumption from other petroleum products consumption in the transportation sector because no prices are available and the individual fuels cannot be separately identified to adjust the consumption of their respective petroleum products. Other biofuels include small volumes of product supplied for renewable jet fuel, renewable naphtha, renewable propane, and other biofuels that are not biodiesel, fuel ethanol, or renewable diesel. Other biofuels data are for the U.S.-level only.

Refinery fuel. SEDS estimates petroleum refinery consumption of distillate fuel, residual fuel, hydrocarbon gas liquids (mainly propane), petroleum coke, still gas, natural gas, steam coal, and electricity for each state and subtracts it from the state's industrial sector total of each energy source.

The SEDS estimation method for petroleum coke consumption by refineries is described in Section 4 of the SEDS consumption technical notes at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

For 1970 through 1985, SEDS subtracts refinery consumption of still gas, excluding still gas consumed as petrochemical feedstocks, from the SEDS industrial sector total. For 1986 forward, EIA no longer reports refinery fuel and feedstock use separately, and SEDS removes all industrial still gas consumption for the expenditure calculations. The SEDS estimation method for still gas consumption is described in Section 4 of the SEDS consumption technical notes at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Refinery consumption of each of the other fuels is available in the data sources by state or group of states (1970 through 1980) and by Petroleum Administration for Defense (PAD) district (1981 forward). For 2013 forward, SEDS uses unpublished state-level refinery fuel consumption data that would not result in a disclosure of identifiable data reported by respondents of the EIA survey forms. The number of states with usable data varies by fuel, from zero for coal and residual fuel oil to over 10 for electricity.

For each fuel, SEDS subtracts consumption for all the usable states within each PAD district from the district's fuel consumption. SEDS allocates the remainder to the other states in the district proportionally to their operable refining capacities. To reduce the possibility of over-allocating refinery fuel use to states that do not consume much of the fuel, SEDS does not include states where industrial sector consumption of a specific fuel is less than 0.05% (for natural gas, electricity, distillate fuel oil, and propane) or 0.1% (for coal and residual fuel oil) of the U.S. industrial sector total consumption in the allocation.

Table TN7.4. Reallocations of excess refinery fuel consumption, 1970 through 2005

Year	Fuel	Thousand barrels	Excess in:	Reallocated to:
1971	Residual fuel oil	294	Kansas	Oklahoma
1973	Residual fuel oil	45	Group 4: Kentucky, Tennessee	Illinois
1979	HGL (propane)	173	Montana	Wyoming
1985	Residual fuel oil	212	PAD District 4	PAD District 5
1986	Residual fuel oil	403	PAD District 4	PAD District 5
1987	Residual fuel oil	497	PAD District 4	PAD District 5
1988	Residual fuel oil	305	PAD District 4	PAD District 5
1989	Residual fuel oil	381	PAD District 4	PAD District 5
1990	Residual fuel oil	336	PAD District 4	PAD District 5
1991	Residual fuel oil	378	PAD District 4	PAD District 5
1992	Residual fuel oil	361	PAD District 4	PAD District 5
1996	Residual fuel oil	184	PAD District 4	PAD District 5
1997	Residual fuel oil	100	PAD District 4	PAD District 5
1998	Residual fuel oil	82	PAD District 4	PAD District 5
1999	Residual fuel oil	142	PAD District 4	PAD District 5
2000	Residual fuel oil	224	PAD District 4	PAD District 5
2001	Residual fuel oil	149	PAD District 4	PAD District 2
2001	Residual fuel oil	95	PAD District 5	PAD District 2
2001	Residual fuel oil	281	PAD District 5	PAD District 1
2002	Residual fuel oil	33	PAD District 5	PAD District 3
2002	Residual fuel oil	67	PAD District 5	PAD District 4
2003	Residual fuel oil	228	PAD District 5	PAD District 3
2004	Residual fuel oil	296	PAD District 5	PAD District 3
2005	HGL (propane)	198	PAD District 5	PAD District 4

Data source: EIA calculations based on data from the State Energy Data System and the *Petroleum Supply Annual*.

Before 2013, except for a few states with data in the earlier years, refinery fuel consumption is available at the regional level. SEDS estimates state-level refinery consumption of each of the other fuels by allocating the regional data (for state groups before 1981 and PAD district for 1981 through 2012) to the states with operating refineries proportionally to their shares of the region's industrial sector consumption of the fuel.

In some cases, the estimated state refinery fuel consumption of residual fuel or hydrocarbon gas liquids exceeds the estimate of the state's total industrial sector consumption of that fuel. For 1970 through 2006, SEDS reduces the refinery fuel consumption for the PAD district, group of states, or individual state until each state has positive industrial consumption. Then, SEDS reallocates the excess refinery fuel to a different PAD district, group of states, or individual state as shown in Table TN7.4. When this adjustment involves a PAD district or group value, SEDS recalculates the refineries' consumption estimates for all states within the PAD district or group using these new values. For 2007 forward, SEDS no longer makes this adjustment.

The data source withholds refinery consumption of coal for 1999 and 2000, and SEDS uses unpublished estimates developed by the data source office for 1999 and 2000. For 2001 and 2002, the data source publishes U.S. values for refinery consumption of coal, but withholds the PAD district values. SEDS estimates the PAD district values for 2001 and 2002 by applying the PAD districts' shares of the U.S. total in 2000 to the U.S. totals for 2001 and 2002.

Because crude oil consumption is not an individual fuel in SEDS for 1970 through 1980, SEDS allocates the small amounts of crude oil used at refineries during those years to residual and distillate fuels consumed at refineries. SEDS allocates the crude oil refinery use to residual and distillate fuels refinery use proportionally to each fuel's share of the total crude oil used directly (including losses) as residual and distillate fuels in EIA's *Petroleum Supply Annual*, Volume 1, Table 2.

Intermediate products. Aviation gasoline blending components, motor gasoline blending components, natural gasoline (1970 through 1983), plant condensate (1970 through 1983), unfinished oils, and unfractionated streams (1970 through 1983) are used at refineries and blending plants to make end-use petroleum products, such as finished motor gasoline. SEDS removes the consumption of these products for the expenditure calculations. Through 2009, SEDS assumes natural gasoline (formerly pentanes plus) to be an intermediate product and removes its consumption for the expenditures calculations.

Crude oil lease, plant, and pipeline fuel. SEDS assumes all industrial crude oil to be used as lease, plant, and pipeline fuel. Because these are process fuel uses, SEDS removes crude oil consumption for the expenditures calculations.

Natural gas lease and plant fuel. Natural gas consumed as lease and plant fuel is process fuel and SEDS removes it for the expenditures calculations.

Natural gas for pipeline and distribution use. Most of the natural gas consumed in the transportation sector is used to power pipelines. As such, it is a process fuel and SEDS removes it for the expenditures calculations.

Electricity exports. SEDS excludes electricity exported to Canada and Mexico from its calculations of U.S. domestic energy expenditures and U.S. average energy prices.

Electrical system energy losses. The amount of energy lost during generation, transmission, and distribution of electricity (including plant use and unaccounted for electrical energy) is process fuel and SEDS removes it from the sector energy consumption estimates used in the price and expenditure tables. The energy losses are "paid for" when residential, commercial, industrial, and transportation sector consumers buy the electricity produced by the electric power sector.

Energy losses and co-products from the production of biofuels. Fuel ethanol and biodiesel are produced from corn, vegetable oils, animal fats, and other biomass inputs that are not included elsewhere as energy sources. The difference in heat content of the feedstock and biofuels is considered process fuel and SEDS removes it from sector energy consumption estimates used in the price and expenditure tables.

Data sources

Biofuels (excluding fuel ethanol) product supplied. 2021 forward: EIA, *Petroleum Supply Annual*, available here for biodiesel product supplied https://www.eia.gov/dnav/pet/pet_cons_psup_a_EPOORDB_VPP_mbbl_a.htm, renewable diesel product supplied https://www.eia.gov/dnav/pet/pet_cons_psup_a_EPOORDO_VPP_mbbl_a.htm, and other biofuels product supplied https://www.eia.gov/dnav/pet/pet_cons_psup_a_EPOORO_VPP_mbbl_a.htm. Converted to British thermal units (Btu) and allocated to states, when available, using data from SEDS Consumption data estimates. See SEDS consumption technical notes.

Capacity of petroleum refineries. 1982 forward: EIA, *Refinery Capacity Report*, https://www.eia.gov/petroleum/refinerycapacity/ or *Petroleum Supply Annual, Volume 1*, https://www.eia.gov/petroleum/supply/annual/volume1/ tables titled "Number and Capacity of Operable Petroleum Refineries," columns titled, "Crude Capacity, Barrels per Calendar Day, Operating" (1982-1985), "Atmospheric Crude Oil Distillation Capacity, Barrels per Calendar Day, Operating" (1986-2012), and "Atmospheric Crude Oil Distillation Capacity, Barrels per Calendar Day, Total" (2013 forward), adjusted with information on "New, Shutdown and Activated Refineries" (2011 forward).

1979 through 1981: EIA, Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories*, table titled "Number and Capacity of Petroleum Refineries," column heading, "Crude Capacity, Barrels per Calendar Day, Operating."

1978: EIA, Energy Data Reports, *Petroleum Refineries in the United States and Puerto Rico*, table titled "Number and Capacity of Petroleum Refineries," column heading, "Crude Capacity, Barrels per Calendar Day, Operating."

1970 through 1977: Bureau of Mines, U.S. Department of the Interior, Mineral Industry Surveys, *Petroleum Refineries in the United States and Puerto Rico*, table titled "Number and Capacity of Petroleum Refineries," column heading, "Crude Capacity, Barrels per Calendar Day, Operating."

Fuel consumed at refineries. 2013 forward: EIA unpublished data on fuels consumed at refineries for selected states.

1981 through 1994, 1996, and 1998 forward: EIA, *Petroleum Supply Annual, Volume 1*, https://www.eia.gov/petroleum/supply/annual/volume1/ table titled "Fuels Consumed at Refineries by PAD District." Data for 1991 are from a separately published EIA *Errata* dated November 10, 1992, GPO Stock No. 061-003-00758-9.

1995, 1997: EIA, *Petroleum Supply Annual, Volume 1*, table titled "Fuels Consumed at Refineries by PAD District." Data for coal, electricity, and natural gas are not published, and values for the previous year are repeated.

1976 through 1980: EIA, Energy Data Reports, *Crude Petroleum, Petroleum Products, and Natural Gas Liquids*, table titled "Fuels Consumed for All Purposes at Refineries in the United States, by States."

1970 through 1975: Bureau of Mines, U.S. Department of the Interior, Mineral Industry Surveys, *Crude Petroleum, Petroleum Products, and Natural Gas Liquids*, table titled "Fuels Consumed for All Purposes at Refineries in the United States, by States."

Intermediate products. 1970 forward: EIA, State Energy Data System, industrial sector consumption estimates for aviation gasoline blending components, crude oil, motor gasoline blending components, natural gasoline (1970-1983), natural gasoline (formerly pentanes plus) (1984 through 2009), petroleum coke, plant condensate (1970-1983), still gas (excluding still gas consumed as petrochemical feedstocks, 1970-1985), unfinished oils, and unfractionated streams (1970-1983).

Natural gas lease, plant, and pipeline fuel use. 1997 forward: EIA, *Natural Gas Annual*, Tables 26 through 76. Also available at https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

1993 through 1996: EIA *Historical Natural Gas Annual 1930 Through*

2000, https://www.eia.gov/oil_gas/natural_gas/data_publications/historical_natural_gas_annual/hnga.html Table 15.

1970 through 1992: EIA *Natural Gas Annual 1994, Volume II,* Table 14.

Residential wood. 1990 forward: EIA, unpublished data from the "1993 *Residential Energy Consumption Survey*," Form EIA-457 https://www.eia.gov/consumption/residential/index.php.

1970 through 1989: EIA, unpublished data from the "1980 *Residential Energy Consumption Survey*," Form EIA-457.

Commercial wood and waste. 1990 forward: EIA, unpublished data from the "1993 *Residential Energy Consumption Survey*," Form EIA-457 https://www.eia.gov/consumption/residential/index.php.

1989 through 2011: EIA, SEDS, U.S. annual average percentages of wood and percentages of waste acquired at no cost by the electric power sector. See data sources for estimating wood and waste prices for the electric power sector in Section 5.

1970 through 1989: EIA, unpublished data from the "1980 *Residential Energy Consumption Survey*," Form EIA-457.

Industrial wood and waste. 1994 forward: EIA, unpublished data from the "1994 *Manufacturing Energy Consumption Survey*" (Form EIA-846) https://www.eia.gov/consumption/manufacturing/.

1989 through 2011: EIA, SEDS, U.S. annual average percentages of wood and percentages of waste acquired at no cost by the electric power sector. See data sources for estimating wood and waste prices for the electric power sector in Section 5.

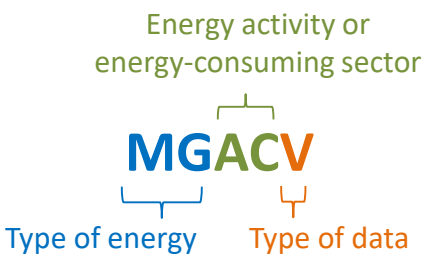
1970 through 1993: EIA, unpublished data from the "1991 *Manufacturing Energy Consumption Survey*" (Form EIA-846).

Appendix A. Mnemonic series names (MSN)

This appendix contains alphabetical listings of the State Energy Data System (SEDS) energy price and expenditure variables, called MSNs. Table A1 presents the price and expenditure variables and Table A2 presents the consumption adjustment variables as described in Section 7, "Consumption adjustments for calculating expenditures."

For each variable, SEDS provides: a brief description; unit of measure; and the formulas used to create the variable. Variables that are entered directly from other sources, but not calculated by SEDS, are independent variables. Formulas for the state calculations have "ZZ" following the variable name, where "ZZ" represents the two-letter state code. The formulas for the United States have "US" following the variable name. If the formula for the states and the United States are the same, only one formula is shown.

The SEDS MSN variables have five-character names that generally consist of the following components:



See Section 1 of the SEDS technical notes for explanation of the five-character MSN code descriptions.

In general, state-level price estimates are independent variables in dollars per million Btu. Estimates of state-level expenditures are equal to the product of the appropriate SEDS consumption estimates by the corresponding prices, in million dollars. The SEDS price and expenditure estimates are in current U.S. dollars and are not adjusted for inflation. For the expenditure calculations, the SEDS consumption data are adjusted for process fuel, intermediate products, and fuels with no direct cost (see discussion in Section 7). Expenditures for the United States are the sum of the 50 states and the District of Columbia. Prices for the United States are the sum of the states' expenditures divided by the sum of the states' consumption or adjusted consumption, converted to dollars per million Btu.

If the consumption variables in a formula are taken directly from the SEDS consumption module (and not adjusted for expenditure calculations), they are listed in Appendix A of the consumption technical notes (https://www.eia.gov/state/seds/sep_use/notes/use_a.pdf) and are not reproduced in this appendix. Generally, if the third and fourth letters of the consumption variables are the same as the corresponding price and expenditure variables, they are from the consumption module. Examples are: TC (total consumption in all energy-consuming sectors), TX (total consumption in all end-use sectors), RC (residential consumption), CC (commercial consumption), IC (industrial consumption), AC (transportation consumption), and EI (electric power sector consumption).

APPENDIX A

Table A1. Price and expenditure variables

MSN	Description	Unit	Formula
ARICD	Asphalt and road oil price in the industrial sector.	Dollars per million Btu	ARICDZZ is independent. ARICDUS = ARICVUS / ARICBUS * 1000
ARICV	Asphalt and road oil expenditures in the industrial sector.	Million dollars	ARICVZZ = ARICBZZ * ARICDZZ / 1000 ARICVUS = ΣARICVZZ
ARTCD	Asphalt and road oil average price, all sectors.	Dollars per million Btu	ARTCD = ARICD
ARTCV	Asphalt and road oil total expenditures.	Million dollars	ARTCV = ARICV
ARTXD	Asphalt and road oil average price, all end-use sectors.	Dollars per million Btu	ARTXD = ARTXV / ARTXB * 1000
ARTXV	Asphalt and road oil total end-use expenditures.	Million dollars	ARTXV = ARICV
AVACD	Aviation gasoline price in the transportation sector.	Dollars per million Btu	AVACDZZ is independent. AVACDUS = AVACVUS / AVACBUS * 1000
AVACV	Aviation gasoline expenditures in the transportation sector.	Million dollars	AVACVZZ = AVACBZZ * AVACDZZ / 1000 AVACVUS = ΣAVACVZZ
AVTCD	Aviation gasoline average price, all sectors.	Dollars per million Btu	AVTCD = AVACD
AVTCV	Aviation gasoline total expenditures.	Million dollars	AVTCV = AVACV
AVTXD	Aviation gasoline average price, all end-use sectors.	Dollars per million Btu	AVTXD = AVTXV / AVTXB * 1000
AVTXV	Aviation gasoline total end-use expenditures.	Million dollars	AVTXV = AVACV
BMCAS	Biomass generating units capacity factor.	Percent	BMCASZZ is independent. BMCASUS is independent.
BTCAS	Battery storage generating units usage factor.	Percent	BTCASZZ is independent. BTCASUS is independent.
BTGBP	Battery storage units net summer capacity in all sectors.	Thousand kilowatts	BTGBPZZ is independent. BTGBPUS is independent.
BTVHN	Battery electric vehicle (BEV) light-duty stocks.	Thousands of registered vehicles	BTVHNZZ is independent. BTVHNUS is independent.
CCEXDUS	Coal coke exports average price, United States.	Dollars per million Btu	CCEXDUS is independent.
CCEXVUS	Coal coke exports expenditures, United States.	Million dollars	CCEXVUS = CCEXBUS * CCEXDUS / 1000
CCIMDUS	Coal coke imports average price, United States.	Dollars per million Btu	CCIMDUS is independent.

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
CCIMVUS	Coal coke imports expenditures, United States.	Million dollars	CCIMVUS = CCIMBUS * CCIMDUS / 1000
CCNIVUS	Coal coke net imports expenditures, United States.	Million dollars	CCNIVUS = CCIMVUS - CCEXVUS
CLACD	Coal price in the transportation sector.	Dollars per million Btu	CLACDZZ is independent. CLACDUS = CLACVUS / CLACBUS * 1000
CLACV	Coal expenditures in the transportation sector.	Million dollars	CLACVZZ = CLACBZZ * CLACDZZ / 1000 CLACVUS = ΣCLACVZZ
CLCAS	Coal generating units capacity factor.	Percent	CLCASZZ is independent. CLCASUS is independent.
CLCCD	Coal price in the commercial sector.	Dollars per million Btu	CLCCDZZ is independent. CLCCDUS = CLCCVUS / CLCCBUS * 1000
CLCCV	Coal expenditures in the commercial sector.	Million dollars	CLCCVZZ = CLCCBZZ * CLCCDZZ / 1000 CLCCVUS = ΣCLCCVZZ
CLEID	Coal price in the electric power sector.	Dollars per million Btu	CLEIDZZ is independent. CLEIDUS = CLEIVUS / CLEIBUS * 1000
CLEIV	Coal expenditures in the electric power sector.	Million dollars	CLEIVZZ = CLEIBZZ * CLEIDZZ / 1000 CLEIVUS = ΣCLEIVZZ
CLGBP	Coal generating units net summer capacity in all sectors.	Thousand kilowatts	CLGBPZZ is independent. CLGBPUS is independent.
CLICD	Coal price in the industrial sector.	Dollars per million Btu	CLICD = CLICV / CLISB * 1000
CLICV	Coal expenditures in the industrial sector.	Million dollars	CLICVZZ = CLKCVZZ + CLOCVZZ CLICVUS = ΣCLICVZZ
CLKCD	Coal price at coke plants.	Dollars per million Btu	CLKCDZZ is independent. CLKCDUS = CLKCVUS / CLKCBUS * 1000
CLKCV	Coal expenditures at coke plants.	Million dollars	CLKCVZZ = CLKCBZZ * CLKCDZZ / 1000 CLKCVUS = ΣCLKCVZZ
CLOCD	Coal price in the industrial sector other than coke plants.	Dollars per million Btu	CLOCDZZ is independent. CLOCDUS = CLOCVUS / CLOSBUS * 1000
CLOCV	Coal expenditures in the industrial sector other than coke plants.	Million dollars	CLOCVZZ = CLOSBZZ * CLOCDZZ / 1000 CLOCVUS = ΣCLOCVZZ
CLRCD	Coal price in the residential sector.	Dollars per million Btu	CLRCDZZ is independent. CLRCDUS = CLRCVUS / CLRCBUS * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
CLRCV	Coal expenditures in the residential sector.	Million dollars	CLRCVZZ = CLRCBZZ * CLRCDZZ / 1000 CLRCVUS = ΣCLRCVZZ
CLTCD	Coal average price, all sectors.	Dollars per million Btu	CLTCD = CLTCV / CLSCB * 1000
CLTCV	Coal total expenditures.	Million dollars	CLTCV = CLKCV + CLXCV
CLTXD	Coal average price, all end-use sectors.	Dollars per million Btu	CLTXD = (CLTXV / (CLSCB - CLEIB)) * 1000
CLTXV	Coal total end-use expenditures.	Million dollars	CLTXVZZ = CLACVZZ + CLCCVZZ + CLICVZZ + CLRCVZZ CLTXVUS = ΣCLTXVZZ
CLXCD	Coal average price for all sectors excluding coke plants and refineries.	Dollars per million Btu	CLXCD = CLXCV / CLXCB * 1000
CLXCV	Coal expenditures for all sectors excluding coke plants and refineries.	Million dollars	CLXCVZZ = CLACVZZ + CLCCVZZ + CLEIVZZ + CLOCVZZ + CLRCVZZ CLXCVUS = ΣCLXCVZZ
CYCAS	Natural gas combined cycle generating units capacity factor.	Percent	CYCASZZ is independent. CYCASUS is independent.
DFACD	Distillate fuel oil price in the transportation sector.	Dollars per million Btu	DFACDZZ is independent. DFACDUS = DFACVUS / DFASBUS * 1000
DFACV	Distillate fuel oil expenditures in the transportation sector.	Million dollars	DFACVZZ = DFASBZZ * DFACDZZ / 1000 DFACVUS = ΣDFACVZZ
DFCCD	Distillate fuel oil price in the commercial sector.	Dollars per million Btu	DFCCDZZ is independent. DFCCDUS = DFCCVUS / DFCSBUS * 1000
DFCCV	Distillate fuel oil expenditures in the commercial sector.	Million dollars	DFCCVZZ = DFCSBZZ * DFCCDZZ / 1000 DFCCVUS = ΣDFCCVZZ
DFEID	Distillate fuel oil price in the electric power sector.	Dollars per million Btu	DFEIDZZ is independent. DFEIDUS = DFEIVUS / DFEIBUS * 1000
DFEIV	Distillate fuel oil expenditures in the electric power sector.	Million dollars	DFEIVZZ = DFEIBZZ * DFEIDZZ / 1000 DFEIVUS = ΣDFEIVZZ
DFICD	Distillate fuel oil price in the industrial sector.	Dollars per million Btu	DFICDZZ is independent. DFICDUS = DFICVUS / DFISBUS * 1000
DFICV	Distillate fuel oil expenditures in the industrial sector.	Million dollars	DFICVZZ = DFISBZZ * DFICDZZ / 1000 DFICVUS = ΣDFICVZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
DFRCD	Distillate fuel oil price in the residential sector.	Dollars per million Btu	DFRCDZZ is independent. DFRCDUS = DFRCVUS / DFRSBUS * 1000
DFRCV	Distillate fuel oil expenditures in the residential sector.	Million dollars	DFRCVZZ = DFRSBZZ * DFRCDZZ / 1000 DFRCVUS = ΣDFRCVZZ
DFTCD	Distillate fuel oil average price, all sectors.	Dollars per million Btu	DFTCD = DFTCV / DFSCB * 1000
DFTCV	Distillate fuel oil total expenditures.	Million dollars	DFTCVZZ = DFACVZZ + DFCCVZZ + DFEIVZZ + DFICVZZ + DFRCVZZ DFTCVUS = ΣDFTCVZZ
DFTXD	Distillate fuel oil average price, all end-use sectors.	Dollars per million Btu	DFTXD = (DFTXV / (DFSCB - DFEIB)) * 1000
DFTXV	Distillate fuel oil total end-use expenditures.	Million dollars	DFTXVZZ = DFACVZZ + DFCCVZZ + DFICVZZ + DFRCVZZ DFTXVUS = ΣDFTXVZZ
DKEID	Distillate fuel oil (including kerosene-type jet fuel before 2001) average price in the electric power sector.	Dollars per million Btu	DKEID = DKEIV / DKEIB * 1000
DKEIV	Distillate fuel oil (including kerosene-type jet fuel before 2001) expenditures in the electric power sector.	Million dollars	DKEIVZZ = DFEIVZZ + JFEUVZZ DKEIVUS = ΣDKEIVZZ
ELEXD	Electricity exports average price.	Dollars per million Btu	ELEXD is independent.
ELEXV	Electricity exports expenditures.	Million dollars	ELEXVZZ = ELEXBZZ * ELEXDZZ / 1000 ELEXVUS = ΣELEXVZZ
ELGBP	Total (all fuels) electric generating units net summer capacity in all sectors.	Thousand kilowatts	ELGBPZZ is independent. ELGBPUS is independent.
ELIMD	Electricity imports average price.	Dollars per million Btu	ELIMD is independent.
ELIMV	Electricity imports expenditures.	Million dollars	ELIMVZZ = ELIMBZZ * ELIMDZZ / 1000 ELIMVUS = ΣELIMVZZ
ELVHN	Total electric vehicle (EV) light-duty stocks.	Thousands of registered vehicles	ELVHNZZ = BTVHNZZ + PHVHNZZ
ELVHS	Electric vehicle (EV) share of total light-duty vehicles.	Percent	ELVHSZZ = ELVHNZZ / LDVHNZZ * 100

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
EMACV	Fuel ethanol, excluding denaturant, expenditures in the transportation sector (through 1992).	Million dollars	EMACVZZ = EMACBZZ * MGACDZZ / 1000 EMACVUS = ΣEMACVZZ
EMCCV	Fuel ethanol, excluding denaturant, expenditures in the commercial sector (through 1992).	Million dollars	EMCCVZZ = EMCCBZZ * MGCCDZZ / 1000 EMCCVUS = ΣEMCCVZZ
EMICV	Fuel ethanol, excluding denaturant, expenditures in the industrial sector (through 1992).	Million dollars	EMICVZZ = EMICBZZ * MGACDZZ / 1000 EMICVUS = ΣEMICVZZ
EMTCV	Fuel ethanol, excluding denaturant, total expenditures (through 1992).	Million dollars	EMTCVZZ = EMACVZZ + EMCCVZZ + EMICVZZ EMTCVUS = ΣEMTCVZZ
ESACD	Electricity price in the transportation sector.	Dollars per million Btu	ESACDZZ is independent. ESACDUS = ESACVUS / ESACBUS * 1000
ESACV	Electricity expenditures in the transportation sector.	Million dollars	ESACVZZ = ESACBZZ * ESACDZZ / 1000 ESACVUS = ΣESACVZZ
ESCCD	Electricity price in the commercial sector.	Dollars per million Btu	ESCCDZZ is independent. ESCCDUS = ESCCVUS / ESCCBUS * 1000
ESCCV	Electricity expenditures in the commercial sector.	Million dollars	ESCCVZZ = ESCCBZZ * ESCCDZZ / 1000 ESCCVUS = ΣESCCVZZ
ESICD	Electricity price in the industrial sector.	Dollars per million Btu	ESICDZZ is independent. ESICDUS = ESICVUS / ESISBUS * 1000
ESICV	Electricity expenditures in the industrial sector.	Million dollars	ESICVZZ = ESISBZZ * ESICDZZ / 1000 ESICVUS = ΣESICVZZ
ESRCD	Electricity price in the residential sector.	Dollars per million Btu	ESRCDZZ is independent. ESRCDUS = ESRCVUS / ESRCBUS * 1000
ESRCV	Electricity expenditures in the residential sector.	Million dollars	ESRCVZZ = ESRCBZZ * ESRCDZZ / 1000 ESRCVUS = ΣESRCVZZ
ESTCD	Electricity average price, all sectors.	Dollars per million Btu	ESTCD = ESTCV / ESSCB * 1000
ESTCV	Electricity total expenditures.	Million dollars	ESTCVZZ = ESACVZZ + ESCCVZZ + ESICVZZ + ESRCVZZ ESTCVUS = ΣESTCVZZ
ESTXD	Electricity average price, all end-use sectors.	Dollars per million Btu	ESTXD = ESTXV / ESSCB * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
ESTXV	Electricity total end-use expenditures.	Million dollars	ESTXVZZ = ESACVZZ + ESCCVZZ + ESICVZZ + ESRCVZZ ESTXVUS = ΣESTXVZZ
FFGBP	Fossil fuel total generating units net summer capacity in all sectors.	Thousand kilowatts	FFGBPZZ is independent. FFGBPUS is independent.
EV0CN	Legacy charging ports for electric vehicles.	Number	EV0CNZZ is independent. EV0CNUS is independent.
EV1CN	Level 1 charging ports for electric vehicles.	Number	EV1CNZZ is independent. EV1CNUS is independent.
EV2CN	Level 2 charging ports for electric vehicles.	Number	EV2CNZZ is independent. EV2CNUS is independent.
EV2CR	Level 2 charging ports per location.	Number	EV2CRZZ is independent. EV2CRUS is independent.
EVCHN	Total charging ports for electric vehicles.	Number	EVCHNZZ is independent. EVCHNUS is independent.
EVCHP	Total electric vehicle charging locations.	Number	EVCHPZZ is independent. EVCHPUS is independent.
EVDCN	DC fast charging ports for electric vehicles.	Number	EVDCNZZ is independent. EVDCNUS is independent.
EVDCR	DC fast charging ports per location.	Number	EVDCRZZ is independent. EVDCRUS is independent.
EVNNP	Electric vehicle charging locations with both networked and non-networked ports.	Number	EVNNPZZ is independent. EVNNPUS is independent.
EVNOP	Electric vehicle charging locations with non-networked ports only.	Number	EVNOPZZ is independent. EVNOPUS is independent.
EVNTP	Electric vehicle charging locations with networked ports only.	Number	EVNTPZZ is independent. EVNTPUS is independent.
EVPPP	Electric vehicle charging locations with both public and private ports.	Number	EVPPPZZ is independent. EVPPPUS is independent.
EVPUP	Electric vehicle charging locations with public ports only.	Number	EVPUPZZ is independent. EVPUPUS is independent.
EVPVP	Electric vehicle charging locations with private ports only.	Number	EVPVPZZ is independent. EVPVPUS is independent.

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
FNICD	Petrochemical feedstocks, naphtha less than 401° F, price in the industrial sector.	Dollars per million Btu	FNICDZZ is independent. FNICDUS = FNICVUS / FNICBUS * 1000
FNICV	Petrochemical feedstocks, naphtha less than 401° F, expenditures in the industrial sector.	Million dollars	FNICVZZ = FNICBZZ * FNICDZZ / 1000 FNICVUS = ΣFNICVZZ
FOICD	Petrochemical feedstocks, other oils equal to or greater than 401° F, price in the industrial sector.	Dollars per million Btu	FOICDZZ is independent. FOICDUS = FOICVUS / FOICBUS * 1000
FOICV	Petrochemical feedstocks, other oils equal to or greater than 401° F, expenditures in industrial sector.	Million dollars	FOICVZZ = FOICBZZ * FOICDZZ / 1000 FOICVUS = ΣFOICVZZ
FSICD	Petrochemical feedstocks, still gas, price in the industrial sector (through 1985).	Dollars per million Btu	FSICDZZ is independent. FSICDUS = FSICVUS / FSICBUS * 1000
FSICV	Petrochemical feedstocks, still gas, expenditures in the industrial sector (through 1985).	Million dollars	FSICVZZ = FSICBZZ * FSICDZZ / 1000 FSICVUS = ΣFSICVZZ
GDPRV	Current-dollar gross domestic product (GDP).	Million dollars	GDPRVZZ is independent. GDPRVUS is independent.
GDPRX	Real gross domestic product (GDP).	Million chained (2017) dollars	GDPRXZZ is independent. GDPRXUS is independent.
GECAS	Geothermal generating units capacity factor.	Percent	GECASZZ is independent. GECASUS is independent.
GEGBP	Geothermal generating units net summer capacity in all sectors.	Thousand kilowatts	GEGBPZZ is independent. GEGBPUS is independent.
HLACD	Hydrocarbon gas liquids price in the transportation sector.	Dollars per million Btu	Before 2010: HLACDZZ is independent. HLACDUS = HLACVUS / HLACBUS * 1000 2010 forward: HLACDZZ = PQACDZZ HLACDUS = HLACVUS / HLACBUS * 1000
HLACV	Hydrocarbon gas liquids expenditures in the transportation sector.	Million dollars	HLACVZZ = HLACBZZ * HLACDZZ / 1000 HLACVUS = ΣHLACVZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
HLCCD	Hydrocarbon gas liquids price in the commercial sector.	Dollars per million Btu	Before 2010: HLCCDZZ is independent. HLCCDUS = HLCCVUS / HLCCBUS * 1000 2010 forward: HLCCDZZ = PQCCDZZ HLCCDUS = HLCCVUS / HLCCBUS * 1000
HLCCV	Hydrocarbon gas liquids expenditures in the commercial sector.	Million dollars	HLCCVZZ = HLCCBZZ * HLCCDZZ / 1000 HLCCVUS = ΣHLCCVZZ
HLICD	Hydrocarbon gas liquids price in the industrial sector.	Dollars per million Btu	Before 2010: HLICDZZ is independent. HLICDUS = HLICVUS / HLISBUS * 1000 2010 forward: HLICD = HLICV / HLISB * 1000
HLICV	Hydrocarbon gas liquids expenditures in the industrial sector.	Million dollars	Before 2010: HLICVZZ = HLISBZZ * HLICDZZ HLICVUS = ΣHLICVZZ 2010 forward: HLICVZZ = OHICVZZ + PQICVZZ HLICVUS = ΣHLICVZZ
HLRCD	Hydrocarbon gas liquids price in the residential sector.	Dollars per million Btu	Before 2010: HLRCDZZ is independent. HLRCDUS = HLRCVUS / HLRCBUS * 1000 2010 forward: HLRCDZZ = PQRCDZZ HLRCDUS = HLRCVUS / HLRCBUS * 1000
HLRCV	Hydrocarbon gas liquids expenditures in the residential sector.	Million dollars	HLRCVZZ = HLRCBZZ * HLRCDZZ / 1000 HLRCVUS = ΣHLRCVZZ
HLTCD	Hydrocarbon gas liquids average price, all sectors.	Dollars per million Btu	HLTCD = HLTCV / HLSCB * 1000
HLTCV	Hydrocarbon gas liquids total expenditures.	Million dollars	HLTCVZZ = HLACVZZ + HLCCVZZ + HLICVZZ + HLRCVZZ HLTCVUS = ΣHLTCVZZ
HLTXD	Hydrocarbon gas liquids average price, all end-use sectors.	Dollars per million Btu	HLTXD = HLTXV / HLSCB * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
HLTXV	Hydrocarbon gas liquids total end-use expenditures.	Million dollars	HLTXVZZ = HLACVZZ + HLCCVZZ + HLICVZZ + HLRCVZZ HLTXVUS = ΣHLTXVZZ
HPCAS	Hydroelectric pumped storage generating units usage factor.	Percent	HPCASZZ is independent. HPCASUS is independent.
HPGBP	Hydroelectric pumped storage generating units net summer capacity in all sectors.	Thousand kilowatts	HPGBPZZ is independent. HPGBPUS is independent.
HVCAS	Conventional hydroelectric generating units capacity factor.	Percent	HVCASZZ is independent. HVCASUS is independent.
HVGBP	Conventional hydroelectric power generating units net summer capacity in all sectors.	Thousand kilowatts	HVGBPZZ is independent. HVGBPUS is independent.
JFACD	Jet fuel price in the transportation sector.	Dollars per million Btu	JFACDZZ is independent. JFACDUS = JFACVUS / JFACBUS * 1000
JFACV	Jet fuel expenditures in the transportation sector.	Million dollars	JFACVZZ = JFACBZZ * JFACDZZ / 1000 JFACVUS = ΣJFACVZZ
JFEUD	Jet fuel price in the electric power sector (1972 through 1982 only).	Dollars per million Btu	JFEUDZZ is independent. JFEUDUS = JFEUVUS / JFEUBZZ * 1000
JFEUV	Jet fuel expenditures in the electric power sector (1972 through 1982 only).	Million dollars	JFEUVZZ = JFEUBZZ * JFEUDZZ / 1000 JFEUVUS = ΣJFEUVZZ
JFTCD	Jet fuel average price, all sectors.	Dollars per million Btu	JFTCD = JFTCV / JFTCB * 1000
JFTCV	Jet fuel total expenditures.	Million dollars	JFTCVZZ = JFACVZZ + JFEUVZZ JFTCVUS = ΣJFTCVZZ
JFTXD	Jet fuel average price, all end-use sectors.	Dollars per million Btu	JFTXD = JFTXV / JFTXB * 1000
JFTXV	Jet fuel total end-use expenditures.	Million dollars	JFTXVZZ = JFACVZZ JFTXVUS = ΣJFTXVZZ
KSCCD	Kerosene price in the commercial sector.	Dollars per million Btu	KSCCDZZ is independent. KSCCDUS = KSCCVUS / KSCCBUS * 1000
KSCCV	Kerosene expenditures in the commercial sector.	Million dollars	KSCCVZZ = KSCCBZZ * KSCCDZZ / 1000 KSCCVUS = ΣKSCCVZZ
KSICD	Kerosene price in the industrial sector.	Dollars per million Btu	KSICDZZ is independent. KSICDUS = KSICVUS / KSICBUS * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
KSICV	Kerosene expenditures in the industrial sector.	Million dollars	KSICVZZ = KSICBZZ * KSICDZZ / 1000 KSICVUS = ΣKSICVZZ
KSRCD	Kerosene price in the residential sector.	Dollars per million Btu	KSRCDZZ is independent. KSRCDUS = KSRCVUS / KSRCBUS * 1000
KSRCV	Kerosene expenditures in the residential sector.	Million dollars	KSRCVZZ = KSRCBZZ * KSRCDZZ / 1000 KSRCVUS = ΣKSRCVZZ
KSTCD	Kerosene average price, all sectors.	Dollars per million Btu	KSTCD = KSTCV / KSTCB * 1000
KSTCV	Kerosene total expenditures.	Million dollars	KSTCVZZ = KSCCVZZ + KSICVZZ + KSRCVZZ KSTCVUS = ΣKSTCVZZ
KSTXD	Kerosene average price, all end-use sectors.	Dollars per million Btu	KSTXD = KSTXV / KSTXB * 1000
KSTXV	Kerosene total end-use expenditures.	Million dollars	KSTXVZZ = KSCCVZZ + KSICVZZ + KSRCVZZ KSTXVUS = ΣKSTXVZZ
LDVHN	Total (all fuels) vehicle light-duty stocks.	Thousands of registered vehicles	LDVHNZZ is independent. LDVHNUS is independent.
LUACD	Lubricants price in the transportation sector.	Dollars per million Btu	LUACDZZ is independent. LUACDUS = LUACVUS / LUACBUS * 1000
LUACV	Lubricants expenditures in the transportation sector.	Million dollars	LUACVZZ = LUACBZZ * LUACDZZ / 1000 LUACVUS = ΣLUACVZZ
LUICD	Lubricants price in the industrial sector.	Dollars per million Btu	LUICDZZ is independent. LUICDUS = LUICVUS / LUICBUS * 1000
LUICV	Lubricants expenditures in the industrial sector.	Million dollars	LUICVZZ = LUICBZZ * LUICDZZ / 1000 LUICVUS = ΣLUICVZZ
LUTCD	Lubricants average price, all sectors.	Dollars per million Btu	LUTCD = LUTCV / LUTCB * 1000
LUTCV	Lubricants total expenditures.	Million dollars	LUTCVZZ = LUACVZZ + LUICVZZ LUTCVUS = ΣLUTCVZZ
LUTXD	Lubricants average price, all end-use sectors.	Dollars per million Btu	LUTXD = LUTXV / LUTXB * 1000
LUTXV	Lubricants total end-use expenditures.	Million dollars	LUTXVZZ = LUACVZZ + LUICVZZ LUTXVUS = ΣLUTXVZZ
MGACD	Motor gasoline price in the transportation sector.	Dollars per million Btu	MGACDZZ is independent. MGACDUS = MGACVUS / MGACBUS * 1000
MGACV	Motor gasoline expenditures in the transportation sector.	Million dollars	MGACVZZ = MGACBZZ * MGACDZZ / 1000 MGACVUS = ΣMGACVZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
MGCCD	Motor gasoline price in the commercial sector.	Dollars per million Btu	MGCCDZZ is independent. MGCCDUS = MGCCVUS / MGCCBUS * 1000
MGCCV	Motor gasoline expenditures in the commercial sector.	Million dollars	MGCCVZZ = MGCCBZZ * MGCCDZZ / 1000 MGCCVUS = ΣMGCCVZZ
MGICD	Motor gasoline price in the industrial sector.	Dollars per million Btu	MGICDZZ is independent. MGICDUS = MGICVUS / MGICBUS * 1000
MGICV	Motor gasoline expenditures in the industrial sector.	Million dollars	MGICVZZ = MGICBZZ * MGICDZZ / 1000 MGICVUS = ΣMGICVZZ
MGTCD	Motor gasoline average price, all sectors.	Dollars per million Btu	MGTCD = MGTCV / MGTCB * 1000
MGTCV	Motor gasoline total expenditures.	Million dollars	MGTCVZZ = MGACVZZ + MGCCVZZ + MGICVZZ MGTCVUS = ΣMGTCVZZ
MGTPV	Motor gasoline expenditures per capita.	Million dollars	MGTPV = MGTCV / TPOPP * 1000
MGTXD	Motor gasoline average price, all end-use sectors.	Dollars per million Btu	MGTXD = MGTXV / MGTXB * 1000
MGTXV	Motor gasoline total end-use expenditures.	Million dollars	MGTXVZZ = MGACVZZ + MGCCVZZ + MGICVZZ MGTXVUS = ΣMGTXVZZ
MSICD	Miscellaneous petroleum products price in the industrial sector.	Dollars per million Btu	MSICDZZ is independent. MSICDUS = MSICVUS / MSICBUS * 1000
MSICV	Miscellaneous petroleum products expenditures in the industrial sector.	Million dollars	MSICVZZ = MSICBZZ * MSICDZZ / 1000 MSICVUS = ΣMSICVZZ
NGACD	Natural gas price in the transportation sector.	Dollars per million Btu	NGACDZZ is independent. NGACDUS = NGACVUS / NGASBUS * 1000
NGACV	Natural gas expenditures in the transportation sector.	Million dollars	NGACVZZ = NGASBZZ * NGACDZZ / 1000 NGACVUS = ΣNGACVZZ
NGCCD	Natural gas price in the commercial sector (including supplemental gaseous fuels).	Dollars per million Btu	NGCCDZZ is independent. NGCCDUS = NGCCVUS / NGCCBUS * 1000
NGCCV	Natural gas expenditures in the commercial sector (including supplemental gaseous fuels).	Million dollars	NGCCVZZ = NGCCBZZ * NGCCDZZ / 1000 NGCCVUS = ΣNGCCVZZ
NGEID	Natural gas price in the electric power sector (including supplemental gaseous fuels).	Dollars per million Btu	NGEIDZZ is independent. NGEIDUS = NGEIVUS / NGEIBUS * 1000
NGEIV	Natural gas expenditures in the electric power sector (including supplemental gaseous fuels).	Million dollars	NGEIVZZ = NGEIBZZ * NGEIDZZ / 1000 NGEIVUS = ΣNGEIVZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
NGGBP	Natural gas generating units net summer capacity in all sectors.	Thousand kilowatts	NGGBPZZ is independent. NGGBPUS is independent.
NGICD	Natural gas price in the industrial sector (including supplemental gaseous fuels).	Dollars per million Btu	NGICDZZ is independent. NGICDUS = NGICVZZ / NGISBZZ * 1000
NGICV	Natural gas expenditures in the industrial sector (including supplemental gaseous fuels).	Million dollars	NGICVZZ = NGISBZZ * NGICDZZ / 1000 NGICVUS = ΣNGICVZZ
NGRCD	Natural gas price in the residential sector (including supplemental gaseous fuels).	Dollars per million Btu	NGRCDZZ is independent. NGRCDUS = NGRCVZZ / NGRCBZZ * 1000
NGRCV	Natural gas expenditures in the residential sector (including supplemental gaseous fuels).	Million dollars	NGRCVZZ = NGRCBZZ * NGRCDZZ / 1000 NGRCVUS = ΣNGRCVZZ
NGTCD	Natural gas average price, all sectors (including supplemental gaseous fuels).	Dollars per million Btu	NGTCD = NGTCV / NGSCB * 1000
NGTCV	Natural gas total expenditures (including supplemental gaseous fuels).	Million dollars	NGTCVZZ = NGACVZZ + NGCCVZZ + NGEIVZZ + NGICVZZ + NGRCVZZ NGTCVUS = ΣNGTCVZZ
NGTXD	Natural gas average price, all end-use sectors (including supplemental gaseous fuels).	Dollars per million Btu	NGTXD = (NGTXV / (NGSCB - NGEIB)) * 1000
NGTXV	Natural gas total end-use expenditures (including supplemental gaseous fuels).	Million dollars	NGTXVZZ = NGACVZZ + NGCCVZZ + NGICVZZ + NGRCVZZ NGTXVUS = ΣNGTXVZZ
NTCAS	Natural gas turbine generating units capacity factor.	Percent	NTCASZZ is independent. NTCASUS is independent.
NUCAS	Nuclear generating units capacity factor.	Percent	NUCASZZ is independent. NUCASUS is independent.
NUEGD	Nuclear fuel price in the electric power sector.	Dollars per million Btu	NUEGDZZ is independent. NUEGDUS = NUEGVUS / NUEGBUS * 1000
NUEGV	Nuclear fuel expenditures in the electric power sector.	Million dollars	NUEGVZZ = NUEGBZZ * NUEGDZZ / 1000 NUEGVUS = ΣNUEGVZZ
NUETD	Nuclear fuel average price, all sectors.	Dollars per million Btu	NUETD = NUETV / NUETB * 1000
NUETV	Nuclear fuel total expenditures.	Million dollars	NUETVZZ = NUEGVZZ NUETVUS = ΣNUETVZZ
NUGBP	Nuclear generating units net summer capacity in all sectors.	Thousand kilowatts	NUGBPZZ is independent. NUGBPUS is independent.

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
NYCAS	Natural gas conventional steam generating units capacity factor.	Percent	NYCASZZ is independent. NYCASUS is independent.
OHICD	Other hydrocarbon gas liquids (other than propane) price in the industrial sector.	Dollars per million Btu	OHICDZZ is independent. OHICDUS = OHICVUS / OHICBZZ * 1000
OHICV	Other hydrocarbon gas liquids (other than propane) expenditures in the industrial sector.	Million dollars	OHICVZZ = OHICBZZ * OHICDZZ / 1000 OHICVUS = ΣOHICVZZ
OJGBP	Other gases generating units net summer capacity in all sectors.	Thousand kilowatts	OJGBPZZ is independent. OJGBPUS is independent.
OPICD	Other petroleum products average price in the industrial sector.	Dollars per million Btu	OPICD = OPICV / OPISB * 1000
OPICV	Other petroleum products total expenditures in the industrial sector.	Million dollars	OPICVZZ = FNICVZZ + FOICVZZ + FSICVZZ + MSICVZZ + SNICVZZ + WXICVZZ OPICVUS = ΣOPICVZZ
OPTCD	Other petroleum products average price, all sectors.	Dollars per million Btu	OPTCD = OPTCV / OPSCB * 1000
OPTCV	Other petroleum products total expenditures.	Million dollars	OPTCVZZ = OPICVZZ OPTCVUS = ΣOPTCVZZ
OPTXD	Other petroleum products average price, all end-use sectors.	Dollars per million Btu	OPTXD = OPTXV / OPSCB * 1000
OPTXV	Other petroleum products total end-use expenditures.	Million dollars	OPTXVZZ = OPICVZZ OPTXVUS = ΣOPTXVZZ
OTGBP	Other generating units net summer capacity in all sectors.	Thousand kilowatts	OTGBPZZ is independent. OTGBPUS is independent.
P1ICD	Asphalt and road oil, kerosene, lubricants, petroleum coke, and “other petroleum products” average price in the industrial sector.	Dollars per million Btu	P1ICD = P1ICV / P1ISB * 1000
P1ICV	Asphalt and road oil, kerosene, lubricants, petroleum coke, and “other petroleum products” expenditures in the industrial sector.	Million dollars	P1ICVZZ = ARICVZZ + KSICVZZ + LUICVZZ + OPICVZZ + PCICVZZ P1ICVUS = ΣP1ICVZZ
P1TCD	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and “other petroleum products” average price, all sectors.	Dollars per million Btu	P1TCD = P1TCV / P1SCB * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
P1TCV	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" total expenditures.	Million dollars	P1TCVZZ = ARTCVZZ + AVTCVZZ + KSTCVZZ + LUTCVZZ + OPTCVZZ + PCTCVZZ P1TCVUS = ΣP1TCVZZ
P1TXD	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" average price, all end-use sectors.	Dollars per million Btu	P1TXD = (P1TXV / (P1SCB - PCEIB)) * 1000
P1TXV	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" total end-use expenditures.	Million dollars	P1TXVZZ = P1TCVZZ - PCEIVZZ P1TXVUS = ΣP1TXVZZ
PAACD	All petroleum products average price in the transportation sector.	Dollars per million Btu	PAACD = PAACV / PAASB * 1000
PAACV	All petroleum products total expenditures in the transportation sector.	Million dollars	PAACVZZ = AVACVZZ + DFACVZZ + HLACVZZ + JFACVZZ + LUACVZZ + MGACVZZ + RFACVZZ PAACVUS = ΣPAACVZZ
PACAS	Petroleum generating units capacity factor.	Percent	PACASZZ is independent. PACASUS is independent.
PACCD	All petroleum products average price in the commercial sector.	Dollars per million Btu	PACCD = PACCV / PACCB * 1000
PACCV	All petroleum products total expenditures in the commercial sector.	Million dollars	PACCVZZ = DFCCVZZ + HLCCVZZ + KSCCVZZ + MGCCVZZ + PCCCVZZ + RFCCVZZ PACCVUS = ΣPACCVZZ
PAEID	All petroleum products average price in the electric power sector.	Dollars per million Btu	PAEID = PAEIV / PAEIB * 1000
PAEIV	All petroleum products total expenditures in the electric power sector.	Million dollars	PAEIVZZ = DKEIVZZ + PCEIVZZ + RFEIVZZ PAEIVUS = ΣPAEIVZZ
PAGBP	Petroleum generating units net summer capacity in all sectors.	Thousand kilowatts	PAGBPZZ is independent. PAGBPUS is independent.
PAICD	All petroleum products average price in the industrial sector.	Dollars per million Btu	PAICD = PAICV / PAISB * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
PAICV	All petroleum products total expenditures in the industrial sector.	Million dollars	PAICVZZ = ARICVZZ + DFICVZZ + HLICVZZ + KSICVZZ + LUICVZZ + MGICVZZ + OPICVZZ + PCICVZZ + RFICVZZ PAICVUS = ΣPAICVZZ
PARCD	All petroleum products average price in the residential sector.	Dollars per million Btu	PARCD = PARCV / PARCB * 1000
PARCV	All petroleum products total expenditures in the residential sector.	Million dollars	PARCVZZ = DFRCVZZ + HLRCVZZ + KSRCVZZ PARCVUS = ΣPARCVZZ
PATCD	All petroleum products average price, all sectors.	Dollars per million Btu	PATCD = PATCV / PASCB * 1000
PATCV	All petroleum products total expenditures.	Million dollars	PATCVZZ = ARTCVZZ + AVTCVZZ + DFTCVZZ + HLTCVZZ + JFTCVZZ + KSTCVZZ + LUTCVZZ + MGTCVZZ + OPTCVZZ + PCTCVZZ + RFTCVZZ PATCVUS = ΣPATCVZZ
PATXD	All petroleum products average price, all end-use sectors.	Dollars per million Btu	PATXD = (PATXV / (PASCB - PAEIB)) * 1000
PATXV	All petroleum products total end-use expenditures.	Million dollars	PATXVZZ = ARTXVZZ + AVTXVZZ + DFTXVZZ + HLTXVZZ + JFTXVZZ + KSTXVZZ + LUTXVZZ + MGTXVZZ + OPTXVZZ + PCTXVZZ + RFTXVZZ PATXVUS = ΣPATXVZZ
PCCCD	Petroleum coke price in the commercial sector.	Dollars per million Btu	PCCCDZZ is independent. PCCCDUS = PCCCVUS / PCCCBUS * 1000
PCCCV	Petroleum coke expenditures in the commercial sector.	Million dollars	PCCCVZZ = PCCCBZZ * PCCCDZZ / 1000 PCCCVUS = ΣPCCCVZZ
PCEID	Petroleum coke price in the electric power sector.	Dollars per million Btu	PCEIDZZ is independent. PCEIDUS = PCEIVUS / PCEIBUS * 1000
PCEIV	Petroleum coke expenditures in the electric power sector.	Million dollars	PCEIVZZ = PCEIBZZ * PCEIDZZ / 1000 PCEIVUS = ΣPCEIVZZ
PCI3D	Price of petroleum coke consumed by the industrial CHP and electricity-only plants.	Dollars per million Btu	PCI3DZZ is independent. PCI3DUS = PCI3VUS / PCI3BUS * 1000
PCI3V	Expenditures of petroleum coke consumed by the industrial CHP and electricity-only plants.	Million dollars	PCI3VZZ = PCI3BZZ * PCI3DZZ / 1000 PCI3VUS = ΣPCI3VZZ
PCICD	Petroleum coke price in the industrial sector.	Dollars per million Btu	PCICD = PCICV / PCISB * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
PCICV	Petroleum coke expenditures in the industrial sector.	Million dollars	PCICVZZ = PCI3VZZ + PCOCVZZ PCICVUS = ΣPCICVZZ
PCOCD	Petroleum coke price in the industrial sector other than for refinery use and CHP.	Dollars per million Btu	PCOCDZZ is independent. PCOCDUS = PCOCVUS / PCOCBUS * 1000
PCOCV	Petroleum coke expenditures in the industrial sector other than for refinery use and CHP.	Million dollars	PCOCVZZ = PCOCBZZ * PCOCDZZ / 1000 PCOCVUS = ΣPCOCVZZ
PCTCD	Petroleum coke average price, all sectors.	Dollars per million Btu	PCTCD = PCTCV / PCSCB * 1000
PCTCV	Petroleum coke total expenditures.	Million dollars	PCTCVZZ = PCCCVZZ + PCEIVZZ + PCICVZZ PCTCVUS = ΣPCTCVZZ
PCTXD	Petroleum coke average price, all end-use sectors.	Dollars per million Btu	PCTXD = PCTXV / (PCSCB - PCEIB) * 1000
PCTXV	Petroleum coke total end-use expenditures.	Million dollars	PCTXVZZ = PCCCVZZ + PCICVZZ PCTXVUS = ΣPCTXVZZ
PEACD	Primary energy average price in the transportation sector.	Dollars per million Btu	PEACD = PEACV / PEASB * 1000
PEACV	Primary energy total expenditures in the transportation sector.	Million dollars	Before 1993: PEACVZZ = CLACVZZ + EMACVZZ + NGACVZZ + PAACVZZ PEACVUS = ΣPEACVZZ 1993 forward: PEACVZZ = CLACVZZ + NGACVZZ + PAACVZZ PEACVUS = ΣPEACVZZ
PECCD	Primary energy average price in the commercial sector.	Dollars per million Btu	PECCD = PECCV / PECSB * 1000
PECCV	Primary energy total expenditures in the commercial sector.	Million dollars	Before 1993: PECCVZZ = CLCCVZZ + EMCCVZZ + NGCCVZZ + PACCVZZ + WWCCVZZ PECCVUS = ΣPECCVZZ 1993 forward: PECCVZZ = CLCCVZZ + NGCCVZZ + PACCVZZ + WWCCVZZ PECCVUS = ΣPECCVZZ
PEEIB	Primary energy consumed by the electric power sector.	Billion Btu	PEEIBZZ = CLEIBZZ + NGEIBZZ + NUEGBZZ + PAEIBZZ + WWEIBZZ + ELIMBZZ PEEIBUS = ΣPEEIBZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
PEEID	Primary energy average price in the electric power sector.	Dollars per million Btu	PEEID = PEEIV / PEEIB * 1000
PEEIV	Primary energy total expenditures in the electric power sector.	Million dollars	PEEIVZZ = CLEIVZZ + ELIMVZZ + NGEIVZZ + NUEGVZZ + PAEIVZZ + WWEIVZZ PEEIVUS = ΣPEEIVZZ
PEICD	Primary energy average price in the industrial sector.	Dollars per million Btu	PEICD = PEICV / PEISB * 1000
PEICV	Primary energy total expenditures in the industrial sector.	Million dollars	Before 1993: PEICVZZ = CLICVZZ + EMICVZZ + NGICVZZ + PAICVZZ + WWICVZZ PEICVUS = ΣPEICVZZ + CCNIVUS 1993 forward: PEICVZZ = CLICVZZ + NGICVZZ + PAICVZZ + WWICVZZ PEICVUS = ΣPEICVZZ + CCNIVUS
PERCD	Primary energy average price in the residential sector.	Dollars per million Btu	PERCD = PERCV / PERSB * 1000
PERCV	Primary energy total expenditures in the residential sector.	Million dollars	PERCVZZ = CLRCVZZ + NGRCVZZ + PARCVZZ + WDRCVZZ PERCVUS = ΣPERCVZZ
PESSD	Primary energy average price, all end-use sectors.	Dollars per million Btu	PESSD = PESSV / PESSB * 1000
PESSV	Primary energy total end-use expenditures.	Million dollars	PESSVZZ = PEACVZZ + PECCVZZ + PEICVZZ + PERCVZZ PESSVUS = ΣPESSVZZ + CCNIVUS
PETCD	Primary energy average price, all sectors.	Dollars per million Btu	PETCD = PETCV / PESCB * 1000
PETCV	Primary energy total expenditures.	Million dollars	PETCVZZ = PEEIVZZ + PESSVZZ PETCVUS = ΣPETCVZZ + CCNIVUS
PETXD	Primary energy average price, all end-use sectors.	Dollars per million Btu	PETXD = (PETXV / (PESCB - PEEIB)) * 1000
PETXV	Primary energy total end-use expenditures.	Million dollars	PETXVZZ = PEACVZZ + PECCVZZ + PEICVZZ + PERCVZZ PETXVUS = ΣPETXVZZ + CCNIVUS

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
PHVHN	Plug-in hybrid electric vehicle (PHEV) light-duty stocks.	Thousands of registered vehicles	PHVHNZZ is independent. PHVHNUS is independent.
PQACD	Propane price in the transportation sector.	Dollars per million Btu	PQACDZZ is independent. PQACDUS = PQACVUS / PQACBUS * 1000
PQACV	Propane expenditures in the transportation sector.	Million dollars	PQACVZZ = PQACBZZ * PQACDZZ / 1000 PQACVUS = ΣPQACVZZ
PQCCD	Propane price in the commercial sector.	Dollars per million Btu	PQCCDZZ is independent. PQCCDUS = PQCCVUS / PQCCBUS * 1000
PQCCV	Propane expenditures in the commercial sector.	Million dollars	PQCCVZZ = PQCCBZZ * PQCCDZZ / 1000 PQCCVUS = ΣPQCCVZZ
PQICD	Propane price in the industrial sector.	Dollars per million Btu	PQICDZZ is independent. PQICDUS = PQICVUS / PQISBUS * 1000
PQICV	Propane expenditures in the industrial sector.	Million dollars	PQICVZZ = PQISBZZ * PQICDZZ / 1000 PQICVUS = ΣPQICVZZ
PQRCD	Propane price in the residential sector.	Dollars per million Btu	PQRCDZZ is independent. PQRCDUS = PQRCVUS / PQRCBUS * 1000
PQRCV	Propane expenditures in the residential sector.	Million dollars	PQRCVZZ = PQRCBZZ * PQRCDZZ / 1000 PQRCVUS = ΣPQRCVZZ
PQTCD	Propane average price, all sectors.	Dollars per million Btu	PQTCD = PQTCV / PQSCB * 1000
PQTCV	Propane total expenditures.	Million dollars	PQTCVZZ = PQACVZZ + PQCCVZZ + PQICVZZ + PQRCVZZ PQTCVUS = ΣPQTCVZZ
PQTXD	Propane average price, all end-use sectors.	Dollars per million Btu	PQTXD = PQTXV / PQSCB * 1000
PQTXV	Propane total end-use expenditures.	Million dollars	PQTXVZZ = PQACVZZ + PQCCVZZ + PQICVZZ + PQRCVZZ PQTXVUS = ΣPQTXVZZ
REGBP	Renewable energy total generating units net summer capacity in all sectors.	Thousand kilowatts	REGBPZZ is independent. REGBPUS is independent.
RFACD	Residual fuel oil price in the transportation sector.	Dollars per million Btu	RFACDZZ is independent. RFACDUS = RFACVUS / RFACBUS * 1000
RFACV	Residual fuel oil expenditures in the transportation sector.	Million dollars	RFACVZZ = RFACBZZ * RFACDZZ / 1000 RFACVUS = ΣRFACVZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
RFCCD	Residual fuel oil price in the commercial sector.	Dollars per million Btu	RFCCDZZ is independent. RFCCDUS = RFCCVUS / RFCCBUS * 1000
RFCCV	Residual fuel oil expenditures in the commercial sector.	Million dollars	RFCCVZZ = RFCCBZZ * RFCCDZZ / 1000 RFCCVUS = ΣRFCCVZZ
RFEID	Residual fuel oil price in the electric power sector.	Dollars per million Btu	RFEIDZZ is independent. RFEIDUS = RFEIVUS / RFEIBUS * 1000
RFEIV	Residual fuel oil expenditures in the electric power sector.	Million dollars	RFEIVZZ = RFEIBZZ * RFEIDZZ / 1000 RFEIVUS = ΣRFEIVZZ
RFICD	Residual fuel oil price in the industrial sector.	Dollars per million Btu	RFICDZZ is independent. RFICDUS = RFICVUS / RFISBUS * 1000
RFICV	Residual fuel oil expenditures in the industrial sector.	Million dollars	RFICVZZ = RFISBZZ * RFICDZZ / 1000 RFICVUS = ΣRFICVZZ
RFTCD	Residual fuel oil average price, all sectors.	Dollars per million Btu	RFTCD = RFTCV / RFSCB * 1000
RFTCV	Residual fuel oil total expenditures.	Million dollars	RFTCVZZ = RFACVZZ + RFCCVZZ + RFEIVZZ + RFICVZZ RFTCVUS = ΣRFTCVZZ
RFTXD	Residual fuel oil average price, all end-use sectors.	Dollars per million Btu	RFTXD = (RFTXV / (RFSCB - RFEIB)) * 1000
RFTXV	Residual fuel oil total end-use expenditures.	Million dollars	RFTXVZZ = RFACVZZ + RFCCVZZ + RFICVZZ RFTXVUS = ΣRFTXVZZ
SHCAS	Solar thermal generating units capacity factor.	Percent	SHCASZZ is independent. SHCASUS is independent.
SNICD	Special naphthas price in the industrial sector.	Dollars per million Btu	SNICDZZ is independent. SNICDUS = SNICVUS / SNICBUS * 1000
SNICV	Special naphthas expenditures in the industrial sector.	Million dollars	SNICVZZ = SNICBZZ * SNICDZZ / 1000 SNICVUS = ΣSNICVZZ
SOGBP	Solar generating units net summer capacity in all sectors.	Thousand kilowatts	SOGBPZZ is independent. SOGBPUS is independent.
SPCAS	Solar photovoltaic generating units capacity factor.	Percent	SPCASZZ is independent. SPCASUS is independent.
TEACD	Total energy average price in the transportation sector.	Dollars per million Btu	TEACD = TEACV / TNASB * 1000

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
TEACV	Total energy expenditures in the transportation sector.	Million dollars	TEACVZZ = ESACVZZ + PEACVZZ TEACVUS = ΣTEACVZZ
TECCD	Total energy average price in the commercial sector.	Dollars per million Btu	TECCD = TECCV / TNCSB * 1000
TECCV	Total energy expenditures in the commercial sector.	Million dollars	TECCVZZ = ESCCVZZ + PECCVZZ TECCVUS = ΣTECCVZZ
TEGDS	Energy expenditures as percent of current-dollar GDP.	Percent	TEGDS = TETCV / GDPRV * 100
TEICD	Total energy average price in the industrial sector.	Dollars per million Btu	TEICD = TEICV / TNISB * 1000
TEICV	Total energy expenditures in the industrial sector.	Million dollars	TEICVZZ = ESICVZZ + PEICVZZ TEICVUS = ΣTEICVZZ + CCNIVUS
TERCD	Total energy average price in the residential sector.	Dollars per million Btu	TERCD = TERCV / TNRSB * 1000
TERCV	Total energy expenditures in the residential sector.	Million dollars	TERCVZZ = ESRCVZZ + PERCVZZ TERCVUS = ΣTERCVZZ
TETCD	Total energy average price.	Dollars per million Btu	TETCD = TETCV / TNSCB * 1000
TETCV	Total energy expenditures.	Million dollars	TETCV = ESTCV + PESSV
TETPV	Total energy expenditures per capita.	Dollars	TETPV = TETCV / TPOPP * 1000
TETXD	Total end-use energy average price.	Dollars per million Btu	TETXD = TETXV / TNSCB * 1000
TETXV	Total end-use energy expenditures.	Million dollars	TETXV = TEACV + TECCV + TEICV + TERCV
TPOPP	Resident population including Armed Forces.	Thousand population	TPOPPZZ is independent. TPOPPUS is independent.
WDC3DUS	Wood price, commercial CHP and electricity-only plants, U.S. only.	Dollars per million Btu	WDC3DUS = WDC3VUS / WDCYBUS * 1000
WDC3V	Wood expenditures, commercial CHP and electricity-only plants.	Million dollars	WDC3VZZ = WDCYBZZ * WDEIDUS / 1000 WDC3VUS = ΣWDC3VZZ
WDC4D	Wood price, commercial sector other than CHP and electricity-only plants.	Dollars per million Btu	WDC4D is independent.
WDC4V	Wood expenditures, commercial sector other than CHP and electricity-only plants.	Million dollars	WDC4VZZ = WDCVBZZ * WDC4DZZ / 1000 WDC4VUS = ΣWDC4VZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
WDEIDUS	Wood price in the electric power sector, U.S. only.	Dollars per million Btu	WDEIDUS is independent.
WDGBP	Wood generating units net summer capacity in all sectors.	Thousand kilowatts	WDGBPZZ is independent. WDGBPUS is independent.
WDI3DUS	Wood price, industrial CHP and electricity-only plants, U.S. only.	Dollars per million Btu	WDI3DUS = WDI3VUS / WDIYBUS * 1000
WDI3V	Wood expenditures, industrial CHP and electricity-only plants.	Million dollars	WDI3VZZ = WDIYBZZ * WDEIDUS / 1000 WDI3VUS = ΣWDI3VZZ
WDRCD	Wood price in the residential sector.	Dollars per million Btu	WDRCDZZ is independent. WDRCDUS = WDRCVUS / WDRSBUS * 1000
WDRCV	Wood expenditures in the residential sector.	Million dollars	WDRCVZZ = WDRSBZZ * WDRCDZZ / 1000 WDRCVUS = ΣWDRCVZZ
WSC3DUS	Waste price, commercial CHP and electricity-only plants, U.S. only.	Dollars per million Btu	WSC3DUS = WSC3VUS / WSCYBUS * 1000
WSC3V	Waste expenditures, commercial CHP and electricity-only plants.	Million dollars	WSC3VZZ = WSCYBZZ * WSEIDUS /1000 WSC3VUS = ΣWSC3VZZ
WSEIDUS	Waste price in the electric power sector, U.S. only.	Dollars per million Btu	WSEIDUS is independent.
WSGBP	Waste generating units net summer capacity in all sectors.	Thousand kilowatts	WSGBPZZ is independent. WSGBPUS is independent.
WSI3DUS	Waste price, industrial CHP and electricity-only plants, U.S. only.	Dollars per million Btu	WSI3DUS = WSI3VUS / WSIYBUS * 1000
WSI3V	Waste expenditures, industrial CHP and electricity-only plants.	Million dollars	WSI3VZZ = WSIYBZZ * WSEIDUS /1000 WSI3VUS = ΣWSI3VZZ
WWCCD	Wood and waste price in the commercial sector.	Dollars per million Btu	WWCCD = WWCCV / WWCSB * 1000
WWCCV	Wood and waste expenditures in the commercial sector.	Million dollars	WWCCVZZ = WDC3VZZ + WDC4VZZ + WSC3VZZ WWCCVUS = ΣWWCCVZZ
WWEID	Wood and waste price in the electric power sector.	Dollars per million Btu	WWEIDZZ is independent. WWEIDUS = WWEIVUS / WWEIBUS * 1000
WWEIV	Wood and waste expenditures in the electric power sector.	Million dollars	WWEIVZZ = WWEIBZZ * WWEIDZZ / 1000 WWEIVUS = ΣWWEIVZZ

Table A1. Price and expenditure variables (cont.)

MSN	Description	Unit	Formula
WWI4D	Wood and waste prices in the industrial sector other than CHP and electricity-only plants.	Dollars per million Btu	WWI4DZZ is independent. WWI4DUS = WWI4VUS / WWIVBUS
WWI4V	Wood and waste expenditures in the industrial sector other than CHP and electricity-only plants.	Million dollars	WWI4VZZ = WWIVBZZ * WWI4DZZ / 1000 WWI4VUS = ΣWWI4VZZ
WWICD	Wood and waste price in the industrial sector.	Dollars per million Btu	WWICD = WWICV / WWISB * 1000
WWICV	Wood and waste expenditures in the industrial sector.	Million dollars	WWICVZZ = WDI3VZZ + WSI3VZZ + WWI4VZZ WWICVUS = ΣWWICVZZ
WWSSV	Wood and waste total end-use expenditures.	Million dollars	WWSSVZZ = WDRCVZZ + WWCCVZZ + WWICVZZ WWSSVUS = ΣWWSSVZZ
WWTCD	Wood and waste average price, all sectors.	Dollars per million Btu	WWTCD = WWTCV / WWSCB * 1000
WWTCV	Wood and waste total expenditures.	Million dollars	WWTCVZZ = WWEIVZZ + WWSSVZZ WWTCVUS = ΣWWTCVZZ
WWTXD	Wood and waste average price, all end-use sectors.	Dollars per million Btu	WWTXD = WWTXV / WWSSB * 1000
WWTXV	Wood and waste total end-use expenditures.	Million dollars	WWTXVZZ = WDRCVZZ + WWCCVZZ + WWICVZZ WWTXVUS = ΣWWTXVZZ
WXICD	Waxes price in the industrial sector.	Dollars per million Btu	WXICDZZ is independent. WXICDUS = WXICVUS / WXICBUS * 1000
WXICV	Waxes expenditures in the industrial sector.	Million dollars	WXICVZZ = WXICBZZ * WXICDZZ / 1000 WXICVUS = ΣWXICVZZ
WYCAS	Wind generating units capacity factor.	Percent	WYCASZZ is independent. WYCASUS is independent.
WYGBP	Wind generating units net summer capacity in all sectors.	Thousand kilowatts	WYGBPZZ is independent. WYGBPUS is independent.
ZWCDP	Cooling degree days (CDD).	Cooling degree days	ZWCDPZZ is independent. ZWCDPUS is independent.
ZWHDP	Heating degree days (HDD).	Heating degree days	ZWHDPZZ is independent. ZWHDPUS is independent.

Table A2. Consumption adjustment variables

MSN	Description	Unit	Formula
B1AUB	Renewable diesel product supplied portion to the transportation sector.	Billion Btu	SEDS consumption variable
B1SUB	Renewable diesel product supplied.	Billion Btu	SEDS consumption variable
BDAUB	Biodiesel product supplied portion to the transportation sector.	Billion Btu	SEDS consumption variable
BDCUB	Biodiesel product supplied portion to the commercial sector.	Billion Btu	SEDS consumption variable
BDRUB	Biodiesel product supplied portion to the residential sector.	Billion Btu	SEDS consumption variable
BDLCB	Energy losses and co-products from the production of biodiesel.	Billion Btu	SEDS consumption variable
BDSUB	Biodiesel product supplied.	Billion Btu	SEDS consumption variable
BFLCB	Energy losses and co-products from the production of biofuels.	Billion Btu	SEDS consumption variable
BOSUBUS	Other biofuels product supplied for the United States.	Billion Btu	SEDS consumption variable
CLISB	Coal consumed by the industrial sector excluding refinery fuel.	Billion Btu	CLISB = CLKCB + CLOSB
CLOCB	Coal consumed by industrial users other than coke plants.	Billion Btu	SEDS consumption variable
CLOCK	Factor for converting coal consumed by industrial users other than coke plants from physical units to Btu.	Million Btu per short ton	SEDS consumption variable
CLOSB	Coal consumed by the industrial sector other than coke plants excluding refinery fuel.	Billion Btu	CLOSB = CLOCB - CLRFB
CLRFB	Coal consumed as refinery fuel.	Billion Btu	CLRFBZZ = CLRFPZZ * CLOCKZZ CLRFBUS = ΣCLRFBZZ

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
CLRFP	Coal consumed as refinery fuel.	Thousand short tons	Before 1981: CLRFPZZ is independent for selected states. CLRFPZZ = (CLOCPZZ / CLOCPGZ) * CLRFPGZ for states belonging to a specific state group, GZ. 1981 through 2012: CLRFPZZ = (CLOCPZZ / CLOCPPZ) * CLRFPPZ for states belonging to a specific PADD, PZ. 2013 forward: CLRFPZZ is independent.
CLSCB	Coal total consumption adjusted for process fuel.	Billion Btu	CLSCB = CLACB + CLCCB + CLEIB + CLISB + CLRCB
CLXCB	Coal consumed by all sectors excluding coke plants and refineries.	Billion Btu	CLXCB = CLACB + CLCCB + CLEIB + CLOSB + CLRCB
DFASB	Distillate fuel oil consumed by the transportation sector including biofuels product supplied.	Billion Btu	Before 2021: DFASBZZ = DFACBZZ DFASBUS = ΣDFASBZZ 2021 forward: DFASBZZ = DFACBZZ + BDAUBZZ + B1AUBZZ DFASBUS = ΣDFASBZZ
DFCSB	Distillate fuel oil consumed by the commercial sector including biofuels product supplied.	Billion Btu	Before 2021: DFCSBZZ = DFCCBZZ DFCSBUS = ΣDFCSBZZ 2021 forward: DFCSBZZ = DFCCBZZ + BDCUBZZ DFCSBUS = ΣDFCSBZZ
DFISB	Distillate fuel oil consumed by the industrial sector excluding refinery fuel.	Billion Btu	DFISB = DFICB - DFRFB
DFRFB	Distillate fuel oil consumed as refinery fuel.	Billion Btu	DFRFBZZ = DFRFPZZ * DFTCKUS DFRFBUS = ΣDFRFBZZ

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
DFRFP	Distillate fuel oil consumed as refinery fuel.	Thousand barrels	Before 1981: DFRFPZZ is independent for selected states. DFRFPZZ = (DFICPZZ / DFICPGZ) * DFRFPGZ for states belonging to a specific state group, GZ. 1981 through 2012: DFRFPZZ = (DFICPZZ / DFICPPZ) * DFRFPPZ for states belonging to a specific PADD, PZ. 2013 forward: DFRFPZZ is independent.
DFRSB	Distillate fuel oil consumed by the residential sector including biofuels product supplied.	Billion Btu	Before 2021: DFRSBZZ = DFRCBZZ DFRSBUS = ΣDFRSBZZ 2021 forward: DFRSBZZ = DFRCBZZ + BDRUBZZ DFRSBUS = ΣDFRSBZZ
DFSCB	Distillate fuel oil total consumption adjusted for process fuel.	Billion Btu	DFSCBZZ = DFASBZZ + DFCSBZZ + DFEIBZZ + DFISBZZ + DFRSBZZ DFSCBUS = ΣDFSCBZZ
EMLCB	Energy losses and co-products from the production of fuel ethanol.	Billion Btu	SEDS consumption variable
ESISB	Electricity consumed by the industrial sector excluding refinery use.	Billion Btu	ESISB = ESICB - ESRFB
ESRFB	Electricity consumed by refineries.	Billion Btu	ESRFBZZ = ESRFPZZ * 3.412 ESRFBUS = ΣESRFBZZ
ESRFP	Electricity consumed by refineries.	Million kilowatthours	Before 1981: ESRFPZZ is independent for selected states. ESRFPZZ = (ESICPZZ / ESICPGZ) * ESRFPGZ for states belonging to a specific state group, GZ. 1981 through 2012: ESRFPZZ = (ESICPZZ / ESICPPZ) * ESRFPPZ for states belonging to a specific PADD, PZ. 2013 forward: ESRFPZZ is independent.
ESSCB	Electricity total consumption adjusted for process fuel.	Billion Btu	ESSCB = ESACB + ESCCB + ESISB + ESRCB

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
HLISB	Hydrocarbon gas liquids consumed by the industrial sector adjusted for processed fuel.	Billion Btu	HLISB = HLICB - HLRFB
HLRFB	Hydrocarbon gas liquids consumed as refinery fuel and intermediate products.	Billion Btu	Before 2010: HLRFBZZ is independent. HLRFBUS = ΣHLRFBZZ 2010 forward: HLRFBZZ = PQRFBZZ HLRFBUS = ΣHLRFBZZ
HLRFP	Hydrocarbon gas liquids consumed as refinery fuel and intermediate products.	Thousand barrels	Before 2010: HLRFPZZ is independent. 2010 forward: HLRFPZZ = PQRFPZZ
HLSCB	Hydrocarbon gas liquids total consumption adjusted for processed fuel.	Billion Btu	HLSCB = HLACB + HLCCB + HLISB + HLRCB
NGASB	Natural gas consumed by the transportation sector adjusted for process fuel.	Billion Btu	NGASB = NGACB - NGPZB
NGISB	Natural gas consumed by the industrial sector excluding refinery fuel and lease and plant fuels (including supplemental gaseous fuels).	Billion Btu	NGISB = NGICB - NGRFB - NGLPB
NGLPB	Natural gas consumed as lease and plant fuel.	Billion Btu	SEDS consumption variable
NGPZB	Natural gas for pipeline and distribution use.	Billion Btu	SEDS consumption variable
NGRFB	Natural gas consumed as refinery fuel (including supplemental gaseous fuels).	Billion Btu	NGRFBZZ = NGRFPZZ * NGTXKZZ NGRFBUS = ΣNGRFBZZ
NGRFP	Natural gas consumed as refinery fuel (including supplemental gaseous fuels).	Million cubic feet	Before 1981: NGRFPZZ is independent for selected states. NGRFPZZ = (NGICPZZ / NGICPGZ) * NGRFPGZ for states belonging to a specific state group, GZ. 1981 through 2012: NGRFPZZ = (NGICPZZ / NGICPPZ) * NGRFPPZ for states belonging to a specific PADD, PZ. 2013 forward: NGRFPZZ is independent.
NGSCB	Natural gas total consumption adjusted for process fuel.	Billion Btu	NGSCB = NGASB + NGCCB + NGEIB + NGISB + NGRCB

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
NGTXK	Factor for converting natural gas used by end-use sectors from physical units to Btu.	Thousand Btu per cubic foot	SEDS consumption variable
OHICB	Other hydrocarbon gas liquids (other than propane) consumed by the industrial sector.	Billion Btu	OHICB = HLICB - PQICB
OPISB	Other petroleum products consumed by the industrial sector excluding refinery fuel and intermediate products.	Billion Btu	OPISB = FNICB + FOICB + FSICB + MSICB + SNICB + WXICB
OPSCB	Other petroleum products total consumption adjusted for refinery fuel and intermediate products.	Billion Btu	OPSCB = OPISB
P1ISB	Asphalt and road oil, kerosene, lubricants, petroleum coke, and other petroleum products consumed by the industrial sector excluding refinery fuel and intermediate products.	Billion Btu	P1ISB = ARICB + KSICB + LUICB + OPISB + PCISB
P1SCB	Asphalt and road oil, kerosene, lubricants, petroleum coke, and other petroleum products total consumption adjusted for process fuel and intermediate products.	Billion Btu	P1SCB = ARTCB + AVTCB + KSTCB + LUTCB + OPSCB + PCSCB
P5RFB	Other petroleum products consumed as refinery fuel and intermediate products.	Billion Btu	P5RFBZZ = ABICBZZ + MBICBZZ + SGICBZZ + UOICBZZ P5RFBUS = ABICBUS + BOSUBUS + MBICBUS + SGICBUS + UOICBUS
PAASB	All petroleum products consumed by the transportation sector excluding other biofuels product supplied for the United States.	Billion Btu	PAASBZZ = PAACBZZ PAASBUS = PAACBUS - BOSUBUS
PAISB	All petroleum products consumed by the industrial sector excluding process fuel and intermediate products.	Billion Btu	PAISB = ARICB + DFISB + HLISB + KSICB + LUICB + MGICB + OPISB + PCISB + RFISB
PASCB	All petroleum products total consumption adjusted for process fuel and intermediate products.	Billion Btu	PASCB = ARTCB + AVTCB + DFSCB + HLSCB + JFTCB + KSTCB + LUTCB + MGTCB + OPSCB + PCSCB + RFSCB
PCISB	Petroleum coke consumed by the industrial sector excluding refinery fuel.	Billion Btu	PCISB = PCICB - PCRFB
PCRFB	Petroleum coke consumed as refinery fuel.	Billion Btu	SEDS consumption variable

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
PCSCB	Petroleum coke total consumption adjusted for process fuel.	Billion Btu	PCSCB = PCCCB + PCEIB + PCISB
PEASB	Primary energy consumed by the transportation sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	Before 1993: PEASB = CLACB + EMACB + NGASB + PAACB 1993 forward: PEASB = CLACB + NGASB + PAASB
PECSB	Primary energy consumed by the commercial sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	Before 1993: PECSB = CLCCB + EMCCB + NGCCB + PACCB+ WWCSB 1993 forward: PECSB = CLCCB + NGCCB + PACCB + WWCSB
PEISB	Primary energy consumed by the industrial sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	Before 1993: PEISBZZ = CLISBZZ + EMICBZZ + NGISBZZ + PAISBZZ+ WWISBZZ PEISBUS = ΣPEISBZZ + CCNIBUS 1993 forward: PEISBZZ = CLISBZZ + NGISBZZ + PAISBZZ + WWISBZZ PEISBUS = ΣPEISBZZ + CCNIBUS
PERSB	Primary energy consumed by the residential sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	PERSB = CLRCB + NGRCB + PARCB + WDRSB
PESCB	Primary energy total consumption, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	PESCB = PEEIB + PESSB
PESSB	Primary energy total end-use consumption, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	PESSB = PEASB + PECSB + PEISB + PERSB
PQISB	Propane consumed by the industrial sector excluding refinery fuel.	Billion Btu	PQISB = PQICB - PQRFB
PQRFB	Propane consumed as refinery fuel.	Billion Btu	PQRFBZZ = PQRFPZZ * 3.841 PQRFBUS = ΣPQRFBZZ
PQRFP	Propane consumed as refinery fuel.	Thousand barrels	PQRFPZZ is independent.
PQSCB	Propane total consumption adjusted for process fuel.	Billion Btu	PQSCB = PQTCB - PQRFB

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
RFISB	Residual fuel oil consumed by the industrial sector excluding refinery fuel.	Billion Btu	RFISB = RFICB - RFRFB
RFRFB	Residual fuel oil consumed as refinery fuel.	Billion Btu	RFRFBZZ = RFRFPZZ * 6.287 RFRFBUS = ΣRFRFBZZ
RFRFP	Residual fuel oil consumed as refinery fuel.	Thousand barrels	Before 1981: RFRFPZZ is independent for selected states. RFRFPZZ = (RFICPZZ / RFICPGZ) * RFRFPGZ for states belonging to a specific state group, GZ. 1981 through 2012: RFRFPZZ = (RFICPZZ / RFICPPZ) * RFRFPPZ for states belonging to a specific PADD, PZ. 2013 forward: RFRFPZZ is independent.
RFSCB	Residential fuel oil total consumption excluding process fuel.	Billion Btu	RFSCB = RFACB + RFCCB + RFEIB + RFISB
SFINB	Supplemental gaseous fuels consumed by the industrial sector.	Billion Btu	SEDS consumption variable
TEPFB	Total energy used as process fuel and other consumption that has no direct fuel costs.	Billion Btu	TEPFBZZ = BDLCBZZ + COICBZZ + EMLCBZZ + GECCBZZ + GEICBZZ + GERCBZZ + HYCCBZZ + HYICBZZ + LOTCBZZ + NGLPBZZ + NGPZBZZ + SOCCBZZ + SOICBZZ + SORCBZZ + TERFBZZ + WDRXBZZ + WWCXBZZ + WWIXBZZ + WYCCBZZ + WYICBZZ TEPFBUS = BDLCBUS + COICBUS + EMLCBUS + GECCBUS + GEICBUS + GERCBUS + HYCCBUS + HYICBUS + LOTCBUS + NGLPBUS + NGPZBUS + SOCCBUS + SOICBUS + SORCBUS + TERFBUS + WDRXBUS + WWCXBUS + WWIXBUS + WYCCBUS + WYICBUS
TERFB	Total energy used as refinery fuel and intermediate products.	Billion Btu	TERFB = CLRFB + DFRFB + ESRFB + HLRFB + NGRFB + P5RFB + PCRFB + RFRFB
TNASB	Total end-use energy consumed by the transportation sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	TNASB = ESACB + PEASB

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
TNCSB	Total end-use energy consumed by the commercial sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	TNCSB = ESCCB + PECSB
TNISB	Total end-use energy consumed by the industrial sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	TNISB = ESISB + PEISB
TNRSB	Total end-use energy consumed by the residential sector, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	TNRSB = ESRCB + PERSB
TNSCB	Total end-use energy consumption, adjusted for process fuel, intermediate products, and fuels with no direct cost.	Billion Btu	TNSCB = ESSCB + PESSB
WDCUB	Wood consumed by the commercial sector other than CHP and electricity-only plants, at no cost.	Billion Btu	WDCUB = WDC4B - WDCVB
WDCVB	Wood consumed by the commercial sector other than CHP and electricity-only plants, costed.	Billion Btu	WDCVBZZ = WDC4BZZ * WDPHSZZ WDCVBUS = ΣWDCVBZZ
WDCYB	Wood consumed by commercial CHP and electricity-only plants, costed.	Billion Btu	WDCYBZZ = WDC3BZZ * WDEISUS WDCYBUS = ΣWDCYBZZ
WDCZB	Wood consumed by commercial CHP and electricity-only plants, at no cost.	Billion Btu	WDCZB = WDC3B - WDCYB
WDEISUS	Purchased wood as a percentage of all wood consumed by the electric power sector, U.S. only.	Percent	WDEISUS is independent.
WDIYB	Wood consumed by industrial CHP and electricity-only plants, costed.	Billion Btu	WDIYBZZ = WDI3BZZ * WDEISUS WDIYBUS = ΣWDIYBZZ
WDIZB	Wood consumed by industrial CHP and electricity-only plants, at no cost.	Billion Btu	WDIZB = WDI3B - WDIYB
WDPHS	Purchased wood as a percentage of all wood consumed by the residential sector.	Percent	WDPHS is independent.

Table A2. Consumption adjustment variables (cont.)

MSN	Description	Unit	Formula
WDRSB	Wood consumed by the residential sector, costed.	Billion Btu	WDRSBZZ = WDRCBZZ * WDPHSZZ WDRSBUS = ΣWDRSBZZ
WDRXB	Wood consumed by the residential sector, at no cost.	Billion Btu	WDRXB = WDRCB - WDRSB
WSCYB	Waste consumed by commercial CHP and electricity-only plants, costed.	Billion Btu	WSCYBZZ = WSC3BZZ * WSEISUS WSCYBUS = ΣWSCYBZZ
WSCZB	Waste consumed by commercial CHP and electricity-only plants, at no cost.	Billion Btu	WSCZB = WSC3B - WSCYB
WSEISUS	Purchased waste as a percentage of all waste consumed by the electric power sector, U.S. only.	Percent	WSEISUS is independent.
WSIYB	Waste consumed by industrial CHP and electricity-only plants, costed.	Billion Btu	WSIYBZZ = WSI3BZZ * WSEISUS WSIYBUS = ΣWSIYBZZ
WSIZB	Waste consumed by industrial CHP and electricity-only plants, at no cost.	Billion Btu	WSIZB = WSI3B - WSIYB
WWCSB	Wood and waste consumed by the commercial sector, costed.	Billion Btu	WWCSB = WDCVB + WDCYB + WSCYB
WWCXB	Wood and waste consumed by the commercial sector, at no cost.	Billion Btu	WWCXB = WDCUB + WDCZB + WSCZB
WWISB	Wood and waste consumed by the industrial sector, costed.	Billion Btu	WWISB = WDIYB + WSIYB + WWIVB
WWIUB	Wood and waste consumed by the industrial sector other than CHP and electricity-only plants, at no cost.	Billion Btu	WWIUB = WWI4B - WWIVB
WWIVB	Wood and waste consumed by the industrial sector other than CHP and electricity-only plants, costed.	Billion Btu	WWIVB is independent.
WWIXB	Wood and waste consumed by the industrial sector, at no cost.	Billion Btu	WWIXB = WDIZB + WSIZB + WWIUB
WWSCB	Wood and waste total consumption, adjusted for fuels with no direct cost.	Billion Btu	WWSCB = WWSSB + WWEIB
WWSSB	Wood and waste consumed by the end-use sectors, costed.	Billion Btu	WWSSB = WDRSB + WWCSB + WWISB

Appendix B. Metric and other physical conversion factors

Data presented in the State Energy Data System (SEDS) are expressed predominately in units that historically have been used in the United States, such as British thermal units, barrels, cubic feet, and short tons.

The metric conversion factors presented in Table B1 can be used to calculate the metric-unit equivalents of values expressed in U.S. customary units. For example, 500 short tons are the equivalent of 453.6 metric tons (500 short tons x 0.9071847 metric tons/short ton = 453.6 metric tons).

In the metric system of weights and measures, the names of multiples and subdivisions of any unit may be derived by combining the name of the unit with prefixes, such as deka, hecto, and kilo, meaning, respectively, 10, 100, 1,000, and deci, centi, and milli, meaning, respectively, one-tenth, one-hundredth, and one-thousandth. Common metric prefixes can be found in Table B2.

The conversion factors presented in Table B3 can be used to calculate equivalents in various physical units commonly used in energy analyses. For example, 10 barrels are the equivalent of 420 U.S. gallons (10 barrels x 42 gallons/barrel = 420 gallons).

APPENDIX B

Table B1. Metric conversion factors

U.S. unit	*multiplied by*	Conversion factor	*equals*	Metric unit	U.S. unit	*multiplied by*	Conversion factor	*equals*	Metric unit
Mass					**Volume**				
short tons (2,000 lb)	x	0.9071847	=	metric tons (t)	barrels of oil (b)	x	0.1589873	=	cubic meters (m^3)
long tons	x	1.016047	=	metric tons (t)	cubic yards (yd^3)	x	0.764555	=	cubic meters (m^3)
pounds (lb)	x	0.45359237[a]	=	kilograms (kg)	cubic feet (ft^3)	x	0.02831685	=	cubic meters (m^3)
pounds uranium oxide (lb U_3O_8)	x	0.384647[b]	=	kilograms uranium (kgU)	U.S. gallons (gal)	x	3.785412	=	liters (L)
ounces, avoirdupois (avdp oz)	x	28.34952	=	grams (g)	ounces, fluid (fl oz)	x	29.57353	=	milliliters (mL)
					cubic inches (in^3)	x	16.38706	=	milliliters (mL)
Length					**Area**				
miles (mi)	x	1.609344[a]	=	kilometers (km)	acres	x	0.40469	=	hectares (ha)
yards (yd)	x	0.9144[a]	=	meters (m)	square miles (mi^2)	x	2.589988	=	square kilometers (km^2)
feet (ft)	x	0.3048[a]	=	meters (m)	square yards (yd^2)	x	0.8361274	=	square meters (m^2)
inches (in)	x	2.54[a]	=	centimeters (cm)	square feet (ft^2)	x	0.09290304[a]	=	square meters (m^2)
					square inches (in^2)	x	6.4516[a]	=	square centimeters (cm^2)
Energy					**Temperature**				
British thermal units (Btu)	x	1,055.05585262[a,c]	=	joules (J)	degrees Fahrenheit (˚F)	x	5/9 (after subtracting 32)[a,d]	=	degrees Celsius (˚C)
calories (cal)	x	4.1868[a]	=	joules (J)					
kilowatthours (kWh)	x	3.6[a]	=	megajoules (MJ)					

[a]Exact conversion.

[b]Calculated by the U.S. Energy Information Administration.

[c]The Btu used in this table is the International Table Btu adopted by the Fifth International Conference on Properties of Steam, London, 1956.

[d]To convert degrees Celsius (°C) to degrees Fahrenheit (°F) exactly, multiply by 9/5, then add 32.

Note: Most metric units shown belong to the International System of Units (SI), and the liter, hectare, and metric ton are accepted for use with the SI units.

Data sources: General Services Administration, Federal Standard 376B, *Preferred Metric Units for General Use by the Federal Government* (Washington, DC, January 27, 1993), pp. 9–11, 13, and 16. National Institute of Standards and Technology, Special Publications 330, 811, and 814. American National Standards Institute/Institute of Electrical and Electronic Engineers, ANSI/IEEE Std 268–1992, pp. 28 and 29.

Table B2. Metric prefixes

Unit multiple	Prefix	Symbol	Unit subdivision	Prefix	Symbol
10^{1}	deka	da	10^{-1}	deci	d
10^{2}	hecto	h	10^{-2}	centi	c
10^{3}	kilo	k	10^{-3}	milli	m
10^{6}	mega	M	10^{-6}	micro	μ
10^{9}	giga	G	10^{-9}	nano	n
10^{12}	tera	T	10^{-12}	pico	p
10^{15}	peta	P	10^{-15}	femto	f
10^{18}	exa	E	10^{-18}	atto	a
10^{21}	zetta	Z	10^{-21}	zepto	z
10^{24}	yotta	Y	10^{-24}	yocto	y

Data source: U.S. Department of Commerce, National Institute of Standards and Technology, *The International System of Units (SI),* NIST Special Publication 330, 1991 Edition (Washington, DC, August 1991), p. 10.

Table B3. Other physical conversion factors

Energy source	Original unit		Conversion factor		Final unit
Petroleum	barrels (b)	x	42[a]	=	U.S. gallons (gal)
Coal	short tons	x	2,000[a]	=	pounds (lb)
	long tons	x	2,240[a]	=	pounds (lb)
	metric tons (t)	x	1,000[a]	=	kilograms (kg)
Wood	cords (cd)	x	1.25[b]	=	short tons
	cords (cd)	x	128[a]	=	cubic feet (ft^3)

[a]Exact conversion.

[b]Calculated by the U.S. Energy Information Administration.

Data source: U.S. Department of Commerce, National Institute of Standards and Technology, *Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices*, NIST Handbook 44, 1994 Edition (Washington, DC, October 1993), pp. B-10, C-17, and C-21.

Appendix C. Data and methodology changes

Tables and data files in the State Energy Data System (SEDS) supply a new year of data each production cycle. The latest data may be preliminary and, therefore, revised the following cycle. Changes made to consumption and price source data for historical years are also regularly incorporated into SEDS.

Listed below are changes in SEDS contents beyond the standard updates.

Natural gas

For 2013 forward, SEDS revises its estimates for natural gas vehicle fuel (transportation sector) prices using historical EIA natural gas vehicle fuel prices from the EIA-176 survey and compressed natural gas (CNG) price data from the U.S. Department of Energy's Alternative Fuels Data Center (AFDC) quarterly *Clean Cities and Communities Alternative Fuel Price Reports*. See the SEDS technical notes for more information.

Petroleum

Distillate fuel oil

For 2009 forward, SEDS revises its estimates for distillate fuel oil consumption, prices, and expenditures for all sectors because of updated biofuels blending and product supplied accounting. For 2009 through 2011, state data are available in SEDS for "adjusted" biodiesel consumption blended with distillate fuel oil in the transportation sector using U.S.-level estimates from EIA's *Monthly Energy Review* (MER) allocated proportionally to SEDS state-level biodiesel consumption estimates. For 2012 forward, state data are available in SEDS for refinery and blender net inputs of biodiesel and renewable diesel by sector using data from EIA's *Petroleum Supply Annual* (PSA) allocated proportionally to SEDS state-level biodiesel and renewable diesel consumption estimates by sector. For 2021 forward, new and revised state data are available in SEDS for biodiesel and renewable diesel product supplied by sector using data from EIA's PSA allocated proportionally to SEDS state-level biodiesel and renewable diesel consumption estimates by sector. See the SEDS technical notes sections for distillate fuel oil, additional calculations, and adjusted consumption for expenditure calculations for more information.

Glossary

Asphalt: A dark brown-to-black cement-like material obtained by petroleum processing and containing bitumens as the predominant component; used primarily for road construction. It includes crude asphalt as well as the following finished products: cements, fluxes, the asphalt content of emulsions (exclusive of water), and petroleum distillates blended with asphalt to make cutback asphalts. *Note:* The conversion factor for asphalt is 5.5 barrels per short ton.

ASTM: American Society for Testing and Materials

Aviation gasoline (finished): A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in aviation reciprocating engines. Fuel specifications are provided in ASTM Specification D 910 and Military Specification MIL-G-5572. *Note:* Data on blending components are not counted in data on finished aviation gasoline.

Aviation gasoline blending components: Naphthas that will be used for blending or compounding into finished aviation gasoline (e.g., straight run gasoline, alkylate, reformate, benzene, toluene, and xylene). Excludes oxygenates (alcohols, ethers), butane, and pentanes plus. Oxygenates are reported as other hydrocarbons, hydrogen, and oxygenates.

Barrel (petroleum): A unit of volume equal to 42 U.S. gallons.

Barrels per calendar day: The amount of input that a distillation facility can process under usual operating conditions. The amount is expressed in terms of capacity during a 24-hour period and reduces the maximum processing capability of all units at the facility under continuous operation (see **Barrels per stream day**) to account for the following limitations that may delay, interrupt, or slow down production: 1. the capability of downstream processing units to absorb the output of crude oil processing facilities of a given refinery. No reduction is necessary for intermediate streams that are distributed to other than downstream facilities as part of a refinery's normal operation; 2. the types and grades of inputs to be processed; 3. the types and grades of products expected to be manufactured; 4. the environmental constraints associated with refinery operations; 5. the reduction of capacity for scheduled downtime due to such conditions as routine inspection, maintenance, repairs, and turnaround; and 6. the reduction of capacity for unscheduled downtime due to such conditions as mechanical problems, repairs, and slowdowns.

Barrels per stream day: The maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime.

Battery electric vehicle (BEV): An all-electric vehicle that receives power by plugging into an electric power source and storing the power in a battery pack. BEVs do not use any petroleum-based or other liquid- or gas-based fuel during operation and do not produce tailpipe emissions.

Biodiesel (B100): Renewable fuel consisting of mono alkyl esters (long chain fatty acids) that are produced through the conversion of animal fats, vegetable oils, and recycled grease feedstocks (transesterification) to produce biodiesel. Biodiesel is typically blended with petroleum diesel in concentrations of 2% to 20% biodiesel, or B2 to B20.

Biofuels: Liquid fuels and blending components produced from biomass feedstocks, used primarily for transportation.

Biomass: Organic non-fossil material of biological origin constituting a re-newable energy source.

Biomass waste: Organic non-fossil material of biological origin that is a byproduct or a discarded product. Biomass waste includes municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural crop byproducts, straw, and other biomass solids, liquids, and gases; but excludes wood and wood-derived fuels (including black liquor), biofuels feedstock, biodiesel, and fuel ethanol. *Note:* EIA biomass waste data also include energy crops grown specifically for energy production, which would not normally constitute waste.

Black liquor: A byproduct of the paper production process, alkaline spent liquor, that can be used as a source of energy. Alkaline spent liquor is removed from the digesters in the process of chemically pulping wood. After evaporation, the residual "black" liquor is burned as a fuel in a recovery furnace that permits the recovery of certain basic chemicals.

British thermal unit (Btu): The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39

degrees Fahrenheit).

Bunker fuels: Fuel supplied to ships and aircraft, both domestic and foreign, consisting primarily of residual and distillate fuel oil for ships and kerosene-based jet fuel for aircraft. The term "international bunker fuels" is used to denote the consumption of fuel for international transport activities. *Note*: For the purposes of greenhouse gas emissions inventories, data on emissions from combustion of international bunker fuels are subtracted from national emissions totals. Historically, bunker fuels have meant only ship fuel.

Butane (C_4H_{10}): A straight-chain or branch-chain hydrocarbon extracted from natural gas or refinery gas streams, which is gaseous at standard temperature and pressure. It includes isobutane and normal butane and is designated in ASTM Specification D1835 and Gas Processors Association specifications for commercial butane.

Butylene (C_4H_8): An olefinic hydrocarbon recovered from refinery or petrochemical processes, which is gaseous at standard temperature and pressure. Butylene is used in the production of gasoline and various petrochemical products.

Carbon dioxide (CO2): A colorless, odorless, non-poisonous gas that is a normal part of Earth's atmosphere. Carbon dioxide is a product of fossil-fuel combustion as well as other processes. It is considered a greenhouse gas as it traps heat (infrared energy) radiated by the Earth into the atmosphere and thereby contributes to the potential for global warming. The global warming potential (GWP) of other greenhouse gases is measured in relation to that of carbon dioxide, which by international scientific convention is assigned a value of one (1).

Catalytic cracking: The refining process of breaking down the larger, heavier, and more complex hydrocarbon molecules into simpler and lighter molecules. Catalytic cracking is accomplished by the use of a catalytic agent and is an effective process for increasing the yield of gasoline from crude oil. Catalytic cracking processes fresh feeds and recycled feeds.

Chained dollar gross domestic product: A measure of gross domestic product using real prices. See **chained dollars** and **gross domestic product (GDP)**.

Chained dollars: A measure used to express real prices. Real prices are those that have been adjusted to remove the effect of changes in the purchasing power of the dollar; they usually reflect buying power relative to a reference year. Before 1996, real prices were expressed in constant dollars, a measure based on the weights of goods and services in a single year, usually a recent year. In 1996, the U.S. Department of Commerce introduced the chained-dollar measure. The new measure is based on the average weights of goods and services in successive pairs of years. It is "chained" because the second year in each pair, with its weights, becomes the first year of the next pair. The advantage of using the chained-dollar measure is that it is more closely related to any given period covered and is therefore subject to less distortion over time.

Coal: A readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50% by weight and more than 70% by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time. Coals are classified according to their degree of progressive alteration from lignite to anthracite. In the U.S. classification, the ranks of coal include lignite, subbituminous coal, bituminous coal, and anthracite and are based on fixed carbon, volatile matter, heating value, and agglomerating (or caking) properties.

Coking coal: Bituminous coal suitable for making coke.

Steam coal: In this report, steam coal represents all noncoking coal.

Coal coke: A solid carbonaceous residue derived from low-ash, low-sulfur bituminous coal from which the volatile constituents are driven off by baking in an oven at temperatures as high as 2,000 degrees Fahrenheit so that the fixed carbon and residual ash are fused together. Coke is used as a fuel and as a reducing agent in smelting iron ore in a blast furnace. Coke from coal is gray, hard, and porous and has a heating value of 24.8 million Btu per ton.

Coke plants: Plants where coal is carbonized for the manufacture of coke in slot or beehive ovens.

Combined-heat-and-power (CHP) plant: A plant designed to produce both heat and electricity. If one or more units of the plant is a CHP unit, then the whole plant is designated as a CHP plant. *Note:* This term is being used in place of the term "cogenerator" that was used by EIA in the past. CHP better describes the facilities because some of the plants included do not produce heat and power in a sequential fashion and, as a result, do not meet the legal definition of cogeneration specified in the Public Utility Regulatory Polices Act (PURPA).

Commercial sector: An energy-consuming sector that consists of service-providing facilities and equipment of: businesses; federal, state,

and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment. *Note:* This sector includes generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.

Conversion factor: A factor for converting data between one unit of measurement and another (such as between short tons and British thermal units, or between barrels and gallons). (See https://www.eia.gov/totalenergy/data/monthly/pdf/mer_a.pdf and https://www.eia.gov/totalenergy/data/monthly/pdf/mer_b.pdf for further information on conversion factors.)

Cord of wood: A cord of wood measures 4 feet by 4 feet by 8 feet, or 128 cubic feet.

Crude oil (including lease condensate): A mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Depending upon the characteristics of the crude stream, crude oil may also include: 1. small amounts of hydrocarbons that exist in gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well (casinghead) gas in lease separators and are subsequently comingled with the crude stream without being separately measured. Lease condensate recovered as a liquid from natural gas wells in lease or field separation facilities and later mixed into the crude stream is also included; 2. Small amounts of nonhydrocarbons produced with the oil, such as sulfur and various metals; 3. Drip gases, and liquid hydrocarbons produced from tar sands, gilsonite, and oil shale. Liquids produced at natural gas processing plants are excluded. Crude oil is refined to produce a wide array of petroleum products, including heating oils; gasoline, diesel and jet fuels; lubricants; asphalt; ethane, propane, and butane; and many other products used for their energy or chemical content.

Crude oil used directly: Crude oil consumed as fuel by crude oil pipelines and on crude oil leases.

Cubic foot (cf), natural gas: The amount of natural gas contained at standard temperature and pressure (60 degrees Fahrenheit and 14.73 pounds standard per square inch) in a cube whose edges are one foot long.

Current-dollar gross domestic product: A measure of gross domestic product using current price. See **gross domestic product (GDP)**.

Denaturant: Petroleum, typically pentanes plus or conventional motor gasoline, added to fuel ethanol to make it unfit for human consumption. Fuel ethanol is denatured, usually before transport from the ethanol production facility, by adding 2 to 5 volume percent denaturant.

Diesel fuel: A fuel composed of distillates obtained in petroleum refining operation or blends of such distillates with residual oil used in motor vehicles. The boiling point and specific gravity are higher for diesel fuels than for gasoline.

Distillate fuel oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation.

Electric power sector: An energy-consuming sector that consists of electricity only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public—i.e., North American Industry Classification System 22 plants. See combined-heat-and-power (CHP) plant and electricity only plant. The electric power sector consumes primary energy to generate electricity and heat (forms of secondary energy). Electricity is sold to the four end-use sectors (residential, commercial, industrial, and transportation), stored for future use, and exported to other countries.

Electrical system energy losses: The amount of energy lost during generation, transmission, and distribution of electricity, including plant and unaccounted-for uses.

Electricity sales to ultimate customers: Electricity sales that are consumed by the customer and not available for resale. Includes electric sales to end users by third-party owners of behind-the-meter PV solar systems.

Electric utility: A corporation, person, agency, authority, or other legal entity or instrumentality aligned with distribution facilities for delivery of electric energy for use primarily by the public. Included are investor-owned electric utilities, municipal and state utilities, federal electric

utilities, and rural electric cooperatives. A few entities that are tariff based and corporately aligned with companies that own distribution facilities are also included.

Electric vehicle (EV): A general term for any on-road licensed vehicle that can plug into an electric power source and uses electric power to move. EVs plug into a source of electricity and store power in a battery pack for all or part of their power needs. Includes Battery electric vehicles (BEVs) and Plug-in hybrid vehicles (PHEVs). Can also be referred to as Plug-in Electric Vehicles (PEV).

Electric vehicle charging location: A geographically distinct place, based on latitude and longitude with one or more Electric Vehicle (EV) charging ports. One charging location can include co-located public and private EV charging ports, networked and non-networked EV charging ports, and EV charging ports of various speeds such as Level 2 and DC fast chargers. Multiple EV charging locations can be associated with a common development area, such as a parking lot or parking garage serving a shopping center or office building.

Electric vehicle charging port: The electric vehicle (EV) charging equipment that connects to and charges an EV. The number of ports is the total number of vehicles that can charge simultaneously at an EV charging location. A single EV charging port can connect to and charge one vehicle at a time. If the EV charging equipment can connect to and charge more than one vehicle simultaneously than that would count as multiple charging ports.

Electrical system energy losses: The amount of energy lost during generation, transmission, and distribution of electricity, including plant and unaccounted for uses.

Electricity sales to ultimate customers: Electricity sales that are consumed by the customer and not available for resale. Includes electric sales to end users by third-party owners of behind-the-meter PV solar systems.

End-use energy consumption: End-use sector (residential, commercial, industrial, and transportation) consumption of primary energy plus electricity sales to ultimate customers. The energy associated with electrical system energy losses is not included.

End-use sectors: The residential, commercial, industrial, and transportation sectors of the economy.

Energy: The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means to accomplish tasks. Electrical energy is usually measured in kilowatthours, while heat energy is usually measured in British thermal units (Btu).

Energy consumption: The use of energy as a source of heat or power or as a raw material input to a manufacturing process.

Energy expenditures: The money directly spent by consumers to purchase energy. Expenditures equal the amount of energy used by the consumer multiplied by the price per unit paid by the consumer. *Note:* In the calculation of the amount of energy used, process fuel and intermediate products are not included.

Energy-consuming sectors: The residential, commercial, industrial, transportation, and electric power sectors of the economy.

Ethane (C_2H_6): A straight-chain saturated (paraffinic) hydrocarbon extracted predominantly from the natural gas stream, which is gaseous at standard temperature and pressure. It is a colorless gas that boils at a temperature of -127 degrees Fahrenheit.

Ethanol (C_2H_5OH): A clear, colorless, flammable alcohol. Ethanol is typically produced biologically from biomass feedstocks such as agricultural crops and cellulosic residues from agricultural crops or wood. Ethanol can also be produced chemically from ethylene. See **fuel ethanol.**

Ethylene (C_2H_4): An olefinic hydrocarbon recovered from refinery or petrochemical processes, which is gaseous at standard temperature and pressure. Ethylene is used as a petrochemical feedstock for many chemical applications and the production of consumer goods.

Exports: Shipments of goods from within the 50 states and the District of Columbia to U.S. possessions and territories or to foreign countries.

f.a.s.: See **free alongside ship**.

Federal Energy Regulatory Commission (FERC): The federal agency with jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing, oil pipeline rates, and gas pipeline certification. FERC is an independent regulatory agency within the Department of Energy and is the successor to the Federal Power Commission.

Federal Power Commission (FPC): The predecessor agency of the Federal Energy Regulatory Commission. The Federal Power Commission was created by an Act of Congress under the Federal Water Power Act on June 10, 1920. It was charged originally with regulating the electric power and natural gas industries. It was abolished on September 30, 1977, when the Department of Energy was created. Its functions were divided between the Department of Energy and the Federal Energy Regulatory Commission, an independent regulatory agency.

Fiscal year: The U.S. Government's fiscal year runs from October 1 through September 30. The fiscal year is designated by the calendar year in which it ends; e.g., fiscal year 2002 begins on October 1, 2001, and ends on September 30, 2002.

Fossil fuel: An energy source formed in the Earth's crust from decayed organic material. The common fossil fuels are petroleum, coal, and natural gas.

Free alongside ship (f.a.s.): The value of a commodity at the port of ex-portation, generally including the purchase price, plus all charges incurred in placing the commodity alongside the carrier at the port of exportation.

Fossil-fuel steam-electric power plant: An electricity generation plant in which the prime mover is a turbine rotated by high-pressure steam produced in a boiler by heat from burning fossil fuels.

Fuel ethanol: Ethanol intended for fuel use. Fuel ethanol in the United States must be anhydrous (less than 1% water). Fuel ethanol is denatured (made unfit for human consumption), usually before transport from the ethanol production facility, by adding 2 to 5 volume percent petroleum, typically pentanes plus or conventional motor gasoline. Fuel ethanol is used principally for blending in low concentrations with motor gasoline as an oxygenate or octane enhancer. In high concentrations, it is used to fuel alternative-fuel vehicles specially designed for its use.

Fuel ethanol excluding denaturant: See **fuel ethanol minus denaturant**.

Fuel ethanol minus denaturant: An unobserved quantity of anhydrous, biomass-derived, undenatured ethanol for fuel use. The quantity is obtained by subtracting the estimated denaturant volume from fuel ethanol volume. Fuel ethanol minus denaturant is counted as renewable energy, while denaturant is counted as nonrenewable fuel.

Gasohol: A blend of finished motor gasoline containing alcohol (generally ethanol but sometimes methanol) at a concentration between 5.7% and 10% by volume.

Geothermal energy: Hot water or steam extracted from geothermal reser-voirs in the Earth's crust. Water or steam extracted from geothermal reser-voirs can be used for geothermal heat pumps, water heating, or electricity generation.

Gross domestic product (GDP): The total value of goods and services produced by labor and property located in the United States. As long as the labor and property are located in the United States, the supplier (that is, the workers and, for property, the owners) may be either U.S. residents or residents of foreign countries.

Gross generation: The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatthours (kWh) or megawatthours (MWh).

Heat content: The amount of heat energy available to be released by the transformation or use of a specified physical unit of an energy form (e.g., a ton of coal, a barrel of oil, a kilowatthour of electricity, a cubic foot of natural gas, or a pound of steam). The amount of heat energy is commonly expressed in British thermal units (Btu). *Note:* Heat content of combustible energy forms can be expressed in terms of either gross heat content (higher or upper heating value) or net heat content (lower heating value), depending upon whether or not the available heat energy includes or excludes the energy used to vaporize water (contained in the original energy form or created during the combustion process). The Energy Information Administration typically uses gross heat content values.

Heat rate: A measure of generating station thermal efficiency commonly stated as Btu per kilowatthour. *Note:* Heat rates can be expressed as either gross or net heat rates, depending on whether the electricity output is gross or net generation. Heat rates are typically expressed as net heat rates.

Heating degree days (HDD): A measure of how cold a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit. The measure is computed for each day by sub-tracting the average of the day's high and low temperatures from the base temperature (65 degrees), with negative values set equal to zero. Each day's heating degree days are summed to create a heating degree day measure for a specified reference period. Heating degree days are used in energy analysis as an indicator of space heating energy requirements or use.

Hydrocarbon gas liquids (HGL): A group of hydrocarbons including ethane, propane, normal butane, isobutane, and natural gasoline, and their associated olefins, including ethylene, propylene, butylene, and isobutylene. As marketed products, HGL represents all natural gas liquids (NGL) and olefins. EIA reports production of HGL from refineries (liquefied refinery gas, or LRG) and natural gas plants (natural gas plant liquids, or NGPL). Excludes liquefied natural gas (LNG).

Hydroelectric power: The use of flowing water to produce electrical energy.

Hydroelectric power, conventional: Hydroelectric power generated from flowing water that is not created by hydroelectric pumped storage.

Hydroelectric pumped storage: Hydroelectric power that is generated during peak load periods by using water previously pumped into an elevated storage reservoir during off-peak periods when excess generating capacity is available to do so. When additional generating capacity is needed, the water can be released from the reservoir through a conduit to turbine generators located in an electric power plant at a lower level.

Hydroelectric power plant: A plant in which the turbine generators are driven by falling water.

Imports: Receipts of goods into the 50 states and the District of Columbia from U.S. possessions and territories or from foreign countries.

Independent power producer: A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation of electricity for use primarily by the public, and that is not an electric utility. *Note:* Independent power producers are included in the electric power sector.

Industrial sector: An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, fishing and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products. *Note:* This sector includes generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities.

Isobutane (C_4H_{10}): A branch-chain saturated (paraffinic) hydrocarbon extracted from both natural gas and refinery gas streams, which is gaseous at standard temperature and pressure. It is a colorless gas that boils at a temperature of 11 degrees Fahrenheit.

Isobutylene (C_4H_8): A branch-chain olefinic hydrocarbon recovered from refinery or petrochemical processes, which is gaseous at standard temperature and pressure. Isobutylene is used in the production of gasoline and various petrochemical products.

Jet fuel: A refined petroleum product used in jet aircraft engines. It includes kerosene-type jet fuel and naphtha-type jet fuel.

Jet fuel, kerosene-type: A kerosene-based product having a maximum distillation temperature of 400 degrees Fahrenheit at the 10% recovery point and a final maximum boiling point of 572 degrees Fahrenheit and meeting ASTM Specification D 1655 and Military Specifications MIL-T-5624P and MIL-T-83133D (Grades JP-5 and JP-8). It is used for commercial and military turbo jet and turbo prop aircraft engines.

Jet fuel, naphtha-type: A fuel in the heavy naphtha boiling range having an average gravity of 52.8 degrees API, 20% to 90% distillation temperatures of 290 degrees to 470 degrees Fahrenheit, and meeting Military Specification MIL-T-5624L (Grade JP-4). It is used primarily for military turbojet and turboprop aircraft engines because it has a lower freeze point than other aviation fuels and meets engine requirements at high altitudes and speeds. *Note:* Beginning with January 2004 data, naphtha-type jet fuel is included in Miscellaneous Products.

Kerosene: A light petroleum distillate that is used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10% recovery point, a final maximum boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. Included are No. 1-K and No. 2-K, the two grades recognized by ASTM Specification D 3699 as well as all other grades of kerosene called range or stove oil, which have properties similar to those of No. 1 fuel oil. Also see **Jet Fuel, Kerosene-type**.

Kilowatthour (kWh): A measure of electricity defined as a unit of work or energy, measured as 1 kilowatt (1,000 watts) of power expended for 1 hour. One kWh is equal to 3,412 Btu.

Lease and plant fuel: Natural gas used in well, field, and lease operations (such as gas used in drilling operations, heaters, dehydrators, and field compressors) and as fuel in natural gas processing plants.

Lease condensate: A mixture consisting primarily of hydrocarbons heavier than pentanes that is recovered as a liquid from natural gas in lease separation facilities. This category excludes natural gas plant liquids, such as butane and propane, which are recovered at downstream natural gas processing plants or facilities.

Liquefied petroleum gases (LPG): A group of hydrocarbon gases, primarily propane, normal butane, and isobutane, derived from crude oil refining or natural gas processing. These gases may be marketed individually or mixed. They can be liquefied through pressurization (without requiring cryogenic refrigeration) for convenience of transportation or storage. Excludes ethane and olefins. *Note*: In some EIA publications, LPG includes ethane and marketed refinery olefin streams, in accordance with definitions used prior to January 2014.

Lubricants: Substances used to reduce friction between bearing surfaces, or incorporated into other materials used as processing aids in the manufacture of other products, or used as carriers of other materials. Petroleum lubricants may be produced either from distillates or residues. Lubricants include all grades of lubricating oils, from spindle oil to cylinder oil to those used in greases.

Methanol (CH_3OH): A light, volatile alcohol eligible for gasoline blending.

Miscellaneous petroleum products: Includes all finished products not classified elsewhere (e.g., petrolatum lube refining by products (aromatic extracts and tars), absorption oils, ram-jet fuel, petroleum rocket fuels, synthetic natural gas feed stocks, and specialty oils).

Motor gasoline (finished): A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in spark-ignition engines. Motor gasoline, as defined in ASTM Specification D 4814 or Federal Specification VV-G-1690C, is characterized as having a boiling range of 122 to 158 degrees Fahrenheit at the 10% recovery point to 365 to 374 degrees Fahrenheit at the 90% recovery point. Motor Gasoline includes conventional gasoline; all types of oxygenated gasoline, including gasohol; and reformulated gasoline, but excludes aviation gasoline. *Note:* Volumetric data on blending components, such as oxygenates, are not counted in data on finished motor gasoline until the blending components are blended into the gasoline.

Motor gasoline blending components: Naphthas (e.g., straight-run gas-oline, alkylate, reformate, benzene, toluene, xylene) used for blending or compounding into finished motor gasoline. These components include re-formulated gasoline blendstock for oxygenate blending (RBOB) but exclude oxygenates (alcohols, ethers), butane, and pentanes plus. *Note:* Oxygenates are reported as individual components and are included in the total for other hydrocarbons, hydrogens, and oxygenates.

Natural gas: A gaseous mixture of hydrocarbon compounds, the primary one being methane.

Natural gas liquids (NGL): A group of hydrocarbons including ethane, propane, normal butane, isobutane, and natural gasoline. Generally include natural gas plant liquids and all liquefied refinery gases except olefins.

Natural gas, dry: Natural gas which remains after: 1) the liquefiable hydrocarbon portion has been removed from the gas stream (i.e., gas after lease, field, and/or plant separation); and 2) any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable. *Note*: Dry natural gas is also known as consumer-grade natural gas. The parameters for measurement are cubic feet at 60 degrees Fahrenheit and 14.73 pounds per square inch absolute.

Natural gasoline: A commodity product commonly traded in natural gas liquids (NGL) markets that comprises liquid hydrocarbons (mostly pentanes and hexanes) and generally remains liquid at ambient temperatures and atmospheric pressure. Natural gasoline is equivalent to pentanes plus.

Net generation: The amount of **gross generation** less the electrical energy consumed at the generating station(s) for station service or auxiliaries. *Note*: Electricity required for pumping at pumped-storage plants is regarded as electricity for station service and is deducted from **gross generation**.

Net interstate flow of electricity: The difference between the sum of electricity sales and losses within a state and the total amount of electricity generated within that state. A positive number indicates that more electricity (including associated losses) came into the state than went out of the state during the year; conversely, a negative number indicates that more electricity (including associated losses) went out of the state than came into the state.

Net summer capacity: The maximum output, commonly expressed in thousand kilowatts (kW), that generating equipment can supply to system load, as demonstrated by a multi-hour test, at the time of summer peak demand (period of June 1 through September 30). This output reflects a reduction in capacity due to electricity use for station service or auxiliaries.

Nominal dollars: A measure used to express nominal price.

Nominal price: The price paid for a product or service at the time of the transaction. Nominal prices are those that have not been adjusted to remove the effect of changes in the purchasing power of the dollar; they reflect buying power in the year in which the transaction occurred.

Non-biomass waste: Material of non-biological origin that is a byproduct or a discarded product. "Non-biomass waste" includes municipal solid waste from non-biogenic sources, such as plastics, and tire-derived fuels.

Non-combustion use: Fossil fuels (coal, natural gas, and petroleum products) that are not burned to release energy and instead used directly as construction materials, chemical feedstocks, lubricants, solvents, waxes, and other products. Sometimes used synonymously with "nonfuel use (of energy)."

Nonutilities: See **nonutility power producer**.

Nonutility power producer: A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for electric generation and is not an electric utility. Nonutility power producers include qualifying cogenerators, qualifying small power producers, and other nonutility generators (including independent power producers). Nonutility power producers are without a designated franchised service area and do not file forms listed in the *Code of Federal Regulations*, Title 18, Part 141.

Normal butane (C_4H_{10}): A straight-chain saturated (paraffinic) hydrocarbon extracted from both natural gas and refinery gas streams, which is gaseous at standard temperature and pressure. It is a colorless gas that boils at a temperature of 31 degrees Fahrenheit.

North American Industry Classification System (NAICS): A classification scheme, developed by the Office of Management and Budget to replace the Standard Industrial Classification (SIC) System, that categorizes establishments according to the types of production processes they primarily use.

Nuclear electric power (nuclear power): Electricity generated by the use of the thermal energy released from the fission of nuclear fuel in a reactor.

Nuclear fuel: Fissionable materials that have been enriched to a composition that, when placed in a nuclear reactor, will support a self-sustaining fission chain reaction, producing heat in a controlled manner for process use.

Other biofuels: Fuels and fuel blending components, except biodiesel, renewable diesel fuel, and fuel ethanol, produced from renewable biomass.

Other energy losses: Energy losses throughout the energy system as they are consumed, usually in the form of heat, that are not separately identified by the U.S. Energy Information Administration. Examples include heat lost in the process of burning motor gasoline to move vehicles or in electricity used to power a lightbulb.

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

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

Pentanes plus: A mixture of liquid hydrocarbons, mostly pentanes and heavier, extracted from natural gas in a gas processing plant. Pentanes plus is equivalent to natural gasoline.

Petrochemical feedstocks: Chemical feedstocks derived from petroleum principally for the manufacture of chemicals, synthetic rubber, and a variety of plastics. In this report the categories reported are "Naphtha Less Than 401°F" and "Other Oils Equal to or Greater Than 401°F."

Petroleum: A broadly defined class of liquid hydrocarbon mixtures. Included are crude oil, lease condensate, unfinished oils, refined products obtained from the processing of crude oil, and natural gas plant liquids.

Note: Volumes of finished petroleum products include nonhydrocarbon compounds, such as additives and detergents, after they have been blended into the products.

Petroleum coke: A residue high in carbon content and low in hydrogen that is the final product of thermal decomposition in the condensation process in cracking. This product is reported as marketable coke or catalyst coke. The conversion is 5 barrels (of 42 U.S. gallons each) per short ton.

Petroleum coke, catalyst: The carbonaceous residue that is deposited on and deactivates the catalyst used in many catalytic operations (e.g., catalytic cracking). Carbon is deposited on the catalyst, thus deactivating the catalyst. The catalyst is reactivated by burning off the carbon, which is used as a fuel in the refining process. That carbon or coke is not recoverable in a concentrated form.

Petroleum coke, marketable: Those grades of coke produced in delayed or fluid cokers that may be recovered as relatively pure carbon. Marketable petroleum coke may be sold as is or further purified by calcining.

Petroleum consumption: The sum of all refined petroleum products sup-plied. See **products supplied (petroleum)**.

Petroleum products: Petroleum products are obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds. Petroleum products include unfinished oils, hydrocarbon gas liquids, aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Photovoltaic energy: Direct-current electricity generated from photovoltaic cells. See **photovoltaic cells (PVC)**.

Photovoltaic cells (PVC): An electronic device consisting of layers of semiconductor materials fabricated to form a junction (adjacent layers of materials with different electronic characteristics) and electrical contacts and being capable of converting incident light directly into electricity (direct current).

Plant condensate: Liquid hydrocarbons recovered at inlet separators or scrubbers in natural gas processing plants at atmospheric pressure and ambient temperatures. Mostly pentanes and heavier hydrocarbons.

Plug-in hybrid electric vehicle (PHEV): A vehicle that can both (1) plug into an electric power source and store power in a battery pack and (2) use petroleum-based or other liquid- or gas-based fuel to power an internal combustion engine (ICE).

Primary energy consumption: Consumption of primary energy. EIA includes the following in U.S. primary energy consumption:

- Coal
- Coal coke net imports
- Petroleum (equal to petroleum products supplied, excluding biofuels)
- Dry natural gas, excluding supplemental gaseous fuels
- Nuclear electricity net generation (converted to Btu using the average annual heat rate of nuclear plants)
- Conventional hydroelectricity net generation (converted to Btu using the heat content of electricity)
- Geothermal electricity net generation (converted to Btu using the heat content of electricity), geothermal heat pump energy, and geothermal direct-use thermal energy
- Solar thermal and photovoltaic electricity net generation, both utility-scale and small-scale (converted to Btu using the heat content of electricity)
- Solar thermal direct-use energy
- Wind electricity net generation (converted to Btu using the heat content of electricity)
- Wood and wood-derived fuels
- Biomass waste
- Biofuels (fuel ethanol, biodiesel, renewable diesel, and other biofuels)
- Losses and co-products from the production of biofuels
- Electricity net imports (converted to Btu using the electricity heat content of electricity)

Primary energy consumption also includes all non-combustion uses of fossil fuels. Energy sources produced from other energy sources—for example, coal coke from coal—are included in primary energy consumption only if their energy content has not already been included as part of the original energy source. As a result, U.S. primary energy consumption does include net imports of coal coke, but it does not include the coal coke produced from domestic coal.

Primary energy expenditures: Expenditures for energy consumed in each of the four major end-use sectors, excluding energy in the form

of electricity, plus expenditures by the electric power sector for energy used to generate electricity. There are no fuel-associated expenditures for associated expenditures for hydroelectric power, geothermal energy, photovoltaic and solar energy, or wind energy. Also excluded are the quantifiable consumption expenditures that are an integral part of process fuel consumption.

Process fuel: All energy consumed in the acquisition, processing, and transportation of energy. Quantifiable process fuel includes three categories: natural gas lease and plant operations, natural gas pipeline operations, and oil refinery operations.

Product supplied (petroleum): Approximately represents consumption of petroleum products because it measures the disappearance of these products from primary sources, i.e., refineries, natural gas-processing plants, blending plants, pipelines, and bulk terminals. In general, product supplied of each product in any given period is computed as follows; field production, plus refinery production, plus imports, plus unaccounted-for crude oil (plus net receipts when calculated on a PAD District basis) minus stock change, minus crude oil losses, minus refinery inputs, and minus exports.

Propane (C_3H_8): A straight-chain saturated (paraffinic) hydrocarbon extracted from natural gas or refinery gas streams, which is gaseous at standard temperature and pressure. It is a colorless gas that boils at a temperature of -44 degrees Fahrenheit. It includes all products designated in ASTM Specification D1835 and Gas Processors Association specifications for commercial (HD-5) propane.

Propylene (C_3H_6): An olefinic hydrocarbon recovered from refinery or petrochemical processes, which is gaseous at standard temperature and pressure. Propylene is an important petrochemical feedstock.

Refinery (petroleum): An installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons, and alcohol.

Refinery olefins: Subset of olefinic hydrocarbons (olefins) produced at crude oil refineries, including ethylene, propylene, butylene, and isobutylene.

Renewable diesel fuel: Renewable fuel consisting of hydrocarbon molecules, produced through the hydrotreating of animal fats, vegetable oils, and recycled grease feedstocks. It is considered a drop-in replacement to petroleum-based diesel fuel (for example, it can be used in diesel engines without modification). Renewable diesel fuel reported on the EIA-819 is produced at dedicated biorefineries or co-processed at petroleum refineries.

Renewable energy: Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. In this report, renewable sources of energy include biomass, hydroelectric power, geothermal, solar, and wind.

Residential sector: An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters.

Residual fuel oil: A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils, that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations. It conforms to ASTM Specifications D 396 and D 975 and Federal Specification VV-F-815C. No. 5, a residual fuel oil of medium viscosity, is also known as Navy Special and is defined in Military Specification MIL-F-859E, including Amendment 2 (NATO Symbol F-770). It is used in steam-powered vessels in government service and inshore powerplants. No. 6 fuel oil includes Bunker C fuel oil and is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes.

Road oil: Any heavy petroleum oil, including residual asphaltic oil, used as a dust palliative and surface treatment on roads and highways. It is generally produced in six grades, from 0, the most liquid, to 5, the most viscous.

Short ton: A unit of weight equal to 2,000 pounds.

Solar energy: The radiant energy of the sun, which can be converted into other forms of energy, such as heat or electricity.

Special naphthas: All finished products within the naphtha boiling range that are used as paint thinners, cleaners, or solvents. These products are refined to a specified flash point. Special naphthas include all commercial hexane and cleaning solvents conforming to ASTM Specifications D1836 and D484, respectively. Naphthas to be blended or marketed as motor gasoline or aviation gasoline, or that are to be used as petrochemical and synthetic natural gas (SNG) feedstocks, are excluded.

Standard Industrial Classification (SIC): Replaced with North American Industry Classification System. See **NAICS**.

Steam coal: See **coal**.

Still gas: Any form or mixture of gases produced in refineries by distillation, cracking, reforming, and other processes. The principal constituents are methane and ethane. May contain hydrogen and small/trace amounts of other gases. Still gas is typically consumed as refinery fuel or used as petrochemical feedstock. Still gas burned for refinery fuel may differ in composition from marketed still gas sold to other users.

Supplemental gaseous fuels supplies: Synthetic natural gas, propane-air, coke oven gas, refinery gas, biomass gas, air injected for Btu stabilization, and manufactured gas commingled and distributed with natural gas.

Total energy consumption: Primary energy consumption, electricity sales to ultimate customers, and electrical system energy losses allocated to each end-use sector. Also includes other energy losses throughout the energy system.

Transportation sector: An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Included are automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse tractors and forklifts) are classified in the sector of their primary use. In this report, natural gas used in the operation of natural gas pipelines is included in the transportation sector.

Unfinished oils: All oils requiring further processing, except those requiring only mechanical blending. Unfinished oils are produced by partial refining of crude oil and include naphthas and lighter oils, kerosene and light gas oils, heavy gas oils, and residuum.

Unfractionated streams: Mixtures of unsegregated natural gas liquid components, excluding those in plant condensate. This product is extracted from natural gas.

United States: The 50 states and the District of Columbia. *Note*: The United States has varying degrees of jurisdiction over a number of territories and other political entities outside the 50 states and the District of Columbia, including Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, Johnston Atoll, Midway Islands, Wake Island, and the Northern Mariana Islands. EIA data programs may include data from some or all of these areas in U.S. totals. For these programs, data products will contain notes explaining the extent of geographic coverage included under the term “United States.”

Value added by manufacture: A measure of manufacturing activity that is derived by subtracting the cost of materials (which covers materials, supplies, containers, fuel, purchased electricity, and contract work) from the value of shipments. This difference is then adjusted by the net change in finished goods and work-in-progress between the beginning- and end-of-year inventories.

Vessel bunkering: Includes sales for the fueling of commercial or private boats, such as pleasure craft, fishing boats, tugboats, and ocean-going ves-sels, including vessels operated by oil companies. Excluded are volumes sold to the U.S. Armed Forces.

Waste energy: Municipal solid waste, landfill gas, methane, digester gas, liquid acetonitrile waste, tall oil, waste alcohol, medical waste, paper pellets, sludge waste, solid byproducts, tires, agricultural byproducts, closed loop biomass, fish oil, and straw used as fuel. See **biomass waste** and **non-biomass waste**.

Wax: A solid or semi-solid material consisting of a mixture of hydrocarbons obtained or derived from petroleum fractions, or through a Fischer-Tropsch type process, in which the straight-chained paraffin series predominates. This includes all marketable wax, whether crude or refined, with a congealing point (ASTM D 938) between 100 and 200 degrees Fahrenheit and a maximum oil content (ASTM D 3235) of 50 weight percent.

Wind energy: Kinetic energy present in wind motion that can be converted to mechanical energy for driving pumps, mills, and electric power generators.

Wood energy: Wood and wood products used as fuel, including round wood (cord wood), limb wood, wood chips, bark, sawdust, forest residues, charcoal, pulp waste, and spent pulping liquor.