State Energy Data System 2018
Consumption Technical Notes

Introduction to the Technical Notes

Purpose

All of the estimates contained in the state energy consumption data tables are developed using the State Energy Data System (SEDS), which is maintained and operated by the U.S. Energy Information Administration (EIA). The goal in maintaining SEDS is to create historical time series of energy production, consumption, prices, and expenditures by state that are defined as consistently as possible over time and across sectors. SEDS exists for two principal reasons: (1) to provide state energy production, consumption, price and expenditure estimates to Members of Congress, federal and state agencies, and the general public, and (2) to provide the historical series necessary for EIA's energy models.

Efforts are made to ensure that the sums of the state estimates equal the national totals as closely as possible for each energy type and end-use sector as published in other EIA publications. SEDS energy consumption estimates are generally comparable to the national statistics in EIA's *Monthly Energy Review* consumption tables.

The report

The SEDS consumption tables, available on the EIA website at http://www.eia.gov/state/seds/seds-data-complete.php, provide annual time series estimates of state-level energy use by broad energy-consuming sectors. Companion tables containing state-level price and expenditure estimates can be found at the same website. State-level energy production estimates, a recent addition to SEDS, are also available at http://www.eia.gov/state/seds/seds-data-complete.php. In addition, tables showing state-level consumption, price, and expenditure estimates by energy source as they are updated for the most current year can be found at http://www.eia.gov/state/seds/seds-data-fuel.php.

The following technical notes are provided to assist users in understanding and interpreting the SEDS consumption estimates. Each section describes how the estimates were derived for each individual energy source and lists the sources of all data series. Additional information is contained in the appendices.

Technical notes for state-level prices and expenditures, as well as production, are also available at http://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Due to page-size constraints, most of the time-series tables displayed as Portable Document Format (PDF) files show estimates for only selected years from 1960 through 2000; thereafter, data are shown consecutively. However, estimates for all years from 1960 forward are maintained in SEDS and are included in the HTML versions of the tables and in the CSV data files available via EIA's website. All years are covered by the documentation in this report.

All estimates with revisions since the last edition of SEDS that are large enough to be seen in the published tables' level of rounding are preceded with an "R" in the PDF data tables on the website.

Estimates

Estimation methodologies. Using SEDS, EIA develops estimates of energy consumption by principal energy sources and broad energy-consuming sectors, by state, from 1960 forward. Energy consumption is estimated by using data from existing surveys of energy suppliers that report consumption, sales, or distribution of energy at the state level. Most of the SEDS estimates rely directly on collected state-level consumption data (See "Collected data and estimated values in SEDS" on page 5, which summarizes the status of current data sources used). Some consumption estimates in SEDS are based on a variety of surrogate measures. The measures are selected principally on the basis of applicability as an indicator of consumption, availability, continuity over time, and consistency. For instance, for petroleum, "product supplied" is a surrogate for consumption and is derived by summing field and refinery production, plus imports, minus exports, plus or minus changes in stocks. State-level sales survey data are used to disaggregate the national petroleum product supplied totals to the states. The measures of consumption and estimation methodologies are explained in detail under each energy source in the Technical Notes.

Methods are also applied to estimate state electrical system energy losses that are not available from any survey. See "Energy consumption measures—total and site" on page 6 for a discussion about losses and how they are reflected in the SEDS tables. U.S. electrical system energy losses are defined as the differences between the heat content of all energy consumed by the electric power sector and the heat content of electricity retail sales. State-level

losses are estimated using two methodologies, depending on whether data on net interstate flow of electricity are available. See Section 6, "Electricity," for details.

Data sources. The original source documents cited in the Technical Notes include descriptions of the data collection methodologies, universes, imputation or adjustment techniques (if any), and errors associated with the processes. Due to the many collection forms and procedures associated with those reports, it is not possible to develop a meaningful numerical estimate of the errors of the integrated data published here.

Reliable, consistent series for long periods of time—especially in the earlier years—are difficult to develop, and estimates and assumptions must be applied to fill data gaps and to maintain definitional consistency. Although SEDS incorporates the most consistent series and procedures possible, users of this report should recognize the limitations of the data that are due to changing and inadequate data sources.

For example, in reports prepared by the Bureau of Mines in the late 1960s and early 1970s, petroleum consumption was equated to demand. Later, consumption was equated to apparent demand and, more recently, to product supplied. Changes in surveys and reduction of data collections, especially after 1978, disturbed the continuity of some petroleum consumption series, most notably for distillate fuel oil, residual fuel oil, and kerosene. These and other data inconsistencies are explained in detail for each energy source in the Technical Notes.

Comparison with other energy consumption reports

EIA conducts many energy-related surveys. In general, the surveys can be divided into two broad groups. One group of surveys, called supply surveys, is directed to the suppliers and marketers of specific energy sources. Those surveys measure the quantities of specific fuels supplied to the market. The results of supply surveys are combined and published in a number of EIA data products, including the *Monthly Energy Review* and SEDS. The second group of surveys, called energy consumption surveys, gather information directly from end users of energy. Although there are some elements in common, the supply survey data and the consumption survey data have substantially different approaches, capabilities, and objectives. Thus, care must be taken in analyzing SEDS consumption estimates in conjunction with consumption survey data for the following reasons:

- SEDS data are designed to be a broad accounting of energy consumption, covering all energy use and splitting it into major sectors as clearly as possible. The energy consumption surveys are designed to be comprehensive and representative within individual sectors. However, the sectors are restricted for purposes of creating relatively homogeneous, well-defined populations and for aiding in sampling and data collection. For example, the Commercial Buildings Energy Consumption Survey covers only energy consumption in commercial buildings, while SEDS includes other commercial consumption, such as street lighting and public services; and the Manufacturing Energy Consumption Survey covers only manufacturing establishments, while SEDS includes other industrial energy consumption (i.e., mining, construction, agriculture, fisheries, and forestry). Further, the consumption surveys do not cover all energy-using sectors. Therefore, energy consumption surveys cannot be summed together to account for all energy use.
- Energy consumption surveys provide user characteristics that allow for both macro-level (for major sectoral sub-populations) and micro-level (at the unit of data collection) interpretive analysis. The surveys of energy consumption by residential households from the Residential Energy Consumption Survey (Form EIA-457) and by commercial buildings from the Commercial Buildings Energy Consumption Survey (Form EIA-871) provide detailed information about the energy end users, their size, their stock of energy-consuming equipment and appliances, and their total energy consumption and expenditures. The Manufacturing Energy Consumption Survey (Form EIA-846) collects consumption by type of use and fuel switching capability from manufacturing establishments grouped by manufacturing classification. SEDS, on the other hand, provides limited characterization of the end users of energy but greater geographic and energy product detail, as well as annual historical time series.
- Sectoral classification in SEDS is generally based on supplier classifications of customer accounts, by whatever means suppliers choose to use. (See discussion in next section.) Sectoral classification for the energy consumption surveys is based upon a categorization, verified by end user, of the primary economic activity of the data collection unit (household, building, or establishment).
- The energy consumption surveys provide data at national and Census region and/or Census division levels, whereas the estimates in SEDS are on national and state levels.
- The reference periods are also different in that SEDS covers calendar years from 1960 forward, while the consumption surveys are for

selected years, and the residential end-use surveys taken before 1987 cover a heating season year (i.e., April through March). Beginning with the 1987 residential end-use survey, the reference period is a calendar year.

Collected data and estimated values in SEDS

Coal. U.S. total coal consumption data by sector are taken directly from EIA's *Annual Coal Report* (ACR) and predecessor publications. Total coal consumption by state and for most sectors is from the ACR, except where values are withheld and must be estimated. The state-level disaggregation of the ACR's combined residential and commercial sector consumption, available through 2007, are estimates. For 2008 forward, only commercial sector consumption is available in ACR, and residential sector consumption is assumed to be zero. Data on coal consumption in the electric power sector (utility-scale facilities with capacity of 1 megawatt and greater) by state and coal type are from Form EIA-923, "Power Plant Operations Report," and predecessor forms.

Natural gas. Natural gas consumption by state and sector is taken directly from EIA's *Natural Gas Annual* (NGA). Natural gas consumed as lease fuel and plant fuel and natural gas delivered to industrial consumers in the NGA are combined in SEDS as industrial sector consumption. Natural gas consumed as vehicle fuel and pipeline fuel are combined in SEDS as transportation sector consumption. Data on natural gas consumption in the electric power sector are from Form EIA-923, "Power Plant Operations Report," and predecessor forms.

Petroleum. U.S. total consumption for each petroleum product is equal to the "product supplied" data from EIA's *Petroleum Supply Annual* (PSA). State values for distillate fuel oil, residual fuel oil, and petroleum coke consumption by the electric power industry are unpublished data from Form EIA-923, "Power Plant Operations Report," and predecessor forms. All other state and sector values for consumption of petroleum products are estimates based on sales data from several sources.

Renewable energy. Renewable energy (**hydroelectric power, geothermal, solar, wind, wood, and waste**) used by the electric power industry (electric power sector and utility-scale commercial and industrial combined heat and power and electricity-only plants) is collected on Form EIA-923, "Power Plant Operations Report," and predecessor forms. In addition, data on small-scale photovoltaic electricity generation for the residential, commercial, and industrial sectors are from EIA's *Electric Power Annual* for 2014 forward. Data for earlier years are estimated in SEDS. Solar thermal energy consumed as heat, produced by non-electric applications, is also estimated. Geothermal energy direct use and by heat pumps in the residential, commercial, and industrial sectors are estimates based on a survey from the Oregon Institute of Technology Geo-Heat Center (through 2009). U.S. wood consumption in the residential, other commercial, and other industrial sectors are estimated by EIA based on data collected on Form EIA-457, "Residential Energy Consumption Survey," Form EIA-871, "Commercial Buildings Energy Consumption Survey," and Form EIA-846, "Manufacturing Energy Consumption Survey" and are published in the *Monthly Energy Review* (MER). The estimates are allocated to the states in SEDS. U.S. **fuel ethanol and biodiesel** consumption is estimated by EIA based on data collected from various survey forms and reported in PSA and MER. State-level consumption by sector is estimated in SEDS.

Nuclear electric power. Nuclear electricity generation by state is collected on Form EIA-923, "Power Plant Operations Report," and predecessor forms.

Electricity. Electricity consumption is equal to retail sales data by sector and state from the *Electric Power Annual* (EPA) with one exception. The exception is that the EPA "Other" category, available from 1960 through 2002, is allocated to the transportation and commercial sectors in each state.

Net interstate flow of electricity. Net interstate electricity flows in kilowatthours from 1990 forward are taken from EIA's State Electricity Profiles. The heat content of these series in British thermal units are estimated in SEDS from 1960 forward.

Electrical system energy losses. These series are estimated in SEDS.

For a more detailed description of the differences between SEDS and the energy consumption surveys, see the EIA analysis report *Energy Consumption by End-Use Sector: A Comparison of Measures by Consumption and Supply Surveys,* DOE/EIA-0533, April 1990.

Energy-consuming sectors

The consumption estimates in SEDS are based on data collected by various surveys that do not necessarily define the consuming sectors exactly the same way. The Technical Notes of this report describe in detail for each energy source how the collected data series are combined and assigned to SEDS consuming sectors. To the degree possible, energy consumption in this report has been assigned to the five sectors according to the following general definitions:

- **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

Energy consumption measures—total and site

Sources of energy can be categorized as primary and secondary. Primary sources of energy, such as coal, petroleum, and natural gas are consumed directly. Electricity is a secondary form of energy that is created from primary energy sources. The amount of electricity actually consumed by the end user (site consumption) does not include the energy lost in the generation and delivery of the electricity to the point of use.

Primary sources of energy are measured in applicable physical units. Coal is measured by the short ton (equal to 2,000 pounds); petroleum, by the barrel (equal to 42 gallons); and natural gas, by the cubic foot. Energy sources are also measured by their heat content, generally expressed in British thermal units (Btu). The heat content per unit of physical unit (i.e., thermal conversion factors) represents the gross (or higher or upper) energy content of the fuel. For example, in 2018, the average short ton of coal consumed by the electric power sector contained 18.915 million Btu (Appendix B, Table B13), the average barrel of distillate fuel oil contained 5.759 million Btu (Appendix B, Table B1), and the average cubic foot of natural gas consumed by the electric power sector contained 1,033 Btu (Appendix B, Table B3).

Electricity, a secondary form of energy, can also be measured in physical units, commonly kilowatthours, and by heat content. The conventional thermal conversion factor for electricity consumed by the end user (site consumption) is 3,412 Btu per kilowatthour.

In 2018 the electric power sector consumed 38.2 quadrillion Btu of primary energy to provide 13.2 quadrillion Btu of electricity for sale. These data indicate that 65% of the primary (embodied) energy in the fuels consumed to generate the electricity was used (or "lost") in converting the primary energy to electricity and transmitting and distributing the electricity to the consumers, and 35% was used as site (point-of-use) electricity by consumers.

In evaluating these energy consumption tables, the tables titled "Total Energy Consumption" include all primary energy sources, including those used to generate electricity; the electricity generated is not included. Tables showing "End-Use Sector Consumption" include columns for the primary sources and electricity that are consumed by the sector, as well as a column for the estimated energy lost in the electrical system processes. The "Total" column in those tables includes all energy consumed by the sector and the associated energy lost in the generation and transmission of electricity. The column titled "Net" is site energy consumption—that is, the sum of the primary sources and electricity, excluding the electrical system energy losses. See Section 7 "Total Energy" for details.

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.

- **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.
- **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

Although the end-use allocations are made according to these aggregations as closely as possible, some data are collected by using different classifications. For example, electric utilities may classify commercial and industrial users by the quantity of electricity purchased rather than by the business activity of the purchaser. Natural gas used in agriculture, forestry, and fisheries was collected and reported in the commercial sector through 1995. Beginning with 1996 data, deliveries of natural gas for agriculture, forestry, and fisheries are reported in the industrial sector instead. Another example is master-metered condominiums and apartments and buildings with a combination of residential and commercial units. In many cases, the metering and billing practices cause residential energy usage of electricity, natural gas, or fuel oil to be included in the commercial sector. No adjustments for these discrepancies were made.

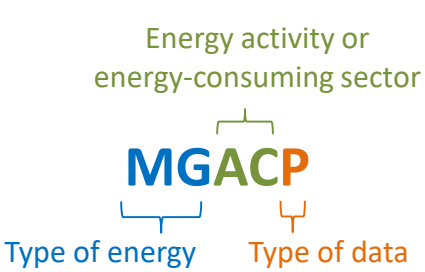
SEDS does not provide further disaggregated end-use consumption estimates. For example, the industrial sector cannot be broken down into the chemical or rubber industries, all manufacturing, or agriculture. The input series for the system are provided in broad end-use categories from the data collection forms and are not available by the individual components. Additional disaggregated regional information, such as counties or cities, are also not available in SEDS.

Section 1. Documentation Guide

This section describes the data identification codes in the State Energy Data System (SEDS). Sections 2 through 7, one for each energy source and total energy, provide: descriptions of all the data series that are entered into SEDS; the formulas applied in SEDS for creating additional data series; and notes on special circumstances for any series.

Appendix A is an alphabetical listing of the variable names and formulas used in consumption estimation; Appendix B lists the conversion factors used to convert physical units into British thermal units and cites the sources for those factors; Appendix C provides the state-level resident population data used in per capita calculations; Appendix D presents the real gross domestic product by state used to calculate total energy per real dollar of economic output; Appendix E provides metric and other physical conversion factors for measures used in energy analyses; and Appendix F summarizes changes made since the last complete release of SEDS estimates.

There are about 1,000 variables in SEDS. All of the variables are identified by five-character mnemonic series names, or MSN. In the following example, MGACP is the identifying code for data on motor gasoline consumption in the transportation sector in physical units:



The energy sources and products in SEDS, which are represented by the first two letters of the variable name, are

AB	=	aviation gasoline blending components
AI	=	aluminum ingot
AR	=	asphalt and road oil
AS	=	asphalt
AV	=	aviation gasoline
BD	=	biodiesel
BF	=	biofuels
BM	=	biomass
BQ	=	normal butane
BY	=	butylene
CC	=	coal coke
CG	=	corrugated and solid fiber boxes
CL	=	coal
CO	=	crude oil, including lease condensate
CT	=	catalytic cracking
DF	=	distillate fuel oil
DK	=	distillate fuel oil, including kerosene-type jet fuel
DM	=	distillate fuel oil, excluding biodiesel
EL	=	electricity
EM	=	fuel ethanol, excluding denaturant
EN	=	fuel ethanol, including denaturant
EQ	=	ethane
ES	=	electricity sales
EY	=	ethylene
FF	=	fossil fuels
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
GE	=	geothermal energy
HL	=	hydrocarbon gas liquids
HV	=	conventional hydroelectric power
HY	=	hydroelectric power
IQ	=	isobutane
IY	=	isobutylene
JF	=	jet fuel
JK	=	jet fuel, kerosene-type
JN	=	jet fuel, naphtha-type
KS	=	kerosene

LO	=	electrical system energy losses
LU	=	lubricants
MB	=	motor gasoline blending components
MG	=	motor gasoline
MM	=	motor gasoline excluding fuel ethanol
MS	=	miscellaneous petroleum products
NA	=	natural gasoline (including isopentane) (before 1984)
NG	=	natural gas, including supplemental gaseous fuels
NN	=	natural gas, excluding supplemental gaseous fuels
NU	=	nuclear electric power
OC	=	organic chemicals
OP	=	other petroleum products
P1	=	asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and other petroleum products
PA	=	all petroleum products
PC	=	petroleum coke
PI	=	paints and allied products
PL	=	plant condensate
PM	=	all petroleum products excluding ethanol blended into motor gasoline
PP	=	natural gasoline (previously pentanes plus)
PQ	=	propane
PY	=	propylene
RD	=	road oil
RE	=	renewable energy
RF	=	residual fuel oil
SF	=	supplemental gaseous fuels
SG	=	still gas
SN	=	special naphtha
SO	=	photovoltaic and solar thermal energy
TE	=	total energy
TN	=	total net energy (net of electrical system energy losses)
UO	=	unfinished oils
US	=	unfractionated streams
WD	=	wood
WS	=	waste
WW	=	wood and waste
WX	=	waxes
WY	=	wind

The energy-consuming sectors, identified by characters three and four of each variable name, are

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

Many other characters occur in the third and fourth positions of the variable names for the sales, deliveries, and distribution data series used in the intermediate calculations in SEDS to derive the end-use consumption estimates. Examples of these codes are

BK	=	sales for use in vessel bunkering
CA	=	capacity
IN	=	deliveries to the industrial sector
KC	=	consumption at coke plants
LP	=	lease and plant fuel
OD	=	distribution to other industrial users
VA	=	value of shipments or value-added in manufacture

A few data series are derived by dividing the consumption series by the resident population. The third and fourth positions are represented by

TP	=	total consumption per capita
RP	=	residential sector consumption per capita (electricity only)

Combining the first two components (the first four letters) produces variable names, such as

NGIC	=	natural gas (including supplemental gaseous fuels) consumed by the industrial sector
NGIN	=	natural gas (including supplemental gaseous fuels) delivered to the industrial sector
RFAC	=	residual fuel oil consumed by the transportation sector
RFBK	=	residual fuel oil sold for vessel bunkering

The fifth character of the variable names in SEDS identifies the type of data by using one of the following letters:

B	=	data in British thermal units (Btu)
K	=	factor for converting data from physical units to Btu
M	=	data in alternative physical units
P	=	data in standardized physical units
S	=	share or ratio expressed as a fraction
V	=	value in million dollars

In general, data entered into SEDS are in physical units, represented by a "P" in the fifth character; for example, coal data are in thousand short tons, petroleum data are in thousand barrels, and natural gas data are in million cubic feet. In a few cases, data are obtained from the source documents in different units, such as thousand gallons instead of thousand barrels, and are represented by an "M" until converted in SEDS to the unit that is consistent with other variables. Conversion factors, represented by a "K" in the fifth character, are applied to the physical unit data to convert the data to British thermal units, a common unit for all forms of energy. The derived data series in billion British thermal units are represented by "B" in the fifth character. In a few cases, consumption estimates are derived by calculating shares of aggregated consumption data. The fractions used to calculate the consumption shares are identified by an "S" in the fifth character. The consumption estimates for some petroleum products are based on the value added in the manufacturing process by related industries in each state. The data series for those industrial activities are in million dollars, and the variable names contain "V" in the fifth character.

There are a few variables that do not follow the convention:

GDPRX	=	real gross domestic product
TETGR	=	total energy consumption per real dollar of GDP
TPOPP	=	resident population

Associated with, and sometimes attached to, each variable name is the geographic identification. Geographic areas used in SEDS are the 50 states and the District of Columbia (represented by the U.S. Postal Service state abbreviations) and the United States as a whole. Some estimates of electricity sales and losses are derived by using only the contiguous 48 states and the District of Columbia, and the variables used in those calculations are identified by "48." The geographic area codes used in SEDS are shown in Table TN1.1.

Throughout this report, the term "state" includes the District of Columbia. Throughout this documentation, "ZZ" is used as a geographic identifier to represent the different state abbreviations that would be interchanged in that position of the variable name.

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

Code	State	Code	State
AK	Alaska	NC	North Carolina
AL	Alabama	ND	North Dakota
AR	Arkansas	NE	Nebraska
AZ	Arizona	NH	New Hampshire
CA	California	NJ	New Jersey
CO	Colorado	NM	New Mexico
CT	Connecticut	NV	Nevada
DC	District of Columbia	NY	New York
DE	Delaware	OH	Ohio
FL	Florida	OK	Oklahoma
GA	Georgia	OR	Oregon
HI	Hawaii	PA	Pennsylvania
IA	Iowa	RI	Rhode Island
ID	Idaho	SC	South Carolina
IL	Illinois	SD	South Dakota
IN	Indiana	TN	Tennessee
KS	Kansas	TX	Texas
KY	Kentucky	UT	Utah
LA	Louisiana	VA	Virginia
MA	Massachusetts	VT	Vermont
MD	Maryland	WA	Washington
ME	Maine	WI	Wisconsin
MI	Michigan	WV	West Virginia
MN	Minnesota	WY	Wyoming
MO	Missouri	US	United States
MS	Mississippi	48	The contiguous 48 states and the District of Columbia
MT	Montana		

Coal Consumption

Physical units

Coal in the United States is mostly consumed by the electric power sector. Data are collected by the U.S. Energy Information Administration (EIA) on Form EIA-923, "Power Plant Operations Report," and predecessor forms. "ZZ" in the variable name is used to represent the two-letter state code:

CLEIPZZ = coal consumed by the electric power sector in each state, in thousand short tons.
CLEIPUS = ΣCLEIPZZ

Seven coal data series are used to estimate state coal consumption for the industrial, commercial, residential, and transportation sectors in the State Energy Data System (SEDS). There are four U.S.-level consumption data series by sector that come from EIA's *Annual Coal Report* (and earlier publications), available in thousands of short tons:

CLACPUS = coal consumed by the transportation sector in the United States;
CLHCPUS = coal consumed by the residential and commercial sectors (commercial sector from 2008 forward) in the United States;
CLKCPUS = coal consumed by coke plants in the United States; and
CLOCPUS = coal consumed by other industrial users in the United States.

There are three state-level coal distribution/consumption series by sector. Before 2008, most of these data are coal distribution data. The state shares of these series are calculated and applied to the U.S. consumption to derive the state-level consumption estimates. In 2008, the survey collecting coal distribution data, Form EIA-6A, "Coal Distribution Report—Annual," was discontinued, and Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users," became the primary source. While Form EIA-3 data are for coal consumption, they are captured in SEDS using the same data series codes as they are used to compile state shares. Another change in the Form EIA-3 data is that residential consumers are no longer covered. The former EIA-6A combined "residential and commercial" sector is replaced by the EIA-3 "commercial and institutional" sector, which is the same as the commercial sector in SEDS. Instead of introducing new SEDS data series codes, the same series codes are used throughout the full SEDS time series. The state-level data are available in thousand short tons.

Before 2008:

CLHDPZZ = coal distributed to the residential and commercial sectors in each state;
CLKDPZZ = coal distributed to coke plants in each state; and
CLODPZZ = coal distributed to other industrial users in each state.

For 2008 forward:

CLHDPZZ = coal consumed by the commercial sector in each state;
CLKDPZZ = coal consumed by coke plants in each state; and
CLODPZZ = coal consumed by other industrial users in each state.

The U.S. totals for the three state-level series are calculated by summing the state data.

Before 2008, state estimates of coal consumed by the residential and commercial sectors combined are made by assuming that coal is consumed in proportion to the amount of coal distributed to the residential and commercial sectors in each state:

CLHCPZZ = (CLHDPZZ/CLHDPUS) * CLHCPUS

To estimate residential coal consumption, EIA calculates the residential share of the combined residential and commercial series at the national level, CLRCSUS (see explanation on page 21). This series, as shown in Table TN2.1, is applied to the combined series to derive the residential consumption, and the remaining quantity is assumed to be for commercial use:

CLRCPZZ = CLHCPZZ * CLRCSUS
CLRCPUS = ΣCLRCPZZ
CLCCPZZ = CLHCPZZ - CLRCPZZ
CLCCPUS = ΣCLCCPZZ

Table TN2.1. Residential sector share of combined residential and commercial coal consumption, 1960 through 2007

Years	CLRCSUS	Years	CLRCSUS	Years	CLRCSUS
1960–1962	0.59	1979	0.20	1994	0.15
1963, 1964	0.58	1980	0.21	1995	0.13
1965–1967	0.57	1981	0.18	1996	0.12
1968–1970	0.56	1982	0.17	1997, 1998	0.11
1971	0.49	1983	0.16	1999	0.12
1972	0.43	1984	0.19	2000, 2001	0.11
1973	0.37	1985	0.22	2002	0.12
1974	0.32	1986, 1987	0.23	2003	0.13
1975	0.30	1988	0.22	2004	0.10
1976	0.29	1989	0.21	2005	0.08
1977	0.28	1990	0.20	2006	0.09
1978	0.23	1991–1993	0.18	2007	0.10

For 2008 forward, CLHDPZZ is completely allocated to the commercial sector:

CLCCPZZ = (CLHDPZZ/CLHDPUS) * CLHCPUS
CLCCPUS = ΣCLCCPZZ
CLRCPZZ = 0
CLRCPUS = 0

Industrial sector consumption is reported for the United States and estimated by state. An assumption is made that coal is consumed by coke plants in proportion to the amount of coal distributed to coke plants in each state. It is also assumed that the consumption of coal by industrial users other than coke plants is in proportion to the amount of coal delivered to the other industrial users in each state. The industrial sector consumption is the sum of coal consumed by coke plants and other industrial users in each state:

CLKCPZZ = (CLKDPZZ/CLKDPUS) * CLKCPUS
CLOCPZZ = (CLODPZZ/CLODPUS) * CLOCPUS
CLICPZZ = CLKCPZZ + CLOCPZZ

There are no data available to estimate transportation sector consumption of coal by state. The transportation sector accounted for just 1% of total U.S. coal consumption in 1960 and none since 1978. An assumption is made that, when transportation sector consumption exists, the consumption by state, CLACPZZ, is proportional to the share of the U.S. industrial sector coal consumption attributed to each state:

CLACPZZ = (CLICPZZ/CLICPUS) * CLACPUS

Total consumption in each state, CLTCPZZ, is the sum of the sectors' consumption:

CLTCPZZ = CLRCPZZ + CLCCPZZ + CLICPZZ + CLACPZZ + CLEIPZZ

The U.S. total consumption estimates for each of the sectors and the total are calculated as the sum of the states' values.

British thermal units (Btu)

Five factors are used to convert coal from physical units to Btu:

- CLACKZZ = the factor for converting coal consumed by transportation sector in each state from short tons to Btu;
- CLEIKZZ = the factor for converting coal consumed by the electric power sector in each state from short tons to Btu;
- CLHCKZZ = the factor for converting coal consumed by the residential and commercial sectors in each state from short tons to Btu;
- CLKCKZZ = the factor for converting coal consumed at coke plants in each state from short tons to Btu; and
- CLOCKZZ = the factor for converting coal consumed by other industrial users in each state from short tons to Btu.

The electric power sector conversion factor for each state is applied to the physical unit value to estimate coal consumed in Btu:

CLEIBZZ = CLEIPZZ * CLEIKZZ

The residential and commercial sectors' state conversion factor is applied to the physical unit values to estimate coal consumed by the two sectors in Btu:

CLRCBZZ = CLRCPZZ * CLHCKZZ
CLCCBZZ = CLCCPZZ * CLHCKZZ

The industrial sector Btu consumption is estimated in three steps. Coal consumed at coke plants and by all industrial users other than coke plants are converted to Btu using their individual state conversion factors. The industrial sector consumption in Btu is then calculated as the sum of the two industrial components:

CLKCBZZ = CLKCPZZ * CLKCKZZ
CLOCBZZ = CLOCPZZ * CLOCKZZ
CLICBZZ = CLKCBZZ + CLOCBZZ

The transportation sector conversion factor for each state is applied to the

physical unit value to estimate coal consumed in Btu:

CLACBZZ = CLACPZZ * CLACKZZ

Total consumption for each state is the sum of the sectors' consumption:

CLTCBZZ = CLRCBZZ + CLCCBZZ + CLICBZZ + CLACBZZ + CLEIBZZ

The U.S. consumption estimates in Btu are calculated by summing the state values for each of the data series. The U.S. average conversion factor for each of the five factors is calculated as the U.S. consumption in Btu divided by the U.S. consumption in physical units for each of the factors.

Additional notes

1. The national-level coal consumption data series for the residential and commercial sectors (CLHCPUS), coke plants (CLKCPUS), and industries other than coke plants (CLOCPUS) are from a continuous data source. However, the data series used to develop state-level allocators by end-use sector (CLHDPZZ, CLKDPZZ, and CLODPZZ) vary for different time periods.

   For 1960 through 1979, U.S. coal consumption is allocated by state based on the proportion of coal distributed to each state.

   Beginning with 1980, state-level total coal consumption data are available; however, many of these data are withheld at the sector level. Withheld data are estimated by substituting residential and commercial coal distribution data for residential and commercial coal consumption. In many states, this leaves only one other sector withheld, which is derived by subtracting the other known sectors from the state total. In some cases withheld Census division values need to be subtracted out from known U.S. totals before the state-level estimates can be derived.

   Beginning with 2001, additional state coal consumption values are withheld, making it no longer possible to subtract out estimates of coal consumed by coke plants for some states. To estimate the withheld consumption values, the known state-level coke plant coal consumption values are subtracted from the known Census division totals leaving a value to be distributed to the states that have withheld values in that division. Data for the same states from a different EIA data series on distribution of coal to coke plants are used to estimate the withheld consumption data. Distribution data for the three years before the year being estimated are summed for each state and its division and each state's share of its division subtotal is used to allocate the withheld coke plant coal consumption to that state. For 2001, Utah was grouped with New York and Pennsylvania to create the subtotal used in the percentage calculations.

   Beginning with 2006, some state-level total coal consumption values that are withheld are first estimated by applying published year-on-year percent changes onto earlier years' published consumption values. In some cases, this would leave only one sector withheld, which is derived by subtracting the other known sectors from the state total.

   In 2008, Form EIA-6A, "Coal Distribution Report—Annual," was discontinued. From 2008 forward, estimates for coal consumption by sector are derived from Form EIA-3, "Quarterly Coal Consumption and Quality Report, Manufacturing and Transformation/Processing Coal Plants and Commercial and Institutional Coal Users." Data for residential consumption are no longer covered and are assumed to be zero.

   These derived series for the residential/commercial (before 2008), commercial/institutional (2008 forward), coke plant, and other industrial sectors are used in SEDS as the distribution data series to calculate coal consumption estimates by state and sector.

   From 2012 forward, state-level consumption data are no longer withheld.

2. Total coal consumption by state for 1980 through 1989 published in the EIA *Quarterly Coal Report* does not sum to the U.S. totals due to a quantity called "Unknown" in the source tables. This unknown coal consumption is added to the residential, commercial, and "other industrial" sectors of Alabama, Illinois, Kentucky, Pennsylvania, Tennessee, and West Virginia in proportion to their total distribution of all coal.

3. Before 1974, data for distribution of bituminous coal and lignite by state include several groupings of states for which separate state data are not available. These groupings are: (1) Maine, New Hampshire, Vermont, and Rhode Island; (2) North Dakota and South Dakota; (3) Delaware and Maryland; (4) Georgia and Florida; (5) Alabama and Mississippi; (6) Arkansas, Louisiana, Oklahoma, and Texas; (7) Montana and Idaho; (8) Arizona and Nevada; and (9) Washington and Oregon. Beginning with 1974, individual state distribution data became available. To estimate the 1960 through 1973 state distribution data, the states are disaggregated in proportion to the individual states' shares of each similar state grouping in 1974.

4. The sources used to develop thermal conversion factors for bituminous coal and lignite consumed by the electric power sector—the National Coal Association report and the Federal Power Commission's (FPC) Form 423 and Federal Energy Regulatory Commission (FERC) Form

423—exclude Alaska. However, Alaska reported consumption of bituminous coal and lignite at electric utilities for all years, 1960 forward. Unpublished FPC heat rates for coal at electric utilities in Alaska were used for 1960 through 1972. The 1972 conversion factor (the last year for which a conversion factor was reported for Alaska) was used for 1973 through 1978. According to industry sources, new mines were opened in 1978 and a more representative factor was used for 1979 through 1997. For 1998 forward, the Alaska factor is calculated using the same methodology as used for other states.

Data sources

CLACKZZ — Factor for converting coal consumed by the transportation sector from physical units to Btu by state.

- 1960 through 1977: Assumed by EIA to be equal to the Btu conversion factor for bituminous coal and lignite consumption by industrial users other than coke plants:
  - 1960 through 1973: Estimated by EIA by adjusting the 1974 average heat value of bituminous coal and lignite consumed by industrial users other than coke plants by the ratios of 1960 through 1973 national averages for the other industrial users to its 1974 average.
  - 1974 through 1977: Calculated by EIA by assuming that the bituminous coal and lignite consumed by industrial users other than coke plants in each state contained heating values equal to those of bituminous coal and lignite received at electric utilities in each state from identified coal-producing districts as reported on Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." The average Btu content of coal delivered from each coal-producing district was applied to deliveries to other industrial users in each state and the sum total of the heat content was divided by total tonnages, yielding a weighted average. The coal distribution data by coal-producing district are reported on Form EIA-6, "Coal Distribution Report," and predecessor Bureau of Mines Form 6-1419-Q.
- 1978 forward: Transportation sector coal is included in the other industrial category. Zero is entered for this variable.

CLACPUS — Coal consumed by the transportation sector in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, chapter "Coal-Bituminous and Lignite," table titled, "Consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States," column "Bunker, lake vessel and foreign."
- 1976 and 1977: EIA, *Energy Data Reports*, "Coal-Bituminous and Lignite," table titled, "Consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States," column "Bunker, lake vessel and foreign."
- 1978 forward: Small amounts of bituminous coal and lignite consumed by the transportation sector are included in the other industrial category (see CLOCPUS). Zero is entered for this variable.

CLEIKZZ — Factor for converting coal consumed by the electric power sector from physical units to Btu by state.

- 1960 through 1988: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS.

  Anthracite conversion factors:
  - 1960 through 1972: EIA assumed that all anthracite consumed at electric utilities was recovered from culm banks and river dredging and was estimated to have an average heat content of 17.500 million Btu per short ton.
  - 1973 through 1988: Calculated annually by EIA by dividing the heat content of anthracite receipts at electric utilities by the quantity of anthracite received at electric utilities. These data are reported on the FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," and predecessor forms.

  Bituminous coal and lignite conversion factors:
  - 1960 through 1972: EIA adopted the average thermal conversion factor of the Bureau of Mines, which used the National Coal Association (NCA) average thermal conversion factor for electric utilities calculated from FPC Form 1 and published in Steam Electric Plant Factors, an NCA annual report. The specific tables are
    - 1960 and 1961: Table 1.
    - 1962 through 1972: Table 2.
  - 1973 through 1982: The average heat content of coal received at steam electric plants 25 megawatts or greater from FPC Form 423 and published in Btu per pound in EIA, *Cost and Quality of Fuels for Electric Utility Plants*, tables titled "Destination and Origin of Coal 'Delivered to' (1973-1979) 'Receipts to' (1980) 'Received at' (1981-1982) Steam-Electric Plants 25-MW or Greater."
  - 1983 through 1988: The average heat content of coal received at

steam electric plants 50 megawatts capacity or larger from FERC Form 423 and published in Btu per pound in the EIA, *Cost and Quality of Fuels for Electric Utility Plants*. The specific tables are
  - 1983 and 1984: Table 58.
  - 1985 through 1988: Table 48.

  Note: The state conversion factors for 1960 through 1972 are derived from actual consumption data, while the conversion factors for 1973 to 1988 are based on receipts of coal. The factors for 1960 through 1972 also may include some quantities of anthracite. These breaks in the series create some data discrepancies. In instances where a state had no receipts for a particular year but did report consumption, it is assumed that the coal received in one year is consumed during the following year and the Btu value of the previous year's receipts is used. See Additional Note 4 on page 15 for Alaska calculations.
- 1989 forward: Calculated by dividing the total heat content of coal received at electric power plants (including electric utilities and independent power producers) by the total quantity consumed in physical units collected on Form EIA-923, "Power Plant Operations Report," and predecessor forms, https://www.eia.gov/electricity/data/eia923/. See Additional Note 4 on page 15 for Alaska factors.

CLEIPZZ — Coal consumed by the electric power sector by state.

- EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, https://www.eia.gov/electricity/data/eia923/.

CLHCKZZ — Factor for converting coal consumed by the residential and commercial sectors from physical units to Btu by state.

- 1960 through 1997: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS.

  Anthracite conversion factors:
  - Calculated annually by EIA by dividing the heat content of anthracite produced less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumption by all sectors other than the electric utility sector less the quantity of anthracite stock changes, losses, and "unaccounted for."

  Bituminous coal and lignite conversion factors:
  - 1960 through 1973: Estimated by EIA by adjusting the 1974 average heat value of bituminous coal and lignite consumed in the residential and commercial sector by the ratios of 1960 through 1973 national averages for the sector to its 1974 average.
  - 1974 through 1997: Calculated by EIA by assuming that the bituminous coal and lignite consumed in the residential and commercial sector in each state contained heating values equal to those of bituminous coal and lignite received at electric utilities in each state from identified coal-producing districts as reported on the FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." The average Btu content of coal delivered from each coal-producing district was applied to deliveries to the residential and commercial sector in each state and the sum total of the heat content was divided by total tonnages, yielding a weighted average. The coal distribution data by coal-producing district are reported on Form EIA-6, "Coal Distribution Report," and predecessor Bureau of Mines Form 6-1419-Q.
- 1998 through 2000: Calculated by EIA from the average heat content of coal received for the residential and commercial sectors combined as reported on Form EIA-860, "Annual Electric Generator Report." For states that are not represented in data on the Form EIA-860, it is assumed that the heat content of the coal receipts in residential and commercial sectors are equal to the heat content of coal received in the other industrial sector as reported on Form EIA-3A, "Annual Coal Quality Report—Manufacturing." For states that are not represented in either Form EIA-3A data or Form EIA-860 data (CT, NH, RI, VT, and DC), the heat content of coal receipts in MA is used for CT, NH, RI, and VT and the heat content of coal receipts in MD is used for DC, because the origin of the coal receipts are similar.
- 2001 through 2007: Calculated by EIA from the coal distribution data reported on Form EIA-6A, "Coal Distribution Report— Annual," and the average heat content of coal reported on FERC Form 423 and Form EIA-423, "Monthly Cost and Quality of Fuels for Electric Plants." Form EIA-6A provides distribution data for the combined residential and commercial sectors by state of origin to the destination state. FERC Form 423 and Form EIA-423 provide the average heat content of coal produced in the state of origin.
- 2008 forward: Calculated by EIA using unpublished data as the average heat content of coal received at commercial and institutional establishments consuming more than 1,000 short tons of coal annually from Form EIA-3, "Quarterly Survey of Industrial, Commercial &

Institutional Coal Users."

CLHCPUS — Coal consumed by the residential and commercial sectors (commercial sector from 2008 forward) in the United States.

- 1960 through 1972: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, Chapter "Coal—Pennsylvania Anthracite Annual" and Chapter "Coal—Bituminous and Lignite," Table titled, "Consumption of bituminous coal and lignite, by consumer class, with retail deliveries in the United States" column titled "Retail deliveries to other consumers" or "Retail sales."
- 1973 through 1984: EIA, *Weekly Coal Production*, August 9, 1986, Table 7.
- 1985 through 1987: EIA, *Weekly Coal Production*, July 16, 1988, Table 6.
- 1988 through 1990, 1992 through 1995: EIA, *Quarterly Coal Report, October-December* for each year. Data are from the report of the following year, i.e., 1988 final data are published in the *Quarterly Coal Report, October-December 1989*. The specific tables are
  - 1988 through 1990: Table 29.
  - 1992 through 1994: Table 51.
  - 1995: Table 43.
- 1991, 1996 through 1999: EIA, *Coal Industry Annual 2000*, Table 75.
- 2000: EIA, *Annual Coal Report 2001*, Table 27.
- 2001 forward: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report*, Table 26, http://www.eia.gov/coal/annual/.

CLHDPZZ — Coal distributed to the residential and commercial sectors (commercial sector from 2008 forward) by state.

- 1960 through 1979: No data available. The 1980 state data are used for years 1960 through 1979.
- 1980 forward: The distribution data are published in
  - 1980 through 1984: EIA, *Coal Distribution, January-December 1984*, Table 21.
  - 1985 through 1989: EIA, *Coal Distribution, January-December 1989*, Table 15.
  - 1990 and 1991: EIA, *Coal Distribution, January-December* for each year, Table 16.
  - 1992 through 1994: EIA, *Quarterly Coal Report, October-December* for the following year, Table 10.
  - 1995 through 1997: Unpublished data from Form EIA-6.
  - 1998 through 2000: EIA, *Coal Industry Annual* for each year, Table 64.
  - 2001 forward: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report*, Table 26, http://www.eia.gov/coal/annual/. EIA, *Annual Coal Distribution Report*, Domestic Distribution of U.S. Coal by Destination State, Consumer, Destination and Method of Transportation, http://www.eia.gov/coal/distribution/annual/ and https://www.eia.gov/coal/distribution/annual/archive.php.

CLKCKZZ — Factor for converting coal consumed at coke plants from physical units to Btu by state.

- 1960 through 1997: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS.

  Anthracite conversion factors:
  - Calculated annually by EIA by dividing the heat content of anthracite produced less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumption by all sectors other than the electric utility sector less the quantity of anthracite stock changes, losses, and "unaccounted for."

  Bituminous coal and lignite conversion factors:
  - 1960 through 1972: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite," sum of columns "Beehive coke plants" and "Oven coke plants."
  - 1973 through 1984: EIA, *Weekly Coal Production*, August 9, 1986, Table 8.
  - 1985 through 1987: EIA, *Weekly Coal Production*, July 16, 1988, Table 7.
  - 1988 through 1997: EIA, Unpublished data from Form EIA-5, "Coke Plant Report, Quarterly."
- 1998 through 2000: Calculated by EIA for 1998 using unpublished data from Form EIA-5, "Coke Plant Report, Quarterly." The 1998 state factors are used for 1999 and 2000.
- 2001 forward: Calculated by EIA from data reported on Form EIA-5, "Quarterly Coal Consumption and Quality Report, Coke Plants" (through 2013) and Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users," after Form EIA-5 was folded into Form EIA-3 in 2014. Coke plant data on tons of coal carbonized

to create coke, the volatilities of the coal carbonized, and conversion factors based on coal volatility are used to calculate average conversion factors by state.

CLKCPUS — Coal consumed by coke plants in the United States.

- 1960 through 1972: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, chapter "Coal—Pennsylvania Anthracite Annual," and chapter "Coal—Bituminous and Lignite," table titled, "Consumption of Bituminous coal and lignite, by consumer class, and retail deliveries in the United States," sum of columns titled "Beehive coke plants" and "Oven coke plants."
- 1973 through 1984: EIA, *Weekly Coal Production*, August 9, 1986, Table 7.
- 1985 through 1987: EIA, *Weekly Coal Production*, July 16, 1988, Table 6.
- 1988 through 1995: EIA, *Quarterly Coal Report, October-December* for each year. Data are from the report of the following year, i.e., 1988 final data are published in the *Quarterly Coal Report, October-December 1989*. The specific tables are
  - 1988 through 1990: Table 27.
  - 1991 through 1994: Table 48.
  - 1995: Table 40.
- 1996 through 1999: EIA, *Coal Industry Annual 2000*, Table 73.
- 2000: EIA, *Annual Coal Report 2001*, Table 27.
- 2001 forward: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report*, Table 26, http://www.eia.gov/coal/annual/.

CLKDPZZ — Coal distributed to coke plants by state.

- 1960 through 1979: Series is the sum of an anthracite data series and a bituminous coal and lignite data series:

  Anthracite:
  - No data available. The 1980 state data are used for years 1960 through 1979.

  Bituminous coal and lignite:
  - 1960 through 1976: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite."
  - 1977 through 1979: EIA, *Energy Data Reports*, "Coal-Bituminous and Lignite." The specific tables are
    - 1977: "Comparative Summary of Distribution of Bituminous Coal and Lignite Produced in the United States During the First Nine Months of 1977" and "Distribution of Bituminous Coal and Lignite Produced in the United States During October-December 1977, by Geographic Division and State Destination."
    - 1978: "Distribution of Bituminous Coal and Lignite Produced in the United States."
    - 1979: "Overall Summary of Distribution of Bituminous, Subbituminous, and Lignite Coal Produced in the United States."
    - 1980 forward: Consumption data became available for some states and are used for this distribution series when available. See Additional Note 1 on page 15 for an explanation of the estimation methodology.
  - 1980 through 1995: EIA, *Quarterly Coal Report, October-December* for each year. Data are from the report of the following year, i.e., 1982 final data are published in the *Quarterly Coal Report, October-December 1983*. The specific tables are
    - 1980: Unpublished data.
    - 1981 through 1983: Table 25.
    - 1984, 1985, and 1987: Table 27.
    - 1986, 1988, and 1989: Unpublished state revisions that are components of the U.S. revisions published in the *Quarterly Coal Report, October-December 1991*, Table 45.
    - 1990: Table 27.
    - 1991 through 1994: Table 48.
    - 1995: Table 40.
  - 1996 through 1999: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Coal Industry Annual 2000*, Table 73.
  - 2000: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report 2001*, Table 27.
  - 2001 forward: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report*, Table 26, http://www.eia.gov/coal/annual/. EIA, *Annual Coal Distribution Report*, Domestic Distribution of U.S. Coal by Destination State, Consumer, Destination and Method of Transportation, http://www.eia.gov/coal/distribution/annual/ and https://www.eia.gov/coal/distribution/annual/archive.php.

CLOCKZZ — Factor for converting coal consumed by industrial users other than coke plants from physical units to Btu by state.

- 1960 through 1997: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level

bituminous coal and lignite factors using factors and consumption from SEDS.

Anthracite conversion factors:
- Calculated annually by EIA by dividing the heat content of anthracite produced less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumption by all sectors other than the electric utility sector less the quantity of anthracite stock changes, losses, and "unaccounted for."

Bituminous coal and lignite conversion factors:
- 1960 through 1973: Estimated by EIA by adjusting the 1974 average heat value of bituminous coal and lignite consumed by industrial users other than coke plants by the ratios of 1960 through 1973 national averages for the other industrial users to its 1974 average.
- 1974 through 1997: Calculated by EIA by assuming that the bituminous coal and lignite consumed by industrial users other than coke plants in each state contained heating values equal to those of bituminous coal and lignite received at electric utilities in each state from identified coal-producing districts as reported on FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." The average Btu content of coal delivered from each coal-producing district was applied to deliveries to other industrial users in each state and the sum total of the heat content was divided by total tonnages, yielding a weighted average. The coal distribution data by coal-producing district are reported on Form EIA-6, "Coal Distribution Report," and predecessor Bureau of Mines Form 6-1419-Q.

- 1998 through 2000: Calculated by EIA from unpublished data as the average heat content of coal received at manufacturing plants (other than coke plants) consuming more than 1,000 short tons of coal reported on Form EIA-3A, "Annual Coal Quality Report—Manufacturing Plants."
- 2001 forward: Calculated by EIA using unpublished data as the average heat content of (1) coal received at manufacturing plants (other than coke plants) consuming more than 1,000 short tons of coal annually from Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users," and predecessor forms; (2) coal consumed by coal mining facilities reported on Form EIA-7A, "Coal Production Report," with heat contents for the coal producing state reported on Form EIA-923, "Power Plant Operations Report," and predecessor forms; and, before 2007, (3) coal distributed to agricultural, mining, and construction sectors reported on Form EIA-6A, "Coal Distribution Report—Annual" with heat contents for the coal producing state reported on FERC Form 423 and Form EIA-423, "Monthly Cost and Quality of Fuels for Electric Plants."

CLOCPUS — Coal consumed by industrial users other than coke plants in the United States.

- 1960 through 1972: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, Chapter "Coal—Pennsylvania Anthracite, Annual" and chapter "Coal—Bituminous and Lignite," table titled "Consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States." Sum of columns titled "Steel and rolling mills," "Cement mills," and "Other manufacturing and mining industries."
- 1973 through 1984: EIA, *Weekly Coal Production*, August 9, 1986, Table 7.
- 1985 through 1987: EIA, *Weekly Coal Production*, July 16, 1988, Table 6.
- 1988 through 1999: EIA, *Quarterly Coal Report, October-December* for each year. Data are from the report of the following year, i.e., 1988 final data are published in the *Quarterly Coal Report, October-December 1989*. The specific tables are
  - 1988 through 1990: Table 28.
  - 1991 through 1994: Table 49.
  - 1995: Table 41.
  - 1996 through 1999: Table 42.
- 2000: EIA, *Annual Coal Report 2001*, Table 27.
- 2001 forward: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report*, Table 26, http://www.eia.gov/coal/annual/.

CLODPZZ — Coal distributed to industrial plants (other than coke plants) by state.

- 1960 through 1979: Series is the sum of an anthracite data series and a bituminous coal and lignite data series:

  Anthracite:
  - No data available. The 1980 state data are used for years 1960 through 1979.

  Bituminous coal and lignite:
  - 1960 through 1976: U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook, "Coal—Bituminous and Lignite."

  - 1977 through 1979: EIA, *Energy Data Reports*, "Coal—Bituminous and Lignite." The specific tables are
    - 1977: "Comparative Summary of Distribution of Bituminous Coal and Lignite Produced in the United States During the First Nine Months of 1977" and "Distribution of Bituminous Coal and Lignite Produced in the United States During October-December 1977, by Geographic Division and State Destination."
    - 1978: "Distribution of Bituminous Coal and Lignite Produced in the United States."
    - 1979: "Overall Summary of Distribution of Bituminous, Subbituminous, and Lignite Coal Produced in the United States."
- 1980 forward: Consumption data became available for some states and are used for this distribution series when available. See Additional Note 1 on page 15 for an explanation of the estimation methodology.
  - 1980 through 1995: EIA, *Quarterly Coal Report, October-December* for each year. Data are from the report of the following year, i.e., 1982 final data are published in the *Quarterly Coal Report, October-December 1983*. The specific tables are
    - 1980: Unpublished data.
    - 1981 through 1983: Table 26.
    - 1984 through 1990: Table 28.
    - 1991 through 1994: Table 49.
    - 1995: Table 41.
  - 1996 through 1999: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Coal Industry Annual 2000*, Table 71.
  - 2000: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, *Annual Coal Report 2001*, Table 27.
  - 2001 forward: EIA, unpublished data in short tons as published rounded to thousand short tons in EIA, Annual Coal Report, Table 26, http://www.eia.gov/coal/annual/.

CLRCSUS — Residential sector share of coal consumed by the residential and commercial sectors combined.

- 1960 through 2007: Calculated by EIA. It is first assumed that an occupied coal-heated housing unit consumes fuel at the same Btu rate as an oil-heated housing unit. Then, for the years in which data are available on the number of occupied housing units by heating source (1960, 1970, 1973 through 1981, and subsequent odd-numbered years), residential use of coal is estimated by the following steps: a ratio is created of the number of occupied housing units heated by coal to the number of housing units heated by oil; the ratio is multiplied by the Btu quantity of distillate fuel oil used by the residential sector to estimate the Btu quantity of coal used by the residential sector; and the residential sector's share of residential and commercial use is calculated. The missing years' shares are interpolated.
- 2008 forward: Discontinued.

Coal Coke Imports and Exports

Physical units

Net imports of coal coke is a component of total U.S. energy consumption. There is no attempt to estimate state allocations of this energy source and all of it is considered to be used by the industrial sector. Net imports of coal coke are included in the U.S. data but not in the state-level data in all tables of total energy consumption and industrial sector energy consumption. Variables for net imports of coal coke into the United States are

CCIMPUS = coal coke imported into the United States, in thousand short tons; and

CCEXPUS = coal coke exported from the United States, in thousand short tons.

Net imports is calculated:

CCNIPUS = CCIMPUS - CCEXPUS

British thermal units (Btu)

The factor for converting coal coke from short tons to Btu is 24.80 million Btu per short ton:

CCIMBUS = CCIMPUS * 24.80
CCEXBUS = CCEXPUS * 24.80
CCNIBUS = CCIMBUS - CCEXBUS

Data sources

CCEXPUS — Coal coke exported from the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, "Coke and Coal Chemicals Annual."
- 1976 through 1979: EIA, *Energy Data Reports*, "Coke and Coal Chemicals Monthly."
- 1980 through 1990: EIA, *Quarterly Coal Report* (October-December of the following year). The specific tables are
  - 1980: Table 7.
  - 1981 through 1984: Table A10.
  - 1985 through 1990: Table A9.
- 1991 and 1992: Unpublished revisions from the EIA, Office of Energy Markets and End Use, Integrated Modeling Data System.
- 1993 through 1997: Unpublished revisions from the EIA, Office of Energy Markets and End Use, Integrated Modeling Data System, as published rounded in the EIA, *Quarterly Coal Report October-December 1999*, Table 2.
- 1998 forward: EIA, *Quarterly Coal Report* (October-December of the following year), Table 15 (1998 and 1999), Table 16 (2000), Table 17 (2001 through 2005), Table 14 (2006 through 2008), and Table 16 (2009 forward), http://www.eia.gov/coal/production/quarterly/.

CCIMPUS — Coal coke imported into the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, "Coke and Coal Chemicals Annual."
- 1976 through 1979: EIA, *Energy Data Reports*, "Coke and Coal Chemicals Monthly."
- 1980 through 1990: EIA, *Quarterly Coal Report* (October-December of the following year). The specific tables are
  - 1980: Table 8.
  - 1981 through 1984: Table A12.
  - 1985 through 1987: Table A11.
  - 1988 through 1990: Table A10.
- 1991 and 1992: Unpublished revisions from the EIA, Office of Energy Markets and End Use, Integrated Modeling Data System.
- 1993 through 1997: Unpublished revisions from the EIA, Office of Energy Markets and End Use, Integrated Modeling Data System, as published rounded in the EIA, *Quarterly Coal Report October-December 1999*, Table 2.
- 1998 forward: EIA, *Quarterly Coal Report* (October-December of the following year), Table 19 (1998 and 1999), Table 20 (2000), Table 21 (2001 through 2005), Table 18 (2006 through 2008), and Table 21 (2009 forward), http://www.eia.gov/coal/production/quarterly/.

Physical units

Eight natural gas data series are used to derive the natural gas consumption estimates in the State Energy Data System (SEDS). Several of these data series are deliveries of natural gas to the end user by state and are used as consumption because actual consumption data at these levels are not available. The sources for the natural gas data are the *Natural Gas Annual* and *Electric Power Annual* published by the U.S. Energy Information Administration (EIA) and its predecessors. Data for recent years are also available on the EIA website. These series, in million cubic feet, for each state are as follows (the two-letter state code is represented by "ZZ" in the following variable names):

- NGCCPZZ = natural gas delivered to the commercial sector. Before 1996, includes gas used in agriculture, forestry, and fisheries;
- NGEIPZZ = natural gas consumed by the electric power sector;
- NGINPZZ = a portion of the natural gas delivered to the industrial sector (includes gas used as fuel and feedstock in chemical plants and to produce carbon black). Beginning in 1996, includes gas used in agriculture, forestry, and fisheries;
- NGLEPZZ = natural gas consumed as lease fuel;
- NGPLPZZ = natural gas consumed as plant fuel;
- NGPZPZZ = natural gas for pipeline and distribution use;
- NGRCPZZ = natural gas delivered to the residential sector; and
- NGVHPZZ = natural gas consumed as vehicle fuel.

The U.S. totals of these independent variables are calculated as the sum of the states' values.

The data are combined into the four major end-use sectors used in SEDS as closely as possible. However, natural gas data are collected using different aggregations of users. The industrial sector in SEDS is intended to contain energy used in agriculture, forestry, and fisheries. For natural gas, these categories are reported with commercial use of natural gas through 1995 and in the industrial sector for 1996 forward. These data cannot be separately identified and no adjustment for this end-use inconsistency is made in SEDS.

The residential sector's consumption of natural gas is represented by the variable for deliveries to the residential sector, NGRCPZZ.

The commercial sector's consumption of natural gas is represented by the variable for deliveries to the commercial sector, NGCCPZZ.

The industrial sector's consumption of natural gas in SEDS, NGICPZZ, is estimated to be the sum of natural gas delivered to the industrial sector, NGINPZZ, natural gas consumed as lease fuel, NGLEPZZ, and natural gas consumed as plant fuel, NGPLPZZ. SEDS contains lease and plant fuel data combined for 1960 through 1982; the combined data series is stored as NGLEPZZ. Beginning in 2001, federal offshore natural gas lease fuel for Alabama, Louisiana, and Texas are reported combined. See "Additional Notes" on page 25 for the method of estimating the individual state values.

NGICPZZ = NGINPZZ + NGLEPZZ + NGPLPZZ

The transportation sector's consumption of natural gas, NGACPZZ, is the sum of natural gas consumed in pipeline operations (primarily in compressors) and for distribution use, NGPZPZZ, and natural gas consumed as vehicle fuel, NGVHPZZ. Before 1990, the small amounts of natural gas consumed as vehicle fuel are included in the commercial sector consumption and cannot be identified separately; therefore, NGVHPZZ is zero before 1990.

NGACPZZ = NGPZPZZ + NGVHPZZ

Electric power sector's consumption of natural gas is represented by the data series NGEIPZZ.

The total consumption of natural gas, estimated for each state, is the sum of the consumption by the end-use sectors and for electricity generation:

NGTCPZZ = NGRCPZZ + NGCCPZZ + NGICPZZ + NGACPZZ + NGEIPZZ

The U.S. consumption estimates for each of the sectors and the U.S. total are calculated as the sum of the states' values.

British thermal units (Btu)

Three state-level factors are used for converting the consumption of natural gas from physical units of million cubic feet to billion Btu. These factors are:

NGTCKZZ = factor for converting total natural gas consumed by all sectors from physical units to Btu;
NGEIKZZ = factor for converting natural gas consumed by the electric power sector from physical units to Btu; and
NGTXKZZ = factor for converting natural gas used by end-use sectors from physical units to Btu.

Total consumption of natural gas in billion Btu is calculated as follows:

NGTCBZZ = NGTCPZZ * NGTCKZZ

Before 2010, electric power sector consumption of natural gas in billion Btu is calculated as follows:

NGEIBZZ = NGEIPZZ * NGEIKZZ

From 2010 forward, NGEIBZZ is directly extracted from the data source to minimize rounding errors.

NGTXKZZ is derived as

NGTXKZZ = (NGTCBZZ- NGEIBZZ)/(NGTCPZZ- NGEIPZZ)

NGTXKZZ is then used to convert individual end-use sector consumption of natural gas from physical units to Btu, such as

NGRCBZZ = NGRCPZZ * NGTXKZZ

The U.S. consumption estimates in Btu for each of the sectors and the U.S. total are calculated as the sum of the states' Btu values.

Before 1972, conversion factors for natural gas consumed for electricity generation were not collected; therefore, the factor for all natural gas consumed (NGTCKZZ) is used for electric power (NGEIKZZ) and for the end-use sectors (NGTXKZZ) for 1963 through 1971. Before 1963, state-level conversion factors for natural gas consumption were not collected and a standard factor of 1.035 thousand Btu per cubic foot is used for all sectors in all states.

Supplemental gaseous fuels

Natural gas consumption contains a small amount of supplemental gaseous fuels (SGF). These fuels are introduced into or commingled with natural gas, and increase the volume available for disposition. Such fuels include, but are not limited to, synthetic natural gas, propane-air, coke oven gas, refinery gas, biomass gas, air injected for Btu stabilization, and manufactured gas. Because SGF are mostly derived from fossil fuels, which are already accounted for, they are removed from total energy consumption in Btu (see Sections 6 and 7) to eliminate any double counting.

Annual data on SGF supplies in physical units are available for each state from 1980 forward in EIA's *Natural Gas Annual*. For all states except North Dakota, this data series is used to approximate SGF contained in the natural gas delivered to users. See "Additional Note 2" on page 25 for the method of assigning North Dakota SGF supplies to North Dakota and other states for consumption. Unknown quantities of SGF are included in the Btu consumption data for 1979 and earlier years.

NGSFPZZ = supplemental gaseous fuels supplies by state in million cubic feet.

It is assumed that SGF are commingled with natural gas consumed by the commercial, other industrial, residential, and electric power sectors, but are not commingled with natural gas used for lease and plant fuel, pipelines, or vehicle fuel. The estimated consumption of SGF within each sector is calculated using the sector's natural gas consumption share.

NGTZPZZ = NGRCPZZ + NGCCPZZ + NGINPZZ + NGEIPZZ

SFCCPZZ = NGSFPZZ * (NGCCPZZ / NGTZPZZ)
SFINPZZ = NGSFPZZ * (NGINPZZ / NGTZPZZ)
SFRCPZZ = NGSFPZZ * (NGRCPZZ / NGTZPZZ)
SFEIPZZ = NGSFPZZ * (NGEIPZZ / NGTZPZZ)

To convert SGF from physical units to Btu, the appropriate natural gas conversion factors are used:

SFCCBZZ = SFCCPZZ * NGTXKZZ
SFINBZZ = SFINPZZ * NGTXKZZ
SFRCBZZ = SFRCPZZ * NGTXKZZ
SFEIBZZ = SFEIPZZ * NGEIKZZ

Total SGF consumed by state in Btu is equal to the sum of the four sectors with SGF:

SFTCBZZ = SFRCBZZ + SFCCBZZ + SFINBZZ + SFEIBZZ

The U.S. consumption estimates for each of the variables and sectors and the U.S. total are calculated as the sum of the states' values.

Natural gas excluding supplemental gaseous fuels in Btu

To facilitate data users who prefer the double-counting of SGF be removed from natural gas, a set of variables is introduced for consumption of natural gas excluding supplemental gaseous fuels in Btu:

NNACBZZ = NGACBZZ
NNCCBZZ = NGCCBZZ - SFCCBZZ
NNICBZZ = NGICBZZ - SFINBZZ
NNRCBZZ = NGRCBZZ - SFRCBZZ
NNEIBZZ = NGEIBZZ - SFEIBZZ
NNTCBZZ = NGTCBZZ - SFTCBZZ

The U.S. total consumption is calculated as the sum of the states' values.

Total consumption of natural gas per capita

Total consumption of natural gas per capita is calculated by dividing total consumption by resident population ("TPOPP"). Information on residential population is presented in Appendix C of the Consumption Technical Notes at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Estimated total consumption of natural gas per capita for each state and the United States, in thousand cubic feet, is represented by "NGTPP" and is calculated:

NGTPP = NGTCP / TPOPP

Estimated total consumption of natural gas per capita for each state and the United States, in million Btu, is represented by "NGTPB" and is calculated:

NGTPB = NGTCB / TPOPP

Additional calculations

Although SEDS does not use U.S.-level conversion factors for calculating natural gas consumption, these factors are calculated by SEDS for reference and are shown in the natural gas tables in Appendix B, http://www.eia.gov/state/seds/seds-technical-notes-complete.php:

NGEIKUS = NGEIBUS / NGEIPUS
NGTCKUS = NGTCBUS / NGTCPUS
NGTXKUS = (NGTCBUS - NGEIBUS) / (NGTCPUS - NGEIPUS)

To produce price and expenditure data, SEDS differentiates between natural gas used in the transportation sector as pipeline fuel, which is not sold and has no price, and natural gas purchased and consumed as vehicle fuel. SEDS also differentiates between natural gas used as lease and plant fuel by the natural gas industry, which is not costed, and natural gas purchased by industrial consumers. Btu values for the price and expenditure tables are calculated in SEDS as follows:

NGPZBZZ = NGPZPZZ * NGTXKZZ
NGVHBZZ = NGVHPZZ * NGTXKZZ
NGLPPZZ = NGLEPZZ + NGPLPZZ
NGLPBZZ = NGLPPZZ * NGTXKZZ

The U.S. totals for each series are calculated as the sum of the states' values.

Additional notes

1. Beginning with 2001 data, federal offshore natural gas lease fuel consumption for Alabama, Louisiana, and Texas is reported combined under "Gulf of Mexico" in the source publication. To estimate each state's portion, data from the U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM, formerly Minerals Management Service) on natural gas production for the Eastern Gulf, Central Gulf, and Western Gulf areas are totaled. Alabama's share of the Gulf of Mexico lease fuel consumption is calculated in proportion to the Eastern Gulf's share of the production total; Louisiana's share is the same proportion as the Central Gulf share, and the Texas share is in proportion to the Western Gulf share. Between 2015 and 2016, BOEM revised the historical data for production by planning area. There is no longer any production for the Eastern Gulf area and Western Gulf production is revised downward. The revised data from 2001 forward are incorporated into SEDS.
2. In general, SGF supplies are small relative to total natural gas consumption, and are assumed to be a good measure of SGF consumption. The only exception is North Dakota. Since 1985, North Dakota's volume of SGF supplies is significant and sometimes exceeds its total natural gas consumption. SEDS assumes that 10% of SGF produced in North Dakota is consumed in the state and the rest is distributed to Iowa, Illinois, and Indiana through the Northern Border Pipeline, according to the capacity of the pipeline going into each state. The percentage allocations of the supplemental gaseous fuels supplies in North Dakota are as follows:
    - From 1985 through 1998: North Dakota (10%), Iowa (90%).
    - From 1999 forward: North Dakota (10%), Iowa (62%), Illinois (22%), Indiana (6%).
3. Beginning in 2009, pipeline and distribution use volumes include line loss, defined as known volumes of natural gas that were the result of

leaks, damage, accidents, migration, and/or blow down.

Data sources

NGCCPZZ — Natural gas delivered to the commercial sector including natural gas consumed as vehicle fuel through 1989 and natural gas used in agriculture, forestry, and fisheries through 1995, by state.

- 1960 through 1966: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Natural Gas Production and Consumption," table titled "Number of consumers and volume of natural gas consumed by principal users in the United States," column "Commercial."
- 1967 through 1988: EIA, *Historical Natural Gas Annual 1930 Through 2000*, Table 16, https://www.eia.gov/naturalgas/annual/archive.
- 1989 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vcs_mmcf_a.htm.

NGEIBZZ — Natural gas consumed by the electric power sector, in billion Btu, by state.

- 1960 through 2009: computed in SEDS.
- 2010 forward: EIA, Form EIA-923, "Power Plant Operations Report, https://www.eia.gov/electricity/data/eia923/.

NGEIKZZ — Factor for converting natural gas consumed by the electric power sector from physical units to Btu by state.

- 1960 through 1971: Assumed by EIA to be equal to the thermal conversion factor for the consumption of natural gas by all users (NGTCKZZ).
- 1972 through 1982: Calculated annually by EIA by dividing the total heat content of natural gas received at steam electric plants 25 megawatts or greater by the total quantity received at those electric plants. The heat contents and quantities received are from the FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."
- 1983 through 1988: The average heat content of natural gas received at steam electric plants 50 megawatts capacity or larger from FERC Form 423 and published from 1993 forward in Btu per cubic foot in the EIA, *Cost and Quality of Fuels for Electric Utility Plants*, Table 14. Note: For states that reported consumption on EIA-759 but were not large enough to report on FERC Form 423, factors were estimated by using previous years' factors or the factor for total natural gas consumption in the state.
- 1989 forward: Calculated by dividing the total heat content of natural gas received at electric power plants (including electric utilities and independent power producers) by the total quantity consumed in physical units collected by EIA on Form EIA-923, "Power Plant Operations Report," and predecessor forms, https://www.eia.gov/electricity/data/eia923/.

NGEIPZZ — Natural gas consumed by the electric power sector by state.

- 1960 through 1975: Federal Power Commission, News Release, "Power Production, Fuel Consumption, and Installed Capacity Data," table titled "Consumption of Fuel by Electric Utilities for Production of Electric Energy by state, Kind of Fuel, and Type of Prime Mover," sum of columns, "steam and gas turbine" and "internal combustion" under column heading "gas."
- 1976 through 1981: EIA, *Electric Power Annual* (1981), Table 67.
- 1982 through 1986: Unrounded data as published in rounded form in EIA, *Electric Power Annual*, 1986, Table 14.
- 1987: Unrounded data as published in rounded form in EIA, *Electric Power Annual* 1988, Table 13.
- 1988: Unrounded data as published in rounded form in EIA, *Electric Power Annual* 1989, Table 19.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, https://www.eia.gov/electricity/data/eia923/.

NGINPZZ — A portion of the natural gas delivered to the industrial sector, including natural gas used in agriculture, forestry, and fisheries beginning in 1996, by state.

- 1960 through 1966: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Natural Gas Production and Consumption," table titled "Number of consumers and volume of natural gas consumed by principal users in the United States." Sum of data in columns "Carbon black," "Refinery fuel," and "Other industrial fuel" (which includes electric utility fuel) minus data in column "Fuel used at electric utility plants."
- 1967 through 1992: EIA, *Historical Natural Gas Annual 1930 Through*

2000, Table 16, https://www.eia.gov/naturalgas/annual/archive.
- 1993 through 1996: Unpublished data comparable to data contained in the *Natural Gas Annual*, State Summaries tables.
- 1997 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vin_mmcf_a.htm.

NGLEPZZ — Natural gas consumed as lease fuel by state (includes natural gas consumed as plant fuel in 1960 through 1990).

- 1960 through 1966: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, Natural Gas chapter. State data are not available from 1960 through 1966, although U.S. totals are available. State estimates were calculated by apportioning the U.S. totals to the states on the basis of each state's share of the U.S. total in 1967.
- 1967 through 1982: EIA, *Natural Gas Annual 1994 Volume II*, Table 14.
- 1983 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vcl_mmcf_a.htm.

NGPLPZZ — Natural gas consumed as plant fuel by state.

- 1960 through 1982: Included with natural gas consumed as lease fuel (see NGLEPZZ).
- 1983 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_VCF_mmcf_a.htm.

NGPZPZZ — Natural gas consumed for pipeline and distribution use by state.

- 1960 through 1966: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Natural Gas Production and Consumption," table titled "Number of consumers and volume of natural gas consumed by principal users in the United States," column "Used as pipeline fuel."
- 1967 through 1992: EIA, *Natural Gas Annual 1994 Volume II*, Table 14.
- 1993 through 1996: EIA, *Historical Natural Gas Annual 1930 Through 2000*, Table 15. This report is available only via the Internet at https://www.eia.gov/naturalgas/annual/archive.
- 1997 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vgp_mmcf_a.htm.

NGRCPZZ — Natural gas delivered to the residential sector, used as consumption, by state.

- 1960 through 1966: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Natural Gas Production and Consumption," table titled "Number of consumers and volume of natural gas consumed by principal users in the United States," column "Residential."
- 1967 through 1988: EIA, *Historical Natural Gas Annual 1930 Through 2000*, Table 16, https://www.eia.gov/naturalgas/annual/archive.
- 1989 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vrs_mmcf_a.htm.

NGSFPZZ — Supplemental gaseous fuels supplies by state.

- 1980 forward: EIA, *Natural Gas Annual*, Table 8, also available at http://www.eia.gov/dnav/ng/ng_prod_ss_a_EPG0_ovi_mmcf_a.htm.

NGTCKZZ — Factor for converting natural gas consumed by all users from physical units to Btu by state.

- 1960 through 1962: EIA adopted the thermal conversion factor of 1,035 Btu per cubic foot as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956*.
- 1963 through 1979: EIA adopted the thermal conversion factors calculated annually by the American Gas Association (AGA) and published in *Gas Facts*, an AGA annual.
- 1980 through 1996: EIA, *Historical Natural Gas Annual 1930 Through 2000*, Table 16, https://www.eia.gov/naturalgas/annual/archive.
- 1997 forward: EIA, *Natural Gas Annual*, Table 16, and unpublished revisions. Data from 2007 forward are also available at http://www.eia.gov/dnav/ng/ng_cons_heat_a_EPG0_VGTH_btucf_a.htm

NGVHPZZ — Natural gas delivered for use as vehicle fuel by state.

- 1960 through 1989: Included in natural gas consumed by the commercial sector (See NGCCPZZ).
- 1990 through 1991: EIA, *Historical Natural Gas Annual 1930 Through 2000*, Table 16, https://www.eia.gov/naturalgas/annual/archive.
- 1992 through 2000: EIA, unpublished data from the Office of Coal,

Nuclear, Electric, and Alternate Fuels (U.S. totals for 1992 forward and state values for 1997 forward) and from the Office of Energy Markets and End Use (state values for 1992 through 1996).

- 2001 forward: EIA, *Natural Gas Annual*, State Summaries tables, also available at http://www.eia.gov/dnav/ng/ng_cons_sum_a_EPG0_vdv_mmcf_a.htm.

Petroleum Overview

At the national level, consumption of each petroleum product is assumed to equal "product supplied." Product supplied measures the disappearance of petroleum 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, minus stock change, minus crude oil losses, minus refinery inputs, and minus exports.

Data on state-level product supplied by sector are not available. The methods of estimating consumption by state and sector are discussed in the individual subsections.

The petroleum products included in the State Energy Data System (SEDS) are explained in this section. For 10 of these products, the means of estimating their consumption by state is described 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

The remaining products are described in the section "Other Petroleum Products" and include the following:

- crude oil, including lease condensate
- miscellaneous petroleum products
- petrochemical feedstocks, naphtha less than 401°F
- petrochemical feedstocks, other oils equal to or greater than 401°F
- petrochemical feedstocks, still gas
- special naphthas
- still gas
- waxes
- unfinished oils
- motor gasoline blending components
- aviation gasoline blending components

The last petroleum documentation section, "Petroleum Summaries," describes how the petroleum products are combined for each major end-use sector's estimated consumption.

Additional notes

1. SEDS assumes U.S. consumption of each petroleum product equals its total product supplied. Occasionally, product supplied for some petroleum products can have negative values (see Energy Information Administration (EIA) *Petroleum Supply Annual* Explanatory Notes, http://www.eia.gov/petroleum/supply/monthly/pdf/psmnotes.pdf). No attempt is made to adjust for negative product supplied values in SEDS.
2. Beginning in the 2016 SEDS data cycle, "hydrocarbon gas liquids" (which covers normal butane, butylene, ethane, ethylene, isobutane, isobutylene, natural gasoline (pentanes plus), propane, and propylene) replaces "liquefied petroleum gases" (which includes all hydrocarbon gas liquids except natural gasoline) as a petroleum product. The definition of "other petroleum products" is revised to exclude petroleum coke and natural gasoline (formerly pentanes plus). Petroleum coke is reported as a separate product and natural gasoline is included in hydrocarbon gas liquids.

Table TN4.1 summarizes the petroleum products' sector assignments in SEDS. Shown in this table are the first four letters of the SEDS variable names. The first two letters identify the petroleum product and the next two letters identify the energy-consuming sector. For example, the table shows that the aviation gasoline estimated to be consumed by the transportation sector is all aviation gasoline consumed, and that there is some estimated consumption

Table TN4.1. Summary of petroleum products in the State Energy Data System

Petroleum products	Residential sector estimated consumption (RC)		Commercial sector estimated consumption (CC)		Industrial sector estimated consumption (IC)		Transportation sector estimated consumption (AC)		Electric power sector estimated consumption (EI)		Total sector estimated consumption (TC)
Asphalt and road oil (AR)					ARIC					=	ARTC
					+						+
Aviation gasoline (AV)							AVAC			=	AVTC
							+				+
Distillate fuel oil (DF)	DFRC	+	DFCC	+	DFIC	+	DFAC	+	DFEI	=	DFTC
	+		+		+		+		+		+
Hydrocarbon gas liquids (HL)	HLRC	+	HLCC	+	HLIC	+	HLAC			=	HLTC
	+		+		+		+				+
Jet fuel (JF)							JFAC	+	JFEU	=	JFTC
							+		+		+
Kerosene (KS)	KSRC	+	KSCC	+	KSIC					=	KSTC
			+		+						+
Lubricants (LU)					LUIC	+	LUAC			=	LUTC
					+		+				+
Motor gasoline (MG)			MGCC	+	MGIC	+	MGAC			=	MGTC
			+		+		+				+
Residual fuel oil (RF)			RFCC	+	RFIC	+	RFAC	+	RFEI	=	RFTC
			+		+				+		+
Petroleum coke (PC)			PCCC	+	PCIC	+			PCEI	=	PCTC
					+						+
Other petroleum products (OP)					OPIC					=	OPTC
Total petroleum (PA)	PARC	+	PACC	+	PAIC	+	PAAC	+	PAEI	=	PATC

of lubricants in the industrial and transportation sectors, while distillate fuel oil is consumed in every sector.

Asphalt and Road Oil

Physical units

There are no state-level consumption data for asphalt and road oil available. Before 2009, state-level sales data are used to apportion national-level consumption numbers to the states. From 2009 forward, state-level production of hot-mix asphalt and warm-mix asphalt, excluding reclaimed asphalt pavement, are used to allocate national-level consumption to the states.

The asphalt and road oil sales and production data are in short tons, while the consumption data are in thousand barrels. Because the tonnage data are used only to apportion the U.S. consumption data to the states, they do not need to be converted into thousand barrels.

The five data series that are used to estimate consumption of asphalt and road oil are (where "ZZ" in the variable name represents the two-letter state code that differs for each state)

ASINPZZ = asphalt sold for use in the industrial sector of each state, in short tons (through 2008);

ASPRPZZ = asphalt (hot-mix and warm-mix) production excluding reclaimed asphalt pavement in each state, in short tons (for 2009 forward);

ASTCPUS = asphalt total consumption in the United States, in thousand barrels (includes road oil from 1983 forward);

RDINPZZ = road oil sold for use in the industrial sector of each state, in short tons (through 1982); and

RDTCPUS = road oil total consumption in the United States, in thousand barrels (through 1982).

Consumption of all asphalt and road oil is assigned to the industrial sector because asphalt and roal oil are mostly used in construction activity. ASTCPUS represents total U.S. consumption of asphalt, and RDTCPUS represents total U.S. consumption of road oil. Both are the "product supplied" data series in the publication *Petroleum Supply Annual,* published by the U.S. Energy Information Administration (EIA). Beginning in 1983, asphalt product supplied includes road oil, and RDTCPUS is entered as zero in SEDS.

Before 2009, state-level asphalt sales data are used to allocate the U.S. consumption value to the states. ASINPZZ represents all asphalt sold as paving products, as roofing products, and for all other uses. RDINPZZ represents all sales of road oil. These data are collected and published by the Department of Interior (1960–1977), EIA (1978–1980), and the Asphalt Institute (1981–2008). Values for RDINPZZ for 1981 and 1982 are estimated as described under "Additional Notes" in this section. Beginning with 1983 data, when road oil is included in asphalt product supplied data, RDINPZZ is entered as zero in SEDS.

To calculate state consumption estimates of asphalt, total sales of asphalt and road oil in the United States to the industrial sector are first calculated as the sum of the state data:

ASINPUS = ΣASINPZZ
RDINPUS = ΣRDINPZZ

Each state's consumption of asphalt in the industrial sector (ASICPZZ) is calculated to be in proportion to each state's sales:

ASICPZZ = (ASINPZZ / ASINPUS) * ASTCPUS
ASICPUS = ΣASICPZZ
RDICPZZ = (RDINPZZ / RDINPUS) * RDTCPUS
RDICPUS = ΣRDICPZZ

Beginning in 2009, state-level asphalt sales data are no longer available from the Asphalt Institute. To estimate state-level consumption, state-level production of hot-mix asphalt and warm-mix asphalt (HMA/WMA) excluding reclaimed asphalt pavement (RAP), ASPRPZZ, is used to allocate U.S. consumption to the states. These data are collected by the National Asphalt Pavement Association (NAPA). HMA/WMA is used by the paving industry and contains about 5% asphalt binder, the petroleum product measured in SEDS. The use of recycled materials reduces the need of asphalt binder. Hence RAP tonnage is removed from HMA/WMA tonnage to derive the state allocators. While estimates of HMA/WMA tonnage are available from the source for all states, RAP estimates are withheld for some states and are estimated in SEDS.

ASPRPUS = ΣASPRPZZ

Each state's consumption of asphalt in the industrial sector (ASICPZZ) is calculated to be in proportion to each state's HMA/WMA production:

ASICPZZ = (ASPRPZZ / ASPRPUS) * ASTCPUS
ASICPUS = ΣASICPZZ

Because all asphalt and road oil are assumed to be used in the industrial sector, their total consumption in each state equals the industrial sector consumption:

ASTCPZZ = ASICPZZ
RDTCPZZ = RDICPZZ

Asphalt and road oil consumption are added together:

ARICPZZ = ASICPZZ + RDICPZZ
ARICPUS = ΣARICPZZ
ARTCPZZ = ASTCPZZ + RDTCPZZ
ARTCPUS = ΣARTCPZZ

British thermal units (Btu)

Asphalt and road oil have a heat content value of about 6.636 million Btu per barrel. This factor is applied to convert asphalt and road oil estimated consumption from physical units to Btu:

ARICBZZ = ARICPZZ * 6.636
ARICBUS = ΣARICBZZ

Because all asphalt and road oil are assumed to be used by the industrial sector, total asphalt and road oil consumption in each state and in the United States is assumed to equal the industrial sector consumption:

ARTCBZZ = ARICBZZ
ARTCBUS = ARICBUS

Additional notes

The federal government stopped collecting asphalt and road oil sales data after 1980. For 1981 through 2008, the source for these numbers was the Asphalt Institute. When companies did not respond to the voluntary survey, the Asphalt Institute did not estimate quantities to compensate for the nonresponse. This could cause large fluctuation in sales from year to year for some states.

For most years through 2008, asphalt and road oil sales data for Maryland and the District of Columbia are published combined to avoid disclosure of proprietary data. Before being entered into SEDS, the combined data are allocated to each state based on their reported sales in 1974. In this allocation procedure 99.4% is allocated to Maryland and 0.6% to the District of Columbia.

The EIA report series "Sales of Asphalt," and predecessor reports, which are the source for road oil sales by state (RDINPZZ) in SEDS for 1960 through 1980, was discontinued after the 1980 report. For 1981 and 1982, state estimates of road oil sales were created by first converting the annual total U.S. road oil product supplied data into short tons (one short ton contains 5.5 barrels of road oil). Then, the U.S. total road oil product supplied, in short tons, was disaggregated to each state in proportion to the state's share of total U.S. asphalt sales as reported in the Asphalt Institute's *Report on Sales of Asphalt in the U.S.*

For 2009 forward, production data from NAPA are used as state allocators.

Data sources

ASINPZZ — Asphalt sold to the industrial sector by state.

- 1960 through 1977: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Sales of Asphalt," the specific tables are
  - 1960 through 1962: Table 6.
  - 1963 through 1977: Table 5.
- 1978 through 1980: EIA, *Energy Data Reports*, "Sales of Asphalt," Table 2.
- 1981 through 1986: The Asphalt Institute, *Asphalt Usage 1987 United States and Canada*, Table B.
- 1987 and 1988: The Asphalt Institute, *Asphalt Usage 1988 United States and Canada*, Tables A and B for state data. *Asphalt Usage 1989 United States and Canada*, page 2 for revised U.S. totals. The Asphalt Institute did not publish corresponding revised state data but did advise EIA on an estimation procedure to adjust 19 state values to sum to the revised U.S. totals.
- 1989 through 1997: The Asphalt Institute, *Asphalt Usage United States and Canada*, table titled "U.S. Asphalt Usage."
- 1998 and 1999: The Asphalt Institute, *Asphalt Usage United States and Canada*, table titled "1998 vs. 1999 U.S. Asphalt Usage." 1998 data for Delaware, New Hampshire, Rhode Island, and Vermont are repeated for 1999 because nonresponse to the survey caused those states data for 1999 to be more than 75% lower than their 1998 values.
- 2000 through 2008: The Asphalt Institute, http://www.asphaltinstitute.org/, *Asphalt Usage Survey for the United States and Canada*, table titled "U.S. Asphalt Usage."

ASPRPZZ — Hot-mix asphalt and warm-mix asphalt production excluding reclaimed asphalt pavement by state.

- 2009 forward: National Asphalt Pavement Association, *Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt*

Usage, http://www.asphaltpavement.org/recycling.

ASTCPUS — Asphalt total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

RDINPZZ — Road oil sold to the industrial sector by state (through 1982).

- 1960 through 1977: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Sales of Asphalt." The specific tables are
  - 1960 through 1962: Table 6.
  - 1963 through 1977: Table 5.
- 1978 through 1980: EIA, *Energy Data Reports*, "Sales of Asphalt," Table 2.
- 1981 and 1982: EIA estimates. (See explanation in "Additional Notes" on page 32.)

RDTCPUS — Road oil total consumption in the United States (through 1982).

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 2.

Aviation Gasoline

Physical units

For 1960 to 2014, three data series are used to estimate consumption of aviation gasoline:

AVMIPZZ	=	aviation gasoline issued to the military in each state, in thousand barrels;
AVNMMZZ	=	aviation gasoline sold to nonmilitary users in each state, in thousand gallons; and
AVTCPUS	=	aviation gasoline total consumption in the United States, in thousand barrels.

The U.S. Department of Transportation, Federal Highway Administration publishes the nonmilitary aviation gasoline sales data by state (AVNMMZZ) in *Highway Statistics*.

AVMIPZZ is the issues of aviation gasoline to the military in each state and is obtained from the U.S. Department of Defense, Defense Logistics Agency.

Total U.S. consumption of aviation gasoline (AVTCPUS) is the product supplied data series in the publication *Petroleum Supply Annual,* published by the U.S. Energy Information Administration (EIA).

The state-level data series are summed to provide totals for the United States:

AVMIPUS = ΣAVMIPZZ
AVNMMUS = ΣAVNMMZZ

The state sales of nonmilitary aviation gasoline data are converted from thousand gallons to thousand barrels (42 gallons = 1 barrel):

AVNMPZZ = AVNMMZZ / 42

The U.S. nonmilitary sales is the sum of the states' sales:

AVNMPUS = ΣAVNMPZZ

The total sales of aviation gasoline is estimated as the sum of nonmilitary sales and military issues:

AVTTPZZ = AVNMPZZ + AVMIPZZ
AVTTPUS = ΣAVTTPZZ

All aviation gasoline is assumed to be used by the transportation sector.

An estimate of aviation gasoline consumption by the transportation sector by state (AVACPZZ) is calculated by assuming that each state consumes aviation gasoline in proportion to the amount sold to that state:

AVACPZZ = (AVTTPZZ / AVTTPUS) * AVTCPUS
AVACPUS = ΣAVACPZZ

Total aviation gasoline consumption in each state, AVTCPZZ, equals the transportation sector consumption in each state:

AVTCPZZ = AVACPZZ

For 2015 forward, SEDS uses a new method to estimate aviation gasoline consumption. EIA publishes annual prime supplier sales volumes of aviation gasoline by state, which include sales to military users, in *Petroleum Marketing Monthly* and on the EIA website. For all states except Alaska and Hawaii, withheld volumes are estimated in SEDS using previous years' data.

For Hawaii, unpublished estimates of aviation gasoline fuel used for aircraft operating primarily in Hawaii from the Federal Aviation Administration's *General Aviation and Part 135 Activity Survey* are used to approximate prime supplier sales.

For Alaska, the estimated prime supplier sales volume is very small because most of Alaska's aviation gasoline is provided by California. Instead of using prime supplier sales, reported taxable volume of aviation gasoline from the Alaska Department of Revenue, Tax Division's *Motor Fuel Tax Annual Report*, calculated on a calendar year basis, is used to approximate aviation gasoline sales in Alaska.

To account for the volume of aviation gasoline shipped to Alaska, California's prime supplier sales volume is redefined as the difference between total sales volumes of Petroleum Administration for Defense District (PADD) 5 and the sum of sales volumes of all other PADD5 states.

AVTTMZZ = aviation gasoline sold to all users in each state, in thousand gallons; and

Aviation gasoline sales in thousand barrels, AVTTPZZ, are calculated and their shares are applied to total U.S. consumption (AVTCPUS) to estimate aviation gasoline consumption by state in the same way as prior years:

AVTTPZZ = AVTTMZZ / 42
AVTTPUS = ΣAVTTPZZ

AVACPZZ = (AVTTPZZ / AVTTPUS) * AVTCPUS

AVACPUS = ΣAVACPZZ

AVTCPZZ = AVACPZZ

British thermal units (Btu)

Aviation gasoline has a heat content value of about 5.048 million Btu per barrel. This factor is applied to convert aviation gasoline estimated consumption from physical units to Btu:

AVACBZZ = AVACPZZ * 5.048
AVACBUS = ΣAVACBZZ

Because all aviation gasoline is assumed to be used for transportation, aviation gasoline total consumption in each state and in the United States equals the transportation sector consumption:

AVTCBZZ = AVACBZZ
AVTCBUS = ΣAVTCBZZ

Data sources

AVMIPZZ — Aviation fuel issued to the military in the United States by state (through 2014).

- 1960 through 1974: No data are available. The 1977 data are used for each year.
- 1975 and 1976: No consistent data series are available. The 1977 data are used for both years.
- 1977 through 1988: U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center, Defense Energy Information System, military retail issues based on fiscal year data. The District of Columbia issues are assumed to be zero; therefore, values reported for the District of Columbia are added to Maryland.
- 1989 and 1990: U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center. State data for the fiscal year from two databases are summed: Defense Fuel Automated Management System (military wholesale issues) and Into-Plane Database (military purchases from commercial airports). Into-plane values reported for the District of Columbia are added to Virginia.
- 1991 through 2003: U.S. Department of Defense, Defense Logistics Agency, Defense Energy Supply Center. State data for the calendar year from two databases are summed: Defense Fuel Automated

Management System (military wholesale issues) and Into-Plane Database (military purchases from commercial airports). Into-plane values reported for the District of Columbia are added to Virginia.
- 2004 through 2014: U.S. Department of Defense, Defense Logistics Agency Energy. State data for product 130, Aviation Gasoline, Grade 100LL, by calendar year were used.

AVNMMZZ — Aviation gasoline sold to nonmilitary users by state (through 2014).

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-24.
- 1965 through 2014: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table G-24 (1965), Table MF-24 (1966 through 2006), and Table 8.4.3 (2007 forward).

AVTCPUS — Aviation gasoline total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

AVTTMZZ — Aviation gasoline sold to all users by state (2015 forward).

- 2015 forward: EIA, *Petroleum Marketing Monthly*, also available at https://www.eia.gov/dnav/pet/pet_cons_prim_a_EPPV_P00_Mgalpd_a.htm.

Distillate Fuel Oil

Physical units

Because state-level and end-use consumption data for distillate fuel oil (except for that consumed by the electric power sector) are not available, sales of distillate fuel oil into or within each state, published by the U.S. Energy Information Administration (EIA) in the *Fuel Oil and Kerosene Sales Report,* are used to estimate distillate fuel oil consumption. The following variable names have been assigned to the sales series, in thousand barrels ("ZZ" in the variable names represents the two-letter state code that differs for each state):

DFBKPZZ	=	distillate fuel oil sales for vessel bunkering use (i.e., the fueling of commercial or private boats, such as pleasure craft, fishing boats, tugboats, and ocean-going vessels, including vessels operated by oil companies, and fueling for other marine purposes), excluding that sold to the military;
DFCMPZZ	=	distillate fuel oil sales to commercial establishments for space heating, water heating, and cooking;
DFIBPZZ	=	distillate fuel oil sales to industrial establishments for space heating and for other industrial use (i.e., for all uses to mines, smelters, plants engaged in producing manufactured products, in processing goods, and in assembling), including farm use;
DFMIPZZ	=	distillate fuel oil sales to the military, for all uses;
DFOCPZZ	=	distillate fuel oil sales for oil company use, including all fuel oil, crude oil, or acid sludge used as fuel at refineries, by pipelines, or in field operations;
DFOFPZZ	=	distillate fuel oil sales as diesel fuel for off-highway use in construction (i.e., earthmoving equipment, cranes, stationary generators, air compressors, etc.) and for off-highway uses other than construction (i.e., logging);
DFONPZZ	=	distillate fuel oil sales as diesel fuel for on-highway use (i.e., as engine fuel for trucks, buses, and automobiles);
DFOTPZZ	=	distillate fuel oil sales for all other uses not identified in other sales categories;
DFRRPZZ	=	distillate fuel oil sales to the railroads for use in fueling trains, operating railroad equipment, space heating of buildings, and other operations; and

DFRSPZZ = distillate fuel oil sales to the residential sector for space heating, water heating, and cooking, excluding farm houses.

Three additional data series are used in calculating distillate fuel oil consumption estimates:

DKEIPZZ = distillate fuel oil (including kerosene-type jet fuel before 2001) consumed by the electric power sector, in thousand barrels;

JKEUPZZ = kerosene-type jet fuel consumed by electric utilities, in thousand barrels (through 1982); and

DFTCPUS = distillate fuel oil total consumption in the United States, in thousand barrels.

Distillate fuel oil consumed by the electric power sector is collected by EIA on Form EIA-923, "Power Plant Operations Report," and predecessor forms. (See Note 4 at the end of this distillate fuel oil section for further information on changes in this series' data definitions.) Before 2001, the data series DKEIPZZ includes kerosene-type jet fuel consumed at electric utilities that is identified as JKEUPZZ. The kerosene-type jet fuel is subtracted from the distillate fuel oil data and accounted for in the jet fuel data described in a following section of this documentation. Data for kerosene-type jet fuel consumed by electric utilities are available for 1972 through 1982 only. Consumption in all other years is assumed to be zero. From 2001 forward, jet fuel consumed by the electric power sector is grouped under waste/other oil and is not accounted for in SEDS. DKEIPZZ is continued to be used to represent distillate fuel oil consumed by the electric power sector.

Total consumption of distillate fuel oil in the United States, DFTCPUS, is the product supplied series in the EIA publication *Petroleum Supply Annual*. From 2011 forward, product supplied of distillate fuel oil includes all biodiesel blended into distillate fuel oil. Before 2011, only the portion of biodiesel that was reported as refinery and blender net input was included.

All of the state-level data series listed above are summed to provide totals for the United States.

Next, the variables are combined as closely as possible into the major end-use sectors used in SEDS. The residential sector sales and the commercial sector sales contain only DFRSPZZ and DFCMPZZ, respectively.

The sales of distillate fuel oil to the industrial sector for each state, DFINPZZ, is the sum of the distillate fuel oil sales for industrial use, including industrial space heating and farm use (DFIBPZZ), for oil company use (DFOCPZZ), for off-highway use (DFOFPZZ), and for all other uses (DFOTPZZ). Data for DFOTPZZ are available through 1994. Starting in 1995, consumption is assumed to be zero:

DFINPZZ = DFIBPZZ + DFOCPZZ + DFOFPZZ + DFOTPZZ
DFINPUS = ΣDFINPZZ

The sales of distillate fuel oil to the transportation sector for each state, DFTRPZZ, is the sum of the distillate fuel oil sales for vessel bunkering, military use, railroad use, and the diesel fuel used on-highway:

DFTRPZZ = DFBKPZZ + DFMIPZZ + DFRRPZZ + DFONPZZ
DFTRPUS = ΣDFTRPZZ

Sales of distillate fuel oil to the residential, commercial, industrial, and transportation sectors are added to create a subtotal of sales to all sectors other than the electric utility sector, DFNDPZZ:

DFNDPZZ = DFRSPZZ + DFCMPZZ + DFINPZZ + DFTRPZZ
DFNDPUS = ΣDFNDPZZ

For 2001 forward, consumption of distillate fuel oil by the electric power sector (DFEIPZZ) is the same as the input series DKEIPZZ:

DFEIPZZ = DKEIPZZ

Before 2001, DFEIPZZ is calculated by subtracting the kerosene-type jet fuel consumed by electric utilities from DKEIPZZ:

DFEIPZZ = DKEIPZZ - JKEUPZZ

For all years, the U.S. total for this data series is summed:

DFEIPUS = ΣDFEIPZZ

The estimated U.S. distillate fuel oil consumption by all sectors other than the electric power sector, DFNCPUS, is calculated by subtracting the distillate fuel oil consumption by the electric power sector from the total U.S. distillate fuel oil consumption:

DFNCPUS = DFTCPUS - DFEIPUS

This U.S. subtotal of distillate fuel oil consumption by the four end-use sectors, DFNCPUS, is apportioned to the states by use of the end-use sectors' state-level sales data. The assumption is made that each state consumes distillate fuel oil in proportion to the amount of sales to that state:

DFNCPZZ = (DFNDPZZ / DFNDPUS) * DFNCPUS

The end-use sectors' subtotal for each state, DFNCPZZ, is further divided into estimates for the four end-use sectors in proportion to each sector's sales. The estimated residential sector consumption in each state, DFRCPZZ, is calculated:

DFRCPZZ = (DFRSPZZ / DFNDPZZ) * DFNCPZZ
DFRCPUS = ΣDFRCPZZ

The commercial sector's estimated consumption in each state, DFCCPZZ, is calculated:

DFCCPZZ = (DFCMPZZ / DFNDPZZ) * DFNCPZZ
DFCCPUS = ΣDFCCPZZ

The industrial sector's estimated consumption in each state, DFICPZZ, is calculated:

DFICPZZ = (DFINPZZ / DFNDPZZ) * DFNCPZZ
DFICPUS = ΣDFICPZZ

The transportation sector's estimated consumption in each state, DFACPZZ, is calculated:

DFACPZZ = (DFTRPZZ / DFNDPZZ) * DFNCPZZ
DFACPUS = ΣDFACPZZ

Total state distillate fuel oil consumption is the sum of the end-use sectors' consumption subtotal and the electric power sector consumption:

DFTCPZZ = DFNCPZZ + DFEIPZZ

British thermal units (Btu)

The factor for converting distillate fuel oil from physical unit values to Btu, DFTCKUS, is calculated annually for 1994 forward by EIA as a consumption-weighted average of the heat contents of three categories of distillate fuel oil based on its sulfur content. DFTCKUS is shown in Table B1 on page 185. For 1960 through 1993, a fixed factor of 5.825 million Btu per barrel is used:

DFTCKUS = factor for converting distillate fuel oil from physical units to Btu.

This factor is applied to convert distillate fuel oil estimated consumption for the five consuming sectors from physical units to Btu as shown in the following example:

DFRCBZZ = DFRCPZZ * DFTCKUS

Total Btu consumption of distillate fuel oil is the sum of the consumption by the end-use sectors and for electricity generation:

DFTCBZZ = DFRCBZZ + DFCCBZZ + DFICBZZ + DFACBZZ + DFEIBZZ

The U.S. Btu consumption estimates are calculated as the sum of all the states' data.

In the SEDS consumption tables, "Estimates of Energy Consumption by the Electric Power Sector," the data used in the column headed "Distillate" is the variable DKEIP, which includes keorsene-type jet fuel before 2001, in physical units. The Btu variable, DKEIB, is calculated as follows (See page 58 for description of JKEUB):

DKEIBZZ = DFEIBZZ for 2001 forward
DKEIBZZ = DFEIBZZ + JKEUBZZ before 2001
DKEIBUS = ΣDKEIBZZ

Additional notes

1. "Deliveries" data are actually called "shipments" in the source document for 1960 and 1961; "consumption" for 1962 through 1966; "shipments" for 1967; "sales" from 1968 through 1978; "deliveries" for 1979 through 1987; and "sales" for 1988 forward.
2. State data for the variables DFONPZZ (on-highway use), DFOFPZZ (off-highway use), and DFOTPZZ (other) for 1967 are unavailable from published sources. These three variables compose the miscellaneous use category for distillate fuel oil, which is known for all years by state. State estimates of DFONPZZ and DFOFPZZ for 1967 were developed by dividing the 1966 values for DFONPZZ and DFOFPZZ by the 1966 total miscellaneous use for each state and applying these percentages to the 1967 total miscellaneous use for each state. The 1967 state estimates for DFOTPZZ are the remainder of the 1967 miscellaneous category after DFONPZZ and DFOFPZZ have been subtracted.
3. In 1979, EIA implemented a new survey form, EIA-172, to obtain deliveries of fuel oil and kerosene data and updated the list of respondents. (A detailed explanation is published in the *Energy Data Report,* "Deliveries of Fuel Oil and Kerosene in 1979.") In this survey form, certain end-use categories were redefined—in many cases to collect more disaggregated

data. The reclassifications resulted in some end-use categories that were no longer comparable with those in previous surveys. Where discontinuities occurred, estimates for the pre-1979 years have been made in the State Energy Data System (SEDS) to conform with the 1979 fuel oil deliveries classifications. The pre-1979 deliveries estimates are not published in this report, but are used in SEDS to disaggregate the known U.S. total product supplied (consumption) into state and major end-use sector consumption estimates.

For distillate fuel oil deliveries in 1979, the end-use categories called "residential," "commercial," "industrial," and "farm" are available. The pre-1979 deliveries categories are called "heating" and "industrial" (which included farm use). While the pre-1979 categories individually are not continuous with the 1979 categories, their subtotals are related. That is, a general comparison can be made between the sum of residential, commercial, industrial, and farm deliveries in 1979 and the sum of heating and industrial deliveries in the pre-1979 years. Therefore, the following method was applied to present a comparable series for distillate fuel oil delivered to the residential, commercial, and industrial sectors:

- For each of the pre-1979 years, a subtotal was created for each state by adding each state's heating and industrial deliveries categories. A comparable 1979 subtotal was created by adding each state's residential, commercial, industrial, and farm deliveries categories.
- Residential, commercial, and industrial (including farm) shares of the subtotal in 1979 were calculated for each state.
- These 1979 end-use shares were then applied to each pre-1979 subtotal of distillate fuel oil deliveries in each state to create state estimates of end-use deliveries for 1960 through 1978.

The 1980 through 1982 distillate fuel oil deliveries data are based on the same survey as that used for 1979; therefore, the 1980 through 1982 data are directly comparable to 1979 data.

In 1984, EIA again updated the list of respondents for this survey, and the Form EIA-172 became the Form EIA-821, "Annual Fuel Oil and Kerosene Sales Report." EIA did not conduct a fuel oil and kerosene deliveries survey for 1983. The 1983 estimates in SEDS are based on 1984 data obtained from the Form EIA-821. Statistical procedures and methodologies used for the Form EIA-821 differ from those used in previous years. Therefore, the 1983 and forward sales data may not be directly comparable to the pre-1983 data. (In the source document, the deliveries data for 1983 forward are reported in thousand gallons. These data are first converted to thousand barrels before being entered into SEDS.)

Some of the No. 2 diesel fuel reported as sold to the commercial and industrial sectors, DFCMPZZ and DFINPZZ, on the EIA forms may also be included in the on-highway data, DFONPZZ, obtained from the Federal Highway Administration. Included in the commercial sector is some diesel fuel consumed by government vehicles and school buses, and included in the industrial sector is some diesel fuel consumed by fleets of trucks. Because the specific quantities involved are unknown, SEDS reflects the diesel fuel consumption as reported in the EIA *Petroleum Marketing Monthly* and no attempt has been made to adjust the end-use reporting.

4. The data on fuel oil consumed by the electric power sector for all years and states are actual fuel oil consumption numbers collected from electric power plants on Form EIA-923, "Power Plant Operations Report," and predecessor forms. Due to changes in fuel oil reporting classifications on the predecessor forms over the years, it is not possible to develop a thoroughly consistent series for all years. However, over time, data more accurately disaggregating fuel oil into distillate fuel oil and residual fuel oil have become available. For 1960 through 1969, only data on total fuel oil consumed at electric utilities by state are available. For 1970 through 1979, fuel oil consumed by plant type (internal combustion and gas turbine plants combined and steam plants) by state are available. For 1980 through 2000, data on consumption of light fuel oil at all plant types combined and consumption of heavy fuel oil at all plant types combined are available by state. For 2001 forward, data on consumption of distillate fuel oil and residual fuel oil are available. In SEDS, the following assumptions have been made:
   - 1960 through 1969—state estimates of fuel oil consumption by plant type have been created for each year by applying the shares of steam plants (primarily residual fuel oil) and internal combustion and gas turbine plants (primarily distillate fuel oil plus small amounts of jet kerosene) by state in 1970 to each year's total fuel oil consumption at electric utilities for 1960 through 1969.
   - 1970 through 1979—fuel oil consumed by steam plants is assumed to equal residual fuel oil consumption, and fuel oil consumed by internal combustion and gas turbine plants is assumed to equal distillate fuel oil plus jet kerosene consumption.
   - 1980 through 2000—total heavy oil consumption at all plant types is assumed to equal residual fuel oil consumption, and total light oil consumption at all plant types is assumed to equal

distillate fuel oil plus jet kerosene consumption.

The data series thus derived for SEDS for residual fuel oil and distillate fuel oil consumption by the electric power sector is considered to be actual consumption by the electric power for each state and each year.

Additional calculations

To assist data users in the analysis of consumption of fossil fuel sources and renewable energy sources, a data series, distillate fuel oil excluding biodiesel, is created for each state and the United States:

From 2009 forward:

DMTCB = DFTCB - BDTCB

Before 2009, SEDS assumes that biodiesel was not included in distillate fuel oil total consumption:

DMTCB = DFTCB

See discussion on biodiesel in Section 5, "Renewable Energy."

Distillate fuel oil excluding biodiesel is used only in the tables showing primary energy consumption by source. For consumption by end-use sector, distillate fuel oil is defined as the product consumed by the end users, that is, including biodiesel.

Data sources

DFBKPZZ — Distillate fuel oil sales for vessel bunkering use by state, excluding that sold to the military.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 17.
  - 1962 and 1963: Table 16.
  - 1964 and 1965: Table 15.
  - 1966 through 1975: Table 11.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 11.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VVB_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VVB_Mgal_a.htm.

DFCMPZZ — Distillate fuel oil sales to the commercial sector for space heating, water heating, and cooking.

- 1960 through 1978: EIA estimates based on statistics of commercial sector deliveries of distillate fuel oil from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene in 1979," Table 1. State ratios based on 1979 commercial sector deliveries were applied to each state's sum of heating plus industrial (including farm use) deliveries categories from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 3, on page 37.)
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VCS_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VCS_Mgal_a.htm.

DFIBPZZ — Distillate fuel oil sales to industrial establishments for space heating and for other industrial use, including farm use by state.

- 1960 through 1978: EIA estimates based on statistics of industrial sector deliveries of distillate fuel oil from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene in 1979," Table 1. State ratios based on 1979 industrial sector deliveries were applied to each state's sum of heating plus industrial (including farm use) deliveries categories from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 3, on page 37.)

- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_vin_Mgal_a.htm and http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VFM_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VFM_Mgal_a.htm and https://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_vin_Mgal_a.htm.

DFMIPZZ — Distillate fuel oil sales to the military for all uses by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 18.
  - 1962 and 1963: Table 17.
  - 1964 and 1965: Table 16.
  - 1966 through 1975: Table 12.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 12.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VMI_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VMI_Mgal_a.htm.

DFOCPZZ — Distillate fuel oil sales for use by oil companies by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 14.
  - 1962 and 1963: Table 13.
  - 1964 and 1965: Table 12.
  - 1966 through 1975: Table 9.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 9.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VOC_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VOC_Mgal_a.htm.

DFOFPZZ — Distillate fuel oil sales as diesel fuel for off-highway use by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 through 1962: Table 19.
  - 1963 and 1964: Table 18.
  - 1965 through 1967: Table 17.
  - 1968 through 1975: Table 14.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 14.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD2D_VHF_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD2D_VHF_Mgal_a.htm.

DFONPZZ — Distillate fuel oil sales as diesel fuel for on-highway use by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 through 1962: Table 19.
  - 1963 and 1964: Table 18.
  - 1965 through 1967: Table 17.
  - 1968 through 1975: Table 14.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 14.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD2D_VHN_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD2D_VHN_Mgal_a.htm.

DFOTPZZ — Distillate fuel oil sales for all other uses not identified in other sales categories.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 through 1962: Table 19.
  - 1963 and 1964: Table 18.
  - 1965 through 1967: Table 17.
  - 1968 through 1975: Table 14.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 14.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly,* also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VOE_Mgal_a.htm.
- 1988 through 1994: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VOE_Mgal_a.htm.
- 1995 forward: Series discontinued; no data available. Values are assumed to be zero.

DFRRPZZ — Distillate fuel oil sales for use by railroads by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 16.
  - 1962 and 1963: Table 15.
  - 1964 and 1965: Table 14.
  - 1966 through 1975: Table 10.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 10.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VRR_

Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VRR_Mgal_a.htm.

DFRSPZZ — Distillate fuel oil sales to the residential sector for space heating, water heating, and cooking.

- 1960 through 1978: EIA estimates based on statistics of residential sector deliveries of distillate fuel oil from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene in 1979," Table 1. State ratios based on 1979 residential sector deliveries were applied to each state's sum of heating plus industrial (including farm use) deliveries categories from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 3, on page 37.)
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 4.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A12.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VRS_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821dst_a_EPD0_VRS_Mgal_a.htm.

DFTCKUS — Factor for converting distillate fuel oil from physical units to Btu.

- 1960 through 1993: EIA adopted the Bureau of Mines thermal conversion factor of 5.825 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."
- 1994 forward: EIA calculates the national annual average thermal conversion factor, which includes biodiesel blended into distillate fuel oil, by using heat content values of three sulfur-content categories of distillate fuel oil, weighted by quantity consumed. See Appendix B Table B1 on page 185.

DFTCPUS — Distillate fuel oil total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

DKEIPZZ — Distillate fuel oil consumed by the electric power sector, including kerosene-type jet fuel before 2001.

- EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms. The following assumptions have been made:
  - 1960 through 1969: Only total fuel oil consumed at electric utilities by state is available. State estimates of distillate fuel oil consumption were created for each year by applying the shares of internal combustion and gas turbine plants (primarily distillate fuel oil plus small amounts of jet fuel) by state from 1970 to each year's total fuel oil consumption at electric utilities for 1960 through 1969.
  - 1970 through 1979: Fuel oil consumed by plant type by state is available. Fuel oil consumed by internal combustion and gas turbine plants combined is assumed to equal distillate and jet fuel consumption.
  - 1980 through 2000: Consumption of light fuel oil at all plant types by state is available. This is assumed to equal distillate and jet kerosene consumption.
  - 2001 forward: Consumption of distillate fuel oil is available.

JKEUPZZ — Kerosene-type jet fuel consumed by the electric utility sector (through 1982). (See data sources for JKEUPZZ under "Jet Fuel" on page 59.)

Hydrocarbon Gas Liquids (1960–2009)

Hydrocarbon gas liquids (HGL) cover 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 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.

Historically, SEDS produced consumption estimates for liquefied petroleum gases (LPG), which included ethane/ethylene, isobutane/isobutylene, normal butane/butylene, propane/propylene, butane-propane mixtures, and ethane-propane mixtures. Pentanes plus (natural gasoline) and three other former products (natural gasoline, plant condensate, and unfractionated streams) were covered in "other petroleum products."

In mid-2010s, the U.S. Energy Information Administration (EIA) began using hydrocarbon gas liquids to describe the nine products and separated the refinery olefins from the natural gas liquids in its product supplied data for 2010 forward. SEDS adopted the HGL definition and applied new estimation methodologies for the individual HGL products for 2010 forward (see page 51). For 1960 through 2009, SEDS assumes HGL consumption to be the sum of LPG and pentanes plus (natural gasoline) consumption. The term "LPG" is no longer used after 2009.

Liquefied petroleum gases (LPG)

Physical units

For 1960 through 2007, the following data series on LPG sales in thousand gallons are used in SEDS to estimate LPG consumption by state.

LGCBMZZ = LPG sold for internal combustion engine fuel use. Included are sales for use in highway vehicles, forklifts, industrial tractors, and for use in oil field drilling, and production equipment, etc.;

LGHCMZZ = LPG sold for residential and commercial use. Included are sales for nonfarm private households for space heating, cooking, water heating, and other household uses, such as clothes drying and incineration. Also included are sales to nonmanufacturing organizations, such as motels, restaurants, retail stores, laundries, and other service enterprises, primarily for use in space heating, water heating, and cooking; and

LGTTPZZ = LPG total sales for all uses.

Data before 1984 were available from the Bureau of Mines reports, U.S. Energy Information Administration (EIA) reports, or were estimated by EIA. From 1984 through 2007, data were extracted from American Petroleum Institute's (API) *Sales of Natural Gas Liquids and Liquefied Refinery Gases*. Withheld state-level sales data are first estimated by EIA by using previous year's data and ensuring all subtotals match the source document.

The U.S. totals for each of these state-level data series are calculated as the sum of the state values.

Total U.S. consumption of LPG is the product supplied data series in EIA *Petroleum Supply Annual*:

LGTCPUS = LPG total consumption in the United States, in thousand barrels (through 2009).

Another variable is used in SEDS to estimate LPG consumption by the transportation sector:

LGTRSUS = the transportation sector share of LPG internal combustion engine sales (through 2009).

Its computation is described in detail in Note 2 on page 45.

Similarly, variables are used in SEDS to estimate LPG consumption by the residential and commercial sectors:

LGRCSZZ = the residential sector share of LPG residential and commercial sales (through 2009); and

LGCCSZZ = the commercial sector share of LPG residential and commercial sales (through 2009).

Their computation is described in detail in Note 3 on page 45.

Because the LPG sales data are in gallons, they must be converted to barrels (42 U.S. gallons per U.S. barrel) to be comparable to total consumption estimates. The formulas for calculating state sales data are

LGCBPZZ = LGCBMZZ / 42
LGCBPUS = ΣLGCBPZZ
LGHCPZZ = LGHCMZZ / 42
LGHCPUS = ΣLGHCPZZ

It is also assumed that LPG sales to the residential and commercial sectors

are equal to the consumption in those sectors. LPG consumption by the residential sector is estimated to be the residential share of propane sales for the residential and commercial sectors:

LGRCPZZ = LGHCPZZ * LGRCSZZ

LPG consumption by the commercial sector is estimated to be the commercial share of propane sales for the residential and commercial sectors:

LGCCPZZ = LGHCPZZ * LGCCSZZ

LPG consumption by the transportation sector is estimated to be the transportation share of the sales for internal combustion engine fuel:

LGACPZZ = LGCBPZZ * LGTRSUS

An estimate of each state's total LPG consumption (LGTCPZZ) is made by allocating the U.S. total consumption to the states in proportion to each state's share of the U.S. total sales:

LGTCPZZ = (LGTTPZZ / LGTTPUS) * LGTCPUS

Industrial sector consumption (LGICPZZ) for each state is the difference between the state's total LPG consumption and the sum of its residential, commercial, and transportation sectors' consumption:

LGICPZZ = LGTCPZZ- (LGACPZZ + LGCCPZZ + LGRCPZZ)

U.S. totals for the four end-use sector consumption estimates are calculated as the sums of the state estimates.

For 2008 and 2009, the API report only covers sales of propane (including propylene). A new methodology is developed to estimate state-level propane consumption and all other LPG consumption. For propane consumption, API's state shares of propane sales are applied to the U.S. propane product supplied published in EIA's *Petroleum Supply Annual* (PSA).

In SEDS, it is assumed that LPG consumed by the residential, commercial, and transportation sectors and for internal combustion fuel is solely propane. The propane consumption for the residential and consumption sectors and for internal combustion engine fuel use are assigned to LGHCMZZ and LGCBMZZ respectively. The same methodology used for 1960 through 2007 to derive LPG consumption for the residential, commercial, and transportation sectors is maintained:

LGCBPZZ = LGCBMZZ / 42
LGHCPZZ = LGHCMZZ / 42
LGRCPZZ = LGHCPZZ * LGRCSZZ
LGCCPZZ = LGHCPZZ * LGCCSZZ
LGACPZZ = LGCBPZZ * LGTRSUS

LPG consumption for the industrial sector, LGICP, is estimated by summing the estimates for the four components:

- Propane — State-level industrial consumption is calculated by subtracting residential, commercial, and transportation sector consumption from total propane consumption.
- Ethane — Data on ethane feed slate capacity of ethylene steam crackers published by the *Oil and Gas Journal* (OGJ) are used to compute a set of state-level preliminary ethane demand, using an ethylene yield factor of 0.8 and a conversion factor of 16.85 barrels per metric ton. Ethane estimates for the two largest consuming states, Louisiana and Texas (where most, if not all, flexible crackers are located), are further adjusted so that the sum of all states' ethane consumption matches the U.S. ethane product supplied published in PSA.
- Normal butane (n-butane) consumed by steam crackers is estimated using data on n-butane feed slate capacity from OGJ and applied them to the U.S. ethylene feed slate demand for n-butane, also available from OGJ. N-butane for other uses, defined as U.S. n-butane total product supplied less ethylene feed slate demand, is allocated to Texas.
- Isobutane — The U.S. product supplied of isobutane is allocated to Texas.

N-butane and isobutane used in gasoline blending and alkylation at the refineries are accounted for in intermediate product processing and not considered end-use consumption.

U.S. totals for the four end-use sector consumption estimates are calculated as the sums of the state estimates.

Total LPG consumption, LGTCP, is the sum of the four end-use sectors' LPG consumption:

LGTCPZZ = LGACPZZ + LGCCPZZ + LGICPZZ + LGRCPZZ

British thermal units (Btu)

The Btu consumption of LPG for the United States, LGTCBUS, is extracted from EIA's *Annual Energy Review* and *Monthly Energy Review*. It is calculated

by multiplying total physical unit consumption (LGTCPUS) with an average conversion factor for LPG. The factor for converting LPG from physical unit values to Btu, LGTCKUS, is calculated annually for 1967 through 2009 by EIA as a consumption-weighted average of the heat contents of the component products (ethane, propane, normal butane, and isobutane) as shown in Appendix B, beginning on page 203. For 1960 through 1966, EIA adopted the 1967 calculated average heat content of 3.810 million Btu per barrel.

LGTCBUS = LPG total consumption in the United States, in billion Btu (through 2009); and

LGTCKUS = Factor for converting U.S. consumption of LPG from physical units to Btu (through 2009).

Because the residential, commercial, and transportation sectors consume mainly propane, it is more appropriate to use the heat content of propane (3.841 million Btu per barrel) to convert LPG consumption for these three sectors into Btu:

LGACBZZ = LGACPZZ * 3.841
LGCCBZZ = LGCCPZZ * 3.841
LGRCBZZ = LGRCPZZ * 3.841

The U.S. totals for the three sectors are the sum of the state estimates.

Industrial sector consumption for the United States is calculated by subtracting the three sectors' consumption estimates from the total:

LGICBUS = LGTCBUS - (LGACBUS + LGCCBUS + LGRCBUS)

Industrial sector consumption for each state is estimated by allocating the U.S. industrial consumption to the states in proportion to the physical unit share:

LGICBZZ = (LGICPZZ / LGICPUS) * LGICBUS

Total estimated consumption of LPG is the sum of the end-use consumption estimates:

LGTCBZZ = LGACBZZ + LGCCBZZ + LGICBZZ + LGRCBZZ

The average conversion factor for industrial consumption of LPG, LGICKUS, is calculated for use in the price computation:

LGICKUS = LGICBUS / LGICPUS

Additional notes

1. Sales data for Maryland and the District of Columbia (D.C.) are combined in the source documents through 2009. Sales data are published in six categories through 2007. The percentages shown in Table TN4.2 are applied to disaggregate the state data in each of the sectors for these years. For 2008 and 2009, the same percentages for the residential and commercial, and internal combustion engine fuel shown in Table TN4.2 are applied to the combined Maryland and D.C. sales for those sales categories. The percentages for the remaining categories are combined using the 2007 data for those categories, resulting in 99.79% for Maryland and 0.21% for D.C. These percentages are applied to the remaining volumes of the combined Maryland and D.C. sales.
2. Sales of LPG for internal combustion engine fuel use are divided between the transportation sector and the industrial sector by using LGTRSUS, the transportation sector's share of internal combustion engine use. LGTRSUS is estimated from data on "special fuels used on highways," a category that includes only LPG and diesel fuel. The special fuels data are published by the U.S. Department of Transportation, Federal Highway Administration (see MGSFPZZ on page 71). The quantity of LPG included in special fuels is estimated each year. LGTRSUS is then derived by dividing the quantity of LPG included in special fuels used on highways by the quantity of LPG sold for internal combustion engine use. This U.S. factor is applied to the internal combustion engine use of each state. LGTRSUS values are shown in Table TN4.3.
3. The shares of propane used by the residential (LGRCS) and commercial (LGCCS) sectors for each state are based on propane sales data in the API report for 2003 through 2009. The average shares of 2003 through 2008 are applied to the earlier years. Data for LPG sold for residential and commercial use are then split into the two end-use sectors using these two variables.
4. LPG sales data by state and end-use categories for 1960 through 1982 are from EIA's "Sales of Liquefied Petroleum Gases and Ethane." In 1979, EIA modified the LPG sales survey, Form EIA-174, and changed the list of respondents. Because of the updated sampling frame, the 1979 through 1982 sales data may not be directly comparable to the pre-1979 sales when a different estimation procedure was used. Explanation of the discontinuities caused by the change in the 1979 sampling frame are provided in EIA's *Energy Data Report,* "Sales of Liquefied Petroleum Gases and Ethane in 1979." Because of the change in survey techniques used for measuring LPG sales, many states' data were withheld from publication in the 1979 through 1982 LPG sales reports to avoid disclosure of company-level data. The consumption estimates in SEDS use all data

Table TN4.2. Percentages used to disaggregate Maryland and D.C. combined LPG sales data, 1960 through 2007

Sales Category	Maryland	D.C.
Residential and commercial	99.9%	0.1%
Internal combustion engine fuel	98.9%	1.1%
Industrial	99.4%	0.6%
Chemical	100.0%	0.0%
Utility gas	100.0%	0.0%
Miscellaneous	100.0%	0.0%

published in the 1979 through 1982 LPG sales reports and estimates prepared by EIA's Office of Oil and Gas for data that were withheld from publication. (See Note 5 following for estimation procedures.) Some end-use categories changed in 1979 due to redefinition of the classifications. One of these changes, for example, occurred with LPG sold to farms for household heating and cooking. Before 1979 these sales were reported as part of the residential and commercial category, while in 1979 they were counted in the farm use category that goes into the industrial sector in SEDS. No attempt has been made to adjust for this type of inconsistency. The Form EIA-174 was cancelled after collection of 1982 data. The 1983 LPG consumption estimates are based on the assumption that LPG end-use sector demand in 1983 occurred in the same proportion as 1982 sector demand within each state; i.e., the 1983 LPG product supplied figure was allocated to the states by using the distribution of volumes consumed for 1982.

5. The following procedures were used to estimate the state end-use sales that were withheld from publication in the 1979-1982 LPG sales reports:
   - For each year, missing state total sales were estimated by allocating the sum of the missing state sales within each Petroleum Administration for Defense (PAD) district to the individual states, in proportion to the sum of the known end-use sales for those states.
   - Missing PAD district end-use totals for 1979 and 1980 were obtained by using the 1980 and 1981 sales reports. Missing PAD district chemical sales were estimated by allocating the total missing volume of chemical sales to the PAD district in proportion to the number of chemical plants in each PAD district. The remaining PAD district end-use totals were obtained by subtraction. For 1981 and 1982, no PAD district estimations were necessary because all PAD district end-use totals are known.
   - The published data and the estimated state and PAD district end-use totals were used to estimate missing state end-use sales volumes within a PAD district: missing state end-use sector values were estimated by allocating the missing volume for the state approximately proportional to the PAD district end-use sector totals.

Table TN4.3. Transportation sector share of LPG internal combustion engine use, 1960 through 2009

Year	LGTRSUS	Year	LGTRSUS	Year	LGTRSUS
1960	0.229	1977	0.478	1994	0.734
1961	0.258	1978	0.594	1995	0.416
1962	0.266	1979	0.536	1996	0.337
1963	0.273	1980	0.380	1997	0.278
1964	0.259	1981	0.671	1998	0.592
1965	0.290	1982	0.579	1999	0.364
1966	0.325	1983	0.578	2000	0.215
1967	0.368	1984	0.631	2001	0.204
1968	0.389	1985	0.440	2002	0.325
1969	0.341	1986	0.456	2003	0.403
1970	0.363	1987	0.375	2004	0.365
1971	0.423	1988	0.437	2005	0.513
1972	0.392	1989	0.428	2006	0.496
1973	0.384	1990	0.471	2007	0.370
1974	0.381	1991	0.426	2008	0.796
1975	0.406	1992	0.425	2009	0.629
1976	0.440	1993	0.443		

6. Before 1979, state data for chemical use of LPG were withheld from publication, although they were included in the U.S. total in the tables in EIA's "Sales of Liquefied Petroleum Gases and Ethane" reports. Beginning in 1979, state-level chemical use data were published in the LPG sales reports, but data for several states were withheld. Estimates for the withheld data for chemical use sales for 1979 and 1980 were created by using the estimation procedure described in Note 5 on page 46. Then the published and the estimated state data for 1979 were used to create state shares of the total U.S. chemical use sales. These percentage shares (shown in Table TN4.4) were applied to the total U.S. LPG chemical use sales in 1960 through 1978 to create state chemical use estimates. The chemical use estimates were added to the states' total LPG sales series, LGTTPZZ.
7. For 1984 through 2007, the American Petroleum Institute (API), the Gas Processors Association, and the National LP-Gas Association jointly sponsored an LPG sales survey. The results are published in the API's report *Sales of Natural Gas Liquids and Liquefied Refinery Gases*. These data include sales of natural gasoline (pentanes plus); the natural

Table TN4.4. State shares of the total U.S. LPG sold for chemical use, 1960 through 1978

State	Percent	State	Percent
Alabama	0.000	Montana	0.000
Alaska	0.589	Nebraska	0.000
Arizona	0.000	Nevada	0.000
Arkansas	0.000	New Hampshire	0.000
California	2.667	New Jersey	2.040
Colorado	0.232	New Mexico	0.603
Connecticut	0.053	New York	0.000
Delaware	0.811	North Carolina	0.327
District of Columbia	0.000	North Dakota	0.000
Florida	0.000	Ohio	1.103
Georgia	0.699	Oklahoma	0.309
Hawaii	0.000	Oregon	0.000
Idaho	0.000	Pennsylvania	0.354
Illinois	7.066	Rhode Island	0.000
Indiana	0.243	South Carolina	0.021
Iowa	0.900	South Dakota	0.000
Kansas	0.451	Tennessee	0.000
Kentucky	2.548	Texas	57.425
Louisiana	20.566	Utah	0.000
Maine	0.012	Vermont	0.000
Maryland	0.050	Virginia	0.025
Massachusetts	0.009	Washington	0.000
Michigan	0.151	West Virginia	0.286
Minnesota	0.000	Wisconsin	0.000
Mississippi	0.315	Wyoming	0.091
Missouri	0.054	United States	100.000

gasoline data were removed by EIA before use in SEDS.

For 1997 through 2007, API incorporated additional imports and exports data in their estimates. Those trade data are also removed by EIA before use in SEDS.

Data sources

LGCBMZZ — LPG sold for internal combustion engine use by state (through 2009). Note: Data for Maryland and the District of Columbia are combined for all years. The method for disaggregating the data is explained in Note 1, on page 45.

- 1960 through 1967: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Liquefied Petroleum Gases and Ethane." The specific tables are
  - 1960 and 1961: Table 5 (data called "Shipments").
  - 1962 through 1966: Table 2 (data called "Consumption").
  - 1967: Table 2 (data called "Shipments").
- 1968 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Sales of Liquefied Petroleum Gases and Ethane," Table 2.
- 1976 through 1980: EIA, *Energy Data Reports*, "Sales of Liquefied Petroleum Gases and Ethane," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, "Sales of Liquefied Petroleum Gases and Ethane," Table 3.
- 1983: EIA estimates.

Note: For 1984 through 2009, some data are adjusted and estimated by EIA. (See explanation in Note 7 on page 46.)

- 1984 through 1988: American Petroleum Institute, *1990 Sales of Natural Gas Liquids and Liquefied Refinery Gases*, pages 24 through 33.
- 1989 through 1991: American Petroleum Institute, *1992 Sales of Natural Gas Liquids and Liquefied Refinery Gases*, pages 4, 5, 18, and 19.
- 1992 through 2007: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table 3.
- 2008 and 2009: EIA estimates based on propane sold for internal combustion engine use by state, published by the American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table B.

LGCCSZZ — Commercial sector share of residential and commercial sales of LPG (through 2009).

- 1960 through 2002: EIA estimates based on the residential and commercial shares of propane used by the residential and commercial sectors published by the American Petroleum Institute.
- 2003 through 2007: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table 3.
- 2008 and 2009: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table B.

LGHCMZZ — LPG sold for residential and commercial use by state (through 2009). Note: Data for Maryland and the District of Columbia are combined for all years. The method for disaggregating the data is explained in Note 1, on page 45.

- 1960 through 1967: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Liquefied Petroleum Gases and Ethane." The specific tables are
  - 1960 and 1961: Table 5 (data called "Shipments").
  - 1962 through 1966: Table 2 (data called "Consumption").
  - 1967: Table 2 (data called "Shipments").
- 1968 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Sales of Liquefied Petroleum Gases and Ethane," Table 2.
- 1976 through 1980: EIA, *Energy Data Reports*, "Sales of Liquefied Petroleum Gases and Ethane," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, "Sales of Liquefied Petroleum Gases and Ethane," Table 3.
- 1983: EIA estimates.

Note: For 1984 through 2009, some data are adjusted and estimated by EIA. (See explanation in Note 7, on page 46).

- 1984 through 1988: American Petroleum Institute, *1990 Sales of Natural Gas Liquids and Liquefied Refinery Gases*, pages 24 through 33.
- 1989 through 1991: American Petroleum Institute, *1992 Sales of Natural Gas Liquids and Liquefied Refinery Gases*, pages 4, 5, 18, and 19.
- 1992 through 2007: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table 3.
- 2008 and 2009: EIA estimates based on propane sold for residential and commercial use by state, published by the American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table B.

LGICPZZ — LPG consumed by the industrial sector (through 2009).

- 1960 through 2007: Calculated in SEDS.
- 2008 and 2009: Estimated by EIA, based on U.S. product supplied, EIA *Petroleum Supply Annual* and data on ethylene feed slate capacity and normal butane demand from the *Oil and Gas Journal*.

LGRCSZZ — Residential sector share of residential and commercial sales of LPG (through 2009).

- 1960 through 2002: EIA estimates based on the residential and commercial shares of propane used by the residential and commercial sectors published by the American Petroleum Institute.
- 2003 through 2007: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table 3.
- 2008 and 2009: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table B.

LGTCBUS — LPG total consumption in the United States, in billion Btu (through 2009).

- 1960 through 1972: EIA, *Annual Energy Review*, Table 5.12.
- 1973 through 2009: EIA, *Monthly Energy Review*, Table 3.6.

LGTCKUS — Factor for converting LPG from physical units to Btu (through 2009).

- 1960 through 1966: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Crude Petroleum and Petroleum Products, 1956," Table 4 footnote, constant value of 4.011 million Btu per barrel.
- 1967 through 2009: Calculated annually by EIA as a weighted average by multiplying the quantity consumed of each of the component products by each product's conversion factor and dividing the sum of those heat contents by the sum of the quantities consumed. The component products are ethane (including ethylene), propane (including propylene), normal butane (including butylene), butane-propane mixtures, ethane-propane mixtures, and isobutane. Their heat content conversion factors are listed in Appendix B beginning on page 185. Quantities consumed are from
  - 1967 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
  - 1981 through 2009: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied."
  - The specific tables are
    - 1981 through 2004: Table 2.
    - 2005 through 2009: Table 1.

LGTCPUS — LPG total consumption in the United States (through 2009).

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*. "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 through 2009: EIA, *Petroleum Supply Annual*, http://www.eia.gov/

petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 through 2009: Table 1.

LGTRSUS — The transportation sector share of LPG internal combustion engine sales (through 2009).

- EIA estimates based on the LPG portion of the special fuels used on highways published by the U.S. Department of Transportation, Federal Highway Administration (variable MGSFPUS in SEDS), as a percentage of the LPG sold for internal combustion engine use published by the American Petroleum Institute (variable LGCBMUS in SEDS). For an explanation of the estimation method, see Note 2, on page 45.

LGTTPZZ — LPG total sales for all uses by state (through 2009).

Note: Data for Maryland and the District of Columbia are combined for all years. The method for disaggregating the data is explained in Note 1, on page 45.

- 1960 through 1967: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Liquefied Petroleum Gases and Ethane." The specific tables are
  - 1960 and 1961: Table 5 (data called "Shipments").
  - 1962 through 1966: Table 2 (data called "Consumption").
  - 1967: Table 2 (data called "Shipments").
- 1968 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Sales of Liquefied Petroleum Gases and Ethane," Table 2.
- 1976 through 1980: EIA, *Energy Data Reports*, "Sales of Liquefied Petroleum Gases and Ethane," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, "Sales of Liquefied Petroleum Gases and Ethane," Table 3.
- 1983: EIA estimates.

Note: For 1984 through 2009, some data are adjusted and estimated by EIA. (See explanation in Note 7, on page 46).

- 1984 through 1988: American Petroleum Institute, *1990 Sales of Natural Gas Liquids and Liquefied Refinery Gases*, pages 24 through 33.
- 1989 through 1991: American Petroleum Institute, *1992 Sales of Natural Gas Liquids and Liquefied Refinery Gases*, pages 4, 5, 18, and 19.
- 1992 through 2007: American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table 3.
- 2008 and 2009: EIA estimates based on propane sold for internal combustion engine use by state, published by the American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table B.

Natural gasoline (formerly pentanes plus)

Before 2010, natural gasoline (formerly called pentanes plus) consumption is assumed to be equal to historical pentanes plus consumption, which included historical natural gasoline, plant condensate, pentanes plus, and unfractionated streams.

NATCPUS	=	historical natural gasoline (including isopentane) total consumption in the United States, in thousand barrels (through 1983);
PLTCPUS	=	plant condensate total consumption in the United States, in thousand barrels (through 1983);
PPTCPUS	=	pentanes plus (natural gasoline) total consumption in the United States, in thousand barrels (1984 through 2009); and
USTCPUS	=	unfractionated streams total consumption in the United States, in thousand barrels (through 1983).

All natural gasoline consumption is assumed to be in the industrial sector. This section covers natural gasoline consumption for 1960 through 2009.

For 2010 forward, SEDS reports natural gasoline (pentanes plus) as a HGL product. See Hydrocarbon Gas Liquids (2010 Forward).

Physical units

Natural gasoline (formerly pentanes plus) is used mainly as petrochemical feedstocks in the same way as naphtha. All natural gasoline consumption is assumed to be in the industrial sector.

Historical natural gasoline (including isopentane), plant condensate, and unfractionated streams are discontinued from the source after 1983. Beginning in 1984, historical natural gasoline and plant condensate are reported together as a new product, pentanes plus; and unfractionated streams are discontinued because its components are reported separately as liquefied petroleum gases. These products are used mostly as petrochemical feedstocks.

To allocate the U.S. consumption of these products to the states, the state

shares of capacity of steam crackers using napthas (FNCASZZ) are used. The method of estimation of FNCASZZ is discussed on page 85.

Historical natural gasoline (including isopentane) state and U.S. consumption are estimated:

NATCPZZ = NATCPUS * FNCASZZ
NAICPZZ = NATCPZZ
NAICPUS = NATCPUS

Pentanes plus (natural gasoline) state and U.S. consumption are estimated:

PPTCPZZ = PPTCPUS * FNCASZZ
PPICPZZ = PPTCPZZ
PPICPUS = PPTCPUS

Plant condensate state and U.S. consumption are estimated:

PLTCPZZ = PLTCPUS * FNCASZZ
PLICPZZ = PLTCPZZ
PLICPUS = PLTCPUS

Unfractionated streams state and U.S. consumption are estimated:

USTCPZZ = USTCPUS * FNCASZZ
USICPZZ = USTCPZZ
USICPUS = USTCPUS

British thermal units (Btu)

Btu estimates for the four historical natural gasoline (pentanes plus) products are developed by multiplying each individual product's estimated consumption in physical units by its respective approximate heat content conversion factor. The calculations performed to estimate total Btu consumption and industrial use Btu consumption by state and for the United States are

NATCBZZ = NATCPZZ * 4.638
NATCBUS = ΣNATCBZZ
NAICBZZ = NATCBZZ
NAICBUS = NATCBUS
PLTCBZZ = PLTCPZZ * 5.418
PLTCBUS = ΣPLTCBZZ
PLICBZZ = PLTCBZZ
PLICBUS = PLTCBUS
PPTCBZZ = PPTCPZZ * 4.638
PPTCBUS = ΣPPTCBZZ
PPICBZZ = PPTCBZZ
PPICBUS = PPTCBUS
USTCBZZ = USTCPZZ * 3.800
USTCBUS = ΣUSTCBZZ
USICBZZ = USTCBZZ
USICBUS = USTCBUS

Additional note

Before the 2010 cycle, natural gasoline (pentanes plus) was allocated to the states in proportion to the value of shipments or value added in the manufacture of industrial organic chemicals from the Economic Censuses collected by the U.S. Census Bureau. Organic chemical manufacturing was used because state-level data for petrochemical manufacturing were not available. This resulted in the allocation of petrochemical feedstocks to more than 25 states, most of which did not produce petrochemicals. The steam cracker capacity shares, while requiring estimations, are better allocators.

Data sources

NATCPUS — Natural gasoline total consumption in the United States (through 1983).

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys. "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 through 1983: EIA, *Petroleum Supply Annual*, Table 2.

PLTCPUS — Plant condensate total consumption in the United States (through 1983).

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys. "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 through 1983: EIA, *Petroleum Supply Annual*, Table 2.

PPTCPUS — Pentanes plus (natural gasoline) total consumption in the United States.

- 1960 through 1983: Data were reported separately as natural gasoline, isopentane, and plant condensate.
- 1984 through 2009: EIA, *Petroleum Supply Annual*, table on U.S. Supply,

Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
- 1984 through 2004: Table 2.
- 2005 through 2009: Table 1.

USTCPUS — Unfractionated streams total consumption in the United States (through 1983).

- 1960 through 1978: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1, included in "Plant Condensate."
- 1979 and 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 through 1983: EIA, *Petroleum Supply Annual*, Table 2, column titled "Products Supplied."

Hydrocarbon gas liquids (HGL)

Before 2010, HGL consumption is defined as the sum of LPG and pentanes plus (natural gasoline). Because pentanes plus is only used in the industrial sector, HGL consumption in the other end-use sectors is equal to LPG consumption:

HLRCPZZ = LGRCPZZ
HLCCPZZ = LGCCPZZ
HLACPZZ = LGACPZZ

HLRCBZZ = LGRCBZZ
HLCCBZZ = LGCCBZZ
HLACBZZ = LGACBZZ

Before 1984, industrial sector HGL consumption is equal to:

HLICPZZ = LGICPZZ + NATCPZZ + PLTCPZZ + USTCPZZ
HLICBZZ = LGICBZZ + NATCBZZ + PLTCBZZ + USTCBZZ

For 1984 through 2009, industrial sector HGL consumption is equal to:

HLICPZZ = LGICPZZ + PPICPZZ
HLICBZZ = LGICBZZ + PPICBZZ

Total HGL consumption is the sum of the end-use consumption estimates:

HLTCPZZ = HLACPZZ + HLCCPZZ + HLICPZZ + HLRCPZZ
HLTCBZZ = HLACBZZ + HLCCBZZ + HLICBZZ + HLRCBZZ

Total U.S. HGL consumption in physical unit is the sum of the product supplied of LPG and pentanes plus:

Before 1984:

HLTCPUS = LGTCPUS + NATCPUS + PLTCPUS + USTCPUS

For 1984 through 2009:

HLTCPUS = LGTCPUS + PPTCPUS

The U.S. totals for all other HL consumption series are calculated as the sum of the state values.

Hydrocarbon Gas Liquids (2010 Forward)

Hydrocarbon gas liquids (HGL) cover 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 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.

For 2010 forward, the U.S. Energy Information Administration (EIA) publishes U.S. products supplied data for total HGL and the nine HGL products, which are used to define U.S. consumption in SEDS:

HLTCPUS	=	hydrocarbon gas liquids total consumption in the United States, in thousand barrels;
BQTCPUS	=	normal butane total consumption in the United States, in thousand barrels;
BYTCPUS	=	butylene from refineries total consumption in the United States, in thousand barrels;
EQTCPUS	=	ethane total consumption in the United States, in thousand barrels;
EYTCPUS	=	ethylene from refineries total consumption in the United States, in thousand barrels;
IQTCPUS	=	isobutane total consumption in the United States, in thousand barrels;
IYTCPUS	=	isobutylene from refineries total consumption in the United States, in thousand barrels;
PPTCPUS	=	natural gasoline (pentanes plus) total consumption in the United States, in thousand barrels;
PQTCPUS	=	propane total consumption in the United States, in thousand barrels; and
PYTCPUS	=	propylene from refineries total consumption in the United States, in thousand barrels.

Natural gasoline (pentanes plus), which was included in "other petroleum products" through 2015 SEDS reports, is included here in HGL.

SEDS estimates state-level HGL consumption using a combination of EIA estimates, American Petroleum Institute's (API) *Sales of Natural Gas Liquids and Liquefied Refinery Gases* (for 2010 through 2016), Propane Education & Research Council's (PERC) *Retail Propane Sales Report* (for 2017 forward), and *Oil and Gas Journal* (OGJ) ethylene steam cracker capacity data.

Residential sector

Physical units

SEDS assumes all residential sector HGL consumption to be equal to residential propane consumption.

PQRCPZZ	=	propane consumed by the residential sector, in thousand barrels.

For 2010 through 2016, propane consumed by the residential sector is derived from API's *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, sales of odorized propane for the residential sector and sales for retailers. For 2017 forward, propane consumed by the residential sector is derived from PERC's *Retail Propane Sales Report*, sales of odorized propane for the residential sector and for cylinder markets. Sales data are reported in gallons and are converted to barrels (42 U.S. gallons per U.S. barrel) for total SEDS residential propane consumption estimates.

Residential sector HGL consumption in each state, HLRCPZZ, equals residential propane consumption:

HLRCPZZ = PQRCPZZ

The U.S. totals for the state data series are calculated as the sum of the state values.

Commercial sector

Physical units

SEDS assumes all commercial sector HGL consumption to be equal to commercial propane consumption.

PQCCPZZ	=	propane consumed by the commercial sector, in thousand barrels.

Propane consumed by the commercial sector is derived from sales of odorized propane for the commercial sector reported in the API report (2010-2016) or the PERC report (2017 forward). Sales data are reported in gallons and are converted to barrels (42 U.S. gallons per U.S. barrel) for total SEDS commercial consumption estimates.

Commercial sector HGL consumption in each state, HLCCPZZ, equals commercial propane consumption:

HLCCPZZ = PQCCPZZ

The U.S. totals for the state data series are calculated as the sum of the state values.

Industrial sector

For 2010 forward, industrial sector consumption is developed for nine HGL components: normal butane, butylene, ethane, ethylene, isobutane, isobutylene, natural gasoline (pentanes plus), propane, and propylene.

Propane physical units

Beginning in 2010, a new methodology is developed to estimate the consumption of propane in the United States by the industrial sector and allocation to the states.

PQICPZZ = propane consumed by the industrial sector, in thousand barrels.

Propane consumed by the industrial sector is defined by two categories: other odorized industrial propane and industrial propane for chemical use. To calculate other odorized industrial propane consumption, SEDS subtracts the sum of residential, commercial, and transportation sectors' propane consumption for each state from the state's total odorized propane sales, available in the API report (2010-2016) or the PERC report (2017 forward). To calculate industrial propane for chemical use for the United States, U.S. total odorized propane sales are subtracted from U.S. total propane consumption. SEDS uses propane chemical feedstock capacity of ethylene steam crackers from OGJ (2010-2014) or estimated by EIA (2015 forward) to allocate consumption to states. The sum of other odorized industrial propane consumption and industrial propane consumption for chemical use is equal to SEDS total industrial propane consumption. Data originally reported in gallons are converted to barrels (42 U.S. gallons per U.S. barrel) for total SEDS industrial consumption estimates.

Other HGL physical units

SEDS assumes all other HGL products (normal butane, butylene, ethane, ethylene, isobutane, isobutylene, natural gasoline, and propylene) are consumed only by the industrial sector.

BQTCPZZ = normal butane total consumption, in thousand barrels;
BYTCPZZ = butylene from refineries total consumption, in thousand barrels;
EQTCPZZ = ethane total consumption, in thousand barrels;
EYTCPZZ = ethylene from refineries total consumption, in thousand barrels;
IQTCPZZ = isobutane total consumption, in thousand barrels;
IYTCPZZ = isobutylene from refineries total consumption, in thousand barrels;
PPTCPZZ = natural gasoline (pentanes plus) total consumption, in thousand barrels; and
PYTCPZZ = propylene from refineries total consumption, in thousand barrels.

State-level estimates for other HGL products are derived by applying state shares estimated by EIA to the U.S. product supplied for each HGL type.

For normal butane, SEDS estimates consumption for Louisiana using capacities from Oil and Gas Journal (OGJ) ethylene crackers feed slates for n-butane. The remainder is assigned to Texas.

For butylene, SEDS estimates state allocations using SEDS naphtha feedstock capacity shares, based on OGJ data, scaled to total U.S. butylene product supplied from PSA. All consumption is assumed to be in Louisiana and Texas.

For ethane, SEDS estimates consumption for Illinois, Iowa, Kentucky, and Louisiana using ethane feedstock plant nameplate capacities for plants in those states, compiled by EIA based on OGJ (2010-2014) and plant-level information. The remainder is assigned to Texas.

For ethylene, SEDS estimates state allocations using total U.S. ethylene product supplied from PSA and allocated proportionally to states based on SEDS ethane consumption estimates.

For isobutane, SEDS assumes all U.S. consumption is in Texas.

For isobutylene, SEDS estimates state allocations using SEDS naphtha feedstock capacity shares, based on OGJ data, scaled to total U.S. isobutylene product supplied from PSA. All consumption is assumed to be in Louisiana and Texas.

For natural gasoline, SEDS estimates state allocations using SEDS naphtha feedstock capacity shares, based on OGJ data, scaled to total U.S. natural gasoline product supplied from PSA. All consumption is assumed to be in Louisiana and Texas.

For propylene, SEDS estimates state allocations using EIA estimated plant production capacities of products using propylene as feedstock, scaled to total U.S. propylene product supplied from PSA. All consumption is assumed to be in California, Illinois, Kentucky, Louisiana, New Jersey, Ohio, Pennsylvania,

Texas, and West Virginia.

Industrial sector consumption by state for each of the other HGL products is equal to its total consumption. For example,

BQICPZZ = BQTCPZZ

Total industrial HGL consumption for each state is equal to:

HLICPZZ = BQICPZZ + BYICPZZ + EQICPZZ + EYICPZZ + IQICPZZ + IYICPZZ + PPICPZZ + PQICPZZ + PYICPZZ

The U.S. totals for the state data series are calculated as the sum of the state values.

Transportation sector

Physical units

SEDS assumes all transportation sector HGL consumption to be equal to transportation propane consumption.

Beginning in 2010, a new methodology is developed to estimate the consumption of propane in the United States by the transportation sector and allocation to the states:

PQACPZZ = propane consumed by the transportation sector, in thousand barrels.

Total U.S. consumption of propane in the United States by the transportation sector, in British thermal units (Btu), comes from the U.S. Energy Information Administration's (EIA) *Annual Energy Outlook*, supplemental table titled "Transportation Sector Energy Use by Fuel Type Within a Mode." The Btu consumption values are converted to barrels using propane's heat content of 3.841 million Btu per barrel.

For 2010 through 2016, SEDS assumes that 65% of propane is consumed by fleet vehicles, including all medium-duty and heavy-duty vehicles and some light-duty vehicles. The remaining 35% is consumed by other light-duty vehicles.

To allocate medium-duty and heavy-duty vehicles to the states, SEDS uses propane consumption data from Form EIA-886 "Annual Survey of Alternative Fueled Vehicles" to calculate state shares. For light-duty vehicles, SEDS uses the U.S. Department of Transportation, Federal Highway Administration publication, *Highway Statistics*, Table VM-2, "Vehicle-miles of travel, by functional system" to calculate state shares. Lastly, the state allocations for the two categories are summed together to calculate the final state consumption.

For 2017 forward, to allocate the U.S. consumption of propane by the transportation sector to the states, SEDS uses unpublished propane autogas sales data from PERC to compute state shares.

Transportation sector HGL consumption in each state, HLACPZZ, equals transportation propane consumption:

HLACPZZ = PQACPZZ

The U.S. totals for the state data series are calculated as the sum of the state values.

Total

Physical units

Total HGL consumption is the sum of the end-use consumption estimates:

HLTCPZZ = HLACPZZ + HLCCPZZ + HLICPZZ + HLRCPZZ

Total propane consumption is also calculated:

PQTCPZZ = PQACPZZ + PQCCPZZ + PQICPZZ + PQRCPZZ

All sectors

British thermal units (Btu)

Btu estimates for each of the nine HGL products in this group are developed by multiplying the estimated consumption of each individual product in physical units by its respective heat content conversion factor. The calculations performed to estimate residential, commercial, industrial, and total propane Btu consumption, and industrial and total other HGL Btu consumption by state and for the United States are

BQICBZZ = BQICPZZ * 4.353
BQICBUS = ΣBQICBZZ
BQTCBZZ = BQTCPZZ * 4.353
BQTCBUS = ΣBQTCBZZ
BYICBZZ = BYICPZZ * 4.377
BYICBUS = ΣBYICBZZ
BYTCBZZ = BYTCPZZ * 4.377

BYTCBUS = ΣBYTCBZZ
EQICBZZ = EQICPZZ * 2.783
EQICBUS = ΣEQICBZZ
EQTCBZZ = EQTCPZZ * 2.783
EQTCBUS = ΣEQTCBZZ
EYICBZZ = EYICPZZ * 2.436
EYICBUS = ΣEYICBZZ
EYTCBZZ = EYTCPZZ * 2.436
EYTCBUS = ΣEYTCBZZ
IQICBZZ = IQICPZZ * 4.183
IQICBUS = ΣIQICBZZ
IQTCBZZ = IQTCPZZ * 4.183
IQTCBUS = ΣIQTCBZZ
IYICBZZ = IYICPZZ * 4.355
IYICBUS = ΣIYICBZZ
IYTCBZZ = IYTCPZZ * 4.355
IYTCBUS = ΣIYTCBZZ
PPICBZZ = PPICPZZ * 4.638
PPICBUS = ΣPPICBZZ
PPTCBZZ = PPTCPZZ * 4.638
PPTCBUS = ΣPPTCBZZ
PQACBZZ = PQACPZZ * 3.841
PQACBUS = ΣPQACBZZ
PQCCBZZ = PQCCPZZ * 3.841
PQCCBUS = ΣPQCCBZZ
PQICBZZ = PQICPZZ * 3.841
PQICBUS = ΣPQICBZZ
PQRCBZZ = PQRCPZZ * 3.841
PQRCBUS = ΣPQRCBZZ
PYICBZZ = PYICPZZ * 3.835
PYICBUS = ΣPYICBZZ
PYTCBZZ = PYTCPZZ * 3.835
PYTCBUS = ΣPYTCBZZ

Estimated consumption of HGL in Btu is the sum of the Btu consumption of each product by the corresponding sector. The state and U.S. totals are calculated:

HLACBZZ = PQACBZZ
HLACBUS = ΣHLACBZZ
HLCCBZZ = PQCCBZZ
HLCCBUS = ΣHLCCBZZ
HLICBZZ = BQICBZZ + BYICBZZ + EQICBZZ + EYICBZZ + IQICBZZ + IYICBZZ + PPICBZZ + PQICBZZ + PYICBZZ
HLICBUS = ΣHLICBZZ
HLRCBZZ = PQRCBZZ
HLRCBUS = ΣHLRCBZZ

Total HGL and propane consumption in Btu are the sum of the sectors:

PQTCBZZ = PQACBZZ + PQCCBZZ + PQICBZZ + PQRCBZZ
PQTCBUS = ΣPQTCBZZ

HLTCBZZ = HLACBZZ + HLCCBZZ + HLICBZZ + HLRCBZZ
HLTCBUS = ΣHLTCBZZ

Additional calculations

HGL products other than propane are combined for use in the estimation of prices and expenditures. They include normal butane, butylene, ethane, ethylene, isobutane, isobutylene, natural gasoline, and propylene. The variables are calculated in Btu, for each state and the United States:

OHICBZZ = BQICBZZ + BYICBZZ + EQICBZZ + EYICBZZ + IQICBZZ + IYICBZZ + PPICBZZ + PYICBZZ
OHICBUS = ΣOHICBZZ

The average factor for converting hydrocarbon gas liquids consumed by the industrial sector from physical units to Btu is calculated as

HLICKZZ = HLICBZZ / HLICPZZ
HLICKUS = HLICBUS / HLICPUS

HLTCKZZ = HLTCBZZ / HLTCPZZ
HLTCKUS = HLTCBUS / HLTCPUS

Data sources

BQTCPUS — Normal butane total consumption in the United States. BQTCPZZ — Normal butane total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1 and ethylene

crackers feed slates for n-butane from the *Oil and Gas Journal*. For 2015, information on n-butane feed slate capacity of ethylene steam crackers are no longer available from OGJ. The 2014 volumes are used for 2015 forward.

BYTCPUS — Butylene from refineries total consumption in the United States.
BYTCPZZ — Butylene from refineries total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1 and state's share of U.S. capacity of steam crackers using naphtha as feedstocks (FNCAS):
  - 2010 through 2014: *Oil and Gas Journal*, specific issues focusing on ethylene production, table on "International Survey of Ethylene from Steam Crackers."
  - 2015 forward: EIA estimation, based on data available from the *Oil and Gas Journal*.

EQTCPUS — Ethane total consumption in the United States.
EQTCPZZ — Ethane total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1, and data on ethane feedstock capacity of ethylene steam crackers estimated by EIA.

EYTCPUS — Ethylene from refineries total consumption in the United States.
EYTCPZZ — Ethylene from refineries total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1, and data on ethane feedstock capacity of ethylene steam crackers estimated by EIA.

HLTCPUS — Hydrocarbon gas liquids total consumption in the United States.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1.

IQTCPUS — Isobutane total consumption in the United States.
IQTCPZZ — Isobutane total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1.

IYTCPUS — Isobutylene from refineries total consumption in the United States.
IYTCPZZ — Isobutylene from refineries total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1 and state's share of U.S. capacity of steam crackers using naphtha as feedstocks (FNCAS):
  - 2010 through 2014: *Oil and Gas Journal*, specific issues focusing on ethylene production, table on "International Survey of Ethylene from Steam Crackers."
  - 2015 forward: EIA estimation, based on data available from the *Oil and Gas Journal*.

PPTCPUS — Natural gasoline (pentanes plus) total consumption in the United States.
PPTCPZZ — Natural gasoline (pentanes plus) total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1 and state's share of U.S. capacity of steam crackers using naphtha as feedstocks (FNCAS):
  - 2010 through 2014: *Oil and Gas Journal*, specific issues focusing on ethylene production, table on "International Survey of Ethylene from Steam Crackers."
  - 2015 forward: EIA estimation, based on data available from the *Oil*

and Gas Journal.

PQACPUS — Propane consumed by the transportation sector, United States.

- 2010 forward: EIA, *Annual Energy Outlook*, http://www.eia.gov/outlooks/aeo/tables_ref.php, supplemental table titled "Transportation Sector Energy Use by Fuel Type Within a Mode" and historical estimates.

PQACPZZ — Propane consumed by the transportation sector by state.

- 2010 through 2016: State allocators estimated using Form EIA-886, http://www.eia.gov/renewable/afv/users.php?fs=a&ufueltype=LPG, Annual "Survey of Alternative Fueled Vehicles," and Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table VM-2.
- 2017 forward: State allocators estimated using the Propane Education & Research Council, *Retail Propane Sales Report*.

PQCCPZZ — Propane consumed by the commercial sector by state.

- 2010 through 2016: Odorized propane sold for the commercial sector by state, published by the American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table C.
- 2017 forward: Odorized propane sold for the commercial sector by state, published by the Propane Education & Research Council, *Retail Propane Sales Report*.

PQICPZZ — Propane consumed by the industrial sector by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1 and data on propane feedstock capacity of ethylene steam crackers estimated by EIA.
  - 2010 through 2016: Estimated using total odorized propane by state, published by the American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table C.
  - 2017 forward: Estimated using total odorized propane by state, published by the Propane Education & Research Council, *Retail Propane Sales Report*.

PQRCPZZ — Propane consumed by the residential sector by state.

- 2010 through 2016: Odorized propane sold for the residential sector and sales for retailers by state, published by the American Petroleum Institute, *Sales of Natural Gas Liquids and Liquefied Refinery Gases*, Table C.
- 2017 forward: Odorized propane sold for the residential sector and for cylinder markets by state, published by the Propane Education & Research Council, *Retail Propane Sales Report*.

PQTCPUS — Propane total consumption in the United States.

- 2010 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1.

PYTCPUS — Propylene from refineries total consumption in the United States.
PYTCPZZ — Propylene from refineries total consumption by state.

- 2010 forward: Estimated using EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied," Table 1.

Jet Fuel

Jet fuel is used primarily for transportation, although small amounts of kerosene-type jet fuel are also used in the electric power sector. There are two types of jet fuel with different heat contents, kerosene-type jet fuel (JK) and naphtha-type jet fuel (JN), which are added in the State Energy Data System (SEDS) to give total jet fuel (JF). Beginning in 2005, naphtha-type jet fuel is included in "Miscellaneous Petroleum Products" in the data source, and is assigned a zero value in SEDS.

Kerosene-type jet fuel

Physical units

Data series used to calculate kerosene-type jet fuel consumption estimates are ("ZZ" in the variable name represents the two-letter state code that differs for each state)

JKTCPUS	=	kerosene-type jet fuel total consumption, in thousand barrels;
JKEUPZZ	=	the electric utility sector consumption of kerosene-type jet fuel in each state, in thousand barrels (through 1982); and
JKTTPZZ	=	kerosene-type jet fuel total sold, in thousand gallons.

Total U.S. consumption of kerosene-type jet fuel, JKTCPUS, is the product supplied data series in the publication *Petroleum Supply Annual,* published by the U.S. Energy Information Administration (EIA).

Kerosene-type jet fuel consumed by electric utilities, JKEUPZZ, is published by EIA in the *Cost and Quality of Fuels for Electric Utility Plants*. These data are available for 1972 through 1982 only. Consumption from 1983 forward is assumed to be zero in SEDS. Beginning in 2001, jet fuel used for power generation is included in waste/other oil in the source data file. Data for waste/other oil are not processed in SEDS because waste oil is not primary energy—consumption of the petroleum products that produced the waste oil has already been accounted for. As such, a small volume of jet fuel used for power generation is included in the transportation sector consumption.

Kerosene-type jet fuel total sold, JKTTPZZ, was collected by the Ethyl Corporation, Petroleum Chemicals Division, for 1960 through 1983, and is collected by EIA for 1984 forward. The Ethyl Corporation data are sales to commercial users and are used to represent total sales based on the assumption that there is little military use of kerosene-type jet fuel during 1960 through 1983. (See Note 1 in the "Additional Notes" section for the source reference for this assumption.) EIA data for 1984 forward include commercial and military sales. Data for 1984 through 1993 are taken from the EIA *Petroleum Marketing Annual* (PMA). Data for 1994 forward are taken from unpublished data in thousand gallons and are available in thousand gallons per day in PMA (through 2009) and on the EIA website. Before 1994, withheld data are estimated by using averages of published months to fill in withheld months; subtracting published states from published PAD district totals; and assigning values based on previous years' quantities. Beginning in 1994, withheld data are estimated using historical growth rates or state shares. They include Arizona (2009), Connecticut (2011), Delaware (1995, 1997, 1998, and 2013–2018), Hawaii (2002–2004 and 2008–2011), Iowa (2010), Nevada (2010 and 2011), New Hampshire (2009), Oregon (2002–2004 and 2008), Rhode Island (2011 and 2012), Tennessee (2010), and Vermont (2009 and 2012). Kerosene-type jet fuel sales in the District of Columbia are assumed to be zero (1994–2018).

U.S. totals for the two state data series are calculated as the sum of the state data.

Most kerosene-type jet fuel is used by the transportation sector. The transportation sector consumption for the United States (JKACPUS) is estimated as the difference between the total kerosene-type jet fuel consumed and the electric utility consumption:

JKACPUS = JKTCPUS - JKEUPUS

It is assumed that kerosene-type jet fuel consumption in each state is in proportion to the amount sold in each state:

JKACPZZ = (JKTTPZZ / JKTTPUS) * JKACPUS

Total kerosene-type jet fuel by state is estimated as

JKTCPZZ = JKACPZZ + JKEUPZZ

British thermal units (Btu)

Kerosene-type jet fuel has a heat content value of about 5.670 million Btu per barrel. This factor is applied to convert kerosene-type jet fuel from physical units to Btu:

JKACBZZ = JKACPZZ * 5.670
JKACBUS = ΣJKACBZZ
JKEUBZZ = JKEUPZZ * 5.670

Table TN4.5. Estimate of U.S. consumption of kerosene and jet fuel for 1960 through 1963 (Thousand barrels)

Year	(1) Kerosene demand, including commercial jet fuel	(2) Jet fuel demand, military use only	(3) Sales of kerosene for commercial jet fuel use	(4) Estimated kerosene consumption (1) – (3)	(5) Estimated total jet fuel consumption (2) + (3)
1960	132,499	102,803	33,159	99,340	135,962
1961	144,435	104,436	47,187	97,248	151,623
1962	164,167	112,401	66,134	98,033	178,535
1963	172,212	115,237	75,236	96,976	190,473

JKEUBUS = ΣJKEUBZZ
JKTCBZZ = JKTCPZZ * 5.670
JKTCBUS = ΣJKTCBZZ

Additional notes

1. An assumption is made that kerosene-type jet fuel use by the military in 1960 through 1983 is negligible. This assumption is based on product definitions from the American Petroleum Institute's *Standard Definitions for Petroleum Statistics,* Technical Report No. 1, Third Edition (1981), page 13, which states that kerosene-type jet fuel is used primarily by commercial aircraft engines.
2. Ethyl Corporation jet fuel sales to commercial users by state include some sales data that were improperly allocated between the states of Illinois and Indiana for 1960 through 1973. To adjust for this error, the average relative proportions of Illinois and Indiana sales from 1974 through 1978 were applied to the sum of the Illinois and Indiana sales in 1960 through 1973. From 1974 through 1983, sales data were correctly allocated.
3. Jet fuel sales in Illinois decreased sharply from 1984 forward, while sales in Indiana increased by about the same amount. It is possible that jet fuel for use at Chicago, Illinois, airports may have been purchased in Indiana. The same anomaly may have happened between New York and New Jersey beginning in 1981, when jet fuel for consumption at New York City airports may have been purchased in New Jersey. This is an inherent problem when using sales data as an indication of consumption, and no attempt has been made to adjust the numbers.
4. Before 1964, kerosene-type jet fuel was included in the total kerosene product supplied data in the source, the U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 2, "Salient Statistics of the Major Refined Petroleum Products in the United States." Table TN4.5 summarizes the derivation of kerosene and jet fuel consumption estimates (columns 4 and 5) from data published in the source (columns 1, 2,and 3) for 1960 through 1963. For 1964 and years following, kerosene and kerosene-type jet fuel are reported separately in the source documents.
5. Kerosene-type jet fuel consumed by electric utilities, JKEUPZZ, is published in the EIA *Cost and Quality of Fuels for Electric Utility Plants*. These data are available for 1972 through 1982 only. Consumption in all other years is assumed to be zero. State-level data for 1972 through 1974 are not available. The percentage of each state's consumption of the total U.S. consumption in 1975 was used to apportion the 1972 through 1974 national data to the states.

Data sources

JKEUPZZ — Kerosene-type jet fuel consumed by electric utilities by state (through 1982).

- 1960 through 1971: No data available. Values are assumed to be zero.
- 1972 through 1974: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Sales of Fuel Oil and Kerosene," Table 15 footnote for U.S. value. These data were apportioned to the states by using the 1975 state proportions of the 1975 U.S. total from the source below.
- 1975 through 1979: Office of Electric Power Regulation, Federal Energy Regulatory Commission, *Annual Summary of Cost and Quality of Electric Utility Plant Fuels*, "Fuel Oil Deliveries for Combustion Turbine and Internal Combustion Units."
- 1980 through 1982: EIA, *Cost and Quality of Fuel for Electric Utility Plants*, Table 30.

JKTTPZZ — Kerosene-type jet fuel total sold by state.

- 1960 through 1983: Ethyl Corporation, Petroleum Chemicals Division, *Yearly Report of Gasoline Sales by States*, "Aviation Turbine Fuel Sales."
- 1984 and 1985: EIA, *Petroleum Marketing Annual 1985*, Volume2.
  - 1984: Table A6.
  - 1985: Table 34.
- 1986 through 1988: EIA, *Petroleum Marketing Annual*, Table 46.
- 1989 through 1993: EIA, *Petroleum Marketing Annual*, Table 48.
- 1994 forward: Unpublished data in thousand gallons from Form EIA-782C, "Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption." Data published in thousand gallons per day in EIA, *Petroleum Marketing Annual*, http://www.eia.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html and on the Prime Supplier Sales Volumes website at http://www.eia.gov/dnav/pet/pet_cons_prim_a_EPJK_P00_Mgalpd_a.htm.
  - 1994 through 2006: Table 49.
  - 2007 through 2009: Table 46.
  - 2010 forward: Web table only, at http://www.eia.gov/dnav/pet/pet_cons_prim_a_EPJK_P00_Mgalpd_a.htm.

JKTCPUS — Kerosene-type jet fuel total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Naphtha-type jet fuel

Physical units

Two data series are used to estimate naphtha-type jet fuel consumption:

JNTCPUS = naphtha-type jet fuel total consumption, in thousand barrels; and

JNMIPZZ = naphtha-type jet fuel issued to the military in each state, in thousand barrels.

Total U.S. consumption of naphtha-type jet fuel, JNTCPUS, is the product supplied data series in the publication *Petroleum Supply Annual,* published by EIA. Beginning in 2005, it is included in "Miscellaneous Petroleum Products," and is assigned a zero value in SEDS.

It is assumed that all naphtha-type jet fuel is used in military aircraft engines. (See the Additional Notes at the end of this section for the source reference for this assumption.) Data on naphtha-type jet fuel issued to the military in each state, JNMIPZZ, are from the U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center.

The total U.S. military issues is the sum of the state data:

JNMIPUS = ΣJNMIPZZ

An estimate of naphtha-type jet fuel consumption by state, JNTCPZZ, is calculated by assuming that each state consumes naphtha-type jet fuel in proportion to the amount issued to the military in that state:

JNTCPZZ = (JNMIPZZ / JNMIPUS) * JNTCPUS

All naphtha-type jet fuel is assumed to be used for transportation purposes so the transportation consumption equals the estimated total consumption for each state and for the United States:

JNACPZZ = JNTCPZZ
JNACPUS = JNTCPUS

British thermal units (Btu)

Naphtha-type jet fuel has a heat content value of about 5.355 million Btu per barrel. This factor is applied to convert naphtha-type jet fuel from physical units to Btu:

JNTCBZZ = JNTCPZZ * 5.355
JNTCBUS = ΣJNTCBZZ

Naphtha-type jet fuel consumed in the transportation sector is equal to total consumption.

JNACBZZ = JNTCBZZ
JNACBUS = JNTCBUS

Additional notes

1. An assumption is made that the naphtha-type jet fuel is for military

use only. This assumption is based on product definitions from the American Petroleum Institute's *Standard Definitions for Petroleum Statistics*, Technical Report No. 1, Third Edition (1981), page 13, which states that naphtha-type jet fuel is used primarily by military aircraft engines.

2. Data on naphtha-type jet fuel issued to the military for each state (JNMIPZZ) are obtained from the U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center. There are no data available for 1960 through 1974, and the data available for 1975 and 1976 are not consistent; therefore, the 1977 values are used for 1960 through 1976 in SEDS. The data are reported by fiscal year for 1977 through 1988 and are taken from the Defense Energy Information System. For 1989 and 1990, fiscal-year data from two databases, Defense Fuel Automated Management System and the Into-Plane Database, are summed. For 1991 and 1992, data from the same two databases, reported by calendar year, are used.
3. Because total naphtha-type jet fuel product supplied is assumed to be zero beginning in 2005, naphtha-type jet fuel issued to the military is also assumed to be zero for 2005 forward.

Data sources

JNMIPZZ — Naphtha-type jet fuel issued to the military in the United States.

- 1960 through 1974: No data are available. The 1977 data are used for each year.
- 1975 and 1976: No consistent data series are available. The 1977 data are used for both years.
- 1977 through 1987: The U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center, Defense Energy Information System, military retail issues based on fiscal year data. The District of Columbia issues are assumed to be zero; therefore, values reported for the District of Columbia are added to Maryland.
- 1988: U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center, average of 1987 data (see source above) and 1989 data (see source below).
- 1989 and 1990: U.S. Department of Defense, Defense Logistics Agency, Defense Fuel Supply Center, Defense Fuel Automated Management System, military wholesale issues based on fiscal year data.
- 1991 through 2004: U.S. Department of Defense, Defense Logistics Agency, Defense Energy Supply Center. State data for the calendar year from two databases are summed: Defense Fuel Automated Management System (military wholesale issues) and Into-Plane Database (military purchases from commercial airports). Into-plane values reported for the District of Columbia are added to Virginia.
- 2005 forward: Value entered in SEDS as zero.

JNTCPUS — Naphtha-type jet fuel total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Data not reported separately. Volumes are included in "Miscellaneous Products" in the *Petroleum Supply Annual*, Table 1. Value entered in SEDS as zero.

Jet fuel totals

Physical units

The following calculations are used to provide total jet fuel consumption estimates by end use in physical units:

JFACPZZ	=	JKACPZZ + JNACPZZ
JFACPUS	=	ΣJFACPZZ
JFEUPZZ	=	JKEUPZZ
JFEUPUS	=	JKEUPUS
JFTCPZZ	=	JFACPZZ + JFEUPZZ
JFTCPUS	=	ΣJFTCPZZ

British thermal units (Btu)

The following calculations are used to provide total jet fuel consumption estimates by end use in Btu:

JFACBZZ	=	JKACBZZ + JNACBZZ
JFACBUS	=	ΣJFACBZZ
JFEUBZZ	=	JKEUBZZ
JFEUBUS	=	JKEUBUS

JFTCBZZ = JFACBZZ + JFEUBZZ
JFTCBUS = ΣJFTCBZZ

Kerosene

Physical units

Because state-level and end-use consumption data for kerosene are not available, four data series published by the U.S. Energy Information Administration (EIA) representing sales of kerosene into or within each state are used to estimate kerosene consumption. The fifth data series, the U.S. total consumption, is the product supplied series from the EIA *Petroleum Supply Annual*. The sales series are used to apportion the known U.S. total consumption into state-level estimates of end-use consumption. The following variable names have been assigned to the five data series ("ZZ" in the variable names represents the two-letter state code that differs for each state):

KSCMPZZ = kerosene sold to the commercial sector, in thousand barrels;
KSIHPZZ = kerosene sold to the industrial sector, in thousand barrels;
KSOTPZZ = kerosene sold for all other uses, including farm use, in thousand barrels;
KSRSPZZ = kerosene sold to the residential sector, in thousand barrels; and
KSTCPUS = kerosene total consumption in the United States, in thousand barrels.

U.S. sales totals for each of the four state-level series are created by summing the state values.

The variables are combined as closely as possible into the major end-use sectors used in SEDS. The residential and commercial sectors contain only KSRSPZZ and KSCMPZZ, respectively.

The sales of kerosene to the industrial sector, KSINPZZ, for each state is the sum of kerosene sold for industrial heating and processing (KSIHPZZ) and kerosene sold for all other uses (KSOTPZZ), including farm use. Sales of kerosene to the industrial sector are calculated:

KSINPZZ = KSOTPZZ + KSIHPZZ
KSINPUS = ΣKSINPZZ

Total sales of kerosene in each state is the sum of these three sectors' sales:
KSTTPZZ = KSRSPZZ + KSCMPZZ + KSINPZZ
KSTTPUS = ΣKSTTPZZ

An estimate of each state's total consumption of kerosene is made by disaggregating the U.S. total consumption to the states in proportion to each state's sales share of the U.S. total sales:

KSTCPZZ = (KSTTPZZ / KSTTPUS) * KSTCPUS

Each state's residential sector sales percentage of total sales is applied to the state's estimated total consumption to create estimated residential sector consumption for the state, KSRCPZZ:

KSRCPZZ = (KSRSPZZ / KSTTPZZ) * KSTCPZZ

The commercial sector's estimated consumption in each state, KSCCPZZ, is calculated:

KSCCPZZ = (KSCMPZZ / KSTTPZZ) * KSTCPZZ

The industrial sector's estimated consumption in each state, KSICPZZ, is calculated:

KSICPZZ = (KSINPZZ / KSTTPZZ) * KSTCPZZ

U.S. totals for the three sectors' consumption estimates are the sums of the states' estimated consumption.

Data on kerosene consumed by the electric power sector are not separately available before 2003. Beginning in 2003, kerosene used for power generation is included in waste/other oil in the source data file. Data for waste/other oil are not processed in SEDS because waste oil is not primary energ—consumption of the petroleum products that produced the waste oil has already been accounted for. While kerosene consumption by the electric power sector is not separately shown, there is no underestimation of total kerosene consumption because U.S. product supplied covers all uses and sales of kerosene to the industrial sector cover the electric power sector.

British thermal units (Btu)

Kerosene has a heat content value of about 5.670 million Btu per barrel. This factor is applied to convert kerosene estimated consumption from physical units to Btu:

KSRCBZZ = KSRCPZZ * 5.670
KSCCBZZ = KSCCPZZ * 5.670
KSICBZZ = KSICPZZ * 5.670

Total estimated consumption of kerosene in Btu is the sum of the end-use consumption estimates:

KSTCBZZ = KSRCBZZ + KSCCBZZ + KSICBZZ

The U.S. Btu consumption estimates for the three consuming sectors and the U.S. total are calculated as the sum of the state-level data.

Additional notes

1. See Note 4 at the end of the "Kerosene-type jet fuel" section on page 59 for comments concerning the inclusion of kerosene-type jet fuel with the kerosene total product supplied before 1964 in the source documents.
2. "Sales" data are actually called "shipments" in the source documents for 1960 and 1961; "consumption" for 1962 through 1966; "shipments" for 1967; "sales" from 1968 through 1978; "deliveries" for 1979 through 1983; and "sales" for 1984 forward.
3. In 1979, EIA implemented a new survey form, EIA-172, to obtain deliveries of fuel oil and kerosene data and updated the list of respondents. (A detailed explanation is published in the *Energy Data Report* "Deliveries of Fuel Oil and Kerosene in 1979.") In this survey form, certain end-use categories were redefined—in many cases, to collect more disaggregated data. The reclassifications resulted in some end-use categories that were no longer comparable with those in previous surveys. Where discontinuities occurred, estimates for the pre-1979 years have been made in SEDS to conform with the 1979 kerosene deliveries classifications. The pre-1979 deliveries estimates are not published in this report but are used in SEDS to disaggregate the known U.S. total product supplied (consumption) into state and major end-use sector consumption estimates.

   For kerosene deliveries in 1979, the end-use categories called "residential," "commercial," and "industrial" are available. The pre-1979 deliveries category called "heating" is related to the sum of "residential," "commercial," and "industrial" in 1979. Therefore, the following method was applied to present a comparable series for kerosene delivered to the residential, commercial, and industrial sectors:
   - A 1979 subtotal for heating was created by summing each state's residential, commercial, and industrial deliveries categories, thereby creating a comparable deliveries subtotal for all years.
   - Residential, commercial, and industrial shares of the heating subtotal in 1979 were calculated for each state.
   - These 1979 end-use shares were then applied to each pre-1979 heating subtotal in each state to create state estimates of end-use

deliveries for 1960 through 1978.

The 1980 through 1982 kerosene deliveries data are based on the same survey as that used for 1979; therefore, the 1980 through 1982 data are directly comparable to 1979 data.

4. In 1984, EIA again updated the list of respondents for this survey, and the Form EIA-172 became the Form EIA-821, "Annual Fuel Oil and Kerosene Sales Report." EIA did not conduct a fuel oil and kerosene sales survey for 1983. The 1983 estimates in SEDS are based on 1984 data obtained from the Form EIA-821. Statistical procedures and methodologies used for the Form EIA-821 differ from those used in previous years and are described in the July 1985 issue of the EIA, *Petroleum Marketing Monthly*. Therefore, the 1983 and forward sales data may not be directly comparable to the pre-1983 data. (In the source document, the sales data for 1983 forward are reported in thousand gallons. These data were first converted to thousand barrels before being entered into SEDS.)
5. In 1975 through 1977, the industrial sector consumption of kerosene includes small quantities of kerosene-type jet fuel that were produced as jet fuel and sold as kerosene.

Data sources

KSCMPZZ — Kerosene sold to the commercial sector.

- 1960 through 1978: EIA estimates based on statistics of commercial sector deliveries of kerosene from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene, in 1979," Table 3. State ratios based on 1979 commercial sector deliveries were applied to each state's heating deliveries category from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 3.)
- 1979 and 1980: EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene," Table 3.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 6.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983 through 1987: EIA, *Petroleum Marketing Monthly*. The specific tables are
  - 1983: July 1985 issue, Table A14.
  - 1984: July 1986 issue, Table A4, subsequently revised in the EIA, Petroleum Navigator, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VCS_Mgal_a.htm.
  - 1985 and 1986: July 1987 issue, Table A6.
  - 1987: June 1988 issue, Table A6.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VCS_Mgal_a.htm, select Excel file labeled "Download Series History."

KSIHPZZ — Kerosene sold to the industrial sector.

- 1960 through 1978: EIA estimates based on statistics of industrial sector deliveries of kerosene from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene in 1979," Table 3. State ratios based on 1979 industrial sector deliveries were applied to each state's heating deliveries category from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 3, on page 63.)
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 3.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 6.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983 through 1987: EIA, *Petroleum Marketing Monthly*. The specific tables are
  - 1983: July 1985 issue, Table A14.
  - 1984: July 1986 issue, Table A4, subsequently revised in the EIA, Petroleum Navigator, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_vin_Mgal_a.htm.
  - 1985 and 1986: July 1987 issue, Table A6.
  - 1987: June 1988 issue, Table A6.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_vin_Mgal_a.htm, select Excel file labeled "Download Series History."

KSOTPZZ — Kerosene sold for all other uses, including farm use.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 10.
  - 1962 and 1963: Table 9.
  - 1964 and 1965: Table 8.
  - 1966 through 1975: Table 5.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and

Kerosene," Table 5.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene." Calculated as the sum of kerosene delivered for farm and other use from Table 3.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 6.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983 through 1987: EIA, *Petroleum Marketing Monthly*. The specific tables are
  - 1983: July 1985 issue, Table A14.
  - 1984: July 1986 issue, Table A4, subsequently revised in the EIA, Petroleum Navigator, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VOE_Mgal_a.htm and http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VFM_Mgal_a.htm.
  - 1985 and 1986: July 1987 issue, Table A6.
  - 1987: June 1988 issue, Table A6.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VOE_Mgal_a.htm and http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VFM_Mgal_a.htm, select Excel file labeled "Download Series History."

KSRSPZZ — Kerosene sold to the residential sector.

- 1960 through 1978: EIA, *Energy Data Report,* "Deliveries of Fuel Oil and Kerosene in 1979," Table 3. State ratios based on 1979 residential sector deliveries were applied to each state's heating deliveries category from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 3, on page 63.)
- 1979 and 1980: EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene," Table 3.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 6.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983 through 1987: EIA, *Petroleum Marketing Monthly*. The specific tables are
  - 1983: July 1985 issue, Table A14.
  - 1984: July 1986 issue, Table A4, subsequently revised in the EIA, Petroleum Navigator, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VRS_Mgal_a.htm.
  - 1985 and 1986: July 1987 issue, Table A6.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, http://www.eia.gov/dnav/pet/pet_cons_821ker_a_EPPK_VRS_Mgal_a.htm, select Excel file labeled "Download Series History."

KSTCPUS — Kerosene total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*. "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Lubricants

Physical units

For 1960 through 2009, three data series are used to estimate state consumption of lubricants. The two state-level sales data series are used to apportion the U.S. total consumption data to the states and the end-use sectors within the states. ("ZZ" in the variable names represents the two-letter state code that differs for each state):

LUINPZZ = lubricants sold to the industrial sector, in thousand barrels;
LUTRPZZ = lubricants sold to the transportation sector, in thousand barrels; and
LUTCPUS = lubricants total consumption in the United States, in thousand barrels.

Data for the first two variables are developed from the U.S. Census Bureau reports "Sales of Lubricating and Industrial Oils and Greases" in the *Current Industrial Reports* series. These series were discontinued in 1977 and the method of estimation for 1978 forward is explained in Note 1 at the end of this "Lubricants" section. The third variable for lubricants is the product supplied data series in the U.S. Energy Information Administration's (EIA) *Petroleum Supply Annual.* The first two variables are used for apportioning the third into state total consumption and state end-use consumption estimates.

Total sales of lubricants for each state, LUTTPZZ, is created by adding the industrial and transportation sales:

LUTTPZZ = LUINPZZ + LUTRPZZ

U.S. sales totals are calculated by summing the state sales data.

Each state's proportion of total U.S. sales is used to calculate each state's estimated consumption of lubricants:

LUTCPZZ = (LUTTPZZ / LUTTPUS) * LUTCPUS

Each state's estimated total consumption of lubricants is further divided into end-use estimates in proportion to that state's sales by sector as a portion of total sales in the state. Lubricants consumed by state for industrial use, LUICPZZ, and for transportation use, LUACPZZ, are calculated:

LUICPZZ = (LUINPZZ / LUTTPZZ) * LUTCPZZ
LUACPZZ = (LUTRPZZ / LUTTPZZ) * LUTCPZZ

The consumption of lubricants in the United States by these two end-use sectors is created by summing the state estimates.

Beginning in 2010, a new methodology is developed to estimate the consumption of lubricants in the United States for the industrial and transportation sectors and allocation to the states.

LUACPZZ = lubricants consumed by the transportation sector, in thousand barrels;
LUACPUS = lubricants consumed by the transportation sector, United States, in thousand barrels;
LUICPZZ = lubricants consumed by the industrial sector, in thousand barrels;
LUICPUS = lubricants consumed by the industrial sector, United States, in thousand barrels; and
LUTCPUS = lubricants total consumption in the United States, in thousand barrels.

Using data from Kline & Company, Inc. on finished lubricant demand for three market segments (industrial, consumer total, and commercial total) and two additional product types covered in the industrial market segment (marine and railroad), shares are compiled for the industrial sector and for the four categories in the transportation sector Table TN4.6.

The shares are applied to U.S. total lubricant consumption to derive U.S. lubricant consumption for the industrial sector, LUICPUS, and for the four transportation categories, which sum to LUACPUS.

State allocators for the consumption of lubricants by the industrial sector are estimated using the use table of the latest benchmark input-output (I-O) accounts and real state gross domestic product (GDP) by industry, both published by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). One of the commodities in the I-O accounts is "other petroleum and coal products manufacturing" (North American Industry Classification System, NAICS, code 324190), which is mostly lubricants. First, SEDS compiles lubricant input per dollar output for 25 industries in the agriculture, mining, construction, and manufacturing sectors using the benchmark I-O accounts use table. Then, the industrial inputs are multiplied by the real state GDP for the 25 industries. Lastly, the products are summed to the state level and are used to derive state shares for lubricant consumption by the industrial sector.

State-level consumption of lubricants by the industrial sector, LUICPZZ, is calculated by applying the state allocators to the U.S. consumption.

Table TN4.6. Shares of U.S. finished lubricant demand for five product categories, 2010 forward

Year	Industrial	Consumer Total	Commercial Total	Marine	Railroad
2010	46.8%	26.9%	22.0%	3.2%	1.2%
2011	46.2%	27.2%	22.2%	3.3%	1.2%
2012	46.6%	27.1%	22.0%	3.1%	1.2%
2013	46.6%	27.0%	22.0%	3.1%	1.2%
2014	46.7%	27.0%	22.1%	3.1%	1.2%
2015	46.6%	27.0%	22.1%	3.0%	1.2%
2016	46.7%	27.0%	22.0%	3.0%	1.2%
2017	46.8%	26.9%	22.1%	3.0%	1.2%
2018	47.1%	26.4%	22.2%	3.1%	1.2%

State allocators for the consumption of lubricants for each of the four categories in the transportation sector are derived using the following SEDS data series:

- Motor gasoline consumption by the transportation sector (MGTRP) to allocate U.S. consumer total demand to the states
- Distillate fuel oil sales as diesel fuel for on-highway use (DFONP) to allocate U.S. commercial total demand to the states
- Distillate and residual fuel oil sales for vessel bunkering use (DFBKP and RFBKP) to allocate U.S. marine demand to the states
- Distillate fuel oil sales for railroad use (DFRRP) to allocate U.S. railroad demand to the states

State-level consumption of lubricants by the transportation sector, LUACPZZ, is the sum of the four data series.

British thermal units (Btu)

Lubricants have a heat content value of about 6.065 million Btu per barrel. This factor is applied to convert lubricants estimated consumption from physical units to Btu:

LUICBZZ = LUICPZZ * 6.065
LUACBZZ = LUACPZZ * 6.065

The state total consumption in Btu is the sum of the two sectors' consumption in Btu:

LUTCBZZ = LUICBZZ + LUACBZZ

The U.S. sector and total consumption estimates in Btu are calculated as the sum of the state data.

Table TN4.7. Lubricants sales data used in consumption estimates, 1960 through 2009

Year of sales data	Year of consumption estimates
1960	1960 and 1961
1962	1962 through 1964
1965	1965 and 1966
1967	1967 and 1968
1969	1969 and 1970
1971	1971 and 1972
1973	1973 and 1974
1975	1975 and 1976
1977	1977 through 2009

Additional notes

1. The lubricants sales data (LUINPZZ and LUTRPZZ) were published about every other year by the U.S. Census Bureau until the discontinuation of the series after 1977. Each year's sales data have been used to calculate that year's and at least one other year's consumption estimates. Table TN4.7 specifies which years of consumption estimates depend on which years of the sales data.
2. The sales data from the source document for LUINPZZ and LUTRPZZ are available in incompatible units. The industrial series, LUINPZZ, is oils and greases sold for industrial lubricating and other uses measured in thousand gallons. The transportation series, LUTRPZZ, is oils and greases sold for automotive and aviation uses measured in thousand pounds. Before use in SEDS, these were converted to thousand barrels by dividing the oil data by 42 gallons per barrel and dividing the greases data by 300 pounds per barrel. In the source document, some state data are not published to avoid disclosing figures for individual companies. The undisclosed data were entered as zero in SEDS.

Data sources

LUACPZZ — Lubricants consumed by the transportation sector by state.

- 2010 forward: Estimated by EIA using state allocators derived from selected SEDS consumption series.

LUACPUS — Lubricants consumed by the transportation sector, United States.

- 2010 forward: Estimated by EIA based on Kline & Company data on

finished lubricant demand for consumer total, commercial total, marine, and railroad use.

LUICPZZ — Lubricants consumed by the industrial sector by state.

- 2010 forward: Estimated by EIA using state allocators derived from U.S. Department of Commerce, Bureau of Economic Analysis, 2012 benchmark input-output accounts and real State Gross Domestic Products by Industry in chained (2012) dollars.

LUICPUS — Lubricants consumed by the industrial sector, United States.

- 2010 forward: Estimated by EIA based on Kline & Company data on finished lubricant demand for industrial (less marine and railroad) use.

LUINPZZ — Lubricants sold to the industrial sector by state (through 2009). Calculated from

- U.S. Department of Commerce, Census Bureau, *Current Industrial Reports*, "Sales of Lubricating and Industrial Oils and Greases," for 1960, 1962, 1965, 1967, 1969, 1971, 1973, 1975, and 1977. (See explanation in Notes 1 and 2, on page 67.)

LUTCPUS — Lubricants total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

LUTRPZZ — Lubricants sold to the transportation sector by state (through 2009). Calculated from

- U.S. Department of Commerce, Census Bureau, *Current Industrial Reports*, "Sales of Lubricating and Industrial Oils and Greases," for 1960, 1962, 1965, 1967, 1969, 1971, 1973, 1975, and 1977. (See explanation in Notes 1 and 2, on page 67.)

Motor Gasoline

Physical units

Twelve data series are used to estimate the state end-use consumption of motor gasoline. Eleven of the series are from the U.S. Department of Transportation, Federal Highway Administration publication, *Highway Statistics*, and represent sales of motor gasoline. The sales data are categorized as sales for highway and non-highway use:

- **Highway use** sales data (MGMFP) are from the Highway Statistics Table 8.4.2 (previously Table MF-21); however, they are reduced by the amount of highway "special fuels" (MGSFP) used in each state each year as reported on Table 8.4.2. Special fuels are primarily diesel fuels, not motor gasoline, and are included in the transportation sector of distillate fuel oil and other energy sources.
- **Non-highway use** sales are further subdivided into sales for: (1) state, county, and municipal non-highway use of motor fuel (MGPNP) from Table 8.4.2, and (2) private and commercial use. Data for the components of private and commercial non-highway use are reported in Table 8.4.3 (previously Table MF-24):
  - agricultural use (MGAGP)
  - industrial and commercial use (MGIYP)
  - construction use (MGCUP)
  - marine use (MGMRP), through 2014
  - boating use (MGBTP), 2015 forward
  - lawn and garden use (MGLGP), 2015 forward
  - recreational vehicle use (MGRVP), 2015 forward
  - miscellaneous use (MGMSP)

The 12th motor gasoline data series (MGTCPUS) is total U.S. consumption of motor gasoline, which is published as the product supplied series in EIA's *Petroleum Supply Annual*. MGTCPUS includes fuel ethanol blended into motor gasoline. Before 1993, motor gasoline product supplied was underreported because not all fuel ethanol blended with motor gasoline was included. There were also misreported volumes of motor gasoline blending components that were blended into finished motor gasoline. To adjust for the underreported data, SEDS added fuel ethanol consumption estimates to total energy consumption for years before 1993 (see Section 7, "Total Energy").

The 12 motor gasoline data series are ("ZZ" in the variable names represent the two-letter state code that differs for each state)

MGAGPZZ = motor gasoline sold for agricultural use in each state, in thousand gallons;
MGBTPZZ = motor gasoline sold for boating use in each state, in thousand gallons (2015 forward);
MGCUPZZ = motor gasoline sold for construction use in each state, in thousand gallons;
MGIYPZZ = motor gasoline sold for industrial and commercial use in each state, in thousand gallons;
MGLGPZZ = motor gasoline sold for lawn and garden use in each state, in thousand gallons (2015 forward);
MGMFPZZ = motor fuel sold for highway use in each state, in thousand gallons;
MGMRPZZ = motor gasoline sold for marine use in each state, in thousand gallons (through 2014);
MGMSPZZ = motor gasoline sold for miscellaneous and unclassified uses in each state, in thousand gallons;
MGPNPZZ = motor fuel sold for public non-highway use in each state, in thousand gallons;
MGRVPZZ = motor gasoline sold for recreational vehicle use in each state, in thousand gallons (2015 forward);
MGSFPZZ = special fuels (primarily diesel fuel with small amounts of liquefied petroleum gases) sold in each state, in thousand gallons; and
MGTCPUS = motor gasoline total consumption in the United States, in thousand barrels.

U.S. totals for the 11 state-level series named above are calculated as the sum of the state data.

The transportation sector accounts for most of the motor gasoline sales. Before 2015, sales to the transportation sector is estimated to be the sum of motor fuel sales for marine use and for highway use (minus the sales of special fuels, which are primarily diesel fuels and are accounted for in the transportation sector of distillate fuel oil). Sales of motor gasoline to the transportation sector in each state (MGTRPZZ) is calculated:

MGTRPZZ = MGMFPZZ + MGMRPZZ - MGSFPZZ

Beginning in 2015, marine use is no longer available to calculate MGTRPZZ and two new sales categories, boating use (MGBTP) and recreational vehicle use (MGRVP), are now included in the definition of transportation sector sales:

MGTRPZZ = MGMFPZZ + MGBTPZZ + MGRVPZZ - MGSFPZZ

Before 2015, two sales data series are added to estimate motor gasoline sales to the commercial sector: miscellaneous (including unclassified) and public non-highway sales. Sales of motor gasoline to the commercial sector in each state (MGCMPZZ) is calculated:

MGCMPZZ = MGMSPZZ + MGPNPZZ

Beginning in 2015, a new sales category, lawn and garden use (MGLGP), is allocated to commercial sector sales:

MGCMPZZ = MGMSPZZ + MGPNPZZ + MGLGPZZ

Sales of motor gasoline for use in the industrial sector in each state (MGINPZZ) is calculated as the sum of the sales for agricultural use, for construction use, and for industrial and commercial use:

MGINPZZ = MGAGPZZ + MGCUPZZ + MGIYPZZ

Total sales of motor gasoline in each state (MGTTPZZ) is calculated as the sum of the sales to the major sectors:

MGTTPZZ = MGCMPZZ + MGINPZZ + MGTRPZZ

U.S. totals for the end-use sectors' sales and total sales are calculated as the sum of the states' sales.

The motor gasoline sales data for the end-use sectors in each state are used to apportion the U.S. total consumption of motor gasoline to the states and end-use sectors.

Total consumption of motor gasoline in each state (MGTCPZZ) is calculated according to each state's share of the total sales:

MGTCPZZ = (MGTTPZZ / MGTTPUS) * MGTCPUS

The commercial sector estimated consumption of motor gasoline (MGCCPZZ) is calculated:

MGCCPZZ = (MGCMPZZ / MGTTPZZ) * MGTCPZZ

The industrial sector estimated consumption (MGICPZZ) is calculated:

MGICPZZ = (MGINPZZ / MGTTPZZ) * MGTCPZZ

The transportation sector estimated consumption (MGACPZZ) is calculated:

MGACPZZ = (MGTRPZZ / MGTTPZZ) * MGTCPZZ

The consumption of motor gasoline by end-use sector in the United States is estimated by summing the states' estimated consumption.

British thermal units (Btu)

A national factor, MGTCKUS, is used to convert motor gasoline consumption from physical units to British thermal units (Btu) for each state. A constant heat content of 5.253 million Btu per barrel is used for 1960 through 1992. Beginning in 1993, an annual average factor is calculated by EIA. The factors, listed in Table B1 on page 185, are used for each state:

MGCCBZZ = MGCCPZZ * MGTCKUS
MGICBZZ = MGICPZZ * MGTCKUS
MGACBZZ = MGACPZZ * MGTCKUS

Total Btu consumption of motor gasoline is the sum of the consumption by the commercial, industrial, and transportation sectors.

MGTCBZZ = MGCCBZZ + MGICBZZ + MGACBZZ

The U.S.-level Btu consumption estimates by end-use sector are calculated as the sum of the state data.

Additional note

In 2015, the Federal Highway Administration revised its methods of estimating non-highway use of motor gasoline. (See Off-Highway and Public-Use Gasoline Consumption Estimation Models used in the Federal Highway Administration.) Estimates from 2015 forward are not compatible with data before 2015.

Additional calculations

To assist data users in the analysis of consumption of fossil fuel sources and renewable energy sources, a new data series, motor gasoline excluding fuel ethanol (MMTCB), is created for each state and the United States:

From 1993 forward

MMTCB = MGTCB - EMTCB

Before 1993, SEDS assumes that fuel ethanol was not included in the motor gasoline data series (see page 68):

MMTCB = MGTCB

EMTCB is fuel ethanol minus denaturant. See discussion on fuel ethanol in Section 5, "Renewable Energy."

Motor gasoline excluding fuel ethanol is used only in the tables showing primary energy consumption by source. For consumption by end-use sector, motor gasoline is defined as the product consumed by the end users, that is, including fuel ethanol.

Data sources

MGAGPZZ — Motor gasoline sold for agricultural use by state.

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-24.
- 1965 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table G-24 in 1965, Table MF-24 (1966 through 2006), and Table 8.4.3 (2007 forward).

MGBTPZZ — Motor gasoline sold for boating use by state.

- 2015 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table 8.4.3.

MGCUPZZ — Motor gasoline sold for construction use by state.

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-24.
- 1965 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table G-24 in 1965, Table MF-24 (1966 through 2006), and Table 8.4.3 (2007 forward).

MGIYPZZ — Motor gasoline sold for industrial and commercial use by state.

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-24.
- 1965 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table G-24 in 1965, Table MF-24 (1966 through 2006), and Table 8.4.3 (2007 forward).

MGLGPZZ — Motor gasoline sold for lawn and garden use by state.

- 2015 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table 8.4.3.

MGMFPZZ — Motor fuel sold for highway use by state.

- 1960 through 1995: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, Table MF-221 gives revised U.S. totals. State revisions can be calculated by adding data from Tables MF-225 and MF-226.
- 1996 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-21 (1996 through 2006) and Table 8.4.2 (2007 forward).

MGMRPZZ — Motor gasoline sold for marine use by state.

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-24.
- 1965 through 2014: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table G-24 in 1965, Table MF-24 (1966 through 2006), and Table 8.4.3 (2007 through 2014).

MGMSPZZ — Motor gasoline sold for miscellaneous uses by state.

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-24. Sum of the "Miscellaneous" column plus the "Unclassified" column minus the "Total Classified" column.
- 1965: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, Table G-24. Sum of the "Miscellaneous" column plus the "Unclassified" column minus the "Total Classified" column.
- 1966 through 1981: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-24, sum of the "Miscellaneous" and the "Unclassified" columns.
- 1982 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-24 (1982 through 2006) and Table 8.4.3 (2007 forward), the "Miscellaneous" column.

MGPNPZZ — Motor fuel sold for public non-highway use by state.

- 1960 through 1964: U.S. Department of Commerce, Bureau of Public Roads, *Highway Statistics*, Table G-21.
- 1985, 1987, and 1992: Unpublished revised state data comparable to the U.S. values published in *Highway Statistics Summary to 1995*, Table 221.
- 1965 through 1984, 1986, 1988 through 1991, and 1993 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table G-21 in 1965, Table MF-21 (1996 through 2006), and Table 8.4.2 (2007 forward).

MGRVPZZ — Motor gasoline sold for recreational vehicle use by state.

- 2015 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table 8.4.3.

MGSFPZZ — Special fuels sales by state (primarily diesel fuel with small amounts of liquefied petroleum gases).

- 1960 through 1995: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995*, Table MF-225.
- 1996 forward: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, http://www.fhwa.dot.gov/policyinformation/statistics.cfm, Table MF-21 (1996 through 2006) and Table 8.4.2 (2007 forward).

MGTCKUS — Factor for converting motor gasoline from physical units to Btu.

- 1960 through 1992: EIA adopted the Bureau of Mines thermal conversion factor of 5.253 million Btu per barrel for "Gasoline, Motor Fuel" as published by the Texas Eastern Transmission Corporation in Appendix V of *Competition and Growth in American Energy Markets 1947-1985*, a 1968 release of historical and projected statistics. The factor excludes oxygenates.
- 1993 forward: EIA calculates the national annual average thermal conversion factor, which includes fuel ethanol blended into motor gasoline (shown in Appendix B Table B1 on page 185). For 1993-

2006, it also includes methyl tertiary butyl ether (MTBE) and other oxygenates blended into motor gasoline.

MGTCPUS — Motor gasoline total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*. "Petroleum Statement, Annual," Table 1.

  For 1960 through 1963, motor gasoline was combined with aviation gasoline and published as "gasoline" in the source table. Table 19 in the "Petroleum Statement, Annual" titled "Salient Statistics of Aviation Gasoline" provided separate data for aviation gasoline for those years. The aviation gasoline data from the second table were subtracted from the gasoline data in the first table to derive the motor gasoline consumption series used in SEDS.
- 1976 through 1980: EIA, *Energy Data Reports*. "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Petroleum Coke

Physical units

Seven data series are used to estimate the consumption of petroleum coke. Five are measures of petroleum coke consumption and two are indicators of industrial activity used to apportion U.S. industrial petroleum coke consumption to the states. ("ZZ" in the variable name represents the two-letter state code that differs for each state):

PCTCPUS	=	petroleum coke total consumption in the United States, in thousand barrels;
PCEIMZZ	=	petroleum coke consumed by the electric power sector in each state, in thousand short tons;
PCC3MZZ	=	petroleum coke consumed for combined-heat-and-power in the commercial sector in each state, in thousand short tons;
PCI3MZZ	=	petroleum coke consumed for combined-heat-and-power in the industrial sector in each state, in thousand short tons;
PCRFPZZ	=	petroleum coke used at refineries as both catalytic and marketable coke in each state, or group of states, or Petroleum Administration for Defense (PAD) district, in thousand barrels;
CTCAPZZ	=	catalytic cracking charge capacity of petroleum refineries in each state, in barrels per calendar day (1960 through 1979) and barrels per stream day (1980 forward); and
AICAPZZ	=	aluminum ingot production capacity in each state, in short tons.

The total consumption of petroleum coke in the United States (PCTCPUS) is the product supplied series from the U.S. Energy Information Administration (EIA) *Petroleum Supply Annual*.

Information on the amount of petroleum coke consumed for the purpose of generating electricity is available from Form EIA-923, "Power Plant Operations Report," and predecessor forms. For the electric power sector (PCEIM), these data are available for 1970 forward. Before 1970, consumption is assumed to be zero. For 1989 forward, the electric power sector includes petroleum coke consumed by electric utilities and independent power producers whose primary business is to sell electricity or electricity and heat. Quantities of petroleum coke used by commercial (PCC3M) and industrial (PCI3M)

facilities in combined-heat-and-power units are also available and are included in the commercial and industrial sectors, respectively.

The data for petroleum coke used to generate electricity are in thousand short tons and are converted into thousand barrels in the State Energy Data System (SEDS) by applying a conversion factor of five barrels per short ton, and the U.S. value is the sum of the state data:

PCEIPZZ = PCEIMZZ * 5
PCEIPUS = ΣPCEIPZZ
PCCCPZZ = PCC3MZZ * 5
PCCCPUS = ΣPCCCPZZ
PCI3PZZ = PCI3MZZ * 5
PCI3PUS = ΣPCI3PZZ

To estimate U.S. industrial consumption of petroleum coke, U.S. electric power and commercial consumption are subtracted from the total U.S. petroleum coke product supplied:

PCICPUS = PCTCPUS - PCEIPUS - PCCCPUS

In addition to combined-heat-and-power generation, petroleum coke is used in the industrial sector as catalyst coke at refineries in a process for increasing the yield of gasoline from crude oil (catalytic cracking) and for other industrial uses (mainly for conversion into electrodes that are consumed in the production of aluminum).

Through 2012, state-level estimates of the refinery consumption of petroleum coke are calculated by assuming that each state consumes petroleum coke in proportion to the catalytic cracking charge capacity (CTCAPZZ) of the refineries in the state. The U.S. total for the state-level data allocating series is calculated by summing the state data.

CTCAPUS = ΣCTCAPZZ

Petroleum coke consumed by refineries for 1960 through 1980 is available for some states while quantities for other states are grouped (G1 through G7 as indicated by GZ in the following formulas). The group quantities are allocated to the states within each group in proportion to each state's portion of the group's catalytic cracking charge capacity. For 1981 forward, PAD district data (P1 through P5 as indicated by PZ in the following formulas) are allocated in the same way to the states within each district:

PCRFPZZ = PCRFPZZ, or
PCRFPZZ = (CTCAPZZ / CTCAPGZ) * PCRFPGZ (1 through 7), or
PCRFPZZ = (CTCAPZZ / CTCAPPZ) * PCRFPPZ (1 through 5)
PCRFPUS = ΣPCRFPZZ

Beginning in 2013, SEDS incorporates unpublished state-level refinery fuel consumption data that satisfied two statistical disclosure rules – that there are at least three refineries not of the same company in the state and that no one refinery uses more than 60% of the particular fuel. For petroleum coke, data for six to nine states are usable. They are subtracted from the PAD district data, and the remainders are allocated to the remaining states using CTCAPZZ.

U.S. petroleum coke used at combined-heat-and-power plants (PCI3PUS) and at refineries (PCRFPUS) are subtracted from the U.S. industrial sector consumption to derive U.S. consumption of petroleum coke for all other industrial uses:

PCOCPUS = PCICPUS - PCI3PUS - PCRFPUS

State-level estimates of petroleum coke consumed by other industrial users, mainly aluminum production, are assumed to be in proportion to each state's aluminum ingot production capacity (AICAPZZ). For 1993 forward, state-level aluminum production capacity is adjusted to account for under-utilization of the plants. Although AICAPZZ is measured in short tons, it is not converted to thousand barrels because it is used only as a state-level allocator. The U.S. total is calculated as the sum of the state data and other industrial use of petroleum coke is allocated to the states as follows:

AICAPUS = ΣAICAPZZ
PCOCPZZ = (AICAPZZ / AICAPUS) * PCOCPUS

Industrial sector petroleum coke consumption by state is the sum of combined-heat-and-power industrial use, consumption at refineries, and all other industrial uses:

PCICPZZ = PCI3PZZ + PCRFPZZ + PCOCPZZ

Total petroleum coke consumption by state is the sum of commercial, industrial, and electric power sector use:

PCTCPZZ = PCCCPZZ + PCICPZZ + PCEIPZZ

British thermal units (Btu)

Two series are used to convert petroleum coke from physical unit values to Btu:

PCCTKUS = factor for converting catalyst petroleum coke from physical units to Btu; and
PCMKKUS = factor for converting marketable petroleum coke from physical units to Btu.

For 2004 forward, PCCTKUS adopts a fixed value of 6.287 million Btu per barrel and PCMKKUS adopts a fixed value of 5.719 million Btu per barrel. For 1960 through 2003, a fixed factor of 6.024 million Btu per barrel is used for both series. See explanation in Appendix B.

These factors are applied to convert estimated petroleum coke consumption from physical units to Btu by state:

PCCCBZZ = PCCCPZZ * PCMKKUS
PCI3BZZ = PCI3PZZ * PCMKKUS
PCOCBZZ = PCOCPZZ * PCMKKUS
PCRFBZZ = PCRFPZZ * PCCTKUS
PCEIBZZ = PCEIPZZ * PCMKKUS

Petroleum coke consumed in the industrial sector is the sum of

PCICBZZ = PCI3BZZ + PCRFBZZ + PCOCBZZ

Total Btu consumption of petroleum coke is the sum of the consumption by the end-use sectors and for electricity generation:

PCTCBZZ = PCCCBZZ + PCICBZZ + PCEIBZZ

The U.S. totals are the sum of the states' values.

Additional notes

The source for petroleum coke used at refineries, PCRFPUS and PCRFPGZ, is the EIA *Petroleum Supply Annual* and predecessor reports. For 1960 through 1980, the data are provided in thousand short tons. For consistency with later years' data, the 1960 through 1980 data are first converted into thousand barrels before being used in SEDS. For 1960 through 1967, the data are published for Texas and New Mexico and for groups of other states. For 1968 through 1980, the data are given for 19 individual states with the remaining states are combined into seven groups. The data for 1960 through 1967 are disaggregated into the 19 states and seven groups used for the later years, before being entered into SEDS, by using the proportions of the 1968 data, which was published in both formats. For 1981 forward, the data are published by PAD districts only. For 2013 forward, unpublished state-level data that satisfied statistical disclosure rules are incorporated in SEDS.

Data sources

AICAPZZ — Aluminum ingot production capacity in each state.

- 1960 through 1973: American Bureau of Metal Statistics, *Year Book*.
- 1974 through 1994: American Bureau of Metal Statistics, *Non-Ferrous Metal Data*, table titled "Aluminum Ingot Production Capacity." Note: Capacities for individual plants owned by one company have been withheld since 1986. The company's total capacity has been apportioned to the individual plants on the basis of their proportional capacities in 1985.
- 1995 forward: U.S. Department of the Interior, U.S. Geological Survey, *Minerals Yearbook*.

CTCAPZZ — Catalytic cracking charge capacity of petroleum refineries by state.

- 1960: Data are unavailable from published reports. The 1961 values are used for 1960.
- 1961 through 1963: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Refineries in the United States." The specific tables are
  - 1961 and 1962: Table 7, under "Cracking Capacity" column heading "Charge."
  - 1963: Table 6, under "Catalytic-Cracking Capacity" column heading "Charge."
- 1964 through 1976: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Refineries in the United States and Puerto Rico," Table 2, all entries next to "Cat. Ck." summed by state.
- 1977: EIA, *Energy Data Reports*, "Petroleum Refineries in the United States and Puerto Rico," Table 2, all entries next to "Cat. Ck." summed by state.
- 1978: EIA, *Energy Data Reports*, "Petroleum Refineries in the United States and U.S. Territories," Table 2, all entries next to "Cat. Ck." summed by state.
- 1979 and 1980: EIA, *Energy Data Reports*, "Petroleum Refineries in the United States and U.S. Territories." The specific tables are
  - 1979: Table 2, sum of "Catalytic Cracking" columns, "Fresh" and "Recycle."
  - 1980: Table 1, sum of "Catalytic Cracking (fresh)" and "Catalytic

Cracking (recycle)" columns.

- 1981 through 2004: EIA, *Petroleum Supply Annual*, sum of "Catalytic Cracking (Fresh)" and "Catalytic Cracking (Recycled)" columns in the following tables:
  - 1981 through 1983: Table 1.
  - 1984: Table 30.
  - 1985 through 1989: Table 29.
  - 1989 through 1994: Table 36.
  - 1995: Data series became biannual. 1994 data used for 1995.
  - 1996: Table 36.
  - 1997: 1996 data used for 1997.
  - 1998 through 2004: Table 36, http://www.eia.gov/petroleum/supply/annual/volume1/.
- 2005 forward: EIA, *Refinery Capacity Report*, Table1, http://www.eia.gov/petroleum/refinerycapacity/.

PCC3MZZ — Petroleum coke consumed for combined-heat-and-power in the commercial sector by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

PCCTKUS — Factor for converting petroleum coke, catalyst coke from physical units to Btu.

- 1960 through 2003: EIA adopted the Bureau of Mines thermal conversion factor of 6.024 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."
- 2004 forward: Assumed by EIA to be 6.287 million Btu per barrel or equal to the thermal conversion factor for residual fuel oil.

PCEIMZZ — Petroleum coke consumed by the electric power sector by state.

- 1960 through 1969: No data available. Values are assumed to be zero.
- 1970 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

PCI3MZZ — Petroleum coke consumed for combined-heat-and-power in the industrial sector by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

PCMKKUS — Factor for converting petroleum coke, marketable coke from physical units to Btu.

- 1960 through 2003: EIA adopted the Bureau of Mines thermal conversion factor of 6.024 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."
- 2004 forward: EIA adopts the thermal conversion factor of 5.719 million Btu per barrel, calculated by dividing 28,595,925 Btu per short ton for petroleum coke (from U.S. Department of Energy, Argonne National Laboratory, "The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model" (GREET), version GREET1_October 2013) by 5.0 barrels per short ton (as given in the Bureau of Mines Form 6-1300-M and successor EIA forms).

PCRFPZZ, PCRFPGZ, or PCRFPPZ — Petroleum coke consumed at refineries (both catalyst and marketable) by state or groups of states.

- 1960: No data available. The 1961 value is used for 1960.
- 1961 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual." The specific tables are
  - 1961 and 1962: Table 18.
  - 1962 through 1966: Table 19.
  - 1967: Table 18.
  - 1968: Table 19.
  - 1969 through 1972: Table 18.
  - 1973 and 1974: Table 21.
  - 1975: Table 22.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual." The specific tables are
  - 1976: Table 22.
  - 1977: Table 21.
  - 1978 through 1980: Table 20.
- 1981 through 2004: EIA, *Petroleum Supply Annual*. The specific tables are
  - 1981 and 1982: Table 17.
  - 1983: Table 15.
  - 1984: Table 44.

  - 1985: Table 43.
  - 1986 through 1988: Table 38.
  - 1989 through 1992: Table 45.
  - 1995 and 1997: Table 36.
    1993 and 1994, 1996, and 1998 through 2004: http://www.eia.gov/petroleum/supply/annual/volume1/, Table 47.
- 2005 forward: EIA, *Refinery Capacity Report*, Table 12 (2006-2008), Table 12a (2009), and Table 10a (2010 forward), http://www.eia.gov/petroleum/refinerycapacity/. Also available at http://www.eia.gov/dnav/pet/pet_pnp_capfuel_a_(na)_8FPP0_Mbbl_a.htm.

PCTCPUS — Petroleum coke total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*. "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Report*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Residual Fuel Oil

Physical units

Because state-level end-use consumption data for residual fuel oil (with the exception of electric power sector data) are not available, sales of residual fuel oil into or within each state, published by the U.S. Energy Information Administration (EIA) in the *Fuel Oil and Kerosene Sales Report*, are used to estimate residual fuel oil consumption. The following variable names have been assigned to the sales series, in thousand barrels ("ZZ" in the following variable names represents the two-letter state code that differs for each state):

RFBKPZZ = residual fuel oil sold for vessel bunkering use (i.e., the fueling of commercial or private boats, such as pleasure craft, fishing boats, tugboats, and ocean-going vessels, including vessels operated by oil companies, and fueling for other marine purposes), excluding sales to the military;

RFCMPZZ = residual fuel oil sold to the commercial sector;

RFIBPZZ = residual fuel oil sold to industrial establishments for space heating and for other industrial use (i.e., for all uses to mines, smelters, plants engaged in producing manufactured products, in processing goods, and in assembling);

RFMIPZZ = residual fuel oil sold to the military, regardless of use;

RFMSPZZ = residual fuel oil sold for all other uses not identified in other sales categories;

RFOCPZZ = residual fuel oil sold for oil company use, including all fuel oil, crude oil, or acid sludge used as fuel at refineries, by pipelines, or in field operations; and

RFRRPZZ = residual fuel oil sold to the railroads for use in fueling trains, operating railroad equipment, space heating of buildings, and other operations.

Two other data series that represent consumption of residual fuel oil are

RFEIPZZ = residual fuel oil consumed by the electric power sector in each state, in thousand barrels; and

RFTCPUS = residual fuel oil total supplied in the United States, in thousand barrels.

Residual fuel oil consumed by the electric power sector (RFEIPZZ) is collected by EIA on Form EIA-923, "Power Plant Operations Report," and predecessor forms. (See Note 3 at the end of this residual fuel oil section for further information on changes in this series' data definitions.)

Total U.S. consumption of residual fuel oil, RFTCPUS, is the product supplied series in EIA's publication *Petroleum Supply Annual*.

All state-level data series listed above are summed to provide totals for the United States.

The data series are then combined as closely as possible into the major end-use sectors used in the State Energy Data System (SEDS). No residual fuel oil is sold to the residential sector. Residual fuel oil sales to the commercial sector is the RFCMPZZ series.

The sales of residual fuel oil to the industrial sector in each state, RFINPZZ, is the sum of the residual fuel oil sold for industrial use, including industrial heating and processing (RFIBPZZ), for oil company use (RFOCPZZ), and for all other uses (RFMSPZZ):

RFINPZZ = RFIBPZZ + RFOCPZZ + RFMSPZZ
RFINPUS = ΣRFINPZZ

The sales of residual fuel oil to the transportation sector in each state, RFTRPZZ, is the sum of the residual fuel oil sales for vessel bunkering (RFBKPZZ), military use (RFMIPZZ), and railroad use (RFRRPZZ):

RFTRPZZ = RFBKPZZ + RFMIPZZ + RFRRPZZ
RFTRPUS = ΣRFTRPZZ

Sales of residual fuel oil to the commercial, industrial, and transportation sectors are added to create a subtotal of sales to all sectors other than the electric power sector (RFNDPZZ):

RFNDPZZ = RFCMPZZ + RFINPZZ + RFTRPZZ
RFNDPUS = ΣRFNDPZZ

The estimated residual fuel oil consumption for the United States by all sectors other than the electric power sector (RFNCPUS) is calculated by subtracting the total residual fuel oil consumption for the electric power sector from the total U.S. residual fuel oil consumption:

RFNCPUS = RFTCPUS - RFEIPUS

This U.S. subtotal of residual fuel oil consumption by the end-use sectors combined (RFNCPUS) is apportioned to the states by using the states' end-use sector sales data. The assumption is made that each state consumes residual fuel oil in proportion to the amount sold in that state:

RFNCPZZ = (RFNDPZZ / RFNDPUS) * RFNCPUS

The end-use sectors' subtotal for each state is further divided into estimates for each sector in proportion to each sector's sales. The estimated commercial sector consumption in each state, RFCCPZZ, is calculated:

RFCCPZZ = (RFCMPZZ / RFNDPZZ) * RFNCPZZ

The industrial sector's estimated consumption in each state, RFICPZZ, is calculated:

RFICPZZ = (RFINPZZ / RFNDPZZ) * RFNCPZZ

The transportation sector's estimated consumption in each state, RFACPZZ, is calculated:

RFACPZZ = (RFTRPZZ / RFNDPZZ) * RFNCPZZ

The consumption of residual fuel oil in the United States by the major end-use sectors is estimated by adding the states' estimated consumption.

Total state residual fuel oil consumption is the sum of the end-use sectors' consumption subtotal and the electric power sector consumption:

RFTCPZZ = RFNCPZZ + RFEIPZZ

British thermal units (Btu)

Residual fuel oil has a heat content value of about 6.287 million Btu per barrel. This factor is applied to convert residual fuel oil estimated consumption from physical units to Btu as shown in the following example:

RFCCBZZ = RFCCPZZ * 6.287

Total Btu consumption of residual fuel oil is the sum of the consumption by the end-use sectors and for electricity generation:

RFTCBZZ = RFCCBZZ + RFICBZZ + RFACBZZ + RFEIBZZ

The U.S.-level Btu consumption estimates are calculated as the sum of the states' Btu consumption.

Additional notes

1. "Sales" data are actually called "shipments" in the source documents

for 1960 and 1961; "consumption" for 1962 through 1966; "shipments" for 1967; "sales" from 1968 through 1978; "deliveries" for 1979 through 1983; and "sales" for 1984 forward.

2. In 1979, EIA implemented a new survey form, EIA-172, to obtain deliveries of fuel oil and kerosene data and updated the list of respondents. (A detailed explanation is published in the *Energy Data Report,*"Deliveries of Fuel Oil and Kerosene in 1979.") In the new survey form, certain end-use categories were redefined—in many cases, to collect more disaggregated data. The reclassifications resulted in some end-use categories that were no longer comparable with those in previous surveys. Where discontinuities occurred, estimates for the pre-1979 years have been made in SEDS to conform with the 1979 fuel oil deliveries classifications. The pre-1979 deliveries estimates are not published in this report but are used in SEDS to disaggregate the known U.S. total product supplied (consumption) into state and major end-use sector consumption estimates.

   For residual fuel oil deliveries in 1979, the end-use categories "commercial" and "industrial" are available. The pre-1979 deliveries categories are called "heating" and "industrial." While the pre-1979 categories individually are not continuous with the 1979 categories, their subtotals are related. That is, a general comparison can be made between the sum of commercial and industrial deliveries in 1979 and the sum of heating and industrial deliveries in the pre-1979 years. Therefore, the following method was applied to present a comparable series for residual fuel oil delivered to the commercial and industrial sectors:
   - For each of the pre-1979 years, a subtotal was created for each state by adding each state's heating and industrial deliveries categories. A comparable 1979 subtotal was created by adding each state's commercial and industrial deliveries categories.
   - Commercial and industrial shares of the subtotal in 1979 were calculated for each state.
   - These 1979 end-use shares were then applied to each pre-1979 subtotal of residual fuel oil deliveries in each state to create state estimates of end-use deliveries for 1960 through 1978.

   The 1980 through 1982 residual fuel oil deliveries data are based on the same survey as that used for 1979; therefore, the 1980 through 1982 data are directly comparable to 1979 data.

   In 1984, EIA again updated the list of respondents for this survey, and the Form EIA-172 became the Form EIA-821, "Annual Fuel Oil and Kerosene Sales Report." EIA did not conduct a fuel oil and kerosene sales survey for 1983. The 1983 estimates in SEDS are based on 1984 data obtained from the Form EIA-821. Statistical procedures and methodologies used for the Form EIA-821 differ from those used in previous years. Therefore, the 1983 and forward sales data may not be directly comparable to the pre-1983 data. (In the source document, the sales data for 1983 forward are reported in thousand gallons. These data were first converted to thousand barrels before being entered into SEDS.)

3. The data on fuel oil consumed by the electric power sector for all years and states are actual fuel oil consumption numbers collected from electric power plants on Form EIA-923, "Power Plant Operations Report," and predecessor forms. Due to changes in fuel oil reporting classifications on the predecessor forms over the years, it is not possible to develop a thoroughly consistent series for all years. However, over time, data more accurately disaggregating fuel oil into distillate fuel oil and residual fuel oil have become available. For 1960 through 1969, only data on total fuel oil consumed at electric utilities by state are available. For 1970 through 1979, fuel oil consumed by plant type (internal combustion and gas turbine plants combined and steam plants) by state are available. For 1980 through 2000, data on consumption of light oil at all plant types combined and consumption of heavy oil at all plant types combined are available by state. For 2001 forward, data on consumption of distillate fuel oil and residual fuel oil are available. In SEDS, the following assumptions have been made:
   - 1960 through 1969—state estimates of fuel oil consumption by plant type have been created for each year by applying the shares of steam plants (primarily residual fuel oil) and internal combustion and gas turbine plants (primarily distillate fuel oil plus small amounts of jet kerosene) by state in 1970 to each year's total fuel oil consumption at electric utilities for 1960 through 1969.
   - 1970 through 1979—fuel oil consumed by steam plants is assumed to equal residual fuel oil consumption, and fuel oil consumed by internal combustion and gas turbine plants is assumed to equal distillate fuel oil plus jet kerosene consumption.
   - 1980 through 2000—total heavy oil consumption at all plant types is assumed to equal residual fuel oil consumption, and total light oil consumption at all plant types is assumed to equal distillate fuel oil plus jet kerosene consumption.

   The data series thus derived for SEDS for residual fuel oil and distillate fuel oil consumption by the electric power sector is considered to be actual consumption by the electric power sector for each state and each year.

Data sources

RFBKPZZ — Residual fuel oil sold for vessel bunkering use by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 17.
  - 1962 and 1963: Table 16.
  - 1964 and 1965: Table 15.
  - 1966 through 1975: Table 11.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 11.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A13.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VVB_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VVB_Mgal_a.htm.

RFCMPZZ— Residual fuel oil sold to the commercial sector.

- 1960 through 1978: EIA estimates based on statistics of commercial sector deliveries of residual fuel oil from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene in 1979," Table 2. State ratios based on 1979 commercial sector deliveries were applied to each state's sum of heating plus industrial deliveries categories from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 2, on page 78.)
- 1979 and 1980: EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5.

Notes: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS. Data for Hawaii in 1986 through 1990 reflect unpublished revisions from an EIA internal memorandum from the Office of Oil and Gas to the Office of Energy Markets and End Use, "Revising Historical Petroleum Data," February 26, 1993.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A13.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VCS_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VCS_Mgal_a.htm.

RFEIPZZ — Residual fuel oil consumed by the electric power sector.

- EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms. The following assumptions have been made:
  - 1960 through 1969: Only total fuel oil consumed at electric utilities by state is available. State estimates of residual fuel oil consumption were created for each year by applying the shares of steam plants (primarily residual fuel oil) by state from 1970 to each year's total fuel oil consumption at electric utilities for 1960 through 1969.
  - 1970 through 1979: Fuel oil consumed by plant type by state is available. Fuel oil consumed by steam plants is assumed to equal residual fuel oil consumption.
  - 1980 through 2000: Consumption of heavy fuel at all plant types by state is available. This is assumed to equal residual fuel oil consumption.
  - 2001 forward: Consumption of residual fuel oil is available.

RFIBPZZ — Residual fuel oil sold to industrial establishments for heating and for other industrial use.

- 1960 through 1978: EIA, estimates based on statistics of industrial sector deliveries of residual fuel from the EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene in 1979," Table 2. State ratios based on 1979 industrial sector deliveries were applied to each state's sum of heating plus industrial deliveries categories from the fuel oil deliveries reports for each year 1960 through 1978. (See explanation in Note 2, on page 78.)
- 1979 and 1980: EIA, *Energy Data Report*, "Deliveries of Fuel Oil and Kerosene," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A13.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_vin_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_vin_Mgal_a.htm.

RFMIPZZ — Residual fuel oil sold to the military regardless of use by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 18.
  - 1962 and 1963: Table 17.
  - 1964 and 1965: Table 16.
  - 1966 through 1975: Table 12.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 12.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A13.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VMI_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VMI_Mgal_a.htm.

RFMSPZZ — Residual fuel oil sold for miscellaneous uses by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 through 1962: Table 19.
  - 1963 and 1964: Table 18.
  - 1965 through 1967: Table 17.
  - 1968 through 1975: Table 14.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 14.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 2, column "Other."
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5, column "All Other."

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS. The data series is titled "All Other."

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A13.
- 1984 through 1987: EIA, *Petroleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VOE_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VOE_Mgal_a.htm.

RFOCPZZ — Residual fuel oil sold for use by oil companies by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 14.
  - 1962 and 1963: Table 13.
  - 1964 and 1965: Table 12.
  - 1966 through 1975: Table 9.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 9.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983: EIA, *Petroleum Marketing Monthly*, July 1985 issue, Table A13.
- 1984 through 1987: EIA, *Petoleum Marketing Monthly*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VOC_Mgal_a.htm.
- 1988 forward: EIA, *Fuel Oil and Kerosene Sales*, also available at http://www.eia.gov/dnav/pet/pet_cons_821rsd_a_EPPR_VOC_Mgal_a.htm.

RFRRPZZ — Residual fuel oil sold for use by railroads by state.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Shipments of Fuel Oil and Kerosene." The specific tables are
  - 1960 and 1961: Table 16.
  - 1962 and 1963: Table 15.
  - 1964 and 1965: Table 14.
  - 1966 through 1975: Table 10.
- 1976 through 1978: EIA, *Energy Data Reports*, "Sales of Fuel Oil and Kerosene," Table 10.
- 1979 and 1980: EIA, *Energy Data Reports*, "Deliveries of Fuel Oil and Kerosene," Table 2.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 5.

Note: Data for 1983 forward are published in thousand gallons. They are converted to thousand barrels by dividing by 42 before being entered into SEDS.

- 1983 through 1987: EIA, *Petroleum Marketing Monthly*. The specific tables are
  - 1983: July 1985 issue, Table A13.
  - 1984 and 1985: July 1986 issue, Table A3.
  - 1986 and 1987: June 1988 issue, Table A5.
- 1988 and 1989: EIA, *Fuel Oil and Kerosene Sales 1989*, Table 5.
- 1990 forward: Series discontinued. Volumes are included with "All Other" data (in SEDS).

RFTCPUS — Residual fuel oil total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Other Petroleum Products

"Other petroleum products" (OP) is the sum of 11 petroleum products. These products, in thousand barrels, are

ABTCPUS = aviation gasoline blending components total consumption in the United States;

COTCPZZ = crude oil (including lease condensate) total consumption in each state;

FNTCPUS = petrochemical feedstocks, naphtha less than 401°F, total consumption in the United States;

FOTCPUS = petrochemical feedstocks, other oils equal to or greater than 401°F, total consumption in the United States;

FSTCPUS = petrochemical feedstocks, still gas, total consumption in the United States (through 1985);

MBTCPUS = motor gasoline blending components total consumption in the United States;

MSTCPUS = miscellaneous petroleum products total consumption in the United States;

SGTCPUS = still gas total consumption in the United States;

SNTCPUS = special naphthas total consumption in the United States;

UOTCPUS = unfinished oils total consumption in the United States; and

WXTCPUS = waxes total consumption in the United States.

It is assumed that all of the products in "other petroleum products" are used by the industrial sector. State estimates are created for other petroleum products by using the following six variables to allocate the products to the states:

COCAPZZ = atmospheric crude oil distillation operable capacity (operating capacity before 2013) at refineries in each state as of January 1 of the following year, adjusted with information on new, shutdown, and reactivated refineries during the year, in barrels per calendar day;

FNCASZZ = state's share of U.S. capacity of steam crackers using naphtha as feedstocks;

FOCASZZ = state's share of U.S. capacity of steam crackers using other oils as feedstocks;

OCVAVZZ = value of shipments (value added before 2001) for the industrial organic chemical manufacturing industry in each state, in million dollars;

PIVAVZZ = value of shipments (value added before 2001) for the paint and coating manufacturing industry in each state, in million dollars; and

CGVAVZZ = value of shipments (value added before 2001) for the corrugated and solid fiber box manufacturing industry in each state, in million dollars.

Value of shipments and value added are two measures of manufacturing activity, both from the Department of Commerce *Economic Census* (previously, *Census of Manufactures*) reports. Value of shipments is a close approximation of gross output, adjusted for inventory changes. Value added excludes the cost of materials from gross output. Before 2001, value added data were used to allocate the national consumption of selected petroleum products to the states. From 2001 forward, value of shipments data are used instead. The change was made because gross output is considered a better indicator of consumption of fuel and feedstock than value added.

Crude oil

Crude oil is normally processed in refineries to produce petroleum products and rarely used directly (as energy consumption). Before 1983, crude oil burned on leases and by pipelines as fuel was reported as either distillate or residual fuel oil and was included in product supplied for those products. For 1983 through 2009, crude oil used directly in petroleum industry operations was reported as product supplied in the U.S. Energy Information Administration's (EIA) *Petroleum Supply Annual*. Beginning in 2010, crude oil product supplied, and therefore consumption, is assumed equal to zero.

Physical units

State estimates for crude oil consumed in petroleum industry operations are the data series COTCPZZ. The U.S. total for this data series is summed:

COTCPUS = ΣCOTCPZZ

Industrial consumption equals total consumption of crude oil:

COICPZZ = COTCPZZ
COICPUS = COTCPUS

British thermal units (Btu)

Crude oil has a heat content value of about 5.800 million Btu per barrel. The calculations performed to estimate total Btu consumption and industrial use Btu consumption by state and for the United States are

COTCBZZ = COTCPZZ * 5.800
COTCBUS = ΣCOTCBZZ
COICBZZ = COTCBZZ
COICBUS = COTCBUS

Data source

COTCPZZ — Crude oil consumed in petroleum industry operations by state.

- 1960 through 1982: Crude oil used directly was included in distillate and residual fuel oil product supplied when reported to the U. S. Energy Information Administration. Zeros are entered for all years.
- 1983 through 2009: Data are available for Petroleum Administration for Defense (PAD) districts, not by state. State estimates are calculated by allocating all crude oil consumption to the six states (Alaska, California, Colorado, Louisiana, Texas, and Utah) that reported distillate and residual fuel oils consumed by pipeline and leases in 1982. (Data on pipeline and lease consumption of fuels are not available after 1982.) Each state's 1982 ratio of distillate and residual fuel oils consumed by pipeline and leases to its respective 1982 PAD district total consumption of those fuels is calculated. This ratio is then applied to the 1983 forward PAD district totals of crude oil product supplied. The 1982 ratios are taken from the Form EIA-90, "Crude Oil Stocks Report," and the crude oil product supplied data are taken from the EIA *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/. The specific tables are
  - 1983 through 1988: Tables 2 and 4 through 8.
  - 1989 through 2004: Tables 2, 4, 6, 8, 10, and 12.
  - 2005 through 2009: Tables 1, 3, 5, 7, 9, and 11.
- 2010 forward: Zeroes are entered for all years.

Aviation gasoline blending components; petrochemical feedstocks, still gas; motor gasoline blending components; still gas; and unfinished oils

Physical units

The five petroleum products in this category are consumed as refinery fuels. Beginning in 1986, still gas for petrochemical feedstocks and still gas for

other uses are reported together in the source document. State consumption estimates of these products are created in proportion to each state's crude oil operable capacity at refineries (COCAPZZ). Before 2013, operating capacity was used. Occasionally, consumption for aviation gasoline blending components and unfinished oils will be negative. This can occur when such products have entered the primary supply channels with their production not having been reported (e.g., streams returned to refineries from petrochemical plants). The U.S. total for this variable is summed:

COCAPUS = ΣCOCAPZZ

Aviation gasoline blending components state and U.S. consumption are estimated:

ABTCPZZ = (COCAPZZ / COCAPUS) * ABTCPUS
ABICPZZ = ABTCPZZ
ABICPUS = ABTCPUS

Petrochemical feedstocks, still gas, state and U.S. consumption are estimated:

FSTCPZZ = (COCAPZZ / COCAPUS) * FSTCPUS
FSICPZZ = FSTCPZZ
FSICPUS = FSTCPUS

Motor gasoline blending components state and U.S. consumption are estimated:

MBTCPZZ = (COCAPZZ / COCAPUS) * MBTCPUS
MBICPZZ = MBTCPZZ
MBICPUS = MBTCPUS

Still gas state and U.S. consumption are estimated:

SGTCPZZ = (COCAPZZ / COCAPUS) * SGTCPUS
SGICPZZ = SGTCPZZ
SGICPUS = SGTCPUS

Unfinished oils state and U.S. consumption are estimated:

UOTCPZZ = (COCAPZZ / COCAPUS) * UOTCPUS
UOICPZZ = UOTCPZZ
UOICPUS = UOTCPUS

British thermal units (Btu)

Btu estimates for all of the products in this group are developed by multiplying the estimated consumption of each individual product in physical units by its respective heat content conversion factor. The conversion factors for aviation gasoline blending components, petrochemical feedstocks of still gas, and unfinished oils are constant for all years. Motor gasoline blending components and still gas use different conversion factors, depending on the year. The formulas are

ABTCBZZ = ABTCPZZ * 5.048
ABTCBUS = ΣABTCBZZ
ABICBZZ = ABTCBZZ
ABICBUS = ABTCBUS
FSTCBZZ = FSTCPZZ * 6.000
FSTCBUS = ΣFSTCBZZ
FSICBZZ = FSTCBZZ
FSICBUS = FSTCBUS
UOTCBZZ = UOTCPZZ * 5.825
UOTCBUS = ΣUOTCBZZ
UOICBZZ = UOTCBZZ
UOICBUS = UOTCBUS

The factor for converting motor gasoline blending components from physical unit values to Btu, MBTCKUS, is fixed at 5.253 million Btu per barrel for 1960 through 2006, and at 5.222 million Btu per barrel for 2007 forward:

MBTCKUS = factor for converting motor gasoline blending components from physical units to Btu.

MBTCBZZ = MBTCPZZ * MBTCKUS
MBTCBUS = ΣMBTCBZZ
MBICBZZ = MBTCBZZ
MBICBUS = MBTCBUS

The factor for converting still gas from physical unit values to Btu is fixed at 6.000 million Btu per barrel for 1960 through 2015 and at 6.287 million Btu per barrel for 2016 forward:

SGTCBZZ = SGTCPZZ * 6.000 through 2015
SGTCBZZ SGTCPZZ * 6.287 beginning in 2016
SGTCBUS = ΣSGTCBZZ
SGICBZZ = SGTCBZZ
SGICBUS = SGTCBUS

Data sources

ABTCPUS — Aviation gasoline blending components total consumption in the United States.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

COCAPZZ — Atmospheric crude oil distillation operable capacity (operating capacity before 2013) at refineries by state as of January 1 of the following year.

- 1960: U.S. Department of the Interior, Bureau of Mines, Petroleum Refineries, Including Cracking Plants, in the United States, Table 3.
- 1961 through 1963: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, "Petroleum Refineries in the United States." The specific tables are
  - 1961 and 1962: Table 3.
  - 1963: Table 1.
- 1964 through 1976: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, "Petroleum Refineries in the United States and Puerto Rico," Table 1.
- 1977: EIA, *Energy Data Reports*, "Petroleum Refineries in the United States and Puerto Rico," Table 1.
- 1978 through 1980: EIA, *Energy Data Reports*, "Petroleum Refineries in the United States and U.S. Territories," Table 1.
- 1981 through 2004: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/. The specific tables are
  - 1981 through 1983: Table 1.
  - 1984: Table 30.
  - 1985 through 1988: Table 29.
  - 1989 through 1994: Table 36.
  - 1995: Unpublished data based on Form EIA-810.
  - 1996 through 2004: Table 36.
- 2005 forward: EIA, *Refinery Capacity Report*, http://www.eia.gov/petroleum/refinerycapacity/, Table 1, supplemented with Table 11 data from 2011 forward.

FSTCPUS — Petrochemical feedstocks, still gas, total consumption in the United States (through 1985).

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, Petroleum Statement, Annual," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 14.
- 1983 through 1985: EIA, *Petroleum Supply Annual*, Table 12.

MBTCPUS — Motor gasoline blending components total consumption in the United States.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

MBTCKUS — Factor for converting motor gasoline blending components from physical units to Btu.

- 1960 through 2006: EIA adopted the Bureau of Mines thermal conversion factor of 5.253 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."
- 2007 forward: EIA adopted the thermal conversion factor of 5.222 million Btu per barrel (124,340 Btu per gallon) for gasoline blendstock from U.S. Department of Energy, Argonne National Laboratory, "The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model" (GREET), version GREET1_2013, October 2013.

SGTCPUS — Still gas total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 and 1982: EIA, *Petroleum Supply Annual*, Table 14.
- 1983 through 1985: EIA, *Petroleum Supply Annual*, Table 12.
- 1986 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled

"Products Supplied." The specific tables are
- 1986 through 2004: Table 2.
- 2005 forward: Table 1.

UOTCPUS — Unfinished oils total consumption in the United States.

- 1960 through 1980: No data available. Values assumed to be zero.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Petrochemical feedstocks, naphtha less than 401˚F; and petrochemical feedstocks, other oils equal to or greater than 401˚F

Physical units

Petrochemical feedstocks, naphtha and other oils, are consumed by the chemical industry in producing petrochemical "building blocks" (such as ethylene) that, in turn, are converted to such products as synthetic fibers, synthetic rubber, and plastics.

The chemical industry produces petrochemicals such as ethylene and propylene by steam cracking. To allocate the U.S. consumption of petrochemical feedstocks to the states, information on nameplate capacity and the share of naphtha and other oils in the feedstock mixture for all steam cracker plants producing ethylene is collected from various issues of the *Oil and Gas Journal* to derive the state shares of capacity of steam crackers using naphtha (FNCASZZ) and those using other oils (FOCASZZ). Based on the data collected for 1997 through 1999, 2002, 2004, 2008, and for 2010 forward, Texas and Louisiana are the only two states that use naphtha and other oils as feedstocks in their steam crackers. The shares for the interim years are interpolated using the compound annual growth rates of the years with data, and the shares for 1997 are used for the earlier years.

For 2015 forward, information on nameplate capacity and the share of naphthas and other oils in the feedstock mixture for steam cracker plants producing ethylene is not available from the *Oil and Gas Journal*. The 2014 values are used for 2015 forward.

Petrochemical feedstocks, naphtha less than 401˚F, state and U.S. consumption are estimated:

FNTCPZZ = FNTCPUS * FNCASZZ
FNICPZZ = FNTCPZZ
FNICPUS = FNTCPUS

Petrochemical feedstocks, other oils equal to or greater than 401˚F, state and U.S. consumption are estimated:

FOTCPZZ = FOTCPUS * FOCASZZ
FOICPZZ = FOTCPZZ
FOICPUS = FOTCPUS

British thermal units (Btu)

Btu estimates for the six petroleum products in this group are developed by multiplying each individual product's estimated consumption in physical units by its respective approximate heat content conversion factor. The calculations performed to estimate total Btu consumption and industrial use Btu consumption by state and for the United States are

FNTCBZZ = FNTCPZZ * 5.248
FNTCBUS = ΣFNTCBZZ
FNICBZZ = FNTCBZZ
FNICBUS = FNTCBUS
FOTCBZZ = FOTCPZZ * 5.825
FOTCBUS = ΣFOTCBZZ
FOICBZZ = FOTCBZZ
FOICBUS = FOTCBUS

Additional note

Before the 2010 cycle, the two products were allocated to the states in proportion to the value of shipments or value added in the manufacture of industrial organic chemicals from the Economic Censuses collected by the U.S. Census Bureau. Organic chemical manufacturing was used because state-level data for petrochemical manufacturing were not available. This resulted in the allocation of petrochemical feedstocks to more than 25 states, most of which did not produce petrochemicals. The steam cracker capacity shares, while requiring estimations, are better allocators.

Data sources

FNCASZZ — State's share of U.S. capacity of steam crackers using naphtha as feedstocks.

- 1960 through 1996: The share for 1997 is used.
- 1997 through 1999, 2002, 2004, 2008, and 2010 through 2014: *Oil and Gas Journal*, specific issues focusing on ethylene production, table on "International Survey of Ethylene from Steam Crackers."
- 2000, 2001, 2003, 2007, 2009, 2015 forward: EIA estimation, based on data available from the *Oil and Gas Journal*.

FNTCPUS — Petrochemical feedstocks, naphtha less than 401°F, total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
  - 1981 forward: EIA, *Petroleum Supply Annual*, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

FOCASZZ — State's share of U.S. capacity of steam crackers using other oils as feedstocks.

- 1960 through 1996: The share for 1997 is used.
- 1997 through 1999, 2002, 2004, 2008, and 2010 through 2014: *Oil and Gas Journal*, specific issues focusing on ethylene production, table on "International Survey of Ethylene from Steam Crackers."
- 2000, 2001, 2003, 2007, 2009, 2015 forward: EIA estimation, based on data available from the *Oil and Gas Journal*.

FOTCPUS — Petrochemical feedstocks, other oils equal to or greater than 401˚F, total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Miscellaneous petroleum products

Physical units

Miscellaneous products include all finished products not classified elsewhere (e.g., petrolatum, lube refining byproducts (aromatic extracts and tars), absorption oils, ram-jet fuel, petroleum rocket fuels, synthetic natural gas feed stocks, and specialty oils). It is assumed that the chief consuming industry for this product line is the organic chemical industry.

State estimates for these products are created in proportion to the value of shipments (value added before 2001) in the manufacture of industrial organic chemicals in each state (OCVAVZZ).

The U.S. total for the data series used to apportion these products to the states is summed:

OCVAVUS = ΣOCVAVZZ

Miscellaneous petroleum products state and U.S. consumption are estimated:

MSTCPZZ = (OCVAVZZ / OCVAVUS) * MSTCPUS
MSICPZZ = MSTCPZZ
MSICPUS = MSTCPUS

British thermal units (Btu)

EIA uses an average heat content value of 5.796 million Btu per barrel for miscellaneous petroleum products. The calculations performed to estimate total Btu consumption and industrial use Btu consumption by state and for the United States are

MSTCBZZ = MSTCPZZ * 5.796
MSTCBUS = ΣMSTCBZZ

Miscellaneous petroleum products consumed in the industrial sector is equal to total consumption.

MSICBZZ = MSTCBZZ
MSICBUS = MSTCBUS

Data sources

MSTCPUS — Miscellaneous petroleum products consumed in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines,

Mineral Industry Surveys, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1. Naphtha-type jet fuel volumes (JNTCPUS) are included in "Miscellaneous Products" in the *Petroleum Supply Annual*, Table 1.

OCVAVZZ — Value of shipments for the industrial organic chemicals manufacturing industry by state.

Note: Value added before 2001.

- 1960 through 1970: U.S. Department of Commerce, *1967 Census of Manufactures*, Volume II, Part 2, Standard Industrial Classification (SIC) 2818. The 1963 state data are used for the years 1960 through 1965, and the 1967 state data are used for 1966 through 1970.
- 1971 through 1980: U.S. Department of Commerce, *1977 Census of Manufactures*, Industry Series, SIC 2869. The 1972 state data are used for 1971 through 1975, and the 1977 state data are used for 1976 through 1980.
- 1981 through 1985: U.S. Department of Commerce, *1987 Census of Manufactures* (Final Report), Industry Series, SIC 2869. The 1982 state data are used for 1981 through 1985.
- 1986 through 1995: U.S. Department of Commerce, *1992 Census of Manufactures* (Final Report), Industry Series, SIC 2869. The 1987 state data are used for 1986 through 1990, and the 1992 state data are used for 1991 through 1995.
- 1996 through 2000: U.S. Department of Commerce, *1997 Economic Census, Manufacturing, Industry Series*, EC97M-3251A for North American Industry Classification System (NAICS) 325110 "Petrochemical Manufacturing" and EC97M-3251G for NAICS 325119 "All Other Basic Inorganic Chemical Manufacturing." The value added by manufacture for both categories are summed to create a data series generally comparable to the SIC 2869 used previously available at https://data.census.gov/cedsci/.
- 2001 forward: U.S. Department of Commerce, *Economic Census*, Manufacturing, Geographic Area Series, column titled "Value of shipments" data for NAICS series 325110, 325120, and 325199 shown in the datasets available at https://data.census.gov/cedsci/. See Additional Note 2 on page 90 for the methodology used to estimated withheld values.
  - 2001 through 2005: 2002 *Economic Census*.
  - 2006 through 2012: 2007 *Economic Census*.
  - 2013 forward: 2012 *Economic Census*.

Special naphthas

Physical units

Special naphthas are used as paint and varnish thinners and dry cleaning liquids or solvents. This petroleum product is allocated to the states in proportion to the value of shipments (value added before 2001) in the manufacture of paints and allied products in each state (PIVAVZZ).

The U.S. total for the apportioning data series is calculated:

PIVAVUS = ΣPIVAVZZ

Special naphthas state and U.S. consumption are estimated:

SNTCPZZ = (PIVAVZZ / PIVAVUS) * SNTCPUS
SNICPZZ = SNTCPZZ
SNICPUS = SNTCPUS

British thermal units (Btu)

Special naphthas have a heat content value of about 5.248 million Btu per barrel. This factor is applied to convert special naphthas estimated consumption from physical units to Btu by state and the United States is the sum of the states:

SNTCBZZ = SNTCPZZ * 5.248
SNTCBUS = ΣSNTCBZZ

Special naphthas consumed in the industrial sector is equal to total consumption.

SNICBZZ = SNTCBZZ
SNICBUS = SNTCBUS

Data sources

PIVAVZZ — Value of shipments for the paint and coating manufacturing industry by state.

Note: Value added before 2001.

- 1960 through 1970: U.S. Department of Commerce, *1967 Census of Manufactures*, Volume II, Part 2, SIC 2851. The 1963 state data are used for the years 1960 through 1965, and the 1967 state data are used for 1966 through 1970.
- 1971 through 1980: U.S. Department of Commerce, *1977 Census of Manufactures*, Industry Series, SIC 2851. The 1972 state data are used for 1971 through 1975, and the 1977 state data are used for 1976 through 1980.
- 1981 through 1985: U.S. Department of Commerce, *1987 Census of Manufactures* (Final Report), Industry Series, SIC 2851. The 1982 state data are used for the years 1981 through 1985.
- 1986 through 1995: U.S. Department of Commerce, *1992 Census of Manufactures* (Final Report), Industry Series, SIC 2851. The 1987 state data are used for the years 1986 through 1990, and the 1992 state data are used for 1991 through 1995.
- 1996 through 2000: U.S. Department of Commerce, *1997 Economic Census, Manufacturing, Industry Series*, EC97M-3255A for NAICS 325510 "Paint and Coating Manufacturing," available at https://data.census.gov/cedsci/.
- 2001 forward: U.S. Department of Commerce, *Economic Census*, Manufacturing, Geographic Area Series, column titled "Value of shipments" data for NAICS series 325510 shown in the data sets available at https://data.census.gov/cedsci/. See Additional Note 2 on page 90 for the methodology used to estimated withheld values.
  - 2001 through 2005: 2002 *Economic Census*.
  - 2006 through 2012: 2007 *Economic Census*.
  - 2013 forward: 2012 *Economic Census*.

SNTCPUS — Special naphthas total consumption in the United States.

- 1960 through 1963: Data included in motor gasoline.
- 1964 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Waxes

Physical units

Because petroleum waxes are very cost-effective moisture and gas barriers, food packaging is the largest market for petroleum waxes in the United States, accounting for more than 50% of petroleum wax consumption. Therefore, waxes are allocated to the states in proportion to the value of shipments (value added before 2001) in the manufacture of corrugated and solid fiber boxes (CGVAVZZ).

The U.S. total for this variable is summed:

CGVAVUS = ΣCGVAVZZ

State and U.S. consumption are estimated:

WXTCPZZ = (CGVAVZZ / CGVAVUS) * WXTCPUS
WXICPZZ = WXTCPZZ
WXICPUS = WXTCPUS

British thermal units (Btu)

Waxes have a heat content value of about 5.537 million Btu per barrel. This factor is applied to convert the estimated consumption of waxes from physical units to Btu by state and the United States is the sum of the states:

WXTCBZZ = WXTCPZZ * 5.537
WXTCBUS = ΣWXTCBZZ

Wax consumption in the industrial sector is equal to total consumption.

WXICBZZ = WXTCBZZ
WXICBUS = WXTCBUS

Data sources

CGVAVZZ — Value of shipments for the solid fiber box manufacturing industry by state.

Note: Value added before 2001. Before 1992, this series was value added for

the sanitary food container manufacturing industry.

- 1960 through 1965: U.S. Department of Commerce, *1963 Census of Manufactures*, Volume II, Part 1, SIC 2654. The 1963 state data are used for the years 1960 through 1965.
- 1966 through 1970: U.S. Department of Commerce, *1967 Census of Manufactures*, Volume II, Part 2, SIC 2654. The 1967 state data are used for 1966 through 1970.
- 1971 through 1980: U.S. Department of Commerce, *1977 Census of Manufactures*, Industry Series, SIC 2654. The 1972 state data are used for 1971 through 1975, and the 1977 state data are used for 1976 through 1980.
- 1981 through 1990: U.S. Department of Commerce, *1982 Census of Manufactures* (Final Report), Industry Series, SIC 2654. The 1982 state data are used for 1981 through 1990.
- 1991 through 1995: U.S. Department of Commerce, *1992 Census of Manufactures* (Final Report), Industry Series, SIC 2653. The 1992 state data are used for 1991 through 1995.
- 1996 through 2000: U.S. Department of Commerce, *1997 Economic Census, Manufacturing, Industry Series*, EC97M-3222A for NAICS 322211 "Corrugated and Solid Fiber Box Manufacturing" available at https://data.census.gov/cedsci/.
- 2001 forward: U.S. Department of Commerce, Economic Census, Manufacturing, Geographic Area Series, column titled "Value of shipments" data for NAICS series 322211 shown in the data sets available at https://data.census.gov/cedsci/. See Additional Note 2 on page 90 for the methodology used to estimated withheld values.
  - 2001 through 2005: 2002 *Economic Census*.
  - 2006 through 2012: 2007 *Economic Census*.
  - 2013 forward: 2012 *Economic Census*.

WXTCPUS — Waxes total consumption in the United States.

- 1960 through 1975: U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, "Petroleum Statement, Annual," Table 1.
- 1976 through 1980: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1.
- 1981 forward: EIA, *Petroleum Supply Annual*, http://www.eia.gov/petroleum/supply/annual/volume1/, table on U.S. Supply, Disposition, and Ending Stocks of Crude Oil and Petroleum Products, column titled "Products Supplied." The specific tables are
  - 1981 through 2004: Table 2.
  - 2005 forward: Table 1.

Total other petroleum products

Physical units

Total other petroleum products is the sum of the 11 "other petroleum products." All of these products are consumed by the industrial sector. State and U.S. industrial use of these other petroleum products are calculated:

OPICPZZ = ABICPZZ + COICPZZ + FNICPZZ + FOICPZZ + FSICPZZ + MBICPZZ + MSICPZZ + SGICPZZ + SNICPZZ + UOICPZZ + WXICPZZ

OPICPUS = ΣOPICPZZ

Total consumption of these products is calculated:

OPTCPZZ = ABTCPZZ + COTCPZZ + FNTCPZZ + FOTCPZZ + FSTCPZZ + MBTCPZZ + MSTCPZZ + SGTCPZZ + SNTCPZZ + UOTCPZZ + WXTCPZZ

OPTCPUS = ABTCPUS + COTCPUS + FNTCPUS + FOTCPUS + FSTCPUS + MBTCPUS + MSTCPUS + SGTCPUS + SNTCPUS + UOTCPUS + WXTCPUS

British thermal units (Btu)

Estimated consumption of all 11 "other petroleum products" in Btu is the sum of the Btu consumption of each product by the industrial sector. The state and U.S. totals are calculated:

OPICBZZ = ABICBZZ + COICBZZ + FNICBZZ + FOICBZZ + FSICBZZ + MBICBZZ + MSICBZZ + SGICBZZ + SNICBZZ + UOICBZZ + WXICBZZ

OPICBUS = ΣOPICBZZ

State and U.S. total consumption of these products is calculated:

OPTCBZZ = ABTCBZZ + COTCBZZ + FNTCBZZ + FOTCBZZ + FSTCBZZ + MBTCBZZ + MSTCBZZ + SGTCBZZ + SNTCBZZ + UOTCBZZ + WXTCBZZ

OPTCBUS = ΣOPTCBZZ

Additional notes

1. The data for "value added" and "value of shipments" that are used to allocate some of the other petroleum products are from the U.S. Department of Commerce, Census Bureau, *Census of Manufactures* (through 1992) or *Economic Census* (for 1997 forward). For individual industry series, some state-level data are withheld from publication to avoid disclosing operations of individual companies. Before 1992, the total withheld data was apportioned to the withheld states on the basis of those states' proportional values in the previous census. For 1992 forward, the total withheld value was apportioned to states with withheld data in proportion to the number of employees in that industry in each state.
2. In 1982, all respondents to the *Census of Manufactures* survey were requested to report their inventories at cost or market before accounting adjustments for "last in, first out" cost. This is a change from prior years in which respondents were permitted to value their inventories by using any generally accepted accounting valuation method. So, data for value added by manufacture after 1982 are not comparable to the prior years' data.

Petroleum Aggregates

This section describes the method of estimating total petroleum consumption for the five energy-consuming sectors. Table TN4.1 indicates which petroleum products are consumed in each sector. In the preceding portions of this section, consumption estimates have been derived for each petroleum product. These petroleum product subtotals are now summed, in physical units of thousand barrels and in Btu, to create estimated consumption for all petroleum products.

Residential sector

Petroleum products consumed by the residential sector are: distillate fuel oil (DF); kerosene (KS); and hydrocarbon gas liquids (HL). For the residential sector, the state and U.S. totals in physical units are

PARCPZZ = DFRCPZZ + HLRCPZZ + KSRCPZZ
PARCPUS = ΣPARCPZZ

State and U.S. totals in Btu are

PARCBZZ = DFRCBZZ + HLRCBZZ + KSRCBZZ
PARCBUS = ΣPARCBZZ

Commercial sector

The commercial sector's use of petroleum products includes: distillate fuel oil (DF); kerosene (KS); hydrocarbon gas liquids (HL); motor gasoline (MG); and residual fuel oil (RF). In physical units, the state and the U.S. totals for the commercial sector are calculated:

PACCPZZ = DFCCPZZ + HLCCPZZ + KSCCPZZ + MGCCPZZ + PCCCPZZ + RFCCPZZ
PACCPUS = ΣPACCPZZ

State and U.S. totals in Btu are

PACCBZZ = DFCCBZZ + HLCCBZZ + KSCCBZZ + MGCCBZZ + PCCCBZZ + RFCCBZZ
PACCBUS = ΣPACCBZZ

Industrial sector

Petroleum used in the industrial sector includes: asphalt and road oil (AR); distillate fuel oil (DF); kerosene (KS); hydrocarbon gas liquids (HL); lubricants (LU); motor gasoline (MG); petroleum coke (PC); residual fuel oil (RF); and the 11 products that are already summed in the "other petroleum products" (OP) subtotal. The state and U.S. total estimates in physical units are

PAICPZZ = ARICPZZ + DFICPZZ + HLICPZZ + KSICPZZ + LUICPZZ + MGICPZZ + OPICPZZ + PCICPZZ + RFICPZZ
PAICPUS = ΣPAICPZZ

State and U.S. totals in Btu are

PAICBZZ = ARICBZZ + DFICBZZ + HLICBZZ + KSICBZZ LUICBZZ + MGICBZZ + OPICBZZ + PCICBZZ + RFICBZZ
PAICBUS = ΣPAICBZZ

Transportation sector

Petroleum products used in the transportation sector are: aviation gasoline (AV); distillate fuel oil (DF); jet fuel (JF); hydrocarbon gas liquids (HL); lubricants (LU); motor gasoline (MG); and residual fuel oil (RF). The state and U.S. totals in physical units are

PAACPZZ = AVACPZZ + DFACPZZ + HLACPZZ + JFACPZZ + LUACPZZ + MGACPZZ + RFACPZZ
PAACPUS = ΣPAACPZZ

State and U.S. totals in Btu are

PAACBZZ = AVACBZZ + DFACBZZ + HLACBZZ + JFACBZZ + LUACBZZ + MGACBZZ + RFACBZZ
PAACBUS = ΣPAACBZZ

Electric power sector

Petroleum products consumed by the electric power sector are: distillate fuel oil (DF), jet fuel (JF), petroleum coke (PC), and residual fuel oil (RF). In physical units, the state and U.S. totals are

PAEIPZZ = DFEIPZZ + JFEUPZZ + PCEIPZZ + RFEIPZZ
PAEIPUS = ΣPAEIPZZ

State and U.S. totals in Btu are

PAEIBZZ = DFEIBZZ + JFEUBZZ + PCEIBZZ + RFEIBZZ
PAEIBUS = ΣPAEIBZZ

Total consumption of petroleum products

Total consumption of all petroleum products is the sum of all of the individual product totals. The state and U.S. physical unit totals are

PATCPZZ = ARTCPZZ + AVTCPZZ + DFTCPZZ + HLTCPZZ + JFTCPZZ + KSTCPZZ + LUTCPZZ + MGTCPZZ + OPTCPZZ + PCTCPZZ + RFTCPZZ
PATCPUS = ARTCPUS + AVTCPUS + DFTCPUS + HLTCPUS + JFTCPUS + KSTCPUS + LUTCPUS + MGTCPUS + OPTCPUS + PCTCPUS + RFTCPUS

State and U.S. totals in Btu are

PATCBZZ = ARTCBZZ + AVTCBZZ + DFTCBZZ + HLTCBZZ + JFTCBZZ + KSTCBZZ + LUTCBZZ + MGTCBZZ + OPTCBZZ + PCTCBZZ + RFTCBZZ
PATCBUS = ΣPATCBZZ

Total consumption of petroleum products per capita

Total consumption of all petroleum products per capita is calculated by dividing total consumption by resident population ("TPOPP"). Information on residential population is presented in Appendix C of the Consumption Technical Notes at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Estimated total consumption of petroleum products per capita for each state and the United States, in barrels, is represented by "PATPP" and is calculated:

PATPP = PATCP / TPOPP

Estimated total consumption of petroleum products per capita for each state and the United States, in million Btu, is represented by "PATPB" and is calculated:

PATPB = PATCB / TPOPP

Additional calculations

A few petroleum products are combined for display in the "Other Petroleum" column in tables on total energy consumption and industrial sector energy consumption. They include asphalt and road oil, aviation gasoline (total energy only), kerosene, lubricants, petroleum coke, and the 11 petroleum products described in the "other petroleum products" section of the Technical Notes. The variables are calculated in physical unit and Btu, for each state and the United States:

P1TCP = ARTCP + AVTCP + KSTCP + LUTCP + OPTCP + PCTCP
P1TCB = ARTCB + AVTCB + KSTCB + LUTCB + OPTCB + PCTCB
P1ICP = ARICP + KSICP + LUICP + OPICP + PCICP
P1ICB = ARICB + KSICB + LUICB + OPICB + PCICB

Total petroleum data typically include the volumes of fuel ethanol and biodiesel consumed with motor gasoline and distillate fuel oil, respectively. To assist data users in the analysis of consumption of renewable energy sources, which include fuel ethanol and biodiesel, versus consumption of fossil fuels, a data series, "total petroleum excluding biofuels" (PMTCB), is created for each state and the United States:

PMTCB = ARTCB + AVTCB + DMTCB + HLTCB + JFTCB +
KSTCB + LUTCB + MMTCB + OPTCB + PCTCB + RFTCB

"Total petroleum excluding biofuels" is used only in the tables showing primary energy consumption by source. For consumption by end-use sector, total petroleum estimates include the volumes of fuel ethanol and biodiesel consumed in motor gasoline and distillate fuel oil, as they are consumed by the end users.

Conversion factors for all petroleum products consumed by each sector, as well as data for the residential and commercial sectors combined, are calculated for use in EIA's *Annual Energy Review* and *Monthly Energy Review*.

PARCKUS = PARCBUS / PARCPUS
PACCKUS = PACCBUS / PACCPUS
PAICKUS = PAICBUS / PAICPUS
PAACKUS = PAACBUS / PAACPUS
PAEIKUS = PAEIBUS / PAEIPUS
PATCKUS = PATCBUS / PATCPUS

Consumption of all petroleum products by the residential and commercial sectors combined, in physical units, in Btu, and the average conversion factor, are calculated:

PAHCPUS = PARCPUS + PACCPUS
PAHCBUS = PARCBUS + PACCBUS
PAHCKUS = PAHCBUS / PAHCPUS

The renewable energy sources included in the State Energy Data System (SEDS) are biodiesel, fuel ethanol, wood, waste, hydroelectric, geothermal, solar, and wind energy.

Biodiesel

Biodiesel is a renewable fuel that can be made from vegetable oils, animal fats, and recycled grease. Biodiesel can be used with, or as a substitute for, petroleum-derived diesel or distillate fuel oil in vehicles or any equipment that operates with diesel fuel. While some smaller amounts of biodiesel are consumed in other sectors, SEDS assigns all biodiesel consumption to the transportation sector because of a lack of information to allocate to the other sectors. For 2001 forward, biodiesel estimates are compiled in SEDS and shown in the tables on primary energy consumption by source.

Physical units

The biodiesel consumption data series in physical units are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state):

BDTCPUS = biodiesel total consumption in the United States, in thousand barrels

BDTCPZZ = biodiesel total consumption by state, in thousand barrels

For 2001 forward, the U.S. total biodiesel consumption is developed by the U.S. Energy Information Administration (EIA) and published in EIA's *Monthly Energy Review*. For 2011 forward, internal EIA estimates of biodiesel consumption by Petroleum Administration for Defense District (PADD) are calculated using PADD-level biodiesel production, net receipts to refineries, net imports, and stock change.

For 2001 through 2010, the state estimates are calculated using the 2011 state shares applied to the U.S. total biodiesel consumption from EIA's *Monthly Energy Review* for each year.

For 2011 forward, the state estimates are calculated using EIA's U.S. total biodiesel consumption, internal EIA PADD-level estimates, state-level reported data, and state-level biodiesel blend ratio mandates.

Some states self-report annual biodiesel consumption in their state, and SEDS assumes those values for those states. State reported biodiesel consumption is available from California's Air Resources Board, *Low Carbon Fuel Standard Reporting Tool Quarterly Summaries* (2011 forward), Hawaii's Department of Business, Economic Development & Tourism Data Warehouse (2011 forward, for utility use), Iowa's Department of Revenue, *Retailers Fuel Gallons Annual Report* and the Iowa Renewable Fuels Association (2011 forward), Montana's Energy Office (2016 forward), New Mexico's Department of Agriculture (2016 forward), and Oregon's Data for the Clean Fuel Program (2016 forward).

Some states have mandates that require a minimum ratio of biodiesel to be blended with petroleum-derived diesel or distillate fuel oil. SEDS assumes that the mandates are the minimum ratio of biodiesel consumption to distillate fuel oil consumption in those states, and biodiesel consumption in these states can exceed the reported blend ratio mandate. States with mandates include Hawaii (5% of distillate fuel oil consumption in the transportation sector for 2016 forward), Illinois (8% for 2011 forward), Minnesota (5% from 2011 to 2013, 6.3% in 2014, 7.5% from 2015 to 2017, and 10% in 2018), New York (2% from 2011 to 2016, 2% of distillate fuel oil consumption in the transportation sector and 3.5% of all other sectors for 2017 and 2018), Oregon (2% to 4.2% from 2011 to 2015), Pennsylvania (2% for 2011 forward), and Washington (2% for 2011 forward).

For the rest of the states, biodiesel consumption is estimated using the following data and methodology:

- U.S. biodiesel consumption (BDTCPUS) reported in EIA's Monthly Energy Review is allocated to the corresponding PADD using internal EIA estimates.
- Reported state biodiesel consumption and minimum biodiesel blend ratios from state mandates are removed from the PADD estimates.
- The remaining volume of biodiesel for each PADD is then allocated to all the states without reported data in proportion to the value of each state's distillate fuel oil consumption.

SEDS assigns all biodiesel consumption to the transportation sector (BDACP):

BDACPZZ = BDTCPZZ

BDACPUS = ΣBDACPZZ

British thermal units (Btu)

Estimates for biodiesel consumption in Btu are developed by multiplying the estimated physical unit consumption by EIA's heat content conversion factor for biodiesel (5.359 million Btu per barrel). Btu consumption by state and for the United States are:

BDACBZZ = BDACPZZ * 5.359
BDACBUS = BDACBZZ
BDTCBZZ = BDACBZZ
BDTCBUS = BDTCBZZ

Energy losses and co-products from biodiesel production

Beginning in 2001, energy losses and co-products from the production of biodiesel are incorporated into state and U.S. industrial sector energy consumption (TEICBZZ and TEICBUS). This concept is defined as the difference between the heat content of the biomass inputs to the production of biodiesel and the heat content of the biodiesel produced. Energy losses for the United States are allocated to the states according to the biodiesel production share for each state. Energy losses for each state and the United States are then added to state and U.S. industrial and total energy consumption.

BDLCBUS = energy losses and co-products from the production of biodiesel for the United States, in billion Btu;
BDPRBUS = production of biodiesel for the United States, in billion Btu; and
BDPRBZZ = production of biodiesel by state, in billion Btu.

BDLCBZZ = (BDPRBZZ / BDPRBUS) * BDLCBUS

Additional note

Because of differences in data sources and estimation methods, the ratio of biodiesel consumption to distillate fuel oil consumption should not be interpreted as the average biodiesel blend ratio.

Data sources

BDTCPUS — Biodiesel total consumption in the United States.

- 1960 through 2000: No data available. Values are assumed to be zero.
- 2001 forward: EIA, *Monthly Energy Review*, Table 10.4.

Fuel Ethanol

Fuel ethanol is used as a gasoline octane enhancer and oxygenate. A small amount of fuel ethanol is used as an alternative fuel, such as E85. It is typically produced biologically from biomass feedstocks such as agricultural crops and cellulosic residues from agricultural crops or wood. It can also be produced chemically from ethylene. For 1981 forward, fuel ethanol estimates are compiled in SEDS and shown in the tables on primary energy consumption by source.

The U.S. total fuel ethanol consumption in SEDS is a series developed by the U.S. Energy Information Administration (EIA) from annual reports of field production of oxygenated gasoline (before 2005), finished motor gasoline and motor gasoline blending components adjustments (2005 forward), and refinery and blender net inputs of fuel ethanol and an adjustment item (all years). The fuel ethanol in physical units is denatured fuel ethanol, which includes a small amount of denaturant added to the fuel ethanol to make it unfit for human consumption.

Through 2004, the U.S. total is allocated to the states using data series on gasohol or fuel ethanol published by the U.S. Department of Transportation, Federal Highway Administration (FHWA).

For 2005 through 2009, the state estimates are calculated using the following EIA data series and assumptions:

- estimated use of fuel ethanol by Petroleum Administration for Defense (PAD) Refining District
- prime supplier sales of conventional (including oxygenated) gasoline and reformulated gasoline by state
- production of conventional and reformulated gasoline, total and blended with alcohol, by PAD Refining District
- a standard ethanol-to-motor gasoline ratio of 10% for all states except Alaska (0%), California (5.7%), and Minnesota (12%)

First, fuel ethanol consumption by refining district is estimated by adding fuel ethanol used as refinery and blender net inputs and an adjustment item derived from the supply and disposition of petroleum and other liquids. Next, the shares of both conventional and reformulated gasoline blended with fuel ethanol are calculated for each Refining District. Then, a set of preliminary state estimates for fuel ethanol blended into motor gasoline is calculated by multiplying the prime supplier sales for both conventional and reformulated gasoline with the corresponding share of gasoline blended with alcohol and the ethanol-to-gasoline ratio, and summing them together for each state. Finally, the preliminary state-level fuel ethanol estimates are scaled to the

fuel ethanol use for each Refining District.

For 2010 forward, the estimation method is refined. Data series and assumptions used in the calculation include

- U.S. fuel ethanol consumption
- motor gasoline consumption by state from SEDS
- prime supplier sales of conventional gasoline and reformulated gasoline by state
- production of conventional and reformulated gasoline, total and blended with fuel ethanol, by PAD Refining District
- inter-PADD movements of conventional gasoline
- net exports of conventional gasoline by PAD Refining District
- a standard ethanol-to-motor gasoline ratio of 10% for all states except Alaska (0%), Iowa (12%), and Minnesota (12%)

First, state-level motor gasoline consumption is allocated to conventional and reformulated gasoline consumption using the corresponding prime supplier sales ratios. Next, the shares of both conventional and reformulated gasoline blended with fuel ethanol are calculated for each Refining District. To better account for the amount of conventional gasoline in the denominator, the share is adjusted by inter-PADD movements and net exports. Then, a set of preliminary fuel ethanol consumption estimates is calculated by multiplying the state-level conventional and reformulated gasoline consumption estimates by the corresponding District-level shares of gasoline blended with fuel ethanol as well as by the ethanol-to-gasoline ratio. The preliminary conventional and reformulated ethanol uses are then summed together for each state. Finally, the preliminary estimates are adjusted to sum to the U.S. fuel ethanol total consumption.

The fuel ethanol data series are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state):

ENTCPUS = fuel ethanol total consumption in the United States, in thousand barrels;

ENTCBUS = fuel ethanol total consumption in the United States, in billion Btu; and

ENTRPZZ = fuel ethanol blended into motor gasoline (1993 forward) or total gasohol sales (1981 through 1992) by states, in thousand gallons.

The U.S. total of the state series, ENTRPUS, is calculated as the sum of the state data, ENTRPZZ. The U.S. value, ENTCPUS, is allocated to the states in proportion to the state estimates, ENTRPZZ:

$$ENTRPUS = \Sigma ENTRPZZ$$
$$ENTCPZZ = (ENTRPZZ / ENTRPUS) * ENTCPUS$$

Fuel ethanol total consumption by state, ENTCPZZ, is allocated to the commercial, industrial, and transportation sectors according to the motor gasoline consumption share for each sector:

$$ENACPZZ = (MGACPZZ / MGTCPZZ) * ENTCPZZ$$
$$ENCCPZZ = (MGCCPZZ / MGTCPZZ) * ENTCPZZ$$
$$ENICPZZ = (MGICPZZ / MGTCPZZ) * ENTCPZZ$$

The U.S. consumption estimates for the three sectors are calculated as the sum of the states' values.

Fuel ethanol total consumption by state in Btu, ENTCBZZ, is calculated by multiplying U.S. fuel ethanol total consumption in Btu with the state share of fuel ethanol consumption in physical unit:

$$ENTCBZZ = (ENTCPZZ / ENTCPUS) * ENTCBUS$$

Fuel ethanol total consumption by state in Btu is allocated to the commercial, industrial, and transportation sectors according to the motor gasoline consumption share for each sector:

$$ENACBZZ = (MGACPZZ / MGTCPZZ) * ENTCBZZ$$
$$ENCCBZZ = (MGCCPZZ / MGTCPZZ) * ENTCBZZ$$
$$ENICBZZ = (MGICPZZ / MGTCPZZ) * ENTCBZZ$$
$$ENACBUS = \Sigma ENACBZZ$$
$$ENCCBUS = \Sigma ENCCBZZ$$
$$ENICBUS = \Sigma ENICBZZ$$

The U.S. fuel ethanol conversion factor is derived from the U.S. fuel ethanol total consumption in Btu and in physical unit:

$$ENTCKUS = ENTCBUS / ENTCPUS$$

Fuel ethanol excluding denaturant

Fuel ethanol contains a small amount of denaturant, which is added to make the finished product unsuitable for human consumption. Fuel ethanol denaturant is typically natural gasoline (pentanes plus) or conventional gasoline. These volumes are already accounted for under petroleum. Therefore, to avoid double-counting, and to separately identify the renewable content of fuel ethanol, EIA estimates the Btu content of fuel ethanol excluding denaturant consumed by the United States. This is then allocated to the states based on

the states shares of fuel ethanol consumption, as follows:

EMTCBUS = fuel ethanol, excluding denaturant, consumed in the United States, in billion Btu.

EMTCBZZ = (ENTCBZZ / ENTCBUS) * EMTCBUS

Similarly, fuel ethanol excluding denaturant is allocated to the commercial, industrial, and transportation sectors according to the motor gasoline consumption share for each sector:

EMACBZZ = (MGACPZZ / MGTCPZZ) * EMTCBZZ
EMCCBZZ = (MGCCPZZ / MGTCPZZ) * EMTCBZZ
EMICBZZ = (MGICPZZ / MGTCPZZ) * EMTCBZZ
EMACBUS = ΣEMACBZZ
EMCCBUS = ΣEMCCBZZ
EMICBUS = ΣEMICBZZ

Energy losses and co-products from fuel ethanol production

Beginning in 1981, energy losses and co-products from the production of fuel ethanol are incorporated into state and U.S. industrial sector energy consumption (TEICBZZ and TEICBUS). This concept is defined as the difference between the heat content of the biomass inputs to the production of fuel ethanol and the heat content of the fuel ethanol produced. Energy losses for the United States are allocated to the states according to the fuel ethanol production share for each state. Energy losses for each state and the Unites States are then added to state and U.S. industrial and total energy consumption.

EMLCBUS = energy losses and co-products from the production of fuel ethanol for the United States, in billion Btu;
EMPRBUS = production of fuel ethanol, excluding denaturant, for the United States, in billion Btu; and
EMPRBZZ = production of fuel ethanol, excluding denaturant, by state, in billion Btu.

EMLCBZZ = (EMPRBZZ / EMPRBUS) * EMLCBUS

Additional notes

1. Because of differences in data sources and estimation methods, the ratio of fuel ethanol consumption to motor gasoline consumption should not be interpreted as the average ethanol blend rate.
2. Fuel ethanol data blended into motor gasoline (ENTRPZZ) are published in FHWA *Highway Statistics* from 1993 through 2001, 2003, and 2004.

   In 2002, fuel ethanol blended into motor gasoline is not available from *Highway Statistics*. The ratio of each state's fuel ethanol in gasohol to total gasohol consumption is calculated for 2001 and 2003. The two ratios for each state are averaged and the average is applied to each state's 2002 total gasohol consumption to derive the amount of fuel ethanol consumed in gasohol in 2002. Fuel ethanol and gasohol data for Florida, Massachusetts, and Rhode Island are available for only 2001 or 2003; in these instances, the ratio of only the available year is used.

Data sources

EMLCBUS — Energy losses and co-products from the production of fuel ethanol for the United States.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, *Monthly Energy Review*, Table 10.3.

EMPRBUS — Production of fuel ethanol excluding denaturant for the United States.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, *Monthly Energy Review*, Table 10.3.

EMPRBZZ — Production of fuel ethanol excluding denaturant by state.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, State Energy Data System, production estimates.

EMTCBUS — Fuel ethanol excluding denaturant consumed in the United States in billion Btu.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, *Monthly Energy Review*, Table 10.3.

ENTCBUS — Fuel ethanol including denaturant consumed in the United States in billion Btu.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 forward: EIA, *Monthly Energy Review*, Table 10.3.

ENTCPUS — Fuel ethanol, including denaturant, consumed in the United States.

- 1960 through 1980: No data available. Values are assumed to be zero.
- 1981 through 1992:
  - 1981, 1984, 1987, and 1989: EIA, *Estimates of U.S. Biofuels Consumption 1990*, Table 10.
  - 1982 and 1983: EIA, Office of Coal, Nuclear, Electric, and Alternate Fuels estimates.
  - 1985, 1986, 1988, and 1991: Values interpolated.
  - 1990 and 1992: EIA, *Estimates of U.S. Biomass Energy Consumption 1992*, Table D1.
- 1993 through 2004: EIA estimates based on data in the EIA *Petroleum Supply Annual,* (PSA) Tables 2 and 16. Ten percent of the "Field Production" of "Oxygenated Finished Motor Gasoline" from the PSA Table 2 is added to the "Refinery Input of Fuel Ethanol" from the PSA Table 16.
- 2005 through 2008: EIA estimates based on data in the EIA PSA, Tables 1 and 15. Motor gasoline blending components adjustments and finished motor gasoline adjustments from PSA, Table 1, are added to fuel ethanol refinery and blender net inputs from PSA, Table 15.
- 2009 forward: EIA estimates based on data in the EIA PSA, Table 1. Fuel Ethanol Stock Exchange and Fuel Ethanol Exports are subtracted from Fuel Ethanol Renewable Fuels and Oxygenate Plant Net Production and Fuel Ethanol Imports.

ENTRPZZ — Fuel ethanol blended into motor gasoline by state.

- 1960 through 1980: Values are set to be zero.
- 1981 through 1992: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995,* Table MF-233GLA.
- 1993 through 1995: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995,* Table MF-233E, column titled "Total Ethanol Used in Gasohol."
- 1996 through 2001, 2003, and 2004: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, Table MF-33E, column titled "Total Ethanol Used in Gasohol."
- 2002: EIA estimates based on the 2001 and 2003 data from *Highway Statistics*. For an explanation of the estimation methodology, see the "Additional Notes" on page 96.
- 2005 through 2009: EIA estimates based on Petroleum & Other Liquids data website, Prime Supplier Sales Volumes, Motor Gasoline http://www.eia.gov/dnav/pet/pet_cons_prim_a_epm0_p00_mgalpd_a.htm, Refinery and Blender Net Production for the finished motor gasoline products—http://www.eia.gov/dnav/pet/pet_pnp_refp_a_epm0f_ypr_mbbl_a.htm, supply of fuel ethanol—http://www.eia.gov/dnav/pet/pet_sum_snd_a_EPOOXE_mbbl_a_cur.htm. See explanation of estimation methodology on page 95.
- 2010 forward: EIA estimates based on Petroleum & Other Liquids data website, Prime Supplier Sales Volumes, Motor Gasoline http://www.eia.gov/dnav/pet/pet_cons_prim_a_epm0_p00_mgalpd_a.htm, Refinery and Blender Net Production for the finished motor gasoline products—http://www.eia.gov/dnav/pet/pet_pnp_refp_a_epm0f_ypr_mbbl_a.htm, movements of conventional gasoline between PAD Districts—http://www.eia.gov/dnav/pet/pet_move_ptb_a_EPM0C_TNR_mbbl_a.htm, and unpublished imports and exports of conventional gasoline by Refining District. See explanation of estimation methodology on page 95.

Geothermal Energy

Electricity generated from geothermal energy is included in the State Energy Data System (SEDS) for all years. Before 1989, it covered geothermal energy input at electric utilities only; for 1989 forward, it includes geothermal energy input for independent power producers in the electric power sector. For 2018 forward, it also covers input for utility-scale commercial CHP and electricity-only facilities. The data series are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state):

GEEGPZZ = geothermal electricity net generation in the electric power sector by state, in million kilowatthours, and

GEC5PZZ = geothermal electricity net generation at utility-scale commercial CHP and electricity-only facilities by state, in million kilowatthours.

Geothermal energy is also used as direct heat or from heat pumps in the residential, commercial (excluding CHP and electricity-only facilities), and industrial sectors. National estimates of geothermal energy consumption for these three end-use sectors for 1989 through 2011 were developed by the Oregon Institute of Technology Geo-Heat Center, which also provided state estimates for selected years (see additional notes on page 98). From 2012 forward, estimates are no longer available from the Geo-Heat Center. The U.S. consumption for these series, estimated by EIA and reported in the *Monthly Energy Review*, is allocated to the states using each state's average share of U.S. geothermal energy consumption for 2009 through 2011.

These data series are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state). For the residential and industrial sectors, they represent all geothermal energy consumed:

GEC4BZZ = geothermal energy consumed as direct heat or from heat pumps in the commercial sector by state, in billion British thermal units (Btu);

GEICBZZ = geothermal energy consumed by the industrial sector by state, in billion Btu; and

GERCBZZ = geothermal energy consumed by the residential sector by state, in billion Btu.

The U.S. totals for the state-level series are calculated by summing the state data:

GEEGPUS = ΣGEEGPZZ
GEC5PUS = ΣGEC5PZZ
GEC4BUS = ΣGEC4BZZ
GEICBUS = ΣGEICBZZ
GERCBUS = ΣGERCBZZ

Geothermal electricity net generation in the electric power sector and the commercial CHP and electricity-only facilities is converted from kilowatthours to British thermal units (Btu) by using the U.S. average heat content of fossil fuels consumed at steam-electric power plants, FFETKUS, as a conversion factor. The annual values for this factor are shown in the Consumption Technical Notes, Appendix B, Table B1, http://www.eia.gov/state/seds/seds-technical-notes-complete.php.

FFETKUS = factor for converting geothermal electricity net generation from kilowatthours to Btu.

The values for the electric power sector in each state are converted to Btu and the U.S. total is the sum of the state data:

GEEGBZZ = GEEGPZZ * FFETKUS
GEEGBUS = ΣGEEGBZZ

The values for geothermal energy consumed in the commercial CHP and electricity-only facilities in each state are converted to Btu:

GEC5BZZ = GEC5PZZ * FFETKUS

Total commercial sector consumption is the sum of geothermal consumed as direct heat or from heat pumps and in CHP and electricity-only facilities. The U.S. total is the sum of the state data.

GECCBZZ = GEC5BZZ + GEC4BZZ
GECCBUS = ΣGECCBZZ

The state totals for geothermal energy are the sum of the residential, commercial, and industrial sectors' use and the electric power sector's geothermal-based generation. The U.S. total is the sum of the state data.

GETCBZZ = GERCBZZ + GECCBZZ + GEICBZZ + GEEGBZZ
GETCBUS = ΣGETCBZZ

Additional notes

Consumption estimates of geothermal energy in the residential, commercial,

and industrial sectors are from the Oregon Institute of Technology Geo-Heat Center. State data for 1989 and 1994 are based on surveys of geothermal equipment producers, distributors, and installers and state energy offices. State estimates from 1998 forward are developed by the Geo-Heat Center from discussions with industry sources.

The state data for 1989, 1994, and 1998 are used by the U.S. Energy Information Administration (EIA) to estimate the state values for intervening years. States with the same value in two survey years are assigned that value for each intervening year. For states with increases or decreases in the survey data, the difference is allocated evenly over the intervening years. If a state went from zero to a value or from a value to zero, it was given zero in the intervening years. The state data for each intervening year are summed and states with increasing or decreasing values are adjusted until the U.S. total equals the U.S. total estimated by the Oregon Institute of Technology Geo-Heat Center.

Data sources

FFETKUS — Fossil-fueled steam-electric power plant conversion factor.

- 1960 through 1988: Estimated by EIA as the weighted annual average heat rate for fossil-fueled steam-electric plants in the United States as published in the EIA, *Electric Plant Cost and Power Production Expenses 1991*, Table 9.
- 1989 through 2000: Calculated annually by EIA by using heat rate data reported on Form EIA-860, "Annual Electric Generator Report" (and predecessor forms); and net generation data reported on Form EIA-759, "Monthly Power Plant Report." The computation includes data for all electric utility steam-electric plants using fossil fuels.
- 2001 forward: Calculated annually by EIA by using fuel consumption and net generation data reported on Form EIA-923, "Power Plant Operations Report," and predeccessor forms. The computation includes data for all electric utilities and electricity-only independent power producers using fossil fuels.

GEC4BUS — Geothermal energy as direct heat or from heat pumps in the commercial sector in the United States.

- 2012 forward: EIA, *Monthly Energy Review*, Table 10.2a and unpublished data.

GEC4BZZ — Geothermal energy consumed as direct heat or from heat pumps in the commercial sector by state.

- 1960 through 1988: No data available. Values assumed to be zero.
- 1989: Oregon Institute of Technology Geo-Heat Center, unpublished tables (April 1999) based on a survey.
- 1990 through 1993: U.S. totals are estimates from the Oregon Institute of Technology Geo-Heat Center, unpublished tables. State data for 1989 and 1994 are used to estimate state values for the intervening years. For an explanation of the estimation methodology, see the "Additional Note" on page 98.
- 1994: Oregon Institute of Technology Geo-Heat Center, unpublished tables (April 1999) based on a survey.
- 1995 through 1997: U.S. totals are from the Oregon Institute of Technology Geo-Heat Center, unpublished tables. State data for 1994 and 1998 are used to estimate state values for the intervening years. For an explanation of the estimation methodology, see the "Additional Note" on page 98.
- 1998 through 2011: Oregon Institute of Technology Geo-Heat Center, unpublished tables based on informal surveys and estimations.
- 2012 forward: Estimated by EIA, based on Oregon Institute of Technology Geo-Heat Center data.

GEC5PZZ — Geothermal electricity net generation at utility-scale commercial CHP and electricity-only facilities by state.

- 1960 through 2017: Values are assumed to be zero.
- 2018 forward: EIA, Form EIA-923, "Power Plant Operations Report."

GEEGPZZ — Geothermal electricity net generation in the electric power sector by state.

- 1960 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

GEICBUS — Geothermal energy consumed by the industrial sector in the United States.

- 2012 forward: EIA, *Monthly Energy Review*, Table 10.2b.

GEICBZZ — Geothermal energy consumed by the industrial sector by state.

- 1960 through 1988: No data available. Values assumed to be zero.
- 1989: Oregon Institute of Technology Geo-Heat Center, unpublished

tables (April 1999) based on a survey.
- 1990 through 1993: U.S. totals are estimates from the Oregon Institute of Technology Geo-Heat Center, unpublished tables. State data for 1989 and 1994 are used to estimate state values for the intervening years. For an explanation of the estimation methodology, see the "Additional Note" on page 98.
- 1994: Oregon Institute of Technology Geo-Heat Center, unpublished tables, (April 1999) based on a survey.
- 1995 through 1997: U.S. totals are from the Oregon Institute of Technology Geo-Heat Center, unpublished tables. State data for 1994 and 1998 are used to estimate state values for the intervening years. For an explanation of the estimation methodology, see the "Additional Note" on page 98.
- 1998 through 2011: Oregon Institute of Technology Geo-Heat Center, unpublished tables based on informal surveys and estimations.
- 2012 forward: Estimated by EIA, based on Oregon Institute of Technology Geo-Heat Center data.

GERCBUS — Geothermal energy consumed by the residential sector in the United States.

- 2012 forward: EIA, *Monthly Energy Review*, Table 10.2a.

GERCBZZ — Geothermal energy consumed by the residential sector by state.

- 1960 through 1988: No data available. Values assumed to be zero.
- 1989: Oregon Institute of Technology Geo-Heat Center, unpublished tables (April 1999) based on a survey.
- 1990 through 1993: U.S. totals are estimates from the Oregon Institute of Technology Geo-Heat Center, unpublished tables. State data for 1989 and 1994 are used to estimate state values for the intervening years. For an explanation of the estimation methodology, see the "Additional Note" on page 98.
- 1994: Oregon Institute of Technology Geo-Heat Center, unpublished tables (April 1999) based on a survey.
- 1995 through 1997: U.S. totals are from the Oregon Institute of Technology Geo-Heat Center, unpublished tables. State data for 1994 and 1998 are used to estimate state values for the intervening years. For an explanation of the estimation methodology, see the "Additional Note" on page 98.
- 1998 through 2011: Oregon Institute of Technology Geo-Heat Center, unpublished tables based on informal surveys and estimations.
- 2012 forward: Estimated by EIA, based on Oregon Institute of Technology Geo-Heat Center data.

Hydroelectric Power

Electricity generated from hydropower is included in the State Energy Data System (SEDS) in the industrial and electric power sectors for all years, 1960 forward, and in the commercial sector for 1989 forward. In the electric power sector, there are two types of hydroelectricity: conventional hydroelectricity and pumped-storage hydroelectricity. Conventional hydroelectricity uses falling water to drive turbines to produce electricity. Pumped-storage hydroelectricity is generated by releasing water that has been pumped into an elevated storage reservoir during off-peak periods to drive the turbines during times of peak demand. Electricity produced from pumped storage, when it can be identified separately, is not included in energy consumption estimates because the energy that was used to pump the water is already accounted for. Hydroelectricity data series included in SEDS are identified by the following names ("ZZ" in the name represents the two-letter state code that differs for each state):

HVEGPZZ = conventional hydroelectricity net generation in the electric power sector by state, in million kilowatthours;

HVC5PZZ = conventional hydroelectricity net generation at commercial CHP and electricity-only facilities by state, in million kilowatthours; and

HVI5PZZ = conventional hydroelectricity net generation at industrial CHP and electricity-only facilities by state, in million kilowatthours.

The U.S. value for each of the series is the sum of the state data.

Total use of hydroelectricity in the commercial, industrial, and electric power sectors is assumed to be the electricity generated by conventional hydroelectricity. The U.S. total for each sector is the sum of the state values:

HYCCPZZ = HVC5PZZ
HYCCPUS = ΣHYCCPZZ
HYICPZZ = HVI5PZZ
HYICPUS = ΣHYICPZZ
HYEGPZZ = HVEGPZZ
HYEGPUS = ΣHYEGPZZ

Hydroelectricity net generation is converted from kilowatthours to British thermal units (Btu) by using the U.S. average heat content of fossil fuels consumed at steam-electric power plants, FFETKUS, as a conversion factor. The annual values for this factor are shown in the Consumption Technical Notes, Appendix B, Table B1, http://www.eia.gov/state/seds/seds-technical-notes-complete.php.

HYCCBZZ = HYCCPZZ * FFETKUS
HYICBZZ = HYICPZZ * FFETKUS
HYEGBZZ = HYEGPZZ * FFETKUS

The U.S. value for each of the series is the sum of the state data.

Total hydroelectricity consumption for each state is the sum of the commercial, industrial, and electric power sectors' generation.

HYTCPZZ = HYCCPZZ + HYICPZZ + HYEGPZZ
HYTCPUS = ΣHYTCPZZ
HYTCBZZ = HYCCBZZ + HYICBZZ + HYEGBZZ
HYTCBUS = ΣHYTCBZZ

Data sources

FFETKUS — Fossil-fueled steam-electric power plant conversion factor.

- 1960 through 1988: Estimated by EIA as the weighted annual average heat rate for fossil-fueled steam-electric plants in the United States as published in the EIA, *Electric Plant Cost and Power Production Expenses 1991*, Table 9.
- 1989 through 2000: Calculated annually by EIA by using heat rate data reported on Form EIA-860, "Annual Electric Generator Report" (and predecessor forms); and net generation data reported on Form EIA-759, "Monthly Power Plant Report." The computation includes data for all electric utility steam-electric plants using fossil fuels.
- 2001 forward: Calculated annually by EIA by using fuel consumption and net generation data reported on Form EIA-923, "Power Plant Operations Report," and predeccessor forms. The computation includes data for all electric utilities and electricity-only independent power producers using fossil fuels.

HVC5PZZ — Conventional hydroelectricity net generation at commercial CHP and electricity-only facilities by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

HVI5PZZ — Conventional hydroelectricity net generation at industrial CHP

and electricity-only facilities by state.

- 1960 through 1978: Federal Power Commission, Form 4, "Monthly Power Plant Report."
- 1979 and 1980: EIA estimates based on previous years' data.
- 1981 through 1988: No data available. The 1980 data are repeated for each year.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

HVEGPZZ — Conventional hydroelectricity net generation in the electric power sector (includes pumped-storage hydroelectric power through 1989) by state.

- 1960 through 1977: Federal Power Commission, News Release, "Power Production, Fuel Consumption, and Installed Capacity Data."
- 1978 through 1980: EIA, *Energy Data Reports*, "Power Production, Fuel Consumption and Installed Capacity Data."
- 1981 through 1988: EIA, Form EIA-759, "Monthly Power Plant Report," and predecessor forms. The data rounded to gigawatthours are published in the following reports:
  - 1981 through 1985: EIA, *Electric Power Annual 1985*, Table 6.
  - 1986 and 1987: EIA, *Electric Power Annual 1987*, Table 18.
  - 1988: EIA, *Electric Power Annual 1989*, Table 14.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

Solar Energy

Solar energy consumption covers solar thermal and photovoltaic electricity generation and solar thermal energy consumed as heat. For electricity net generation in facilities with capacity of 1 megawatt or greater (utility-scale), data are collected by the U.S. Energy Information Administration (EIA) on Form EIA-923, "Power Plant Operations Report," and predecessor forms. Net generation in the electric power sector is available for 1984 forward and net generation at commercial and industrial utility-scale facilities are available for 2008 forward.

For photovoltaic electricity generation in facilities with a combined generator capacity less than 1 megawatt (small-scale), data for the residential, commercial, and industrial sectors for 2014 forward are estimated by EIA and reported in EIA's *Electric Power Annual*. State-level generation for 1989 through 2013 are calculated by allocating the national estimate, published in EIA's *Monthly Energy Review* (MER), to the states using cumulative capacity of photovoltaic installation.

For solar thermal energy consumed as heat, that is, produced by non-electric applications such as pool heating and hot water heating, the national series is estimated by EIA for 1989 forward and published in the MER. Although there are applications in the commercial and industrial sectors, they cannot be separately estimated, and all applications are included in the residential sector. The method of estimating state-level data is described on page 104.

Electric power sector

The electric power sector includes estimates of electricity produced from solar thermal and photovoltaic energy sources by electric utilities for 1984 forward, and by both electric utilities and independent power producers for 1989 forward. The data series is identified in SEDS by the following name ("ZZ" in the variable name represents the two-letter state code that differs for each state):

SOEGPZZ = solar thermal and photovoltaic electricity net generation in the electric power sector, for each state, in million kilowatthours.

The U.S. total for this series is calculated as the sum of the state data:

SOEGPUS = ΣSOEGPZZ

Solar thermal and photovoltaic electricity net generation in the electric

power sector is converted from kilowatthours to British thermal units (Btu) by using a conversion factor that is the U.S. average heat content of fossil fuels consumed at steam-electric power plants, FFETKUS. The annual values for this factor are shown in Appendix B, Table B1, http://www.eia.gov/state/seds/seds-technical-notes-complete.php.

FFETKUS = factor for converting solar thermal and photovoltaic electricity net generation from kilowatthours to Btu.

The values for the electric power sector in each state are converted to Btu and the U.S. total is the sum of the state data:

SOEGBZZ = SOEGPZZ * FFETKUS
SOEGBUS = ΣSOEGBZZ

Commercial sector

Solar energy consumed by the commercial sector covers solar electricity generation at utility-scale and small-scale facilities. Data for solar thermal and photovoltaic electricity net generation at commercial combined-heat-and-power (CHP) and electricity-only plants with combined generator capacity of 1 megawatt or greater (utility-scale) are available for 2008 forward. The SEDS data series is identified by the following name ("ZZ" in the name represents the two-letter state code that differs for each state):

SOC5PZZ = solar thermal and photovoltaic electricity net generation at utility-scale commercial CHP and electricity-only facilities by state, in million kilowatthours.

The U.S. value for each series is the sum of the state data.

SOC5PUS = ΣSOC5PZZ

Data for photovoltaic electricity generation at facilities with a combined generator capacity less than 1 megawatt (small-scale) in the commercial sector, not covered by EIA's power plant operations survey, are estimated by EIA for 2014 forward. The SEDS data series is identified by the following name ("ZZ" in the name represents the two-letter state code that differs for each state):

SOC7PZZ = photovoltaic electricity generation at small-scale commercial facilities by state, in million kilowatthours.

The U.S. value for the series is the sum of the state data:

SOC7PUS = ΣSOC7PZZ

Before 2014, U.S. small-scale photovoltaic electricity generation is estimated by EIA and published in the EIA *Monthly Energy Review*. For 2006 through 2013, state generation is estimated using historical growth rates of the state-level cumulative installed capacity estimated by EIA based on capacity of PV installations in the non-residential sector provided by the Interstate Renewable Energy Council (IREC) and aligned to the U.S. total. For 1989 through 2005, the U.S. total is allocated to the states using 2006 state cumulative installed capacity shares.

Consumption in Btu is calculated by using the conversion factor FFETKUS:

SOC5BZZ = SOC5PZZ * FFETKUS
SOC7BZZ = SOC7PZZ * FFETKUS

Total commercial sector solar energy consumption includes consumption of energy from both utility-scale and small-scale electricity generation:

SOCCPZZ = SOC5PZZ + SOC7PZZ
SOCCPUS = ΣSOCCPZZ
SOCCBZZ = SOC5BZZ + SOC7BZZ
SOCCBUS = ΣSOCCBZZ

Industrial sector

Solar energy consumed by the industrial sector covers solar energy generation at utility-scale and small-scale facilities. Data for solar thermal and photovoltaic electricity net generation at industrial combined-heat-and-power (CHP) and electricity-only plants with combined generator capacity of 1 megawatt or greater (utility-scale) are available for 2008 forward. The SEDS data series is identified by the following name ("ZZ" in the name represents the two-letter state code that differs for each state):

SOI5PZZ = solar thermal and photovoltaic electricity net generation at utility-scale industrial CHP and electricity-only facilities by state, in million kilowatthours.

The U.S. value for the series is the sum of the state data:

SOI5PUS = ΣSOI5PZZ

Data for photovoltaic electricity generation at facilities with a combined generator capacity less than 1 megawatt (small-scale) in the industrial sector,

not covered by EIA's power plant operations survey, are estimated by EIA for 2014 forward. The SEDS data series is identified by the following name ("ZZ" in the name represents the two-letter state code that differs for each state):

SOI7PZZ = photovoltaic electricity generation at small-scale industrial facilities by state, in million kilowatthours.

The U.S. value for the series is the sum of the state data:

SOI7PUS = ΣSOI7PZZ

Before 2014, U.S. small-scale photovoltaic electricity generation is estimated by EIA and published in the EIA *Monthly Energy Review*. For 2006 through 2013, state generation is estimated using historical growth rates of the state-level cumulative installed capacity estimated by EIA based on capacity of PV installations in the non-residential sector published by the Interstate Renewable Energy Council (IREC) and aligned to the U.S. total. For 1989 through 2005, the U.S. total is allocated to the states using 2006 state cumulative installed capacity shares.

Consumption in Btu is calculated by using the conversion factor FFETKUS:

SOI5BZZ = SOI5PZZ * FFETKUS
SOI7BZZ = SOI7PZZ * FFETKUS

Total industrial sector solar energy consumption includes consumption of energy from both utility-scale and small-scale electricity generation:

SOICPZZ = SOI5PZZ + SOI7PZZ
SOICPUS = ΣSOICPZZ
SOICBZZ = SOI5BZZ + SOI7BZZ
SOICBUS = ΣSOICBZZ

Residential sector

Solar energy consumed by the residential sector covers small-scale photovoltaic electricity generation and solar thermal energy consumed as heat. Data in British thermal units (Btu) for U.S. solar thermal energy consumed as heat are estimated by EIA and published in the EIA *Monthly Energy Review* for 1989 forward:

SOT8BUS = solar thermal energy consumed as heat in the United States, in billion Btu.

The commercial and industrial sectors also consume solar thermal energy as heat, but those amounts cannot be separately estimated. All solar heat consumption is included in the residential sector.

A state-level series for allocating the U.S. total to the states is developed by EIA from accumulated data on shipments of solar thermal collectors to states, measured in square feet, as collected on Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," and predecessor forms. The data were published in the EIA *Renewable Energy Annual*. The assumption is made that the retirement/replacement period for solar thermal collectors is 20 years. See "Additional Notes on Solar Energy" on page 105 for more details. The data series are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state):

SOTTPZZ = rolling 20-year accumulation of shipments of solar thermal energy collectors by state, in square feet.

The U.S. total of shipments of solar thermal energy collectors is calculated as the sum of the state data:

SOTTPUS = ΣSOTTPZZ

The survey EIA-63A was terminated in 2012 and data for 2010 forward are not available from EIA or other sources. The 2009 values for SOTTPZZ are used for 2010 forward.

The U.S. solar thermal energy consumed as heat is allocated to the states as follows:

SOT8BZZ = (SOTTPZZ / SOTTPUS) * SOT8BUS

Data for photovoltaic electricity generation by small-scale applications in the residential sector are estimated by EIA for 2014 forward. The SEDS data series is identified by the following name ("ZZ" in the name represents the two-letter state code that differs for each state):

SOR7PZZ = photovoltaic electricity generation by small-scale applications in the residential sector by state, in million kilowatthours.

The U.S. value for the series is the sum of the state data:

SOI7PUS = ΣSOI7PZZ

Before 2014, U.S. small-scale photovoltaic electricity generation is estimated by EIA and published in the EIA *Monthly Energy Review*. For 2006 through 2013, state generation is estimated using historical growth rates of the state-

level cumulative installed capacity estimated by EIA based on capacity of PV installations in the residential sector provided by the Interstate Renewable Energy Council (IREC) and aligned to the U.S. total. For 1989 through 2005, the U.S. total is allocated to the states using 2006 state cumulative installed capacity shares.

Consumption in Btu is calculated by using the conversion factor FFETKUS:

SOR7BZZ = SOR7PZZ * FFETKUS

Total residential sector solar energy consumption includes solar thermal energy consumed as heat and energy consumption from small-scale electricity generation:

SORCBZZ = SOT8BZZ + SOR7BZZ
SORCBUS = ΣSORCBZZ

Total consumption

Each state's total solar energy consumption is the sum of the sectors' values, and the U.S. total is the sum of the states' totals:

SOTCBZZ = SOEGBZZ + SOCCBZZ + SOICBZZ + SORCBZZ
SOTCBUS = ΣSOTCBZZ

Additional calculation

Total net generation from solar energy in both utility-scale and small-scale facilities and applications is calculated as follows:

SOTGPZZ = SOR7PZZ + SOCCPZZ + SOICPZZ + SOEGPZZ
SOTGPUS = ΣSOTGPZZ

Additional notes

Shipments of solar thermal collectors in the United States, in thousand square feet, for 1974 through 2009 are collected on Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," (and predecessor forms) and used to develop this series for 1989 forward. The data are accumulated year to year on the assumption that the replacement/retirement period for solar thermal collectors is 20 years. Data for 1974 through 1985 are available for the U.S. total only and are allocated to the states by using an allocating series that is the average of the 1986 and 1987 shipments (the first years state-level data were collected). The ratios of the average 1986 and 1987 state values to the average 1986 and 1987 U.S. value are applied to the national annual values for each year, 1974 through 1985. Beginning in 1986, the U.S. data are adjusted to remove Puerto Rico and the Virgin Islands.

Shipments of solar thermal collectors include high-temperature parabolic dish or trough collectors used by the electric power sector. Data for California (1986 through 1996, 1998 through 2001, 2008, and 2009), Arizona (2005, 2009), and Nevada (2006) are reduced by the shipments of high-temperature parabolic dish or trough collectors to the electric power sector as shown in the EIA *Renewable Energy Annual*. See SOTTPZZ Data Sources on page 106 for source table details.

Data sources

FFETKUS — Fossil-fueled steam-electric power plant conversion factor.

- 1960 through 1988: Estimated by EIA as the weighted annual average heat rate for fossil-fueled steam-electric plants in the United States as published in the EIA, *Electric Plant Cost and Power Production Expenses 1991*, Table 9.
- 1989 through 2000: Calculated annually by EIA by using heat rate data reported on Form EIA-860, "Annual Electric Generator Report" (and predecessor forms); and net generation data reported on Form EIA-759, "Monthly Power Plant Report." The computation includes data for all electric utility steam-electric plants using fossil fuels.
- 2001 forward: Calculated annually by EIA by using fuel consumption and net generation data reported on Form EIA-923, "Power Plant Operations Report," and its predecessor forms. The computation includes data for all electric utilities and electricity-only independent power producers using fossil fuels.

SOC5PZZ — Solar thermal and photovoltaic electricity net generation at utility-scale commercial CHP and electricity-only facilities by state.

- 1960 through 2007: No data available. Values are assumed to be zero.
- 2008 forward: EIA, Form EIA-923, "Power Plant Operations Report."

SOC7PUS — Photovoltaic electricity generation at small-scale commercial facilities in the United States.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 through 2013: EIA, *Monthly Energy Review*, Table 10.6.
- 2014 forward: EIA, *Electric Power Annual*, Table 3.4.B.

SOC7PZZ — Photovoltaic electricity generation at small-scale commercial

facilities by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 through 2013: Estimated by EIA.
- 2014 forward: EIA, *Electric Power Annual*, Table 3.21.

SOEGPZZ — Solar thermal and photovoltaic electricity net generation in the electric power sector by state.

- 1960 through 1983: No data available. Values are assumed to be zero.
- 1984 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

SOI5PZZ — Solar thermal and photovoltaic electricity net generation at utility-scale industrial CHP and electricity-only facilities by state.

- 1960 through 2007: No data available. Values are assumed to be zero.
- 2008 forward: EIA, Form EIA-923, "Power Plant Operations Report."

SOI7PUS — Photovoltaic electricity generation at small-scale industrial facilities in the United States.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 through 2013: EIA, *Monthly Energy Review*, Table 10.6.
- 2014 forward: EIA, *Electric Power Annual*, Table 3.5.B.

SOI7PZZ — Photovoltaic electricity generation at small-scale industrial facilities by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 through 2013: Estimated by EIA.
- 2014 forward: EIA, *Electric Power Annual*, Table 3.21.

SOR7PUS — Photovoltaic electricity generation by small-scale applications in the residential sector in the United States.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 through 2013: EIA, *Monthly Energy Review*, Table 10.6.
- 2014 forward: EIA, *Electric Power Annual*, Table 3.6.

SOR7PZZ — Photovoltaic electricity generation by small-scale applications in the residential sector by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 through 2013: Estimated by EIA.
- 2014 forward: EIA, *Electric Power Annual*, Table 3.21.

SOT8BUS — Solar thermal energy consumed as heat in the United States.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, *Monthly Energy Review*, Table 10.5.

SOTTPZZ — Rolling 20-year accumulation of shipments of solar thermal energy collectors by state.

- 1960 through 1988: Values are set to zero in SEDS for consistency with SORCBUS.
- 1989 through 2009: Shipments of solar thermal collectors in the United States, in thousand square feet, for 1974 forward are collected on Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey," (and predecessor forms) and used to develop this series for 1989 forward. The sources for these data series are
  - 1986 through 1993: EIA, *Solar Collector Manufacturing Activity* for each year. The specific table numbers are
    - 1986 through 1988, 1990: Table 5.
    - 1989: Table 4.
    - 1991 and 1992: Table 13.
    - 1993: Table 12.
  - 1994 through 2009: EIA, *Renewable Energy Annual*. Data are from the report of the following year (i.e., 1994 data are published in the *Renewable Energy Annual 1995*) for 1994 through 2000. Beginning in 2001, data are from the report of the same year. The specific tables are
    - 1994: Table 13.
    - 1995: Table F9.
    - 1996: Table 16.
    - 1997: Table 15.
    - 1998 and 1999: Table 12.
    - 2000: Unpublished data.
    - 2001 through 2003: Table 14.
    - 2004 and 2005: Table 34.
    - 2006 through 2009: Table 2.6.

Note: High-temperature parabolic dish or trough collectors shipped to the electric power sector are deducted from the solar thermal collector shipments. They are available in the following tables:

- 1986 through 1993: EIA, *Renewable Energy Annual 1995*,Table 13.
- 1994 through 2009: EIA, *Renewable Energy Annual*. Data are from

the report of the following year (i.e., 1994 data are published in the *Renewable Energy Annual 1995*) for 1994 through 2000. Beginning in 2001, data are from the report of the same year. The specific tables are

- 1994: Table H3.
- 1995: Table F10.
- 1996: Table 17.
- 1997: Table 19.
- 1998 and 1999: Table 16.
- 2000: Unpublished data.
- 2001 through 2003: Table 18.
- 2004 and 2005: Table 38.
- 2006: Table 2.10.
- 2007 through 2009: Table 2.13.

Wind Energy

Wind electricity net generation in the electric power sector is included in the State Energy Data System (SEDS) for 1983 forward. For 2009 forward, data for wind electricity net generation at utility-scale commercial and industrial combined-heat-and-power (CHP) and electricity-only plants are available from the U.S. Energy Information Administration (EIA) electric power plant survey. The data are identified in SEDS by the following name ("ZZ" in the variable name represents the two-letter state code that differs for each state):

WYEGPZZ = wind electricity net generation in the electric power sector, by state, in million kilowatthours;

WYC5PZZ = wind electricity net generation at utility-scale commercial CHP and electricity-only facilities by state, in million kilowatthours; and

WYI5PZZ = wind electricity net generation at utility-scale industrial CHP and electricity-only facilities by state, in million kilowatthours.

Wind electricity net generation in the commercial and industrial sectors is represented by

WYCCPZZ = WYC5PZZ
WYICPZZ = WYI5PZZ

The U.S. total is calculated as the sum of the state data for each series.

Wind electricity net generation is converted from kilowatthours to British thermal units (Btu) by using a conversion factor that is the U.S. average heat content of fossil fuels consumed at steam-electric power plants, FFETKUS. The annual values for this factor are shown in Appendix B, Table B1, http://www.eia.gov/state/seds/seds-technical-notes-complete.php.

FFETKUS = factor for converting wind electricity net generation from kilowatthours to Btu.

WYEGBZZ = WYEGPZZ * FFETKUS
WYC5BZZ = WYC5PZZ * FFETKUS
WYI5BZZ = WYI5PZZ * FFETKUS
WYCCBZZ = WYC5BZZ
WYICBZZ = WYI5BZZ

The U.S. value for each of the series is the sum of the state data.

Each state's total consumption of wind electricity is the sum of the sectors'

values, and the U.S. total is the sum of the states' totals:

WYTCPZZ = WYEGPZZ + WYCCPZZ + WYICPZZ
WYTCPUS = ΣWYTCPZZ
WYTCBZZ = WYEGBZZ + WYCCBZZ + WYICBZZ
WYTCBUS = ΣWYTCBZZ

Data sources

FFETKUS — Fossil-fueled steam-electric power plant conversion factor.

- 1960 through 1988: Estimated by EIA as the weighted annual average heat rate for fossil-fueled steam-electric plants in the United States as published in the EIA, *Electric Plant Cost and Power Production Expenses 1991*, Table 9.
- 1989 through 2000: Calculated annually by EIA by using heat rate data reported on Form EIA-860, "Annual Electric Generator Report" (and predecessor forms); and net generation data reported on Form EIA-759, "Monthly Power Plant Report." The computation includes data for all electric utility steam-electric plants using fossil fuels.
- 2001 forward: Calculated annually by EIA by using fuel consumption and net generation data reported on Form EIA-923, "Power Plant Operations Report," and predecessor forms. The computation includes data for all electric utilities and electricity-only independent power producers using fossil fuels.

WYC5PZZ — Wind electricity net generation at utility-scale commercial CHP and electricity-only facilities by state.

- 1960 through 2008: No data available. Values are assumed to be zero.
- 2009 forward: EIA, Form EIA-923, "Power Plant Operations Report."

WYEGPZZ — Wind electricity net generation in the electric power sector by state.

- 1960 through 1982: No data available. Values are assumed to be zero.
- 1983 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms.

WYI5PZZ — Wind electricity net generation at utility-scale industrial CHP and electricity-only facilities by state.

- 1960 through 2009: No data available. Values are assumed to be zero.
- 2010 forward: EIA, Form EIA-923, "Power Plant Operations Report."

Wood and Waste

Different forms of wood and waste are used by each consuming sector. The residential sector burns wood for space heating. The commercial sector uses wood for space heating, and it uses wood, municipal waste, and landfill gas for steam heat and electricity generation. The industrial sector uses combustible industrial byproducts and wood chips for electricity generation and process steam. The electric power sector uses wood, industrial wood waste and waste gas, and municipal waste as cofiring or primary fuels to produce electricity. Consumption of wood and waste in all sectors is included in the State Energy Data System (SEDS) for 1960 forward. Wood includes wood and wood-derived fuels. Waste is biomass waste which includes municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural byproducts, etc. Before 2001, waste also includes non-biomass waste (municipal solid waste from non-biogenic sources and tire-derived fuels).

Residential sector

Physical units

Before 2015, residential sector wood consumption is estimated in thousand cords and converted to British thermal units (Btu). For 2015 forward, residential wood consumption is estimated in Btu only.

Estimates of wood consumed in the residential sector by state for 1960 through 1979 are from the U.S. Energy Information Administration (EIA) *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*. Data published in thousand short tons are converted to thousand cords using the factors of one short ton equals 17.2 million Btu (as published in the footnote of Table A4) and 20 million Btu equal one cord of wood, (as published in EIA, *Household Energy Consumption and Expenditures 1993*, page 314).

For 1980 through 2014, state estimates are developed using (1) U.S. total, Census division, and selected state data collected on the EIA triennial/quadrennial survey, Residential Energy Consumption Survey (RECS), (2) U.S. residential wood consumption estimates published in EIA's *Annual Energy Review* (AER) or *Monthly Energy Review* (MER), and (3) U.S. Department of Commerce, Census Bureau, annual estimates of number of housing units by state from the Population Census or Annual Housing Survey (prior to 2005) or the number of occupied housing units that use wood as primary heating fuel from the American Community Survey (2005 through 2014).

RECS data are available for 1981, 1984, 1987, 1990, 1993, 1997, 2001, 2005, and 2009. The 1981 RECS provides wood consumption data for the national

total and Census regions. For all other cycles, RECS provides data for the national total and Census divisions. From 1993 through 2005, data for the four largest consuming states—California, Florida, New York, and Texas are available. The regional totals for the rest of the states in each Census division are compiled. For 2009, data are available in the microdata file for 16 states (the top four states plus Arizona, Colorado, Georgia, Illinois, Massachusetts, Michigan, Missouri, New Jersey, Pennsylvania, Tennessee, Virginia, and Wisconsin) and 11 regions covering all the other states.

For the RECS data years prior to 2005, the regional values are allocated to the states within each region in proportion to the U.S. Census Bureau data on housing units by state, assuming that no wood is consumed in the residential sector in Hawaii. For 2005 and 2009, the number of occupied housing units that use wood as primary heating fuel from the American Community Survey (3-Year Estimates) is used to allocate the regional values to the states.

For the other (non-RECS) years, the U.S. totals published in AER or MER are converted from Btu to thousand cords using the factor of 20 million Btu per cord. They are then allocated to the states using the estimated state shares of the preceding available RECS year.

The state data derived above are identified in SEDS as WDRCPZZ, "ZZ" represents the two-letter state code that differs for each state.

WDRCPZZ = wood consumed by the residential sector of each state, in thousand cords.

The state-level data are summed to a U.S. total:

WDRCPUS = ΣWDRCPZZ

British thermal units (Btu)

For 1960 through 2014, the residential sector data in cords are converted to Btu by using the conversion factor of 20 million Btu per cord:

WDRCBZZ = WDRCPZZ * 20
WDRCBUS = ΣWDRCBZZ

For 2015 forward, residential wood consumption is estimated in billion Btu, using (1) data collected on the EIA Residential Energy Consumption Survey (RECS), (2) U.S. residential wood consumption estimates published in EIA's *Monthly Energy Review* (MER), (3) U.S. Department of Commerce, Census Bureau, annual estimates of number of occupied housing units that use wood as primary heating fuel from the American Community Survey (ACS), and (4) U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), state-level population-weighted heating degree-days (HDD). For Hawaii, an adjusted temperature-based HDD using EIA internal estimates is assigned.

RECS data are available for 2015. However, data by state are no longer available. A set of state shares is derived by using the product of heating degree-days and ACS housing units that use wood as primary heating fuel for each state for 2015.

For the other (non-RECS) years, state shares based on the product of heating degree-days and ACS housing units using wood as primary heating fuel for the year are applied to the U.S. total Btu consumption published in MER.

The state data derived above are identified in SEDS as WDRCBZZ, "ZZ" represents the two-letter state code that differs for each state.

WDRCBZZ = wood consumed by the residential sector of each state, in billion Btu.

The U.S. total for the state data series is calculated as the sum of the state values.

Data sources

WDRCPZZ — Wood energy consumed by the residential sector by state.

- 1960 through 1979: EIA, *Estimates of U.S. Wood Consumption from 1949 to 1981*, Table A4.
- 1980 through 2014: U.S. totals published in the EIA *Annual Energy Review* (AER) or *Monthly Energy Review* (MER), Table 10.2a.
  - 1980 through 1983: U.S. Census region wood consumption in thousand cords from Form EIA-457, "1981 Residential Energy Consumption Survey" is allocated to the states within each region in proportion to the U.S. Department of Commerce, Census Bureau, *American Housing Survey*, "Total Housing Units for States, July 1, 1981."
  - 1984 through 1986: U.S. Census division wood consumption in thousand cords from Form EIA-457, "1984 Residential Energy Consumption Survey" is allocated to the states within each division in proportion to the U.S. Department of Commerce, Census Bureau, *American Housing Survey*, "Total Housing Units for States, July 1, 1984."
  - 1987 through 1989: U.S. Census division wood consumption in thousand cords from Form EIA-457, "1987 Residential Energy Consumption Survey" is allocated to the states within each division in proportion to the U.S. Department of Commerce, Census Bureau,

American Housing Survey, "Total Housing Units for States, July 1, 1987."

- 1990 through 1992: U.S. Census division wood consumption in thousand cords is from Form EIA-457, "1990 Residential Energy Consumption Survey." State-level estimates are available for 1993 for California, Florida, New York, and Texas from the Form EIA-457, "1993 Residential Energy Consumption Survey." Those four states' percentages of their respective Census division totals in the 1993 survey are applied to the 1990 Census division data to derive their 1990 values. Wood consumption by the other states in each division is estimated by allocating the remaining division data to the states in proportion to the U.S. Department of Commerce, Census Bureau, Internet file (ST-98-51) "Estimates of Housing Units,...Annual Time Series,... (includes revised April 1, 1990 census housing...)" column titled "4/1/90 Census" at http://www.census.gov/population/estimates/housing/sthuhh6.txt.
- 1993 through 1996: Residential wood consumption data for U.S. Census divisions and for California, Florida, New York, and Texas are from Form EIA-457, "1993 Residential Energy Consumption Survey." Data for the other states in each division are estimated by allocating the remaining division data to the states in proportion to the U.S. Department of Commerce, Census Bureau, Internet file (ST-98-51) "Estimates of Housing Units,...Annual Time Series, July 1, 1991 to July 1, 1998...," column titled "7/1/93" at http://www.census.gov/population/estimates/housing/sthuhh6.txt.
- 1997 through 2000: Residential wood consumption data for U.S. Census divisions and for California, Florida, New York, and Texas are from Form EIA-457, "1997 Residential Energy Consumption Survey." Data for the other states in each division are estimated by allocating the remaining division data to the states in proportion to the U.S. Department of Commerce, Census Bureau, Internet file (ST-98-51) "Estimates of Housing Units,...Annual Time Series, July 1, 1991 to July 1, 1998...," column titled "7/1/97" at http://www.census.gov/population/estimates/housing/sthuhh6.txt.
- 2001 through 2004: Residential wood consumption data for U.S. Census divisions and for California, Florida, New York, and Texas are from Form EIA-457, "2001 Residential Energy Consumption Survey." Data for the other states in each division are estimated by allocating the remaining division data to the states in proportion to the U.S. Department of Commerce, Census Bureau, Internet file "Table 1. Annual Estimates of Housing Units for the United States and States: April 1, 2000 to July 1, 2007," column titled "July 1, 2001" at http://www.census.gov/programs-surveys/popest.html.
- 2005 through 2008: Residential wood consumption data for U.S. Census divisions and for California, Florida, New York, and Texas are from Form EIA-457, "2005 Residential Energy Consumption Survey." Data for the other states in each division are estimated by allocating the remaining division data to the states in proportion to the U.S. Department of Commerce, Census Bureau, 2005-2007 American Community Survey 3-Year Estimates, Series B25040, by state, Occupied Housing Units by House Heating Fuel," item titled "Wood," at https://data.census.gov/cedsci/.
- 2009 through 2014: Residential wood consumption data for 16 states and 11 regions are from Form EIA-457, "2009 Residential Energy Consumption Survey." Data for the states in each region are estimated by allocating the regional data to the states in proportion to the U.S. Department of Commerce, Census Bureau, 2008-2010 American Community Survey 3-Year Estimates, Series B25040, by state, Occupied Housing Units by House Heating Fuel," item titled "Wood," at https://data.census.gov/cedsci/.

WDRCBUS — Wood energy consumed by the residential sector in the United States.

- 2015 forward: EIA, *Monthly Energy Review,* Table 10.2a.

WDRCBZZ — Wood energy consumed by the residential sector by state.

- 2015 forward: Estimated by EIA using state allocators derived from U.S. Department of Commerce, Census Bureau, American Community Survey 1-Year Estimates, Series B25040, by state, Occupied Housing Units by House Heating Fuel," item titled "Wood," at https://data.census.gov/cedsci/ and U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information, historical state-level heating degree days data at ftp://ftp.ncdc.noaa.gov/pub/data/cirs/climdiv/ and National Weather Service Climate Prediction Service, Degree Days Statistics at http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/.

Commercial sector

Estimates of wood consumed in the commercial sector by state for 1960 through 1979 are from the EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*. The data published in thousand short tons are converted to billion Btu by using the conversion factor of one short ton equals 17.2 million

Btu. The assumption was made in that report that wood is consumed in the commercial sector in proportion to consumption in the residential sector each year. For 1980 through 1988, national-level commercial wood consumption estimates in trillion Btu are from the EIA, *Annual Energy Review* (AER). Using the same methodology as for previous years, the national data are allocated to the states in proportion to residential sector wood use each year.

For 1989 forward, state-level data on wood and waste consumption by commercial combined-heat-and-power (CHP) and electricity-only plants are available from Form EIA-923, "Power Plant Operations Report," and predecessor forms. The U.S. total wood consumption in the commercial sector is published in the AER or the *Monthly Energy Review* (MER). The U.S. total of the state commercial CHP and electricity-only plant wood consumption is subtracted from the AER/MER national commercial sector total, and the remainder is allocated to the states in proportion to each state's residential sector wood use each year from 1989 forward.

The data series described above, used to estimate SEDS wood and waste consumption in the commercial sector, are identified as follows ("ZZ" in the variable names represents the two-letter state code that differs for each state):

WDCCBUS = wood consumed by the commercial sector in the United States, in billion Btu;
WDC3BZZ = wood consumed by CHP and electricity-only facilities in the commercial sector of each state, in billion Btu; and
WSC3BZZ = waste consumed by CHP and electricity-only facilities in the commercial sector of each state, in billion Btu.

The U.S. totals for the state-level series are calculated as the sum of the state data.

WDC3BUS = ΣWDC3BZZ
WSC3BUS = ΣWSC3BZZ

The national total wood consumed by commercial entities other than CHP and electricity-only facilities are calculated as shown below, and those volumes are allocated to the states in proportion to the residential wood consumption series as follows:

WDC4BUS = WDCCBUS - WDC3BUS
WDC4BZZ = (WDRCPZZ / WDRCPUS) * WDC4BUS

State totals of commercial wood consumption are calculated as the sum of consumption by CHP and electricity-only facilities and the remaining commercial sector:

WDCCBZZ = WDC3BZZ + WDC4BZZ

Total commercial consumption of waste is set equal to the commercial consumption of waste by CHP and electricity-only facilities, which are the only commercial facilities with waste consumption, and the U.S. total is calculated as the sum of the state values:

WSCCBZZ = WSC3BZZ
WSCCBUS = ΣWSCCBZZ

The total wood and waste consumption in the commercial sector is calculated as the sum of wood consumption and waste consumption, and the U.S. total is calculated as the sum of the state data:

WWCCBZZ = WDCCBZZ + WSCCBZZ
WWCCBUS = ΣWWCCBZZ

Data sources

WDC3BZZ — Wood energy consumed by CHP and electricity-only facilities in the commercial sector of each state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

WDCCBUS — Wood consumed by the commercial sector in the United States.

- 1960 through 1979: EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A7.
- 1980 through 2010: EIA, *Annual Energy Review,* Table 10.2a.
- 2011 forward: EIA, *Monthly Energy Review,* Table 10.2a.

WSC3BZZ — Waste energy consumed by CHP and electricity-only facilities in the commercial sector of each state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

Industrial sector

For 1989 forward, state-level data on wood and waste consumption by industrial combined heat and power (CHP) and electricity-only facilities are available from Form EIA-923, "Power Plant Operations Report," and predecessor forms. These data are used with the manufacturing data to estimate total industrial sector wood and waste consumption for each state.

Industrial wood and waste consumption is expressed in Btu because its components are physically measured in a variety of units (e.g., tons, cubic feet, and kilowatthours). Wood and waste consumed by industrial CHP and electricity-only facilities are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state):

WDI3BZZ = wood consumed by CHP and electricity-only facilities in the industrial sector in each state, in billion Btu; and

WSI3BZZ = waste consumed by CHP and electricity-only facilities in the industrial sector of each state, in billion Btu.

Before 1989, wood and waste consumed by industrial CHP and electricity-only facilities are assumed to be zero.

The U.S. totals of the state series are calculated as the sum of the state data:

WDI3BUS = ΣWDI3BZZ
WSI3BUS = ΣWSI3BZZ

Wood and waste consumed by all other industries (mainly the manufacturing sector) are identified in SEDS by the following names:

WDI4BZZ = wood consumed for other uses in the industrial sector of each state, in billion Btu; and

WSI4BZZ = waste consumed for other uses in the industrial sector of each state, in billion Btu.

Industrial sector wood and waste consumption estimates by state for 1960 through 1979 are from the EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*. The data, published in thousand short tons, are converted to billion Btu using the factor of one short ton equals 17.2 million Btu.

Estimates for 1980 through 1995 are based on a national-level data series published in the EIA *Annual Energy Review* (AER) or *Monthly Energy Review* (MER). National wood and waste consumption by type is collected by Standard Industrial Classification (SIC) on the EIA triennial survey Form EIA-846, "Manufacturing Energy Consumption Survey" (MECS) for 1985, 1988, 1991, and 1994. The assumption is made that wood and waste use in the manufacturing sector occurs primarily in the industries included in SIC series 2421 (sawmills and planing mills), 2511 (wood household furniture), 2621 (paper mills), 2046 (wet corn milling), and 2061 (raw cane sugar). The amount of wood and waste consumed by each of the SIC groups of industries is estimated from the MECS data, and the MECS proportions are used to allocate the U.S. totals from the AER to SIC groups for each year. The SIC annual subtotals are allocated to the states using state-level data on the value added in manufacturing processes for each of the SIC series listed above, as published in the U.S. Department of Commerce, Census Bureau, *Census of Manufactures, Industry Series*, for 1982, 1987, and 1992.

Estimates for 1996 forward use the same methodology used for 1980 through 1995 with the exception that the U.S. Census Bureau, *Economic Census* data for 1997 forward use North American Industry Classification System (NAICS) instead of SIC. Some categories used in the two classification systems are directly comparable and some are closely or roughly comparable. The NAICS codes used for estimating wood consumption are: 311221, 313, 321113, 3212, 322121, 322130, and 3372. The NAICS codes used for estimating waste consumption are: 311221, 311311 (for 2007 and earlier *Economic Census)* or 311314 (for 2012 *Economic Census*), 313, 32191, 322122, 322130, and 3372. The EIA survey Form EIA-846, MECS, also uses NAICS codes in the surveys for 1998 forward. The discontinuity in these state allocating series caused by the change from SIC to NAICS categories is not significant in light of the broad assumptions of the estimation methodology.

Also beginning in 2006, data on value of shipments from the *Economic Censuses* are used instead of value added data.

For 2011 forward, the method of estimating WSI4B is refined. Two-thirds of the U.S. industrial waste consumption is assumed to be landfill gas, which is used to generate heat or electricity. To allocate landfill gas consumption to the states, data on landfill gas flow for all operational landfill projects with capacity under 1 megawatt from the Landfill Methane Outreach Program maintained by the U.S. Environmental Protection Agency are used to compile the state shares. The remaining one-third of WSI4B is allocated to the states using the MECS data and Economic Census data as explained above. The two components are then summed together to form WSI4B.

The U.S. totals of the state series are calculated as the sum of the state data:

WDI4BUS = ΣWDI4BZZ
WSI4BUS = ΣWSI4BZZ

Industrial sector wood and waste consumption is calculated as the sum of consumption by CHP and electricity-only facilities and consumption by other

industries:

WDICBZZ = WDI3BZZ + WDI4BZZ
WDICBUS = ΣWDICBZZ

WSICBZZ = WSI3BZZ + WSI4BZZ
WSICBUS = ΣWSICBZZ

Total wood and waste consumed by other industries is calculated as the sum of wood consumption and the sum of waste consumption, and the U.S. total is calculated as the sum of the state data:

WWI4BZZ = WDI4BZZ + WSI4BZZ
WWI4BUS = ΣWWI4BZZ

The total industrial sector is calculated as the sum of wood consumption and the sum of waste consumption, and the U.S. total is calculated as the sum of the state data:

WWICBZZ = WDICBZZ + WSICBZZ
WWICBUS = ΣWWICBZZ

Data sources

WDI3BZZ — Wood consumed by CHP and electricity-only facilities in the industrial sector by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

WDI4BZZ — Wood consumed by the industrial sector other than CHP and electricity-only facilities by state.

- 1960 through 1979: EIA, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, Table A10.
- 1980 forward: EIA estimates developed by using three data sources. U.S. totals for each year are as published for selected years in the EIA, *Annual Energy Review* (AER), Table 10.2b, or *Monthly Energy Review* (MER), Table 10.2b.
  - 1980 through 1985: U.S. totals from the AER are allocated to Standard Industrial Classification (SIC) groups 20, 24, 25, and 26 based on data from the Form EIA-846, "Manufacturing Energy Consumption Survey 1985," Table 3, Columns "Major Byproducts" and "Other." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1982 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2511 Wood Household Furniture, Industry 2621 Paper Mills, and Industry 2631 Paperboard Mills. The state values for each of the four SIC groups are summed to derive state total wood and waste industrial consumption estimates.
  - 1986 through 1989: U.S. totals from the AER are allocated to SIC groups 20, 24, 25, and 26 based on data from the Form EIA-846, "Manufacturing Energy Consumption Survey 1988," Tables 2 and 18, columns "Pulping Liquor," "Roundwood," and "Wood Chips." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1987 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2511 Wood Household Furniture, Industry 2621 Paper Mills, and Industry 2631 Paperboard Mills. The state values for each of the four SIC groups are summed to derive state total industrial wood consumption estimates. For 1989 only, state-level data on wood consumption by combined heat and power (CHP) and electricity-only facilities are available from the Form EIA-867, "Annual Nonutility Power Producer Report" in billion Btu. These CHP and electricity-only state data are summed and subtracted from the AER U.S. total. The remaining value is assumed to be the manufacturing sector and is allocated to the states using the method above. The state values for each of the four SIC groups and the CHP and electricity-only facilities are summed to derive state total industrial wood consumption estimates.
  - 1990 through 1993: State-level data on wood consumption by CHP and electricity-only facilities from the Form EIA-867, "Annual Nonutility Power Producer Report" in billion Btu are summed and subtracted from the AER U.S. total. The remaining national value is allocated to SIC groups 20, 24, 25, and 26 based on unpublished data on pulping liquor, roundwood, and wood chips from the Form EIA-846, "Manufacturing Energy Consumption Survey 1991 (MECS)." SIC groups 20 and 26 are grouped as "Other" in MECS. The proportions of those two groups in the 1988 and 1994 MECS are averaged and used to estimate the breakout for 1991. These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1992 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry

2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2541 Wood Partitions and Fixtures, and Industry 2621 Paper Mills. The state values for each of the four SIC groups and the CHP and electricity-only facilities are summed to derive State total industrial wood consumption estimates.

– 1994 and 1995: State-level data on wood consumption by CHP and electricity-only facilities from the Form EIA-867, "Annual Nonutility Power Producer Report" in billion Btu are summed and subtracted from the AER U.S. total. The remaining national value is allocated to SIC groups 20, 24, 25, 26, and "Other" based on data from the Form EIA-846, "1994 Manufacturing Energy Consumption Survey," Table A7, columns "Pulping or Black Liquor," "Wood from Trees," and "Wood from Mills." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1992 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2511 Wood Household Furniture, Industry 2621 Paper Mills, and Industry 2631 Paperboard Mills. The state values for each of the five SIC groups and the CHP and electricity-only facilities are summed to derive state total industrial wood consumption estimates.
– 1996 and 1997: State-level data on wood consumption by CHP and electricity-only facilities from the Form EIA-867, "Annual Nonutility Power Producer Report," in billion Btu are summed and subtracted from the AER U.S. total. The remaining national value is allocated to SIC groups 20, 24, 25, 26, and "Other" based on data from the Form EIA-846, "1994 Manufacturing Energy Consumption Survey," Table A7, columns "Pulping or Black Liquor," "Wood from Trees," and "Wood from Mills." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1997 Economic Census.* In the *Economic Census* the SIC groupings for the state data are replaced by North American Industry Classification System (NAICS) industry groups. The two industry classification systems are not identical, but NAICS groups are chosen that compare with SIC categories as closely as possible. The state series are from Table 2, column titled "Value Added by Manufacturer," from the publications for NAICS Industry 311221 Wet Corn Milling (for SIC 20 Food), Industry 321113 Sawmills, and Industry 3212 Engineered Wood Product Manufacturing (for SIC 24 Wood), Industry 3372 Office Furniture Manufacturing (for SIC 25 Furniture), Industry 322121 Paper Mills, and Industry 322130 Paperboard Mills (for SIC 26 Paper), and Industry 313 Textile Mills (for Other SIC). The state values for each of the five NAICS group subtotals and the CHP and electricity-only facilities are summed to derive state total industrial wood consumption estimates.
– 1998 forward: State-level data on wood consumption by CHP and electricity-only facilities from the Form EIA-923, "Power Plant Operations Report," and predecessor forms, in billion Btu are summed and subtracted from the AER/MER U.S. total. The remaining national value is allocated to NAICS industry groups 311, 321, 322, 337, and "Other" based on data from the Form EIA-846, "Manufacturing Energy Consumption Survey," 1998 (for 1998-2001), 2002 (for 2002-2005), 2006 (for 2006-2010), 2010 (for 2011-2013), and 2014 (for 2014 forward), table entitled "Selected Wood and Wood-Related Products in Fuel Consumption," columns "Pulping or Black Liquor," "Wood from Trees," and "Wood from Mills." These NAICS subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *Economic Census* for 1997 (1998-2000), 2002 (2001-2005), 2007 (2006-2010), and 2012 (2011 forward). For 1997 and 2002, the state series are from Table 2, column titled "Value Added by Manufacturer," from the publications for NAICS Industry 311221 Wet Corn Milling (for NAICS 311 Food), Industry 321113 Sawmills, and Industry 3212 Engineered Wood Product Manufacturing (for NAICS 321 Wood products), Industry 3372 Office Furniture Manufacturing (for NAICS 337 Furniture), Industry 322121 Paper Mills, and Industry 322130 Paperboard Mills (for NAICS 322 Paper), and Industry 313 Textile Mills (for Other NAICS). For 2007 forward, the state series are the "Value of Shipments" data for the specific industries. *Economic Census* data are available at https://data.census.gov/cedsci/.

WSI3BZZ — Waste consumed by CHP and electricity-only facilities in the industrial sector by state.

- 1960 through 1988: No data available. Values are assumed to be zero.
- 1989 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

WSI4BZZ — Waste consumed by the industrial sector other than CHP and electricity-only facilities by state.

- 1960 through 1980: No data available. Values assumed to be zero.
- 1981 forward: EIA estimates developed by using three data sources. U.S. totals for each year are as published for selected years in the EIA, *Annual Energy Review* (AER), Table 10.2b, or *Monthly Energy Review*

(MER), Table 10.2b.

- 1981 through 1985: U.S. totals from the AER are allocated to Standard Industrial Classifications (SIC) groups 20, 24, 25, and 26 based on data from the EIA "Manufacturing Energy Consumption Survey 1985 (MECS)," Table 3, columns "Major By-products" and "Other." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1982 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2511 Wood Household Furniture, Industry 2621 Paper Mills, and Industry 2631 Paperboard Mills. The state values for each of the four SIC groups are summed to derive state total industrial waste consumption estimates.
- 1986 through 1989: U.S. totals from the AER are allocated to SIC groups 20, 24, 25, and 26 based on data from the Form EIA-846, "Manufacturing Energy Consumption Survey 1988," Tables 2 and 18, columns "Waste" and "Biomass." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1987 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2511 Wood Household Furniture, Industry 2621 Paper Mills, and Industry 2631 Paperboard Mills. The state values for each of the four SIC groups are summed to derive state total industrial waste consumption estimates. For 1989 only, state-level data on waste consumption by CHP and electricity-only facilities are available from the Form EIA-867, "Annual Nonutility Power Producer Report" in billion Btu. These CHP and electricity-only state data are summed and subtracted from the AER U.S. total. The remaining value is assumed to be the manufacturing sector and is allocated to the states using the method above. The state values for each of the four SIC groups and the CHP and electricity-only facilities are summed to derive state total industrial waste consumption estimates.
- 1990 through 1993: State-level data on waste consumption by CHP and electricity-only facilities from the Form EIA-867, "Annual Nonutility Power Producer Report" in billion Btu are summed and subtracted from the AER U.S. total. The remaining national value is allocated to SIC groups 20, 24, 25, and 26 based on unpublished data on waste and biomass from the Form EIA-846, "Manufacturing Energy Consumption Survey 1991 (MECS)." SIC groups 20 and 26 are grouped as "Other" in MECS 1991. The proportions of those two groups in the 1988 and 1994 MECS are averaged and used to estimate the breakout for 1991. These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1992 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2541 Wood Partitions and Fixtures, and Industry 2621 Paper Mills. The state values for each of the four SIC groups and the CHP and electricity-only facilities are summed to derive state total industrial waste consumption estimates.
- 1994 and 1995: State-level data on waste consumption by CHP and electricity-only facilities from the Form EIA-867, "Annual Nonutility Power Producer Report" in billion Btu are summed and subtracted from the AER U.S. total. The remaining national value is allocated to SIC groups 20, 24, 25, 26, and "Other" based on data from the Form EIA-846, "1994 Manufacturing Energy Consumption Survey," Table A7, columns "Agricultural Waste" and "Wood and Paper Refuse." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1992 Census of Manufactures,* Table 2, column titled "Value Added by Manufacturer," from the publications for Industry 2061 Raw Cane Sugar, Industry 2046 Wet Corn Milling, Industry 2421 Sawmills and Planing Mills, Industry 2511 Wood Household Furniture, Industry 2621 Paper Mills, and Industry 2631 Paperboard Mills. The state values for each of the five SIC groups and the CHP and electricity-only facilities are summed to derive state total industrial waste consumption estimates.
- 1996 and 1997: State-level data on waste consumption by CHP and electricity-only facilities from the Form EIA-867, "Annual Nonutility Power Producer Report" or Form EIA-860, "Annual Electric Generator Report" in billion Btu are summed and subtracted from the AER U.S. total. The remaining national value is allocated to SIC groups 20, 24, 25, 26, and "Other" based on data from the Form EIA-846, "1994 Manufacturing Energy Consumption Survey," Table A7, columns "Agricultural Waste" and "Wood and Paper Refuse." These SIC subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *1997 Economic Census*. In the *Economic Census* the SIC groupings for the state data are replaced by North American Industry Classification System (NAICS) industry groups. The two industry classification systems are not identical, but NAICS groups are chosen that compare with SIC categories as closely as possible. The state series are from Table 2,

column titled "Value Added by Manufacturer," from the publications for NAICS Industry 311311 Sugar Cane Mills, and Industry 311221 Wet Corn Milling (for SIC 20 Food), Industry 321912 Cut Stock, Resawing Lumber, and Planing (for SIC 24 Wood), Industry 3372 Office Furniture Manufacturing (for SIC 25 Furniture), Industry 322122 Newsprint Mills, and Industry 322130 Paperboard Mills (for SIC 26 Paper), and Industry 313 Textile Mills (for Other SIC). The state values for each of the five NAICS group subtotals and the CHP and electricity-only facilities are summed to derive state total industrial waste consumption estimates.

- 1998 through 2010: State-level data on waste consumption by CHP and electricity-only facilities from the Form EIA-923, "Power Plant Operations Report," and predecessor forms, in billion Btu are summed and subtracted from the AER/MER U.S. total. The remaining national value is allocated to NAICS industry groups 311, 321, 337, and 322, and "Other" based on data from the Form EIA-846, "Manufacturing Energy Consumption Survey," 1998 (for 1998-2001), 2002 (for 2002-2005), and 2006 (for 2006-2010), table entitled "Selected Wood and Wood-Related Products in Fuel Consumption," columns "Agricultural Waste" and "Wood and Paper Refuse." These NAICS subtotals are allocated to the states using state-level series from the U.S. Department of Commerce, Census Bureau, *Economic Census* for 1997 (1998-2000), 2002 (2001-2005), and 2007 (2006-2010). For 1997 and 2002, the state series are from Table 2, column titled "Value Added by Manufacturer," from the publications for NAICS Industry 311311 Sugar Cane Mills, and Industry 311221 Wet Corn Milling (for NAICS 311 Food), Industry 321912 Cut Stock, Resawing Lumber, and Planing (for NAICS 321 Wood), Industry 3372 Office Furniture Manufacturing (for NAICS 337 Furniture), Industry 322122 Newsprint Mills, and Industry 322130 Paperboard Mills (for NAICS 322 Paper), and Industry 313 Textile Mills (for Other NAICS). For 2007, the state series are the "Value of Shipments" data for the specific industries. *Economic Census* data are available at https://data.census.gov/cedsci/.
- 2011 forward: State-level data on waste consumption by CHP and electricity-only facilities from the Form EIA-923, "Power Plant Operations Report," and predecessor forms, in billion Btu are summed and subtracted from the AER/MER U.S. total. Two-thirds of the remaining national value is allocated using data from U.S. Environmental Protection Agency, Landfill Methane Outreach Program, http://www.epa.gov/lmop/. One-third of the remaining national value is allocated to NAICS industry groups 311, 321, 337, and 322, and "Other" based on data from the Form EIA-846, "Manufacturing Energy Consumption Survey," 2010 (for 2011-2013) and 2014 (for 2014 forward), table entitled "Selected Wood and Wood-Related Products in Fuel Consumption," columns "Agricultural Waste" and "Wood and Paper Refuse." These NAICS subtotals are allocated to the states using state-level data from the U.S. Department of Commerce, Census Bureau, *Economic Census* for 2012. The state series are the "Value of Shipments" data for the specific industries: 311314 Sugar Cane Manufacturing and 311221 Wet Corn Milling (for NAICS 311 Food), 321912 Cut Stock, Resawing Lumber, and Planing (for NAICS 321 Wood), 3372 Office Furniture Manufacturing (for NAICS 337 Furniture), 322122 Newsprint Mills and 322130 Paperboard Mills (for NAICS 322 Paper), and 313 Textile Mills (for Other NAICS). *Economic Census* data are available at https://data.census.gov/cedsci/.

Electric power sector

Electric power sector use of wood and waste to generate electricity is based on data series from Form EIA-923, "Power Plant Operations Report," and predecessor forms and is estimated in SEDS. From 2001 forward, the Btu content of the wood and waste consumed by electric power plants is reported on the data collection forms and used in SEDS. Before 2001, Btu data were not collected by the source data forms and data on electricity generation from wood and waste are used instead. Net generation of electricity is converted to equivalent Btu using the fossil-fueled steam-electric plant conversion factor, and the resulting Btu values are entered into SEDS. Rarely, power plants can use more electricity than they generate from wood and waste energy sources and a negative net generation (and, therefore, Btu consumption) value can be seen in SEDS. From 1960 through 1981, electricity generation from wood and waste are reported combined and from 1982 forward generation or Btu values from each source are reported separately.

The data series are identified in SEDS by the following names ("ZZ" in the variable name represents the two-letter state code that differs for each state):

WDEIBZZ = wood consumed by the electric power sector in each state (included in waste energy for 1960 through 1981), in million Btu; and

WSEIBZZ = waste consumed by the electric power sector in each state (included in wood energy for 1960 through 1981), in million Btu.

The U.S. totals are calculated as the sum of the state data, and wood and waste are summed to provide a total (WW) value:

WDEIBUS = ΣWDEIBZZ
WSEIBUS = ΣWSEIBZZ

WWEIBZZ = WDEIBZZ + WSEIBZZ
WWEIBUS = ΣWWEIBZZ

Data sources

WDEIBZZ — Wood consumed by the electric power sector by state.

- 1960 through 1981: Data included in waste energy sources, see WSEIBZZ.
- 1982 through 2000: EIA, Form EIA-759, "Monthly Power Plant Report," electricity generation from wood converted to Btu using the fossil-fueled steam-electric power plant conversion factor shown in Table B1 (http://www.eia.gov/state/seds/seds-technical-notes-complete.php).
- 2001 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

WSEIBZZ — Waste consumed by the electric power sector by state.

- 1960 through 2000: EIA, Form EIA-759, "Monthly Power Plant Report" and predecessor forms, electricity generation from waste (includes wood energy sources from 1960 through 1981) converted to Btu using the fossil-fueled steam-electric power plant conversion factor shown in Table B1 (http://www.eia.gov/state/seds/seds-technical-notes-complete.php).
- 2001 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

Totals

State total consumption of wood and waste is calculated as the sum of the consumption in the residential, commercial, and industrial sectors as well as consumption by the electric power sector. The U.S. total is the sum of the state data:

WDTCBZZ = WDRCBZZ + WDCCBZZ + WDICBZZ + WDEIBZZ
WDTCBUS = ΣWDTCBZZ

WSTCBZZ = WSCCBZZ + WSICBZZ + WSEIBZZ
WSTCBUS = ΣWSTCBZZ

WWTCBZZ = WDTCBZZ + WSTCBZZ
WWTCBUS = ΣWWTCBZZ

Biofuels

Biofuels are renewable liquid fuels and blending components produced from biomass feedstocks, primarily used for transportation. Additional calculations are made in SEDS to aggregate some data series to be shown in the tables of this report.

The losses and co-products from the production of biodiesel and fuel ethanol are combined to be shown under "biofuels losses and co-products" in the summary tables titled "Primary Energy Consumption Estimates by Source" and "Industrial Sector Energy Consumption Estimates" as follows:

BFLCB = BDLCB + EMLCB

Biofuel consumption is defined as biodiesel and fuel ethanol consumption as well as the losses and co-products from their production:

BFTCB = BDTCB + EMTCB + BFLCB

Biomass Total

Additional calculations are made in SEDS to aggregate some data series to be shown in the tables of this report. Biodiesel, fuel ethanol, losses and co-products from the production of biodiesel and fuel ethanol, and wood and biomass waste, are combined to be shown under "biomass" in the summary tables titled "Energy Consumption Estimates by Source" as follows:

BMTCB = BDLCB + BDTCB + EMLCB + EMTCB + WWTCB

Renewable Energy Total

Renewable energy subtotals for each consuming sector in billion Btu are calculated for each state and the U.S. totals. In addition, the industrial sector includes energy losses and co-products from the production of biodiesel (BDLCB) and fuel ethanol (EMLCB).

RERCB = GERCB + SORCB + WDRCB
RECCB = EMCCB + GECCB + HYCCB + SOCCB + WWCCB + WYCCB
REICB = BDLCB + EMICB + EMLCB + GEICB + HYICB + SOICB + WWICB + WYICB
REACB = BDACB + EMACB
REEIB = GEEGB + HYEGB + SOEGB + WWEIB + WYEGB

Total renewable energy consumption is also calculated for each state and the United States:

RETCB = BDLCB + BDTCB + EMLCB + EMTCB + GETCB + HYTCB + SOTCB + WWTCB + WYTCB

In the calculations of all aggregated series, data for any component series that are not available in the earlier years are assumed to be zero.

Section 6. Electricity

This section describes the energy sources consumed by the electric power sector; electricity consumed by end users (i.e., electricity sold to end users); estimates of the electrical system energy losses incurred in the generation, transmission, and distribution of electricity; and estimates of net interstate sales of electricity.

The electric power sector consists of electric utilities and independent power producers (electricity-only and combined-heat-and-power (CHP) plants) classified under Sector 22 of the North American Industry Classification System whose primary business is to sell electricity, or electricity and heat, to the public. It does not include commercial or industrial electricity-only or CHP plants that produce electricity and/or heat primarily to support the activities of the commercial or industrial establishments.

Electrical Energy Sources

Physical units

Electricity is produced from a number of energy sources. In the State Energy Data System (SEDS), coal, natural gas, and petroleum are measured in physical units of thousand short tons, million cubic feet, and thousand barrels, respectively, as they are consumed by the electric power sector. Because wood and waste are measured in a variety of physical units, they are converted to the equivalent heat content and entered into SEDS measured in British thermal units (Btu). Because comparable measures in physical units for nuclear power, hydroelectric, wood, waste, geothermal, wind, photovoltaic, and solar thermal energy sources are not available, energy output in the form of electricity produced from these energy sources, in million kilowatthours, is used instead. The variable names for these data are as follows ("ZZ" in the variable name represents the two-letter state code that differs for each state):

CLEIPZZ = coal consumed by the electric power sector (described in Section 2 of this report), in thousand short tons;

ELEXPZZ = electricity exported from the United States, in million kilowatthours;

ELIMPZZ = electricity imported into the United States, in million kilowatthours;

GEEGPZZ = electricity produced from geothermal energy by the electric power sector (described in Section 5), in million kilowatthours;

HYEGPZZ = electricity produced from hydroelectric power in the electric power sector (described in Section 5), in million kilowatthours;

NGEIPZZ = natural gas consumed by the electric power sector (described in Section 3), in million cubic feet;

NUEGPZZ = electricity produced from nuclear power in the electric power sector, in million kilowatthours;

PAEIPZZ = petroleum consumed by the electric power sector (described in Section 4), in thousand barrels;

SOEGPZZ = electricity produced from photovoltaic and solar thermal energy sources in the electric power sector (described in Section 5), in million kilowatthours;

WDEIBZZ = wood energy sources consumed by the electric power sector (described in Section 5), in billion Btu;

WSEIBZZ = waste energy sources consumed by the electric power sector (described in Section 5), in billion Btu; and

WYEGPZZ = electricity produced from wind energy by the electric power sector (described in Section 5), in million kilowatthours.

The U.S. totals for these series are calculated as the sum of the state data.

British thermal units (Btu)

All energy sources are converted to the common unit of Btu to calculate the total amount of energy used to produce electricity. The methods for calculating the Btu content of coal, natural gas, petroleum, and renewable energy sources consumed for generating electric power are explained in their respective sections of this documentation. Nuclear electric power is described in the following section.

Total energy consumed by the electric power sector is the sum of all primary energy used to generate electricity, including net imports of electricity across U.S. borders (ELNIBZZ, see page 123). To eliminate the double counting of supplemental gaseous fuels, which are accounted for in the energy sources

(such as coal) from which they are derived, and in natural gas, they are removed from the total:

TEEIBZZ = CLEIBZZ + ELNIBZZ + GEEGBZZ + HYEGBZZ + NGEIBZZ + NUEGBZZ + PAEIBZZ + SOEGBZZ + WWEIBZZ + WYEGBZZ - SFEIBZZ

TEEIBUS = ΣTEEIBZZ

Nuclear Electric Power

Electricity generated from nuclear power, in million kilowatthours, by both regulated electric utilities and independent power producers are included in the State Energy Data System (SEDS) electric power sector. In the following formulas, "ZZ" in the variable name represents the two-letter state code that differs for each state:

NUEGPZZ = nuclear electricity net generation in the electric power sector, in million kilowatthours.

The U.S. total is calculated as the sum of the state data:

NUEGPUS = ΣNUEGPZZ

Nuclear power used for generating electricity is the total nuclear energy, NUETP, included in EIA consumption data:

NUETPZZ = NUEGPZZ
NUETPUS = NUEGPUS

The factor for converting electricity generated from nuclear energy (NUETKUS) from kilowatthours to British thermal units (Btu) is developed from data collected from nuclear steam-electric power plants. These U.S. average factors, which vary from year to year, can be found in the State Energy Data Consumption Technical Notes, Appendix B—Thermal conversion factors, Table B1, http://www.eia.gov/state/seds/sep_use/notes/use_b.pdf.

NUETKUS = factor for converting electricity generated from nuclear power from kilowatthours to Btu.

The formulas for applying the nuclear factor are

NUEGBZZ = NUEGPZZ * NUETKUS
NUEGBUS = ΣNUEGBZZ
NUETBZZ = NUEGBZZ
NUETBUS = NUEGBUS

Data sources

NUEGPZZ — Nuclear electricity net generation in the electric power sector by state.

- 1960 through 1977: Federal Power Commission, News Release, "Power Production, Fuel Consumption, and Installed Capacity Data," table titled "Net Generation of Electric Utilities by State and Source."
- 1978 through 1980: U.S. Energy Information Administration (EIA),

Energy Data Reports, "Power Production, Fuel Consumption and Installed Capacity Data," table titled "Net Generation of Electric Utilities by State and Source" (1978) and Table 36 (1979 and 1980).

- 1981 through 1985: EIA, Form EIA-759, "Monthly Power Plant Report," and predecessor forms. Data are published in the EIA, *Electric Power Annual 1985*, Table 6.
- 1986 forward: EIA, Form EIA-923, "Power Plant Operations Report," and predecessor forms, http://www.eia.gov/electricity/data/eia923/.

NUETKUS — Factor for converting electricity produced from nuclear power from physical units to Btu.

- 1960 through 1984: Calculated annually by EIA by dividing the total heat content consumed in reactors at nuclear plants by the total (net) electricity generated by nuclear plants. The heat content and electricity generation are reported on FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others" and Form EIA-412, "Annual Report of Public Electric Utilities," and predecessor forms. The factors for 1982 through 1984 are published in the following:
  - 1982: EIA, *Historical Plant Cost and Annual Production Expenses for Selected Electric Plants 1982*, page 215.
  - 1983 and 1984: EIA, *Electric Plant Cost and Power Production Expenses 1991*, Table 13.
- 1985 forward: Calculated annually by EIA 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). Also available in Table A6 of the EIA, *Monthly Energy Review*, http://www.eia.gov/totalenergy/data/monthly/index.php.

Electricity Imports and Exports

Electricity transmitted across U.S. borders with Canada and Mexico are included in the State Energy Data System (SEDS) electric power sector.

ELEXPZZ = electricity exported from the United States by state, in million kilowatthours; and
ELIMPZZ = electricity imported into the United States by state, in million kilowatthours.

U.S. totals are calculated as the sum of the state data:

ELIMPUS = ΣELIMPZZ
ELEXPUS = ΣELEXPZZ

Net imports are derived by subtracting exports of electricity from imports:

ELNIPZZ = ELIMPZZ - ELEXPZZ
ELNIPUS = ΣELNIPZZ

Imports and exports of electricity in million kilowatthours are converted to billion Btu by multiplying the physical unit data by the conversion factor of 3.412 thousand Btu per kilowatthour.

ELIMBZZ = ELIMPZZ * 3.412
ELIMBUS = ΣELIMBZZ
ELEXBZZ = ELEXPZZ * 3.412
ELEXBUS = ΣELEXBZZ

ELNIBZZ = ELIMBZZ - ELEXBZZ
ELNIBUS = ΣELNIBZZ

Data sources

ELEXPZZ — Electricity exported from the United States (assumed to be produced by hydroelectric power through 1988) by state.

- 1960 through 1981: Economic Regulatory Administration, *Staff Reports*, "Report on Electric Energy Exchanges with Canada and Mexico." Source data are arranged by the Regional Reliability Council Areas and then by the electric utility. State data were tabulated by aggregating the data of all electric utilities within each state.
- 1982 and 1983: U.S. Energy Information Administration (EIA) state estimates are based on data from Economic Regulatory Administration Form ERA-781R, "Annual Report of Electrical Export/Import Data." State estimates are consistent with national and regional totals

published in the ERA, *Electricity Exchanges Across International Borders*.

- 1984 through 1987: EIA state estimates are based on data from Economic Regulatory Administration Form ERA-781R, "Annual Report of Electrical Export/Import Data," the Federal Energy Regulatory Commission (FERC) Form 1, and the Bonneville Power Administration Annual Report. State estimates are consistent with national and regional totals published in the ERA, *Electricity Transactions Across International Borders*.
- 1988 forward: EIA state estimates are based on data from National Energy Board of Canada; FERC Form 714, "Annual Electric Balancing Authority Area and Planning Report;" California Energy Commission; and EIA retail sales data. Data for 1990 forward are presented in EIA, State Electricity Profiles, Table 10 "Supply and disposition of electricity" for each state.

ELIMPZZ — Electricity imported into the United States (assumed to be produced by hydroelectric power through 1988) by state.

- 1960 through 1981: Economic Regulatory Administration, *Staff Reports*, "Report on Electric Energy Exchanges with Canada and Mexico." Source data are arranged by the Regional Reliability Council Areas and then by the electric utility. State data were tabulated by aggregating the data of all electric utilities within each state.
- 1982 and 1983: EIA state estimates are based on data from Economic Regulatory Administration Form ERA-781R, "Annual Report of Electrical Export/Import Data." State estimates are consistent with national and regional totals published in the ERA, *Electricity Exchanges Across International Borders*.
- 1984 through 1987: EIA state estimates are based on data from Economic Regulatory Administration Form ERA-781R, "Annual Report of Electrical Export/Import Data," the FERC Form 1, and the Bonneville Power Administration Annual Report. State estimates are consistent with national and regional totals published in the ERA, *Electricity Transactions Across International Borders*.
- 1988 forward: EIA state estimates are based on data from National Energy Board of Canada; FERC Form 714, "Annual Electric Balancing Authority Area and Planning Report;" California Energy Commission; and EIA retail sales data. Data for 1990 forward are presented in EIA, State Electricity Profiles, Table 10 "Supply and disposition of electricity" for each state.

Electricity Consumed by the End-Use Sectors

Physical units

The amount of electricity sold to end users is considered to be the amount of electricity consumed by the end-use sectors. Four electricity sales data series, in physical units of million kilowatthours, available in the U.S. Energy Information Administration (EIA) *Electric Power Annual* and the electric power sales and revenue database, are used. The variable names for these data are as follows ("ZZ" in the variable name represents the two-letter state code that differs for each state):

ESRCPZZ = electricity sold to the residential sector;
ESCMPZZ = electricity sold to the commercial sector;
ESICPZZ = electricity sold to the industrial sector; and
ESACPZZ = electricity sold to the transportation sector (2003 forward).

Beginning in 2003, electricity consumed by the commercial sector is considered to be the electricity sold to the commercial sector:

ESCCPZZ = ESCMPZZ

Before 2003, there was no data series for the transportation sector, and the coverage of the commercial sector was smaller in scope. Another data series, electricity sold to the "Other" users, reported in the database, was used:

ESOTPZZ = electricity sold to "Other" users (including public street and highway lighting, other public authorities, railroads and railways, and interdepartmental sales).

To estimate electricity consumed by the transportation sector before 2003, electricity consumed by transit systems from the U.S. Department of Transportation, Federal Transit Administration, was used:

ESTRPZZ = electricity consumed by transit systems.

Consumption of electricity for the transportation and commercial sectors for 1960 through 2002 is defined as follows:

ESACPZZ = ESTRPZZ
ESCCPZZ = ESCMPZZ + (ESOTPZZ- ESTRPZZ)

For all years, total electricity consumed, represented by ESTCPZZ, is calculated by adding the four end-use sector estimates:

ESTCPZZ = ESRCPZZ + ESCCPZZ + ESICPZZ + ESACPZZ

U.S. totals are calculated as the sum of the state data.

British thermal units (Btu)

Electricity consumption estimates are converted into Btu by applying a constant factor of 3.412 thousand Btu per kilowatthour as illustrated in the formulas:

ESRCBZZ = ESRCPZZ * 3.412
ESTCBZZ = ESTCPZZ * 3.412

U.S. totals for the Btu series are calculated as the sum of the state data.

Residential sector and total consumption of electricity per capita

Residential sector and total consumption of electricity per capita are calculated by dividing residential sector and total consumption by resident population ("TPOPP"). Information on residential population is presented in Appendix C of the Consumption Technical Notes at https://www.eia.gov/state/seds/seds-technical-notes-complete.php.

Estimated residential sector consumption of electricity per capita for each state and the United States, in kilowatthours, is represented by "ESRPP" and is calculated:

ESRPP = ESRCP / TPOPP * 1000

Estimated total consumption of electricity per capita for each state and the United States, in kilowatthours, is represented by "ESTPP" and is calculated:

ESTPP = ESTCP / TPOPP * 1000

Additional calculations

Beginning in 2003, electricity sold for transportation use is available from the EIA electric power sales and revenue database. For years before 2003, additional calculations are performed in the State Energy Data System (SEDS) to provide data for the EIA *Monthly Energy Review* and *Annual Energy Review* to use in estimating transportation electricity use. The share of electricity sold to the "Other" category of consumers that is used for transportation is calculated:

ESTRSUS = ESTRPUS / ESOTPUS

Additional notes on electricity sales

1. Beginning in 2003, the source for electricity consumed by the transportation sector is Form EIA-861, "Annual Electric Power Industry Report." This is the first year that electricity sales data are collected separately for the transportation sector (previously these volumes were included in Commercial and "Other"). In 2003, information from the U.S. Department of Transportation, National Transit Database, http://www.transit.dot.gov/ntd/ntd-data, is used to supplement the EIA data for three states with missing or incomplete volumes: Missouri, Ohio, and Tennessee.
2. The source for the electricity sales data for 1960 through 1983 is Form EIA-826, "Electric Utility Company Monthly Statement," and predecessor forms. Electricity sales data for 1984 forward are from Form EIA-861, "Annual Electric Utility Report." At the national level, data from both forms correspond closely (within 3%) for all end-use sectors. However, differences in the number of survey respondents and the reporting of commercial and industrial sales caused inconsistencies between 1983 and 1984 data in those end-use sectors for some states. See EIA *Electric Power Annual, 1991,* DOE/EIA-0348(91), p. 130, and *An Assessment of the Quality of Selected EIA Data Series, Electric Power Data*, DOE/EIA-0292(87), pp. 17-28, for detailed discussions of the reporting differences.
3. For 1960 through 1983, electricity sales data for the District of Columbia and Maryland are combined on the survey forms. Estimates of separate sales for the District of Columbia and Maryland were created by using electricity sales data by end-use sector by communities from the FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others," filed by the Potomac Electric Power Company (PEPCO). PEPCO sales to the District of Columbia were assumed to be total electricity sales in the District of Columbia. Electricity sales to the District of Columbia reported by PEPCO on the FERC Form 1 were subtracted from the Form EIA-826 District of Columbia and Maryland aggregate figures to obtain estimates of Maryland electricity sales by sector. Beginning with 1981 data, electric utilities were no longer required to report sales to specific communities. Sales data for the District of Columbia for 1981 through 1983 were obtained directly from PEPCO's accounting department.

Data sources

ESACPZZ — Electricity sold to (consumed by) the transportation sector by state.

- 1960 through 2002: Equal to ESTRPZZ.

- 2003 forward: EIA, "Retail Sales of Electricity by State by Sector by Provider (EIA-861)" spreadsheet at http://www.eia.gov/electricity/data/state/, sector name "Total Electric Industry," column "Transportation Sales."

ESCMPZZ — Electricity sold to (consumed by) the commercial sector by state.

Note: Data for Maryland and the District of Columbia were combined for 1960 through 1983. The method for disaggregating the data is explained in Additional Note 3 on this page.

- 1960 through 1975: Federal Power Commission, *Electric Power Statistics*, "Sales of Electric Energy to Ultimate Consumers."
- 1976 through 1980: EIA, *Electric Power Annual* (November 1982), Table 125.
- 1981 through 1983: EIA, Form EIA-826, "Electric Utility Company Monthly Statement," and predecessor forms. Published data rounded to gigawatthours in EIA, *Electric Power Annual 1983*, Table 51.
- 1984 through 1986: EIA, Form EIA-861, "Annual Electric Utility Report." Unpublished data.
- 1987: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual 1988,* Table 19.
- 1988 and 1989: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual,* Table 27.
- 1990 forward: EIA, "Retail Sales of Electricity by State by Sector by Provider (EIA-861)" spreadsheet at http://www.eia.gov/electricity/data/state/, sector name "Total Electric Industry," column "Commercial Sales."

ESICPZZ — Electricity sold to (consumed by) the industrial sector by state. Note: Data for Maryland and the District of Columbia were combined for 1960 through 1983. The method for disaggregating the data is explained in Additional Note 3 on page 125.

- 1960 through 1975: Federal Power Commission, Electric Power Statistics, "Sales of Electric Energy to Ultimate Consumers."
- 1976 through 1980: EIA, *Electric Power Annual* (November 1982), Table 126.
- 1981 through 1983: EIA, Form EIA-826, "Electric Utility Company Monthly Statement," and predecessor forms. Published data rounded to gigawatthours in EIA, *Electric Power Annual 1983*, Table 51.
- 1984 through 1986: EIA, Form EIA-861, "Annual Electric Utility Report." Unpublished data.
- 1987: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual 1988*, Table 19.
- 1988 and 1989: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual,* Table 27.
- 1990 forward: EIA, "Retail Sales of Electricity by State by Sector by Provider (EIA-861)" spreadsheet at http://www.eia.gov/electricity/data/state/, sector name "Total Electric Industry," column "Industrial Sales."

ESOTPZZ — Electricity sold to (consumed by) the "Other" sector (i.e., public street and highway lighting, sales to other public authorities, railroads and railways, and interdepartmental sales) by state (through 2002).

Note: Data for Maryland and the District of Columbia were combined for 1960 through 1983. The method for disaggregating the data is explained in Additional Note 3 on page 125.

- 1960 through 1975: Federal Power Commission, *Electric Power Statistics*, "Sales of Electric Energy to Ultimate Consumers."
- 1976 through 1980: EIA, *Electric Power Annual* (November 1982), Table 127.
- 1981 through 1983: EIA, Form EIA-826, "Electric Utility Company Monthly Statement," and predecessor forms. Published data rounded to gigawatthours in EIA, *Electric Power Annual 1983*, Table 51.
- 1984 through 1986: EIA, Form EIA-861, "Annual Electric Utility Report." Unpublished data.
- 1987: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual 1988*, Table 19.
- 1988 and 1989: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual,* Table 27.
- 1990 through 2002: EIA, "Retail Sales of Electricity by State by Sector by Provider (EIA-861)" spreadsheet at http://www.eia.gov/electricity/data/state/, sector name "Total Electric Industry," column "Other Sales."

ESRCPZZ — Electricity sold to (consumed by) the residential sector by state.

Note: Data for Maryland and the District of Columbia were combined for 1960 through 1983. The method for disaggregating the data is explained in Additional Note 3 on page 125.

- 1960 through 1975: Federal Power Commission, *Electric Power Statistics*, "Sales of Electric Energy to Ultimate Consumers."
- 1976 through 1980: EIA, *Electric Power Annual* (November 1982), Table 124.
- 1981 through 1983: EIA, Form EIA-826, "Electric Utility Company Monthly Statement," and predecessor forms. Published data rounded to gigawatthours in EIA, *Electric Power Annual 1983*, Table 51.
- 1984 through 1986: EIA, Form EIA-861, "Annual Electric Utility Report." Unpublished data.
- 1987: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual 1988*, Table 19.
- 1988 and 1989: EIA, Form EIA-861, "Annual Electric Utility Report." Published in the EIA, *Electric Power Annual,* Table 27.
- 1990 forward: EIA, "Retail Sales of Electricity by State by Sector by Provider (EIA-861)" spreadsheet at http://www.eia.gov/electricity/data/state/, sector name "Total Electric Industry," column "Residential Sales."

ESTRPZZ — Electricity consumed by transit systems by state (through 2002).

Notes: The transit system data include electricity used to operate commuter rail, rapid rail, streetcars or light rail, cable cars, trolley-buses, motorbuses, automated guideways, inclined plane railways, and aerial tramways. These data do not include electricity used by Amtrak. These data are available on a fiscal year basis (July 1 through June 30) for 1979 through 1982 and for calendar years 1983 forward. Some data for 1979 through 1983 were adjusted by EIA on the basis of an analysis of historical trends. Electricity consumption for the District of Columbia for 1976 through 2002 is partially apportioned to Maryland and Virginia on the basis of electricity consumption data from the Washington Metropolitan Area Transit Authority.

- 1960 through 1978: EIA estimates are based on data from:
  - The American Public Transit Association (formerly the American Transit Association) annual operating reports.
  - Pushkarev, Boris S. and others, Urban Rail in America. (Bloomington, IN: Indiana University Press, 1982.)
  - U.S. Department of Transportation, *A Directory of Regularly Scheduled, Fixed Route, Local Public Transportation Service in Urbanized Areas Over 50,000 Population*, 1980 and 1981.
- 1979 through 1989: U.S. Department of Transportation, Urban Mass Transportation Administration, *National Urban Mass Transportation Statistics, Section 15 Annual Report*, table titled "Energy Consumption: Details by Transit System."
  - 1979 and 1980: Table 2.13.1.
  - 1981 and 1982: Table 3.13.1.
  - 1983 through 1989: Table 3.12.
- 1990 through 2002: U.S. Department of Transportation, Federal Transit Administration, *Data Tables for the Section 15 Report Year*, http://www.transit.dot.gov/ntd/ntd-data:
  - 1990: Table 2.12.
  - 1991: Table 13.
  - 1992 through 1997: Table 15.
  - 1998: Table 16.
  - 1999 through 2002: Table 17.

Electrical System Energy Losses and Net Interstate Flow of Electricity

Electrical system energy losses, identified by "LO" in SEDS, include all losses incurred in the generation, transmission, and distribution of electricity, including plant use and unaccounted-for quantities. At the national level, total losses, LOTCBUS, is defined as the difference between the heat content of all energy consumed by the electric power sector (TEEIBUS) and the heat content of retail electricity sold to the end-use sectors (ESTCBUS). Total losses for the United States are calculated in billion Btu as follows:

LOTCBUS = TEEIBUS - ESTCBUS

At the state level, however, this calculation does not yield losses because electricity can flow from one state to another. If information on bilateral flow of electricity across state lines is available, a detailed account of the electricity flowing between states and the corresponding energy losses can be compiled. However, EIA's surveys do not capture such information, and some assumptions have to be made in the estimation of energy losses and interstate electricity flow.

In the late 2000s, EIA's State Electricity Profiles introduced a new table on the supply and disposition of electricity in kilowatthours for each state. Net interstate trade is computed as the state's total electricity supply less all within-state electricity disposition (i.e., retail sales, direct use, international exports, and estimated losses). Estimates are available for 1990 forward.

This new series of net interstate trade was incorporated into SEDS in the 2010 data cycle. As a result, the method of estimating state-level electrical system energy losses from 1990 forward was revised. Before 1990, the old method of first estimating electrical system energy losses and then deriving net interstate electricity flow continues to be used (see "1960 through 1989" below).

1990 forward

Net interstate trade of electricity for each state is available in EIA's State Electricity Profiles. The series is multiplied by -1 to convert to SEDS net interstate flow electricity:

ELISPZZ = net interstate flow of electricity for each state, ZZ, in million kilowatthours.

A positive value indicates net inflow of electricity, and a negative value indicates net outflow. The sum of net interstate flow for all states, ELISPUS, is zero.

To estimate the Btu value of net interstate flow (including attributed energy losses), ELISBZZ, states with net electricity outflow (i.e. negative ELISPZZ) and states with net electricity inflow (i.e. positive ELISPZZ) are identified. For states with net electricity outflow, the average heat content of the outflow is assumed to be the same as the average heat content of the energy used to produce electricity for in-state use. That is, total energy consumed by the electric power sector, TEEIBZZ, is allocated to in-state retail sales and outflow according to their physical unit shares:

ELISBZZ = - (TEEIBZZ * (|ELISPZZ| / (|ELISPZZ| + ESTCPZZ)))
for states with net electricity outflow

An annual average outflow Btu-to-kilowatthour ratio is derived by dividing the sum of ELISBZZ for all states with net electricity outflow by the sum of their ELISPZZ. This ratio is used to estimate the Btu value of net inflow of electricity:

ELISBZZ = ELISPZZ * (Average outflow Btu-to-kilowatthour ratio)
for states with net electricity inflow

Total energy used to generate the electricity consumed in the state, TEESBZZ, is computed by removing the outflow energy (for the states with net outflow) or adding the inflow energy (for the states with net inflow) from/to the total energy consumed by the electric power sector in the state. Because ELISBZZ is negative for the net outflow states, there is only one formula:

TEESBZZ = TEEIBZZ + ELISBZZ

Because the sum of net interstate flow is zero, TEESBUS, the sum of TEESBZZ, equals TEEIBUS.

Electrical system energy losses, LOTCBZZ, are defined as the total energy used to generate the electricity consumed in the state less the heat content of the retail sales of electricity:

LOTCBZZ = TEESBZZ - ESTCBZZ

By definition, the sum of LOTCBZZ equals LOTCBUS.

Electrical system energy losses are then allocated to the four end-use sectors according to the sales shares:

LORCBZZ = LOTCBZZ * (ESRCBZZ / ESTCBZZ)
LOCCBZZ = LOTCBZZ * (ESCCBZZ / ESTCBZZ)
LOICBZZ = LOTCBZZ * (ESICBZZ / ESTCBZZ)
LOACBZZ = LOTCBZZ * (ESACBZZ / ESTCBZZ)

Losses for the United States are the sums of all the states' losses.

1960 through 1989

Because of insufficient data, efforts to estimate net interstate trade before 1990 were not successful. The earlier methodology created by SEDS continues to be used for data years 1960 through 1989. This methodology first estimates the electrical system energy losses for the states, and then calculates net interstate flow.

Because Alaska and Hawaii have no exchanges of electricity with other states, their electrical system energy losses are simply the difference between all energy consumed by the electric power sector and the heat content of the retail sales of electricity:

LOTCBAK = TEEIBAK - ESTCBAK
LOTCBHI = TEEIBHI - ESTCBHI

An annual losses-to-sales ratio is created for the aggregate of the contiguous 48 states plus the District of Columbia by dividing the aggregate electrical system energy losses with the aggregated retail sales of electricity:

LOTCB48 = LOTCBUS - (LOTCBAK + LOTCBHI)
ESTCB48 = ESTCBUS - (ESTCBAK + ESTCBHI)
ELLSS48 = LOTCB48 / ESTCB48

This ratio is fairly constant over time, ranging from a minimum of 2.3 in 1987 to a maximum of 2.5 in 1960. The ratio is applied to total retail sales and to retail sales by end-use sector in each of the 48 contiguous states and the District of Columbia:

LOTCBZZ = ESTCBZZ * ELLSS48

Electrical system energy losses are allocated to the four end-use sectors according to the sales shares:

LORCBZZ = LOTCBZZ * (ESRCBZZ / ESTCBZZ)
LOCCBZZ = LOTCBZZ * (ESCCBZZ / ESTCBZZ)
LOICBZZ = LOTCBZZ * (ESICBZZ / ESTCBZZ)
LOACBZZ = LOTCBZZ * (ESACBZZ / ESTCBZZ)

Losses for the United States are the sums of all the states' losses.

Net interstate flow of electricity is then calculated as the difference between total electricity sales plus attributed losses and the total energy consumption by the electric power sector within each state.

ELISBZZ = (ESTCBZZ + LOTCBZZ) - TEEIBZZ

The sum of ELISBZZ is zero.

Data sources

ELISPZZ — Net interstate flow of electricity for each state.

- 1960 through 1989: Not available.
- 1990 forward: EIA, State Electricity Profiles, http://www.eia.gov/electricity/state/, Table 10.

Section 7. Total Energy

The preceding sections of this documentation describe how the U. S. Energy Information Administration (EIA) arrives at state end-use consumption estimates by individual energy source in the State Energy Data System (SEDS). This section describes how all energy sources are added in Btu to create total energy consumption and end-use consumption estimates.

Total Energy Consumption

Total energy consumption by state is defined in SEDS as the sum of all energy sources consumed. The total includes all primary energy sources used directly by the energy-consuming sectors (residential, commercial, industrial, transportation, and electric power), as well as net interstate flow of electricity (ELISB) and net imports of electricity (ELNIB).

Energy sources can be categorized as renewable and non-renewable sources:

Non-Renewable Sources

Fossil fuels:

- coal (CL)
- net imports of coal coke (United States only)
- natural gas excluding supplemental gaseous fuels (NN)
- petroleum products excluding fuel ethanol blended into motor gasoline and biodiesel blended into distillate fuel (PM)

Nuclear electric power (NU)

Renewable Sources

- biodiesel (BD)
- fuel ethanol minus denaturant (EM)
- geothermal direct use energy and geothermal heat pumps (GE)
- conventional hydroelectric power (HY)
- solar thermal direct use energy and photovoltaic electricity net generation (SO)
- electricity produced by wind (WY)
- wood and wood-derived fuels (WD)
- biomass waste (WS)

Total consumption of fossil fuels in billion Btu are calculated for each state and the United States as follows:

FFTCBZZ = CLTCBZZ + NNTCBZZ + PMTCBZZ
FFTCBUS = CLTCBUS + CCNIBUS + NNTCBUS + PMTCBUS

The definition and calculation of the total consumption of each fossil fuel energy source is explained in Sections 2 through 4. Renewable energy total consumption (RETCB) is described in Section 5. Nuclear electric power (NUETB), net imports of electricity (ELNIB), and net interstate flow of electricity (ELISB) are described in Section 6.

Total energy consumption in billion Btu for each state and the United States is calculated as follows:

TETCBZZ = FFTCBZZ + NUETBZZ + RETCBZZ + ELNIBZZ + ELISBZZ
TETCBUS = FFTCBUS + NUETBUS + RETCBUS + ELNIBUS

Total Energy Consumption by End Use

Total energy consumption for each of the four end-use sectors (residential, commercial, industrial, and transportation) is the sum of all energy sources consumed by the sector. Each sector total includes retail sales of electricity, which is produced from other primary energy sources, and electrical system energy losses, which are allocated to the end-use sectors based on electricity sales.

Energy sources are presented as they are consumed; that is, natural gas includes supplemental gaseous fuels that are commingled with the natural gas, and petroleum products include biofuels that are blended into the products.

In general, total energy consumed by the four end-use sectors by state and for the United States as a whole include the following:

- coal (CL)
- natural gas (NG), which includes supplemental gaseous fuels
- all petroleum products (PA), which include fuel ethanol blended into motor gasoline and biodiesel blended into distillate fuel oil
- geothermal direct use energy and geothermal heat pumps (GE)
- conventional hydroelectric power (HY)
- solar thermal direct use energy and photovoltaic electricity net generation (SO)
- wood (WD)
- biomass waste (WS)
- electricity sales (ES)
- electrical system energy losses (LO)

To adjust for the underreporting of fuel ethanol in motor gasoline consumption before 1993 and biodiesel in distillate fuel oil consumption before 2009, fuel ethanol consumption is added to total consumption for the commercial, industrial, and transportation sectors before 1993 and biodiesel consumption is added to total consumption for the transportation sector before 2009. (Fuel ethanol data before 1981 and biodiesel data before 2001 are not available and are assumed to be zero.)

To prevent double counting of supplemental gaseous fuels (SF), which are accounted for as part of the fossil fuels from which they are derived, and also as part of natural gas, supplemental gaseous fuels are removed from total energy for the residential, commercial, industrial, and electric power sectors.

Specific details for each of the end-use sectors are described below.

Residential sector

From 1960 forward:

TERCB = CLRCB + NGRCB + PARCB + GERCB + SORCB + WDRCB + ESRCB + LORCB - SFRCB

Commercial sector

From 1960 through 1992:

TECCB = CLCCB + NGCCB + PACCB + EMCCB + GECCB + HYCCB + SOCCB + WWCCB + ESCCB + LOCCB - SFCCB

From 1993 forward:

TECCB = CLCCB + NGCCB + PACCB + GECCB + HYCCB + SOCCB + WWCCB + WYCCB + ESCCB + LOCCB - SFCCB

Industrial sector

The industrial sector includes energy losses and co-products from the production of fuel ethanol (EMLCB) and biodiesel (BDLCB). It includes net imports of coal coke (CCNIBUS) in the U.S. total but not in the individual state estimates because no reliable means of allocating the U.S. amount to the states has been developed.

From 1960 through 1992:

TEICBUS = CLICBUS + CCNIBUS + NGICBUS + PAICBUS + EMICBUS + EMLCBUS + GEICBUS + HYICBUS + SOICBUS + WWICBUS + ESICBUS + LOICBUS - SFINBUS

TEICBZZ = CLICBZZ + NGICBZZ + PAICBZZ + EMICBZZ + EMLCBZZ + GEICBZZ + HYICBZZ + SOICBZZ + WWICBZZ + ESICBZZ + LOICBZZ - SFINBZZ

From 1993 forward:

TEICBUS = CLICBUS + CCNIBUS + NGICBUS + PAICBUS + BFLCBUS + GEICBUS + HYICBUS + SOICBUS + WWICBUS + WYICBUS + ESICBUS + LOICBUS - SFINBUS

TEICBZZ = CLICBZZ + NGICBZZ + PAICBZZ + BFLCBZZ + GEICBZZ + HYICBZZ + SOICBZZ + WWICBZZ + WYICBZZ + ESICBZZ + LOCIBZZ - SFINBZZ

Transportation sector

From 1960 through 1992:

TEACB = CLACB + NGACB + PAACB + EMACB + ESACB + LOACB

From 1993 through 2008:

TEACB = CLACB + NGACB + PAACB + BDACB + EMACB + ESACB + LOACB

From 2009 forward:

TEACB = CLACB + NGACB + PAACB + ESACB + LOACB

Total End-Use Energy Consumption

Total end-use energy consumption is the sum of the four end-use sectors' energy consumption. This series is represented by "TX."

TETXB = TEACB + TECCB + TEICB + TERCB

Mathematically, total end-use energy consumption (TETXB) equals total primary energy consumption (TETCB). Conceptually, the difference between the two variables is the way in which the electric power sector is incorporated. TETXB is calculated by summing: (1) the direct consumption of primary energy sources by end-use sector; (2) total electricity retail sales to end-use sectors; and (3) the losses incurred through the generation, transmission, and distribution of electricity, which are allocated to the four end-use sectors. TETCB, on the other hand, is calculated by summing the overall consumption of each primary energy source, which includes both direct end-use consumption and consumption by the electric power sector for electricity. The slight discrepancies between TETXB and TETCB are caused by independent rounding of the components.

Total Net Energy

A set of totals is calculated to estimate consumption in the four major end-use sectors excluding each sector's share of all electrical system energy losses that are incurred in the generation, transmission, and distribution of electricity. This series is total net energy consumption and is represented by "TN."

Total net energy consumption in the residential, commercial, industrial, and transportation sectors are calculated:

TNRCB = TERCB - LORCB
TNCCB = TECCB - LOCCB
TNICB = TEICB - LOICB
TNACB = TEACB - LOACB

Total Energy Consumption per Capita

The energy consumed per person residing in each state and in the United States is estimated by dividing the total energy series ("TE") by the resident population as published by the U.S. Department of Commerce, Census Bureau. Before 1980, the U.S. total population estimates may be revised more frequently than the state population estimates, so the sum of the available states' population estimates may not equal the U.S. totals. Therefore, the U.S. total population estimates are input into SEDS instead of being calculated as the sum of the states' values. The variable names for the series are ("ZZ" in the variable name represents the two-letter state code that differs for each state)

TPOPPZZ = resident population estimates of each state; and
TPOPPUS = resident population estimates of the United States.

Estimated energy consumption per capita for each state and the United States, in million Btu, is represented by "TETPB" and is calculated:

TETPB = TETCB / TPOPP

Total energy consumption per capita for the four end-use sectors are estimated:

TERPB = TERCB / TPOPP
TECPB = TECCB / TPOPP
TEIPB = TEICB / TPOPP
TEAPB = TEACB / TPOPP

Data sources

TPOPPUS — Resident population estimates of the United States. July 1 estimates for all years.

- 1960 through 2009: U.S. Department of Commerce, Census Bureau, National Intercensal Tables, http://www.census.gov/programs-surveys/popest/data/tables.All.html.
- 2010 forward: U.S. Department of Commerce, Census Bureau, http://www.census.gov/data/datasets/time-series/demo/popest/2010s-state-total.html.

TPOPPZZ — Resident population estimates by state. July 1 estimates for all years.

- 1960 through 2009: U.S. Department of Commerce, Census Bureau, State Intercensal Tables, http://www.census.gov/programs-surveys/

popest/data/tables.All.html.

- 2010 forward: U.S. Department of Commerce, Census Bureau, http://www.census.gov/data/datasets/time-series/demo/popest/2010s-state-total.html.

Total Energy Consumption per Real Dollar of Gross Domestic Product

Total energy consumtion per chained (2012) dollar of output by state and the United States is estimated by dividing the total energy series ("TE") by real gross domestic product (GDP) as published by the U.S. Department of Commerce, Bureau of Economic Analysis, beginning in 1997.

Both the national-level and state-level real GDP data are available from the U.S. Department of Commerce, Bureau of Economic Analysis "Regional Economic Accounts" dataset. There is a difference in the coverage between the two series. The difference between the sum of the states GDP and the U.S-level GDP reflects federal military and civilian activity located overseas. For details, see BEA Regional Economic Accounts: Methodologies, http://www.bea.gov/regional/methods.cfm.

The variable names for the series are ("ZZ" in the variable name represents the two-letter state code that differs for each state)

GDPRXUS = real gross domestic product of the United States in million chained (2012) dollars; and

GDPRXZZ = real gross domestic product by state in million chained (2012) dollars.

Estimated energy consumption per real chained (2012) dollar for each state and the United States, in thousand Btu per chained (2012) dollar, is represented by "TETGR" and is calculated:

TETGR = TETCB / GDPRX

Data sources

GDPRXUS — Real gross domestic product of the United States in million chained (2012) dollars.

- 1997 forward: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey.

GDPRXZZ — Real gross domestic product by state in million chained (2012) dollars.

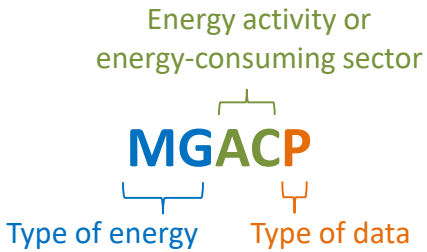
- 1997 forward: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1, select

Annual Gross Domestic Product by State, Gross Domestic Product (GDP) summary (SAGDP1), All Areas, and Real GDP (millions of chained 2012 dollars).

Appendix A. Mnemonic Series Names (MSN)

This appendix contains an alphabetical listing of the variable used in the consumption module of the State Energy Data System (SEDS). Provided for each variable are: a brief description; unit of measure; and the formulas used to create the variable. If a variable is not one calculated in SEDS but is entered into the system, it is described as an independent variable. Formulas for the state calculations have "ZZ" following the variable name, where "ZZ" represent the two-letter code of a state, and formulas for the United States have "US" following the variable name.

Variables in SEDS have five-letter names that generally consist of the following components:



Characters 1 through 4 are explained in the description of each variable.

Character 5 is one of the following:

B	=	Data in British thermal units (Btu)
K	=	Factor for converting data from physical units to Btu
M	=	Data in alternative physical units
P	=	Data in standardized physical units
S	=	Share or ratio expressed as a fraction
V	=	Value, such as value of shipments

Associated with or attached to the variable names are two-letter U.S. Postal Service codes for the 50 states and the District of Columbia (represented by "ZZ" following the variable names) and the United States ("US"). In this system, the United States means the 50 states and the District of Columbia.

Table A1. Consumption Variables

MSN	Description	Unit	Formula
ABICB	Aviation gasoline blending components consumed by the industrial sector.	Billion Btu	ABICBZZ = ABTCBZZ ABICBUS = ABTCBUS
ABICP	Aviation gasoline blending components consumed by the industrial sector.	Thousand barrels	ABICPZZ = ABTCPZZ ABICPUS = ABTCPUS
ABTCB	Aviation gasoline blending components total consumption.	Billion Btu	ABTCBZZ = ABTCPZZ * 5.048 ABTCBUS = ΣABTCBZZ
ABTCP	Aviation gasoline blending components total consumption.	Thousand barrels	ABTCPZZ = (COCAPZZ / COCAPUS) * ABTCPUS ABTCPUS is independent.
AICAP	Aluminum ingot production capacity.	Short tons	AICAPZZ is independent. AICAPUS = ΣAICAPZZ
ARICB	Asphalt and road oil consumed by the industrial sector.	Billion Btu	ARICBZZ = ARICPZZ * 6.636 ARICBUS = ΣARICBZZ
ARICP	Asphalt and road oil consumed by the industrial sector.	Thousand barrels	ARICPZZ = ASICPZZ + RDICPZZ ARICPUS = ΣARICPZZ
ARTCB	Asphalt and road oil total consumption.	Billion Btu	ARTCBZZ = ARICBZZ ARTCBUS = ARICBUS
ARTCP	Asphalt and road oil total consumption.	Thousand barrels	ARTCPZZ = ASTCPZZ + RDTCPZZ ARTCPUS = ΣARTCPZZ
ARTXB	Asphalt and road oil total end-use consumption.	Billion Btu	ARTXBZZ = ARICBZZ ARTXBUS = ARICBUS
ARTXP	Asphalt and road oil total end-use consumption.	Thousand barrels	ARTXPZZ = ARICPZZ ARTXPUS = ARICPUS
ASICP	Asphalt consumed by the industrial sector.	Thousand barrels	Before 2009: ASICPZZ = (ASINPZZ / ASINPUS) * ASTCPUS ASICPUS = ΣASICPZZ 2009 forward: ASICPZZ = (ASPRPZZ / ASPRPUS) * ASTCPUS ASICPUS = ΣASICPZZ
ASINP	Asphalt sold to the industrial sector.	Short tons	ASINPZZ is independent. ASINPUS = ΣASINPZZ
ASPRP	Asphalt (hot-mix and warm-mix) production excluding reclaimed asphalt pavement.	Short tons	ASPRPZZ is independent. ASPRPUS = ΣASPRPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
ASTCP	Asphalt total consumption.	Thousand barrels	ASTCPZZ = ASICPZZ ASTCPUS is independent.
AVACB	Aviation gasoline consumed by the transportation sector.	Billion Btu	AVACBZZ = AVACPZZ * 5.048 AVACBUS = ΣAVACBZZ
AVACP	Aviation gasoline consumed by the transportation sector.	Thousand barrels	AVACPZZ = (AVTTPZZ / AVTTPUS) * AVTCPUS AVACPUS = ΣAVACPZZ
AVMIP	Aviation gasoline issued to the military (through 2014).	Thousand barrels	AVMIPZZ is independent. AVMIPUS = ΣAVMIPZZ
AVNMM	Aviation gasoline sold to nonmilitary users (through 2014).	Thousand gallons	AVNMMZZ is independent. AVNMMUS = ΣAVNMMZZ
AVNMP	Aviation gasoline sold to nonmilitary users (through 2014).	Thousand barrels	AVNMPZZ = AVNMMZZ / 42 AVNMPUS = ΣAVNMPZZ
AVTCB	Aviation gasoline total consumption.	Billion Btu	AVTCBZZ = AVACBZZ AVTCBUS = ΣAVTCBZZ
AVTCP	Aviation gasoline total consumption.	Thousand barrels	AVTCPZZ = AVACPZZ AVTCPUS is independent.
AVTTM	Aviation gasoline sold to all users (2015 forward).	Thousand gallons	AVTTMZZ is independent. AVTTMUS = ΣAVTTMZZ
AVTTP	Aviation gasoline total sales to the transportation sector.	Thousand barrels	Before 2015: AVTTPZZ = AVMIPZZ + AVNMPZZ AVTTPUS = ΣAVTTPZZ 2015 forward: AVTTPZZ = AVTTMZZ / 42 AVTTPUS = ΣAVTTPZZ
AVTXB	Aviation gasoline total end-use consumption.	Billion Btu	AVTXBZZ = AVACBZZ AVTXBUS = ΣAVTXBZZ
AVTXP	Aviation gasoline total end-use consumption.	Thousand barrels	AVTXPZZ = AVACPZZ AVTXPUS = ΣAVTXPZZ
BDACB	Biodiesel consumed by the transportation sector.	Billion Btu	BDACBZZ = BDACPZZ * 5.359 BDACBUS = ΣBDACBZZ
BDACP	Biodiesel consumed by the transportation sector.	Thousand barrels	BDACPZZ = BDTCPZZ BDACPUS = ΣBDACPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
BDLCB	Energy losses and co-products from the production of biodiesel.	Billion Btu	BDLCBZZ is independent. BDLCBUS is independent.
BDTCB	Biodiesel total consumption.	Biliion Btu	BDTCBZZ = BDTCPZZ * 5.359 BDTCBUS = ΣBDTCBZZ
BDTCP	Biodiesel total consumption.	Thousand barrels	BDTCPZZ is independent. BDTCPUS is independent.
BFLCB	Energy losses and co-products from the production of biofuels.	Billion Btu	BFLCBZZ = BDLCBZZ + EMLCBZZ BFLCBUS = BDLCBUS + EMLCBUS
BFTCB	Biofuels total consumption.	Billion Btu	BFTCBZZ = BDTCBZZ + EMTCBZZ + BFLCBZZ BFTCBUS = BDTCBUS + EMTCBUS + BFLCBUS
BMTCB	Biomass total consumption.	Billion Btu	BMTCB = BDLCB + BDTCB + EMLCB + EMTCB + WWTCB
BQICB	Normal butane consumed by the industrial sector.	Billion Btu	BQICBZZ = BQTCBZZ BQICBUS = BQTCBUS
BQICP	Normal butane consumed by the industrial sector.	Thousand barrels	BQICPZZ = BQTCPZZ BQICPUS = BQTCPUS
BQTCB	Normal butane total consumption.	Billion Btu	BQTCBZZ = BQTCPZZ * 4.353 BQTCBUS = ΣBQTCBZZ
BQTCP	Normal butane total consumption.	Thousand barrels	BQTCPZZ is independent. BQTCPUS is independent.
BYICB	Butylene from refineries consumed by the industrial sector.	Billion Btu	BYICBZZ = BYTCBZZ BYICBUS = BYTCBUS
BYICP	Butylene from refineries consumed by the industrial sector.	Thousand barrels	BYICPZZ = BYTCPZZ BYICPUS = BYTCPUS
BYTCB	Butylene from refineries total consumption.	Billion Btu	BYTCBZZ = BYTCPZZ * 4.377 BYTCBUS = ΣBYTCBZZ
BYTCP	Butylene from refineries total consumption.	Thousand barrels	BYTCPZZ is independent. BYTCPUS is independent.
CCEXBUS	Coal coke exported from the United States.	Billion Btu	CCEXBUS = CCEXPUS * 24.80
CCEXPUS	Coal coke exported from the United States.	Thousand short tons	CCEXPUS is independent.
CCIMBUS	Coal coke imported into the United States.	Billion Btu	CCIMBUS = CCIMPUS * 24.80
CCIMPUS	Coal coke imported into the United States.	Thousand short tons	CCIMPUS is independent.

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
CCNIBUS	Coal coke net imports into the United States.	Billion Btu	CCNIBUS = CCIMBUS - CCEXBUS
CCNIPUS	Coal coke net imports into the United States.	Thousand short tons	CCNIPUS = CCIMPUS - CCEXPUS
CGVAV	Value of shipments (value added prior to 2001) for the corrugated and solid fiber box manufacturing industry.	Million dollars	CGVAVZZ is independent. CGVAVUS = ΣCGVAVZZ
CLACB	Coal consumed by the transportation sector.	Billion Btu	CLACBZZ = CLACPZZ * CLACKZZ CLACBUS = ΣCLACBZZ
CLACK	Factor for converting coal consumed by the transportation sector from physical units to Btu.	Million Btu per short ton	CLACKZZ is independent. CLACKUS = CLACBUS / CLACPUS
CLACP	Coal consumed by the transportation sector.	Thousand short tons	CLACPZZ = (CLICPZZ / CLICPUS) * CLACPUS CLACPUS is independent.
CLCCB	Coal consumed by the commercial sector.	Billion Btu	CLCCBZZ = CLCCPZZ * CLHCKZZ CLCCBUS = ΣCLCCBZZ
CLCCP	Coal consumed by the commercial sector.	Thousand short tons	Before 2008: CLCCPZZ = CLHCPZZ - CLRCPZZ CLCCPUS = ΣCLCCPZZ 2008 forward: CLCCPZZ = (CLHDPZZ / CLHDPUS) * CLHCPUS CLCCPUS = ΣCLCCPZZ
CLEIB	Coal consumed by the electric power sector.	Billion Btu	CLEIBZZ = CLEIPZZ * CLEIKZZ CLEIBUS = ΣCLEIBZZ
CLEIK	Factor for converting coal consumed by the electric power sector from physical units to Btu.	Million Btu per short ton	CLEIKZZ is independent. CLEIKUS = CLEIBUS / CLEIPUS
CLEIP	Coal consumed by the electric power sector.	Thousand short tons	CLEIPZZ is independent. CLEIPUS = ΣCLEIPZZ
CLHCB	Coal consumed by the residential and commercial sectors.	Billion Btu	CLHCBZZ = CLCCBZZ + CLRCBZZ CLHCBUS = ΣCLHCBZZ
CLHCK	Factor for converting coal consumed by the residential and commercial sectors from physical units to Btu.	Million Btu per short ton	CLHCKZZ is independent. CLHCKUS = CLHCBUS / CLHCPUS
CLHCP	Coal consumed by the residential and commercial sectors (commercial sector from 2008 forward).	Thousand short tons	CLHCPZZ = (CLHDPZZ / CLHDPUS) * CLHCPUS CLHCPUS is independent.

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
CLHDP	Coal distributed to the residential and commercial sectors (commercial sector from 2008 forward).	Thousand short tons	CLHDPZZ is independent. CLHDPUS = ΣCLHDPZZ
CLICB	Coal consumed by the industrial sector.	Billion Btu	CLICBZZ = CLKCBZZ + CLOCBZZ CLICBUS = ΣCLICBZZ
CLICP	Coal consumed by the industrial sector.	Thousand short tons	CLICPZZ = CLKCPZZ + CLOCPZZ CLICPUS = ΣCLICPZZ
CLKCB	Coal consumed at coke plants (coking coal).	Billion Btu	CLKCBZZ = CLKCPZZ * CLKCKZZ CLKCBUS = ΣCLKCBZZ
CLKCK	Factor for converting coal consumed at coke plants from physical units to Btu.	Million Btu per short ton	CLKCKZZ is independent. CLKCKUS = CLKCBUS / CLKCPUS
CLKCP	Coal consumed by coke plants (coking coal).	Thousand short tons	CLKCPZZ = (CLKDPZZ / CLKDPUS) * CLKCPUS CLKCPUS is independent.
CLKDP	Coal distributed to coke plants (coking coal).	Thousand short tons	CLKDPZZ is independent. CLKDPUS = ΣCLKDPZZ
CLOCB	Coal consumed by industrial users other than coke plants.	Billion Btu	CLOCBZZ = CLOCPZZ * CLOCKZZ CLOCBUS = ΣCLOCBZZ
CLOCK	Factor for converting coal consumed by industrial users other than coke plants from physical units to Btu.	Million Btu per short ton	CLOCKZZ is independent. CLOCKUS = CLOCBUS / CLOCPUS
CLOCP	Coal consumed by industrial users other than coke plants.	Thousand short tons	CLOCPZZ = (CLODPZZ / CLODPUS) * CLOCPUS CLOCPUS is independent.
CLODP	Coal distributed to industrial users other than coke plants.	Thousand short tons	CLODPZZ is independent. CLODPUS = ΣCLODPZZ
CLRCB	Coal consumed by the residential sector.	Billion Btu	CLRCBZZ = CLRCPZZ * CLHCKZZ CLRCBUS = ΣCLRCBZZ
CLRCP	Coal consumed by the residential sector.	Thousand short tons	Before 2008: CLRCPZZ = CLHCPZZ * CLRCSUS CLRCPUS = ΣCLRCPZZ 2008 forward: CLRCPZZ = 0 CLRCPUS = 0
CLRCSUS	The share of residential and commercial coal consumed by the residential sector.	Percent	CLRCSUS is independent.

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
CLTCB	Coal total consumption.	Billion Btu	CLTCBZZ = CLACBZZ + CLCCBZZ + CLEIBZZ + CLICBZZ + CLRCBZZ CLTCBUS = ΣCLTCBZZ
CLTCP	Coal total consumption.	Thousand short tons	CLTCPZZ = CLACPZZ + CLCCPZZ + CLEIPZZ + CLICPZZ + CLRCPZZ CLTCPUS = ΣCLTCPZZ
CLTXB	Coal total end-use consumption.	Billion Btu	CLTXBZZ = CLACBZZ + CLCCBZZ + CLICBZZ + CLRCBZZ CLTXBUS = ΣCLTXBZZ
CLTXP	Coal total end-use consumption.	Thousand barrels	CLTXPZZ = CLACPZZ + CLCCPZZ + CLICPZZ + CLRCPZZ CLTXPUS = ΣCLTXPZZ
COCAP	Atmospheric crude oil distillation operable capacity (operating capacity before 2013) at refineries.	Barrels per calendar day	COCAPZZ is independent. COCAPUS = ΣCOCAPZZ
COICB	Crude oil consumed by the industrial sector.	Billion Btu	COICBZZ = COTCBZZ COICBUS = COTCBUS
COICP	Crude oil consumed by the industrial sector.	Thousand barrels	COICPZZ = COTCPZZ COICPUS = COTCPUS
COTCB	Crude oil consumed in petroleum industry operations.	Billion Btu	COTCBZZ = COTCPZZ * 5.800 COTCBUS = ΣCOTCBZZ
COTCP	Crude oil consumed in petroleum industry operations.	Thousand barrels	COTCPZZ is independent. COTCPUS = ΣCOTCPZZ
CTCAP	Catalytic cracking charge capacity of petroleum refineries.	1960 through 1979: Barrels per calendar day; 1980 forward: Barrels per stream day	CTCAPZZ is independent. CTCAPUS = ΣCTCAPZZ
DFACB	Distillate fuel oil consumed by the transportation sector.	Billion Btu	DFACBZZ = DFACPZZ * DFTCKUS DFACBUS = ΣDFACBZZ
DFACP	Distillate fuel oil consumed by the transportation sector.	Thousand barrels	DFACPZZ = (DFTRPZZ / DFNDPZZ) * DFNCPZZ DFACPUS = ΣDFACPZZ
DFBKP	Distillate fuel oil sales for vessel bunkering use, excluding that sold to the military.	Thousand barrels	DFBKPZZ is independent. DFBKPUS= ΣDFBKPZZ
DFCCB	Distillate fuel oil consumed by the commercial sector.	Billion Btu	DFCCBZZ = DFCCPZZ * DFTCKUS DFCCBUS = ΣDFCCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
DFCCP	Distillate fuel oil consumed by the commercial sector.	Thousand barrels	DFCCPZZ = (DFCMPZZ / DFNDPZZ) * DFNCPZZ DFCCPUS = ΣDFCCPZZ
DFCMP	Distillate fuel oil sales to the commercial sector.	Thousand barrels	DFCMPZZ is independent. DFCMPUS = ΣDFCMPZZ
DFEIB	Distillate fuel oil consumed by the electric power sector.	Billion Btu	DFEIBZZ = DFEIPZZ * DFTCKUS DFEIBUS = ΣDFEIBZZ
DFEIP	Distillate fuel oil consumed by the electric power sector.	Thousand barrels	DFEIPZZ = DKEIPZZ - JKEUPZZ DFEIPUS = ΣDFEIPZZ
DFIBP	Distillate fuel oil sales for industrial space heating and other industrial use, including farm use.	Thousand barrels	DFIBPZZ is independent. DFIBPUS = ΣDFIBPZZ
DFICB	Distillate fuel oil consumed by the industrial sector.	Billion Btu	DFICBZZ = DFICPZZ * DFTCKUS DFICBUS = ΣDFICBZZ
DFICP	Distillate fuel oil consumed by the industrial sector.	Thousand barrels	DFICPZZ = (DFINPZZ / DFNDPZZ) * DFNCPZZ DFICPUS = ΣDFICPZZ
DFINP	Distillate fuel oil sales to the industrial sector.	Thousand barrels	DFINPZZ = DFIBPZZ + DFOCPZZ + DFOFPZZ + DFOTPZZ DFINPUS = ΣDFINPZZ
DFMIP	Distillate fuel oil sales to the military, regardless of use.	Thousand barrels	DFMIPZZ is independent. DFMIPUS = ΣDFMIPZZ
DFNCP	Distillate fuel oil consumption by all sectors other than the electric power sector.	Thousand barrels	DFNCPZZ = (DFNDPZZ / DFNDPUS) * DFNCPUS DFNCPUS = DFTCPUS - DFEIPUS
DFNDP	Distillate fuel oil sales to all sectors other than the electric power sector.	Thousand barrels	DFNDPZZ = DFCMPZZ + DFINPZZ + DFRSPZZ + DFTRPZZ DFNDPUS = ΣDFNDPZZ
DFOCP	Distillate fuel oil sales for use by oil companies.	Thousand barrels	DFOCPZZ is independent. DFOCPUS =ΣDFOCPZZ
DFOFP	Distillate fuel oil sales as diesel fuel for off-highway use.	Thousand barrels	DFOFPZZ is independent. DFOFPUS = ΣDFOFPZZ
DFONP	Distillate fuel oil sales as diesel fuel for on-highway use.	Thousand barrels	DFONPZZ is independent. DFONPUS = ΣDFONPZZ
DFOTP	Distillate fuel oil sales for all other uses not identified in other sales categories.	Thousand barrels	DFOTPZZ is independent. DFOTPUS = ΣDFOTPZZ
DFRCB	Distillate fuel oil consumed by the residential sector.	Billion Btu	DFRCBZZ = DFRCPZZ * DFTCKUS DFRCBUS = ΣDFRCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
DFRCP	Distillate fuel oil consumed by the residential sector.	Thousand barrels	DFRCPZZ = (DFRSPZZ / DFNDPZZ) * DFNCPZZ DFRCPUS = ΣDFRCPZZ
DFRRP	Distillate fuel oil sales for use by railroads.	Thousand barrels	DFRRPZZ is independent. DFRRPUS = ΣDFRRPZZ
DFRSP	Distillate fuel oil sales to the residential sector.	Thousand barrels	DFRSPZZ is independent. DFRSPUS = ΣDFRSPZZ
DFTCB	Distillate fuel oil total consumption.	Billion Btu	DFTCBZZ = DFACBZZ + DFCCBZZ + DFEIBZZ + DFICBZZ + DFRCBZZ DFTCBUS = ΣDFTCBZZ
DFTCP	Distillate fuel oil total consumption.	Thousand barrels	DFTCPZZ = DFEIPZZ + DFNCPZZ DFTCPUS is independent.
DFTCKUS	Factor for converting distillate fuel from physical units to Btu.	Million Btu per barrel	DFTCKUS is independent.
DFTRP	Distillate fuel oil sales to the transportation sector.	Thousand barrels	DFTRPZZ = DFBKPZZ + DFMIPZZ + DFONPZZ + DFRRPZZ DFTRPUS = ΣDFTRPZZ
DFTXB	Distillate fuel oil total end-use consumption.	Billion Btu	DFTXBZZ = DFACBZZ + DFCCBZZ + DFICBZZ + DFRCBZZ DFTXBUS = ΣDFTXBZZ
DFTXP	Distillate fuel oil total end-use consumption.	Thousand barrels	DFTXPZZ = DFACPZZ + DFCCPZZ + DFICPZZ + DFRCPZZ DFTXPUS = ΣDFTXPZZ
DKEIB	Distillate fuel oil (including kerosene-type jet fuel before 2001) consumed by the electric power sector.	Billion Btu	DKEIBZZ = DFEIBZZ + JKEUBZZ DKEIBUS = ΣDKEIBZZ
DKEIP	Distillate fuel oil (including kerosene-type jet fuel before 2001) consumed by the electric power sector.	Thousand barrels	DKEIPZZ is independent. DKEIPUS = ΣDKEIPZZ
DMTCB	Distillate fuel oil, excluding biodiesel, total consumption.	Billion Btu	Before 2009: DMTCBZZ = DFTCBZZ DMTCBUS = DFTCBUS 2009 forward: DMTCBZZ = DFTCBZZ - BDTCBZZ DMTCBUS = DFTCBUS - BDTCBUS
ELEXB	Electricity exported from the United States.	Billion Btu	ELEXBZZ = ELEXPZZ * 3.412 ELEXBUS = ΣELEXBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
ELEXP	Electricity exported from the United States.	Million kilowatthours	ELEXPZZ is independent. ELEXPUS = ΣELEXPZZ
ELIMB	Electricity imported into the United States.	Billion Btu	ELIMBZZ = ELIMPZZ * 3.412 ELIMBUS = ΣELIMBZZ
ELIMP	Electricity imported into the United States.	Million kilowatthours	ELIMPZZ is independent. ELIMPUS = ΣELIMPZZ
ELISB	Net interstate flow of electricity and associated losses (negative indicates flow out of state).	Billion Btu	Before 1990: ELISBZZ = (ESTCBZZ + LOTCBZZ) - TEEIBZZ ELISBUS = 0 1990 forward: If ELISPZZ < 0, ELISBZZ = -(TEEIBZZ * (-ELISPZZ / (-ELISPZZ + ESTCPZZ))) If ELISPZZ >= 0, ELISBZZ = ELISPZZ * (average heat content of energy for all outflow electricity) ELISBUS = 0
ELISP	Net interstate flow of electricity (negative indicates flow out of state).	Million kilowatthours	ELISPZZ is independent. ELISPUS = 0
ELLSS48	The ratio of electrical system energy losses to electricity sold in the contiguous 48 states and the District of Columbia.	Fraction	ELLSS48 = LOTCB48 / ESTCB48
ELNIB	Net imports of electricity into the United States.	Billion Btu	ELNIBZZ = ELIMBZZ - ELEXBZZ ELNIBUS = ΣELNIBZZ
ELNIP	Net imports of electricity into the United States.	Million kilowatthours	ELNIPZZ = ELIMPZZ - ELEXPZZ ELNIPUS = ΣELNIPZZ
EMACB	Fuel ethanol, excluding denaturant, consumed by the transportation sector.	Billion Btu	EMACBZZ = (MGACPZZ / MGTCPZZ) * EMTCBZZ EMACBUS = ΣEMACBZZ
EMCCB	Fuel ethanol, excluding denaturant, consumed by the commercial sector.	Billion Btu	EMCCBZZ = (MGCCPZZ / MGTCPZZ) * EMTCBZZ EMCCBUS = ΣEMCCBZZ
EMICB	Fuel ethanol, excluding denaturant, consumed by the industrial sector.	Billion Btu	EMICBZZ = (MGICPZZ / MGTCPZZ) * EMTCBZZ EMICBUS = ΣEMICBZZ
EMLCB	Energy losses and co-products from the production of fuel ethanol.	Billion Btu	EMLCBZZ = (EMPRBZZ / EMPRBUS) * EMLCBUS EMLCBUS is independent.
EMPRB	Fuel ethanol production excluding denaturant.	Billion Btu	EMPRBZZ is independent. EMPRBUS is independent.

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
EMTCB	Fuel ethanol, excluding denaturant, total consumption.	Billion Btu	EMTCBZZ = (EMTCBUS / ENTCBUS) * ENTCBZZ EMTCBUS is independent.
ENACB	Fuel ethanol, including denaturant, consumed by the transportation sector.	Billion Btu	ENACBZZ = (MGACPZZ / MGTCPZZ) * ENTCBZZ ENACBUS = ΣENACBZZ
ENACP	Fuel ethanol, including denaturant, consumed by the transportation sector.	Thousand barrels	ENACPZZ = (MGACPZZ / MGTCPZZ) * ENTCPZZ ENACPUS = ΣENACPZZ
ENCCB	Fuel ethanol, including denaturant, consumed by the commercial sector.	Billion Btu	ENCCBZZ = (MGCCPZZ / MGTCPZZ) *ENTCBZZ ENCCBUS = ΣENCCBZZ
ENCCP	Fuel ethanol, including denaturant, consumed by the commercial sector.	Thousand barrels	ENCCPZZ = (MGCCPZZ / MGTCPZZ) * ENTCPZZ ENCCPUS = ΣENCCPZZ
ENICB	Fuel ethanol, including denaturant, consumed by the industrial sector.	Billion Btu	ENICBZZ = (MGICPZZ / MGTCPZZ) * ENTCBZZ ENICBUS = ΣENICBZZ
ENICP	Fuel ethanol, including denaturant, consumed by the industrial sector.	Thousand barrels	ENICPZZ = (MGICPZZ / MGTCPZZ) * ENTCPZZ ENICPUS = ΣENICPZZ
ENTCB	Fuel ethanol, including denaturant, total consumption.	Billion Btu	ENTCBZZ = (ENTCPZZ / ENTCPUS) * ENTCBUS ENTCBUS is independent.
ENTCK	Fuel ethanol total consumption conversion factor.	Million Btu per barrel	ENTCKUS = ENTCBUS / ENTCPUS
ENTCP	Fuel ethanol, including denaturant, total consumption.	Thousand barrels	ENTCPZZ = (ENTRPZZ / ENTRPUS) * ENTCPUS ENTCPUS is independent.
ENTRP	Fuel ethanol blended into motor gasoline.	Thousand gallons	ENTRPZZ is independent. ENTRPUS = ΣENTRPZZ
EQICB	Ethane consumed by the industrial sector.	Billion Btu	EQICBZZ = EQTCBZZ EQICBUS = EQTCBUS
EQICP	Ethane consumed by the industrial sector.	Thousand barrels	EQICPZZ = EQTCPZZ EQICPUS = EQTCPUS
EQTCB	Ethane total consumption.	Billion Btu	EQTCBZZ = EQTCPZZ * 2.783 EQTCBUS = ΣEQTCBZZ
EQTCP	Ethane total consumption.	Thousand barrels	EQTCPZZ is independent. EQTCPUS is independent.
ESACB	Electricity consumed by (i.e., sold to) the transportation sector.	Billion Btu	ESACBZZ = ESACPZZ * 3.412 ESACBUS = ΣESACBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
ESACP	Electricity consumed by (i.e., sold to) the transportation sector.	Million kilowatthours	Before 2003: ESACPZZ = ESTRPZZ ESACPUS = ΣESACPZZ 2003 forward: ESACPZZ is independent. ESACPUS = ΣESACPZZ
ESCCB	Electricity consumed by (i.e., sold to) the commercial sector.	Billion Btu	ESCCBZZ = ESCCPZZ * 3.412 ESCCBUS = ΣESCCBZZ
ESCCP	Electricity consumed by (i.e., sold to) the commercial sector.	Million kilowatthours	Before 2003: ESCCPZZ = ESCMPZZ + (ESOTPZZ - ESTRPZZ) ESCCPUS = ΣESCCPZZ 2003 forward: ESCCPZZ = ESCMPZZ ESCCPUS = ΣESCCPZZ
ESCMP	Electricity sold to a portion of the commercial sector.	Million kilowatthours	ESCMPZZ is independent. ESCMPUS = ΣESCMPZZ
ESICB	Electricity consumed by (i.e., sold to) the industrial sector.	Billion Btu	ESICBZZ = ESICPZZ * 3.412 ESICBUS = ΣESICBZZ
ESICP	Electricity consumed by (i.e., sold to) the industrial sector.	Million kilowatthours	ESICPZZ is independent. ESICPUS = ΣESICPZZ
ESOTP	Electricity sold to the “Other” sector (i.e., public street and highway lighting, sales to other public authorities, railroads and railways, and interdepartmental sales) (through 2002).	Million kilowatthours	ESOTPZZ is independent. ESOTPUS = ΣESOTPZZ
ESRCB	Electricity consumed by (i.e., sold to) the residential sector.	Billion Btu	ESRCBZZ = ESRCPZZ * 3.412 ESRCBUS = ΣESRCBZZ
ESRCP	Electricity consumed by (i.e., sold to) the residential sector.	Million kilowatthours	ESRCPZZ is independent. ESRCPUS = ΣESRCPZZ
ESRPP	Electricity consumed by (i.e., sold to) the residential sector per capita.	Kilowatthours	ESRPP = ESRCP / TPOPP * 1000
ESTCB	Electricity total consumption (i.e., retail sales).	Billion Btu	ESTCBZZ = ESTCPZZ * 3.412 ESTCBUS = ΣESTCBZZ ESTCB48 = ESTCBUS - (ESTCBAK + ESTCBHI)

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
ESTCP	Electricity total consumption (i.e., retail sales).	Million kilowatthours	ESTCPZZ = ESACPZZ + ESCCPZZ + ESICPZZ + ESRCPZZ ESTCPUS = ΣESTCPZZ
ESTPP	Electricity total consumption (i.e., retail sales) per capita.	Kilowatthours	ESTPP = ESTCP / TPOPP * 1000
ESTRP	Electricity consumed by transit systems (through 2002).	Million kilowatthours	ESTRPZZ is independent. ESTRPUS = ΣESTRPZZ
ESTRSUS	The share of electricity sold to the "Other" sector (ESOTP) that is used for transportation (through 2002).	Fraction	ESTRSUS = ESACPUS / ESOTPUS
ESTXB	Electricity total end-use consumption (i.e., retail sales).	Billion Btu	ESTXBZZ = ESACBZZ + ESCCBZZ + ESICBZZ + ESRCBZZ ESTXBUS = ΣESTXBZZ
ESTXP	Electricity total end-use consumption (i.e., retail sales).	Million kilowatthours	ESTXPZZ = ESACPZZ + ESCCPZZ + ESICPZZ + ESRCPZZ ESTXPUS = ΣESTXPZZ
EYICB	Ethylene from refineries consumed by the industrial sector.	Billion Btu	EYICBZZ = EYTCBZZ EYICBUS = EYTCBUS
EYICP	Ethylene from refineries consumed by the industrial sector.	Thousand barrels	EYICPZZ = EYTCPZZ EYICPUS = EYTCPUS
EYTCB	Ethylene from refineries total consumption.	Billion Btu	EYTCBZZ = EYTCPZZ * 2.436 EYTCBUS = ΣEYTCBZZ
EYTCP	Ethylene from refineries total consumption.	Thousand barrels	EYTCPZZ is independent. EYTCPUS is independent.
FFETKUS	Fossil-fueled steam-electric power plant conversion factor.	Thousand Btu per kilowatthour	FFETKUS is independent.
FFTCB	Fossil fuels total consumption.	Billion Btu	FFTCBZZ = CLTCBZZ + NNTCBZZ + PMTCBZZ FFTCBUS = CCNIBUS + CLTCBUS + NNTCBUS + PMTCBUS
FNCAS	State's share of U.S. capacity of steam crackers using naphtha as feedstocks.	Percent share	FNCASZZ is independent.
FNICB	Petrochemical feedstocks, naphtha less than 401° F, consumed by the industrial sector.	Billion Btu	FNICBZZ = FNTCBZZ FNICBUS = FNTCBUS
FNICP	Petrochemical feedstocks, naphtha less than 401° F, consumed by the industrial sector.	Thousand barrels	FNICPZZ = FNTCPZZ FNICPUS = FNTCPUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
FNTCB	Petrochemical feedstocks, naphtha less than 401° F, total consumption.	Billion Btu	FNTCBZZ = FNTCPZZ * 5.248 FNTCBUS = ΣFNTCBZZ
FNTCP	Petrochemical feedstocks, naphtha less than 401° F, total consumption.	Thousand barrels	FNTCPZZ = FNTCPUS * FNCASZZ FNTCPUS is independent.
FOCAS	State's share of U.S. capacity of steam crackers using other oils as feedstocks.	Percent share	FOCASZZ is independent.
FOICB	Petrochemical feedstocks, other oils equal to or greater than 401° F, consumed by the industrial sector.	Billion Btu	FOICBZZ = FOTCBZZ FOICBUS = FOTCBUS
FOICP	Petrochemical feedstocks, other oils equal to or greater than 401° F, consumed by the industrial sector.	Thousand barrels	FOICPZZ = FOTCPZZ FOICPUS = FOTCPUS
FOTCB	Petrochemical feedstocks, other oils equal to or greater than 401° F, total consumption.	Billion Btu	FOTCBZZ = FOTCPZZ * 5.825 FOTCBUS = ΣFOTCBZZ
FOTCP	Petrochemical feedstocks, other oils equal to or greater than 401° F, total consumption.	Thousand barrels	FOTCPZZ = FOTCPUS * FOCASZZ FOTCPUS is independent.
FSICB	Petrochemical feedstocks, still gas, consumed by the industrial sector (through 1985).	Billion Btu	FSICBZZ = FSTCBZZ FSICBUS = FSTCBUS
FSICP	Petrochemical feedstocks, still gas, consumed by the industrial sector (through 1985).	Thousand barrels	FSICPZZ = FSTCPZZ FSICPUS = FSTCPUS
FSTCB	Petrochemical feedstocks, still gas, total consumption (through 1985).	Billion Btu	FSTCBZZ = FSTCPZZ * 6.000 FSTCBUS = ΣFSTCBZZ
FSTCP	Petrochemical feedstocks, still gas, total consumption (through 1985).	Thousand barrels	FSTCPZZ = (COCAPZZ / COCAPUS) * FSTCPUS FSTCPUS is independent.
GDPRX	Real gross domestic product.	Million chained (2012) dollars	GDPRXUS is independent. GDPRXZZ is independent.
GEC4B	Geothermal energy consumed as direct heat or from heat pumps in the commercial sector.	Billion Btu	GEC4BZZ is independent. GEC4BUS = ΣGEC4BZZ
GEC5B	Geothermal energy consumed for electricity generation at utility-scale commercial CHP and electricity-only facilities.	Billion Btu	GEC5BZZ = GEC5PZZ * FFETKUS GEC5BUS = ΣGEC5BZZ
GEC5P	Geothermal electricity net generation at utility-scale commercial CHP and electricity-only facilities.	Million kilowatthours	GEC5PZZ is independent. GEC5PUS = ΣGEC5PZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
GECCB	Geothermal energy consumed by the commercial sector.	Billion Btu	GECCBZZ = GEC4BZZ + GEC5BZZ GECCBUS = ΣGECCBZZ
GEEGB	Geothermal energy consumed for electricity generation by the electric power sector.	Billion Btu	GEEGBZZ = GEEGPZZ * FFETKUS GEEGBUS = ΣGEEGBZZ
GEEGP	Geothermal electricity net generation in the electric power sector.	Million kilowatthours	GEEGPZZ is independent. GEEGPUS = ΣGEEGPZZ
GEICB	Geothermal energy consumed by the industrial sector.	Billion Btu	GEICBZZ is independent. GEICBUS = ΣGEICBZZ
GERCB	Geothermal energy consumed by the residential sector.	Billion Btu	GERCBZZ is independent. GERCBUS = ΣGERCBZZ
GETCB	Geothermal energy total consumption.	Billion Btu	GETCBZZ = GECCBZZ + GEEGBZZ + GEICBZZ + GERCBZZ GETCBUS = ΣGETCBZZ
GETXB	Geothermal energy total end-use consumption.	Billion Btu	GETXBZZ = GECCBZZ + GEICBZZ + GERCBZZ GETXBUS = ΣGETXBZZ
HLACB	Hydrocarbon gas liquids consumed by the transportation sector.	Billion Btu	Before 2010: HLACBZZ = LGACBZZ HLACBUS = ΣHLACBZZ 2010 forward: HLACBZZ = PQACBZZ HLACBUS = ΣHLACBZZ
HLACP	Hydrocarbon gas liquids consumed by the transportation sector.	Thousand barrels	Before 2010: HLACPZZ = LGACPZZ HLACPUS = ΣHLACPZZ 2010 forward: HLACPZZ = PQACPZZ HLACPUS = ΣHLACPZZ
HLCCB	Hydrocarbon gas liquids consumed by the commercial sector.	Billion Btu	Before 2010: HLCCBZZ = LGCCBZZ HLCCBUS = ΣHLCCBZZ 2010 forward: HLCCBZZ = PQCCBZZ HLCCBUS = ΣHLCCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
HLCCP	Hydrocarbon gas liquids consumed by the commercial sector.	Thousand barrels	Before 2010: HLCCPZZ = LGCCPZZ HLCCPUS = ΣHLCCPZZ 2010 forward: HLCCPZZ = PQCCPZZ HLCCPUS = ΣHLCCPZZ
HLICB	Hydrocarbon gas liquids consumed by the industrial sector.	Billion Btu	Before 1984: HLICBZZ = LGICBZZ + NATCBZZ + PLTCBZZ + USTCBZZ 1984 through 2009: HLICBZZ = LGICBZZ + PPICBZZ 2010 forward: HLICBZZ = BQICBZZ + BYICBZZ + EQICBZZ + EYICBZZ + IQICBZZ + IYICBZZ + PPICBZZ + PQICBZZ + PYICBZZ HLICBUS = ΣHLICBZZ for all years.
HLICK	Average factor for converting hydrocarbon gas liquids consumed by the industrial sector from physical unit to Btu.	Million Btu per barrel	HLICKZZ = HLICBZZ / HLICPZZ HLICKUS = HLICBUS / HLICPUS
HLICP	Hydrocarbon gas liquids consumed by the industrial sector.	Thousand barrels	Before 1984: HLICPZZ = LGICPZZ + NATCPZZ + PLTCPZZ + USTCPZZ 1984 through 2009: HLICPZZ = LGICPZZ + PPICPZZ 2010 forward: HLICPZZ = BQICPZZ + BYICPZZ + EQICPZZ + EYICPZZ + IQICPZZ + IYICPZZ + PPICPZZ + PQICPZZ + PYICPZZ HLICPUS = ΣHLICPZZ for all years.
HLRCB	Hydrocarbon gas liquids consumed by the residential sector.	Billion Btu	Before 2010: HLRCBZZ = LGRCBZZ HLRCBUS = ΣHLRCBZZ 2010 forward: HLRCBZZ = PQRCBZZ HLRCBUS = ΣHLRCBZZ
HLRCP	Hydrocarbon gas liquids consumed by the residential sector.	Thousand barrels	Before 2010: HLRCPZZ = LGRCPZZ HLRCPUS = ΣHLRCPZZ 2010 forward: HLRCPZZ = PQRCPZZ HLRCPUS = ΣHLRCPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
HLTCB	Hydrocarbon gas liquids total consumption.	Billion Btu	HLTCBZZ = HLACBZZ + HLCCBZZ + HLICBZZ + HLRCBZZ HLTCBUS = ΣHLTCBZZ
HLTCK	Average factor for converting hydrocarbon gas liquids total consumption from physical unit to Btu.	Million Btu per barrel	HLTCKZZ = HLTCBZZ / HLTCPZZ HLTCKUS = HLTCBUS / HLTCPUS
HLTCP	Hydrocarbon gas liquids total consumption.	Thousand barrels	HLTCPZZ = HLACPZZ + HLCCPZZ + HLICPZZ + HLRCPZZ for all years. Before 1984: HLTCPUS = LGTCPUS + NATCPUS + PLTCPUS + USTCPUS 1984 through 2009: HLTCPUS = LGTCPUS + PPTCPUS 2010 forward: HLTCPUS is independent.
HLTXB	Hydrocarbon gas liquids total end-use consumption.	Billion Btu	HLTXBZZ = HLACBZZ + HLCCBZZ + HLICBZZ + HLRCBZZ HLTXBUS = ΣHLTXBZZ
HLTXP	Hydrocarbon gas liquids total end-use consumption.	Thousand barrels	HLTXPZZ = HLACPZZ + HLCCPZZ + HLICPZZ + HLRCPZZ HLTXPUS = ΣHLTXPZZ
HVC5P	Conventional hydroelectricity net generation at commercial CHP and electricity-only facilities.	Million kilowatthours	HVC5PZZ is independent. HVC5PUS = ΣHVC5PZZ
HVEGP	Conventional hydroelectricity net generation in the electric power sector.	Million kilowatthours	HVEGPZZ is independent. HVEGPUS = ΣHVEGPZZ
HVI5P	Conventional hydroelectricity net generation at industrial CHP and electricity-only facilities.	Million kilowatthours	HVI5PZZ is independent. HVI5PUS = ΣHVI5PZZ
HYCCB	Hydropower consumed by the commercial sector.	Billion Btu	HYCCBZZ = HYCCPZZ * FFETKUS HYCCBUS = ΣHYCCBZZ
HYCCP	Hydroelectricity net generation in the commercial sector.	Million kilowatthours	HYCCPZZ = HVC5PZZ HYCCPUS = ΣHYCCPZZ
HYEGB	Hydropower consumed for electricity generation by the electric power sector.	Billion Btu	HYEGBZZ = HYEGPZZ * FFETKUS HYEGBUS = ΣHYEGBZZ
HYEGP	Hydroelectricity net generation in the electric power sector.	Million kilowatthours	HYEGPZZ = HVEGPZZ HYEGPUS = ΣHYEGPZZ
HYICB	Hydropower consumed by the industrial sector.	Billion Btu	HYICBZZ = HYICPZZ * FFETKUS HYICBUS = ΣHYICBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
HYICP	Hydroelectricity net generation in the industrial sector.	Million kilowatthours	HYICPZZ = HVI5PZZ HYICPUS = ΣHYICPZZ
HYTCB	Hydropower total consumption.	Billion Btu	HYTCBZZ = HYCCBZZ + HYEGBZZ + HYICBZZ HYTCBUS = ΣHYTCBZZ
HYTCP	Hydroelectricity total net generation.	Million kilowatthours	HYTCPZZ = HYCCPZZ + HYEGPZZ + HYICPZZ HYTCPUS = ΣHYTCPZZ
HYTXB	Hydropower energy total end-use consumption.	Billion Btu	HYTXBZZ = HYCCBZZ + HYICBZZ HYTXBUS = ΣHYTXBZZ
HYTXP	Hydroelectricity, total end-use net generation.	Million kilowatthours	HYTXPZZ = HYCCPZZ + HYICPZZ HYTXPUS = ΣHYTXPZZ
IQICB	Isobutane consumed by the industrial sector.	Billion Btu	IQICBZZ = IQTCBZZ IQICBUS = IQTCBUS
IQICP	Isobutane consumed by the industrial sector.	Thousand barrels	IQICPZZ = IQTCPZZ IQICPUS = IQTCPUS
IQTCB	Isobutane total consumption.	Billion Btu	IQTCBZZ = IQTCPZZ * 4.183 IQTCBUS = ΣIQTCBZZ
IQTCP	Isobutane total consumption.	Thousand barrels	IQTCPZZ is independent. IQTCPUS is independent.
IYICB	Isobutylene from refineries consumed by the industrial sector.	Billion Btu	IYICBZZ = IYTCBZZ IYICBUS = IYTCBUS
IYICP	Isobutylene from refineries consumed by the industrial sector.	Thousand barrels	IYICPZZ = IYTCPZZ IYICPUS = IYTCPUS
IYTCB	Isobutylene from refineries total consumption.	Billion Btu	IYTCBZZ = IYTCPZZ * 4.355 IYTCBUS = ΣIYTCBZZ
IYTCP	Isobutylene from refineries total consumption.	Thousand barrels	IYTCPZZ is independent. IYTCPUS is independent.
JFACB	Jet fuel consumed by the transportation sector.	Billion Btu	JFACBZZ = JKACBZZ + JNACBZZ JFACBUS = ΣJFACBZZ
JFACP	Jet fuel consumed by the transportation sector.	Thousand barrels	JFACPZZ = JKACPZZ + JNACPZZ JFACPUS = ΣJFACPZZ
JFEUB	Jet fuel consumed by the electric power sector (through 1982).	Billion Btu	JFEUBZZ = JKEUBZZ JFEUBUS = JKEUBUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
JFEUP	Jet fuel consumed by the electric power sector (through 1982).	Thousand barrels	JFEUPZZ = JKEUPZZ JFEUPUS = JKEUPUS
JFTCB	Jet fuel total consumption.	Billion Btu	JFTCBZZ = JFACBZZ + JFEUBZZ JFTCBUS = ΣJFTCBZZ
JFTCP	Jet fuel total consumption.	Thousand barrels	JFTCPZZ = JFACPZZ + JFEUPZZ JFTCPUS = ΣJFTCPZZ
JFTXB	Jet fuel total end-use consumption.	Billion Btu	JFTXBZZ = JFACBZZ JFTXBUS = ΣJFTXBZZ
JFTXP	Jet fuel total end-use consumption.	Thousand barrels	JFTXPZZ = JFACPZZ JFTXPUS = ΣJFTXPZZ
JKACB	Kerosene-type jet fuel consumed by the transportation sector.	Billion Btu	JKACBZZ = JKACPZZ * 5.670 JKACBUS = ΣJKACBZZ
JKACP	Kerosene-type jet fuel consumed by the transportation sector.	Thousand barrels	JKACPZZ = (JKTTPZZ / JKTTPUS) * JKACPUS JKACPUS = JKTCPUS - JKEUPUS
JKEUB	Kerosene-type jet fuel consumed by the electric power sector (through 1982).	Billion Btu	JKEUBZZ = JKEUPZZ * 5.670 JKEUBUS = ΣJKEUBZZ
JKEUP	Kerosene-type jet fuel consumed by the electric power sector (through 1982).	Thousand barrels	JKEUPZZ is independent. JKEUPUS = ΣJKEUPZZ
JKTCB	Kerosene-type jet fuel total consumption.	Billion Btu	JKTCBZZ = JKTCPZZ * 5.670 JKTCBUS = ΣJKTCBZZ
JKTCP	Kerosene-type jet fuel total consumption.	Thousand barrels	JKTCPZZ = JKACPZZ + JKEUPZZ JKTCPUS is independent.
JKTTP	Kerosene-type jet fuel total sold.	Thousand gallons	JKTTPZZ is independent. JKTTPUS = ΣJKTTPZZ
JNACB	Naphtha-type jet fuel consumed by the transportation sector.	Billion Btu	JNACBZZ = JNTCBZZ JNACBUS = JNTCBUS
JNACP	Naphtha-type jet fuel consumed by the transportation sector.	Thousand barrels	JNACPZZ = JNTCPZZ JNACPUS = JNTCPUS
JNMIP	Naphtha-type jet fuel issued to the military.	Thousand barrels	JNMIPZZ is independent. JNMIPUS = ΣJNMIPZZ
JNTCB	Naphtha-type jet fuel total consumption.	Billion Btu	JNTCBZZ = JNTCPZZ * 5.355 JNTCBUS = ΣJNTCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
JNTCP	Naphtha-type jet fuel total consumption.	Thousand barrels	JNTCPZZ = (JNMIPZZ / JNMIPUS) * JNTCPUS JNTCPUS is independent.
KSCCB	Kerosene consumed by the commercial sector.	Billion Btu	KSCCBZZ = KSCCPZZ * 5.670 KSCCBUS = ΣKSCCBZZ
KSCCP	Kerosene consumed by the commercial sector.	Thousand barrels	KSCCPZZ = (KSCMPZZ / KSTTPZZ) * KSTCPZZ KSCCPUS = ΣKSCCPZZ
KSCMP	Kerosene sold to the commercial sector.	Thousand barrels	KSCMPZZ is independent. KSCMPUS = ΣKSCMPZZ
KSICB	Kerosene consumed by the industrial sector.	Billion Btu	KSICBZZ = KSICPZZ * 5.670 KSICBUS = ΣKSICBZZ
KSICP	Kerosene consumed by the industrial sector.	Thousand barrels	KSICPZZ = (KSINPZZ / KSTTPZZ) * KSTCPZZ KSICPUS = ΣKSICPZZ
KSIHP	Kerosene sold for industrial heating and processing.	Thousand barrels	KSIHPZZ is independent. KSIHPUS = ΣKSIHPZZ
KSINP	Kerosene sold to the industrial sector.	Thousand barrels	KSINPZZ = KSIHPZZ + KSOTPZZ KSINPUS = ΣKSINPZZ
KSOTP	Kerosene sold for all other uses, including farm use.	Thousand barrels	KSOTPZZ is independent. KSOTPUS = ΣKSOTPZZ
KSRCB	Kerosene consumed by the residential sector.	Billion Btu	KSRCBZZ = KSRCPZZ * 5.670 KSRCBUS = ΣKSRCBZZ
KSRCP	Kerosene consumed by the residential sector.	Thousand barrels	KSRCPZZ = (KSRSPZZ / KSTTPZZ) * KSTCPZZ KSRCPUS = ΣKSRCPZZ
KSRSP	Kerosene sold to the residential sector.	Thousand barrels	KSRSPZZ is independent. KSRSPUS = ΣKSRSPZZ
KSTCB	Kerosene total consumption.	Billion Btu	KSTCBZZ = KSCCBZZ + KSICBZZ + KSRCBZZ KSTCBUS = ΣKSTCBZZ
KSTCP	Kerosene total consumption.	Thousand barrels	KSTCPZZ = (KSTTPZZ / KSTTPUS) * KSTCPUS KSTCPUS is independent.
KSTTP	Kerosene total sold.	Thousand barrels	KSTTPZZ = KSCMPZZ + KSINPZZ + KSRSPZZ KSTTPUS = ΣKSTTPZZ
KSTXB	Kerosene total end-use consumption.	Billion Btu	KSTXBZZ = KSCCBZZ + KSICBZZ + KSRCBZZ KSTXBUS = ΣKSTXBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
KSTXP	Kerosene total end-use consumption.	Thousand barrels	KSTXPZZ = KSCCPZZ + KSICPZZ + KSRCPZZ KSTXPUS = ΣKSTXPZZ
LGACB	LPG consumed by the transportation sector (through 2009).	Billion Btu	LGACBZZ = LGACPZZ * 3.841 LGACBUS = ΣLGACBZZ
LGACP	LPG consumed by the transportation sector (through 2009).	Thousand barrels	LGACPZZ = LGCBPZZ * LGTRSUS LGACPUS = ΣLGACPZZ
LGCBM	LPG sales for internal combustion engine use (through 2009).	Thousand gallons	LGCBMZZ is independent. LGCBMUS = ΣLGCBMZZ
LGCBP	LPG consumed for internal combustion engine use (through 2009).	Thousand barrels	LGCBPZZ = LGCBMZZ / 42 LGCBPUS = ΣLGCBPZZ
LGCCB	LPG consumed by the commercial sector (through 2009).	Billion Btu	LGCCBZZ = LGCCPZZ * 3.841 LGCCBUS = ΣLGCCBZZ
LGCCP	LPG consumed by the commercial sector (through 2009).	Thousand barrels	LGCCPZZ = LGHCPZZ * LGCCSZZ LGCCPUS = ΣLGCCPZZ
LGCCS	The share of residential and commercial LPG consumed by the commercial sector (through 2009).	Percent	LGCCSZZ is independent.
LGHCM	LPG sold for residential and commercial use (through 2009).	Thousand gallons	LGHCMZZ is independent. LGHCMUS = ΣLGHCMZZ
LGHCP	LPG consumed by the residential and commercial sectors (through 2009).	Thousand barrels	LGHCPZZ = LGHCMZZ / 42 LGHCPUS = ΣLGHCPZZ
LGICB	LPG consumed by the industrial sector (through 2009).	Billion Btu	LGICBZZ = (LGICPZZ / LGICPUS) * LGICBUS LGICBUS = LGTCBUS - (LGACBUS + LGCCBUS + LGRCBUS)
LGICK	Average conversion factor for industrial consumption of LPG (through 2009).	Million Btu per barrel	LGICKUS = LGICBUS / LGICPUS
LGICP	LPG consumed by the industrial sector (through 2009).	Thousand barrels	Before 2008: LGICPZZ = LGTCPZZ - (LGACPZZ + LGCCPZZ + LGRCPZZ) LGICPUS = ΣLGICPZZ For 2008 and 2009: LGICPZZ is Independent. LGICPUS = ΣLGICPZZ
LGRCB	LPG consumed by the residential sector (through 2009).	Billion Btu	LGRCBZZ = LGRCPZZ * 3.841 LGRCBUS = ΣLGRCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
LGRCP	LPG consumed by the residential sector (through 2009).	Thousand barrels	LGRCPZZ = LGHCPZZ * LGRCSZZ LGRCPUS = ΣLGRCPZZ
LGRCS	The share of residential and commercial LPG consumed by the residential sector (through 2009).	Percent	LGRCSZZ is independent.
LGTCB	LPG total consumption (through 2009).	Billion Btu	LGTCBZZ = LGACBZZ + LGCCBZZ + LGICBZZ + LGRCBZZ LGTCBUS is independent.
LGTCKUS	Factor for converting LPG from physical units to Btu (through 2009).	Million Btu per barrel	LGTCKUS is independent.
LGTCP	LPG total consumption (through 2009).	Thousand barrels	Before 2008: LGTCPZZ = (LGTTPZZ / LGTTPUS) * LGTCPUS LGTCPUS is independent. For 2008 and 2009: LGTCPZZ = LGACPZZ + LGCCPZZ + LGICPZZ + LGRCPZZ LGTCPUS is independent.
LGTRSUS	The transportation sector's share of LPG internal combustion engine sales (through 2009).	Fraction	LGTRSUS is independent.
LGTTP	LPG total sold (through 2009).	Thousand gallons	LGTTPZZ is independent. LGTTPUS = ΣLGTTPZZ
LGTXB	LPG total end-use consumption (through 2009).	BillionBtu	LGTXBZZ = LGACBZZ + LGCCBZZ + LGICBZZ + LGRCBZZ LGTXBUS = ΣLGTXBZZ
LGTXP	LPG total end-use consumption (through 2009).	Thousand barrels	LGTXPZZ = LGACPZZ + LGCCPZZ + LGICPZZ + LGRCPZZ LGTXPUS = ΣLGTXPZZ
LOACB	The transportation sector's share of electrical system energy losses.	Billion Btu	LOACBZZ = (ESACBZZ / ESTCBZZ) * LOTCBZZ LOACBUS = ΣLOACBZZ
LOCCB	The commercial sector's share of electrical system energy losses.	Billion Btu	LOCCBZZ = (ESCCBZZ / ESTCBZZ) * LOTCBZZ LOCCBUS = ΣLOCCBZZ
LOICB	The industrial sector's share of electrical system energy losses.	Billion Btu	LOICBZZ = (ESICBZZ / ESTCBZZ) * LOTCBZZ LOICBUS = ΣLOICBZZ
LORCB	The residential sector's share of electrical system energy losses.	Billion Btu	LORCBZZ = (ESRCBZZ / ESTCBZZ) * LOTCBZZ LORCBUS = ΣLORCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
LOTCB	Total electrical system energy losses.	Billion Btu	Before 1990: LOTCBZZ = ESTCBZZ * ELLSS48 Exceptions: LOTCBAK = TEEIBAK - ESTCBAK LOTCBHI = TEEIBHI - ESTCBHI LOTCBUS = TEEIBUS - ESTCBUS LOTCB48 = LOTCBUS - (LOTCBAK + LOTCBHI) 1990 forward: LOTCBZZ = TEESBZZ - ESTCBZZ LOTCBUS = TEEIBUS - ESTCBUS
LOTXB	Total electrical system energy losses allocated to the end-use sectors.	Billion Btu	LOTXBZZ = LOACBZZ + LOCCBZZ + LOICBZZ + LORCBZZ LOTXBUS = ΣLOTXBZZ
LUACB	Lubricants consumed by the transportation sector.	Billion Btu	LUACBZZ = LUACPZZ * 6.065 LUACBUS = ΣLUACBZZ
LUACP	Lubricants consumed by the transportation sector.	Thousand barrels	Before 2010: LUACPZZ = (LUTRPZZ / LUTTPZZ) * LUTCPZZ LUACPUS = ΣLUACPZZ 2010 forward: LUACPZZ is independent. LUACPUS is independent.
LUICB	Lubricants consumed by the industrial sector.	Billion Btu	LUICBZZ = LUICPZZ * 6.065 LUICBUS = ΣLUICBZZ
LUICP	Lubricants consumed by the industrial sector.	Thousand barrels	Before 2010: LUICPZZ = (LUINPZZ / LUTTPZZ) * LUTCPZZ LUICPUS = ΣLUICPZZ 2010 forward: LUICPZZ is independent. LUICPUS is independent.
LUINP	Lubricants sold to the industrial sector (through 2009).	Thousand barrels	LUINPZZ is independent. LUINPUS = ΣLUINPZZ
LUTCB	Lubricants total consumption.	Billion Btu	LUTCBZZ = LUACBZZ + LUICBZZ LUTCBUS = ΣLUTCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
LUTCP	Lubricants total consumption.	Thousand barrels	Before 2010: LUTCPZZ = (LUTTPZZ / LUTTPUS) * LUTCPUS LUTCPUS is independent. 2010 forward: LUTCPZZ = LUACPZZ + LUICPZZ LUTCPUS is independent.
LUTRP	Lubricants sold to the transportation sector (through 2009).	Thousand barrels	LUTRPZZ is independent. LUTRPUS = ΣLUTRPZZ
LUTTP	Lubricants total sold (through 2009).	Thousand barrels	LUTTPZZ = LUINPZZ + LUTRPZZ LUTTPUS = ΣLUTTPZZ
LUTXB	Lubricants total end-use consumption.	Billion Btu	LUTXBZZ = LUACBZZ + LUICBZZ LUTXBUS = ΣLUTXBZZ
LUTXP	Lubricants total end-use consumption.	Thousand barrels	LUTXPZZ = LUACPZZ + LUICPZZ LUTXPUS = ΣLUTXPZZ
MBICB	Motor gasoline blending components consumed by the industrial sector.	Billion Btu	MBICBZZ = MBTCBZZ MBICBUS = MBTCBUS
MBICP	Motor gasoline blending components consumed by the industrial sector.	Thousand barrels	MBICPZZ = MBTCPZZ MBICPUS = MBTCPUS
MBTCB	Motor gasoline blending components total consumption.	Billion Btu	MBTCBZZ = MBTCPZZ * MBTCKUS MBTCBUS = ΣMBTCBZZ
MBTCP	Motor gasoline blending components total consumption.	Thousand barrels	MBTCPZZ = (COCAPZZ / COCAPUS) * MBTCPUS MBTCPUS is independent.
MBTCKUS	Factor for converting motor gasoline blending components from physical units to Btu.	Million Btu per barrel	MBTCKUS is independent.
MGACB	Motor gasoline consumed by the transportation sector.	Billion Btu	MGACBZZ = MGACPZZ * MGTCKUS MGACBUS = ΣMGACBZZ
MGACP	Motor gasoline consumed by the transportation sector.	Thousand barrels	MGACPZZ = (MGTRPZZ / MGTTPZZ) *MGTCPZZ MGACPUS = ΣMGACPZZ
MGAGP	Motor gasoline sold for agricultural use.	Thousand gallons	MGAGPZZ is independent. MGAGPUS = ΣMGAGPZZ
MGBTP	Motor gasoline sold for boating use (2015 forward).	Thousand gallons	MGBTPZZ is independent. MGBTPUS = ΣMGBTPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
MGCCB	Motor gasoline consumed by the commercial sector.	Billion Btu	MGCCBZZ = MGCCPZZ * MGTCKUS MGCCBUS = ΣMGCCBZZ
MGCCP	Motor gasoline consumed by the commercial sector.	Thousand barrels	MGCCPZZ = (MGCMPZZ / MGTTPZZ) *MGTCPZZ MGCCPUS = ΣMGCCPZZ
MGCMP	Motor gasoline sold to the commercial sector.	Thousand gallons	Before 2015: MGCMPZZ = MGMSPZZ + MGPNPZZ MGCMPUS = ΣMGCMPZZ 2015 forward: MGCMPZZ = MGLGPZZ + MGMSPZZ + MGPNPZZ MGCMPUS = ΣMGCMPZZ
MGCUP	Motor gasoline sold for construction use.	Thousand gallons	MGCUPZZ is independent. MGCUPUS = ΣMGCUPZZ
MGICB	Motor gasoline consumed by the industrial sector.	Billion Btu	MGICBZZ = MGICPZZ * MGTCKUS MGICBUS = ΣMGICBZZ
MGICP	Motor gasoline consumed by the industrial sector.	Thousand barrels	MGICPZZ = (MGINPZZ / MGTTPZZ) * MGTCPZZ MGICPUS = ΣMGICPZZ
MGINP	Motor gasoline sold to the industrial sector.	Thousand gallons	MGINPZZ = MGAGPZZ + MGCUPZZ + MGIYPZZ MGINPUS = ΣMGINPZZ
MGIYP	Motor gasoline sold for industrial and commercial use (Federal Highway Administration terminology).	Thousand gallons	MGIYPZZ is independent. MGIYPUS = ΣMGIYPZZ
MGLGP	Motor gasoline sold for lawn and garden use (2015 forward).	Thousand gallons	MGLGPZZ is independent. MGLGPUS = ΣMGLGPZZ
MGMFP	Motor gasoline sold for highway use.	Thousand gallons	MGMFPZZ is independent. MGMFPUS = ΣMGMFPZZ
MGMRP	Motor gasoline sold for marine use (through 2014).	Thousand gallons	MGMRPZZ is independent. MGMRPUS = ΣMGMRPZZ
MGMSP	Motor gasoline sold for miscellaneous and unclassified uses.	Thousand gallons	MGMSPZZ is independent. MGMSPUS = ΣMGMSPZZ
MGPNP	Motor gasoline sold for public nonhighway use.	Thousand gallons	MGPNPZZ is independent. MGPNPUS = ΣMGPNPZZ
MGRVP	Motor gasoline sold for recreational vehicle use (2015 forward).	Thousand gallons	MGRVPZZ is independent. MGRVPUS = ΣMGRVPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
MGSFP	Special fuels sold (Federal Highway Administration terminology; primarily diesel fuel with small amounts of liquefied petroleum gases).	Thousand gallons	MGSFPZZ is independent. MGSFPUS = ΣMGSFPZZ
MGTCB	Motor gasoline total consumption.	Billion Btu	MGTCBZZ = MGACBZZ + MGCCBZZ + MGICBZZ MGTCBUS = ΣMGTCBZZ
MGTCP	Motor gasoline total consumption.	Thousand barrels	MGTCPZZ = (MGTTPZZ / MGTTPUS) * MGTCPUS MGTCPUS is independent.
MGTCKUS	Factor for converting motor gasoline from physical units to Btu.	Million Btu per barrel	MGTCKUS is independent.
MGTRP	Motor gasoline sold to the transportation sector.	Thousand gallons	Before 2015: MGTRPZZ = MGMFPZZ + MGMRPZZ - MGSFPZZ MGTRPUS = ΣMGTRPZZ 2015 forward: MGTRPZZ = MGBTPZZ + MGMFPZZ + MGRVPZZ - MGSFPZZ MGTRPUS = ΣMGTRPZZ
MGTTP	Motor gasoline total sold.	Thousand gallons	MGTTPZZ = MGCMPZZ + MGINPZZ + MGTRPZZ MGTTPUS = ΣMGTTPZZ
MGTXB	Motor gasoline total end-use consumption.	Billion Btu	MGTXBZZ = MGACBZZ + MGCCBZZ + MGICBZZ MGTXBUS = ΣMGTXBZZ
MGTXP	Motor gasoline total end-use consumption.	Thousand barrels	MGTXPZZ = MGACPZZ + MGCCPZZ + MGICPZZ MGTXPUS = ΣMGTXPZZ
MMTCB	Motor gasoline total consumption, excluding fuel ethanol.	Billion Btu	Before 1993: MMTCBZZ = MGTCBZZ MMTCBUS = MGTCBUS 1993 forward: MMTCBZZ = MGTCBZZ - EMTCBZZ MMTCBUS = MGTCBUS - EMTCBUS
MSICB	Miscellaneous petroleum products consumed by the industrial sector.	Billion Btu	MSICBZZ = MSTCBZZ MSICBUS = MSTCBUS
MSICP	Miscellaneous petroleum products consumed by the industrial sector.	Thousand barrels	MSICPZZ = MSTCPZZ MSICPUS = MSTCPUS
MSTCB	Miscellaneous petroleum products total consumption.	Billion Btu	MSTCBZZ = MSTCPZZ * 5.796 MSTCBUS = ΣMSTCBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
MSTCP	Miscellaneous petroleum products total consumption.	Thousand barrels	MSTCPZZ = (OCVAVZZ / OCVAVUS) * MSTCPUS MSTCPUS is independent.
NAICB	Natural gasoline consumed by the industrial sector (through 1983).	Billion Btu	NAICBZZ = NATCBZZ NAICBUS = NATCBUS
NAICP	Natural gasoline consumed by the industrial sector (through 1983).	Thousand barrels	NAICPZZ = NATCPZZ NAICPUS = NATCPUS
NATCB	Natural gasoline total consumption (through 1983).	Billion Btu	NATCBZZ = NATCPZZ * 4.638 NATCBUS = ΣNATCBZZ
NATCP	Natural gasoline total consumption (through 1983).	Thousand barrels	NATCPZZ = NATCPUS * FNCASZZ NATCPUS is independent.
NGACB	Natural gas consumed by the transportation sector.	Billion Btu	NGACBZZ = NGACPZZ * NGTXKZZ NGACBUS = ΣNGACBZZ
NGACP	Natural gas consumed by the transportation sector.	Million cubic feet	NGACPZZ = NGPZPZZ + NGVHPZZ NGACPUS = ΣNGACPZZ
NGCCB	Natural gas delivered to the commercial sector, used as consumption (including supplemental gaseous fuels).	Billion Btu	NGCCBZZ = NGCCPZZ * NGTXKZZ NGCCBUS = ΣNGCCBZZ
NGCCP	Natural gas delivered to the commercial sector, used as consumption (including supplemental gaseous fuels).	Million cubic feet	NGCCPZZ is independent. NGCCPUS = ΣNGCCPZZ
NGEIB	Natural gas consumed by the electric power sector (including supplemental gaseous fuels).	Billion Btu	Before 2010: NGEIBZZ = NGEIPZZ * NGEIKZZ 2010 forward: NGEIBZZ is independent. NGEIBUS = ΣNGEIBZZ for all years.
NGEIK	Factor for converting natural gas consumed by the electric power sector from physical units to Btu.	Thousand Btu per cubic foot	NGEIKZZ is independent. NGEIKUS = NGEIBUS / NGEIPUS
NGEIP	Natural gas consumed by the electric power sector (including supplemental gaseous fuels).	Million cubic feet	NGEIPZZ is independent. NGEIPUS = ΣNGEIPZZ
NGICB	Natural gas consumed by the industrial sector (including supplemental gaseous fuels).	Billion Btu	NGICBZZ = NGICPZZ * NGTXKZZ NGICBUS = ΣNGICBZZ
NGICP	Natural gas consumed by the industrial sector (including supplemental gaseous fuels).	Million cubic feet	NGICPZZ = NGINPZZ + NGLEPZZ + NGPLPZZ NGICPUS = ΣNGICPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
NGINP	A portion of the natural gas delivered to the industrial sector.	Million cubic feet	NGINPZZ is independent. NGINPUS = ΣNGINPZZ
NGLEP	Natural gas consumed as lease fuel.	Million cubic feet	NGLEPZZ is independent. NGLEPUS = ΣNGLEPZZ
NGLPB	Natural gas consumed as lease and plant fuel.	Billion Btu	NGLPBZZ = NGLPPZZ * NGTXKZZ NGLPBUS = ΣNGLPBZZ
NGLPP	Natural gas consumed as lease and plant fuel.	Million cubic feet	NGLPPZZ = NGLEPZZ + NGPLPZZ NGLPPUS = ΣNGLPPZZ
NGPLP	Natural gas consumed as plant fuel.	Million cubic feet	NGPLPZZ is independent. NGPLPUS = ΣNGPLPZZ
NGPZB	Natural gas for pipeline and distribution use.	Billion Btu	NGPZBZZ = NGPZPZZ * NGTXKZZ NGPZBUS = ΣNGPZBZZ
NGPZP	Natural gas for pipeline and distribution use.	Million cubic feet	NGPZPZZ is independent. NGPZPUS = ΣNGPZPZZ
NGRCB	Natural gas delivered to the residential sector, used as consumption (including supplemental gaseous fuels).	Billion Btu	NGRCBZZ = NGRCPZZ * NGTXKZZ NGRCBUS = ΣNGRCBZZ
NGRCP	Natural gas delivered to the residential sector, used as consumption (including supplemental gaseous fuels).	Million cubic feet	NGRCPZZ is independent. NGRCPUS = ΣNGRCPZZ
NGSFP	Supplemental gaseous fuels supplies.	Million cubic feet	NGSFPZZ is independent. NGSFPUS = ΣNGSFPZZ
NGTCB	Natural gas total consumption (including supplemental gaseous fuels).	Billion Btu	NGTCBZZ = NGTCPZZ * NGTCKZZ NGTCBUS = ΣNGTCBZZ
NGTCK	Factor for converting natural gas total consumption from physical units to Btu.	Thousand Btu per cubic foot	NGTCKZZ is independent. NGTCKUS = NGTCBUS / NGTCPUS
NGTCP	Natural gas total consumption (including supplemental gaseous fuels).	Million cubic feet	NGTCPZZ = NGACPZZ + NGCCPZZ + NGEIPZZ + NGICPZZ + NGRCPZZ NGTCPUS = ΣNGTCPZZ
NGTPB	Natural gas total consumption per capita.	Million Btu	NGTPB = NGTCB / TPOPP
NGTPP	Natural gas total consumption per capita.	Thousand cubic feet	NGTPP = NGTCP / TPOPP

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
NGTXB	Natural gas total end-use consumption (including supplemental gaseous fuels).	Billion Btu	NGTXBZZ = NGACBZZ + NGCCBZZ + NGICBZZ + NGRCBZZ NGTXBUS = ΣNGTXBZZ
NGTXK	Factor for converting natural gas consumed by all sectors other than the electric utility sector from physical units to Btu.	Thousand Btu per cubic foot	NGTXKZZ = (NGTCBZZ - NGEIBZZ) / (NGTCPZZ - NGEIPZZ) NGTXKUS = (NGTCBUS - NGEIBUS) / (NGTCPUS - NGEIPUS)
NGTXP	Natural gas total end-use consumption (including supplemental gaseous fuels).	Million cubic feet	NGTXPZZ = NGACPZZ + NGCCPZZ + NGICPZZ + NGRCPZZ NGTXPUS = ΣNGTXPZZ
NGTZP	Natural gas consumed in sectors that have supplemental gaseous fuels commingled with natural gas.	Million cubic feet	NGTZPZZ = NGCCPZZ + NGEIPZZ + NGINPZZ + NGRCPZZ NGTZPUS = ΣNGTZPZZ
NGVHB	Natural gas consumed as vehicle fuel.	Billion Btu	NGVHBZZ = NGVHPZZ * NGTXKZZ NGVHBUS = ΣNGVHBZZ
NGVHP	Natural gas consumed as vehicle fuel.	Million cubic feet	NGVHPZZ is independent. NGVHPUS = ΣNGVHPZZ
NNACB	Natural gas consumed by the transportation sector.	Billion Btu	NNACBZZ = NGACBZZ NNACBUS = ΣNNACBZZ
NNCCB	Natural gas consumed by the commercial sector (excluding supplemental gaseous fuels).	Billion Btu	NNCCBZZ = NGCCBZZ - SFCCBZZ NNCCBUS = ΣNNCCBZZ
NNEIB	Natural gas consumed by the electric power sector (excluding supplemental gaseous fuels).	Billion Btu	NNEIBZZ = NGEIBZZ - SFEIBZZ NNEIBUS = ΣNNEIBZZ
NNICB	Natural gas consumed by the industrial sector (excluding supplemental gaseous fuels).	Billion Btu	NNICBZZ = NGICBZZ - SFINBZZ NNICBUS = ΣNNICBZZ
NNRCB	Natural gas consumed by the residential sector (excluding supplemental gaseous fuels).	Billion Btu	NNRCBZZ = NGRCBZZ - SFRCBZZ NNRCBUS = ΣNNRCBZZ
NNTCB	Natural gas total consumption (excluding supplemental gaseous fuels).	Billion Btu	NNTCBZZ = NGTCBZZ - SFTCBZZ NNTCBUS = ΣNNTCBZZ
NUEGB	Nuclear energy consumed for electricity generation by the electric power sector.	Billion Btu	NUEGBZZ = NUEGPZZ * NUETKUS NUEGBUS = ΣNUEGBZZ
NUEGP	Nuclear electricity net generation in the electric power sector.	Million kilowatthours	NUEGPZZ is independent. NUEGPUS = ΣNUEGPZZ
NUETB	Nuclear energy consumed for electricity generation, total.	Billion Btu	NUETBZZ = NUEGBZZ NUETBUS = NUEGBUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
NUETKUS	Factor for converting electricity generated from nuclear power from physical units to Btu.	Thousand Btu per kilowatthour	NUETKUS is independent.
NUETP	Nuclear electricity total net generation.	Million kilowatthours	NUETPZZ = NUEGPZZ NUETPUS = ΣNUETPZZ
OCVAV	Value of shipments (value added prior to 2001) for the industrial organic chemical manufacturing industry.	Million dollars	OCVAVZZ is independent. OCVAVUS = ΣOCVAVZZ
OHICB	Other hydrocarbon gas liquids (other than propane) consumed by the industrial sector.	Billion Btu	OHICB = HLICB - PQICB
OPICB	Other petroleum products consumed by the industrial sector.	Billion Btu	OPICBZZ = ABICBZZ + COICBZZ + FNICBZZ + FOICBZZ + FSICBZZ + MBICBZZ + MSICBZZ + SGICBZZ + SNICBZZ + UOICBZZ + WXICBZZ OPICBUS = ΣOPICBZZ
OPICP	Other petroleum products consumed by the industrial sector.	Thousand barrels	OPICPZZ = ABICPZZ + COICPZZ + FNICPZZ + FOICPZZ + FSICPZZ + MBICPZZ + MSICPZZ + SGICPZZ + SNICPZZ + UOICPZZ + WXICPZZ OPICPUS = ΣOPICPZZ
OPTCB	Other petroleum products total consumption.	Billion Btu	OPTCBZZ = ABTCBZZ + COTCBZZ + FNTCBZZ + FOTCBZZ + FSTCBZZ + MBTCBZZ + MSTCBZZ + SGTCBZZ + SNTCBZZ + UOTCBZZ + WXTCBZZ OPTCBUS = ΣOPTCBZZ
OPTCP	Other petroleum products total consumption.	Thousand barrels	OPTCPZZ = ABTCPZZ + COTCPZZ + FNTCPZZ + FOTCPZZ + FSTCPZZ + MBTCPZZ + MSTCPZZ + SGTCPZZ + SNTCPZZ + UOTCPZZ + WXTCPZZ OPTCPUS = ABTCPUS + COTCPUS + FNTCPUS + FOTCPUS + FSTCPUS + MBTCPUS + MSTCPUS + SGTCPUS + SNTCPUS + UOTCPUS + WXTCPUS
OPTXB	Other petroleum products total end-use consumption.	Billion Btu	OPTXBZZ = OPICBZZ OPTXBUS = ΣOPTXBZZ
OPTXP	Other petroleum products total end-use consumption.	Thousand barrels	OPTXPZZ = OPICPZZ OPTXPUS = ΣOPTXPZZ
P1ICB	Asphalt and road oil, kerosene, lubricants, petroleum coke, and “other petroleum products” consumed by the industrial sector.	Billion Btu	P1ICBZZ = ARICBZZ + KSICBZZ + LUICBZZ + OPICBZZ + PCICBZZ P1ICBUS = ARICBUS + KSICBUS + LUICBUS + OPICBUS + PCICBUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
P1ICP	Asphalt and road oil, kerosene, lubricants, petroleum coke, and "other petroleum products" consumed by the industrial sector.	Thousand barrels	P1ICPZZ = ARICPZZ + KSICPZZ + LUICPZZ + OPICPZZ + PCICPZZ P1ICPUS = ARICPUS + KSICPUS + LUICPUS + OPICPUS + PCICPUS
P1TCB	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" total consumption.	Billion Btu	P1TCBZZ = ARTCBZZ + AVTCBZZ + KSTCBZZ + LUTCBZZ + OPTCBZZ + PCTCBZZ P1TCBUS = ARTCBUS + AVTCBUS + KSTCBUS + LUTCBUS + OPTCBUS + PCTCBUS
P1TCP	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" total consumption.	Thousand barrels	P1TCPZZ = ARTCPZZ + AVTCPZZ + KSTCPZZ + LUTCPZZ + OPTCPZZ + PCTCPZZ P1TCPUS = ARTCPUS + AVTCPUS + KSTCPUS + LUTCPUS + OPTCPUS + PCTCPUS
P1TXB	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" total end-use consumption.	Billion Btu	P1TXBZZ = ARTXBZZ + AVTXBZZ + KSTXBZZ + LUTXBZZ + OPTXBZZ + PCTXBZZ P1TXBUS = ΣP1TXBZZ
P1TXP	Asphalt and road oil, aviation gasoline, kerosene, lubricants, petroleum coke, and "other petroleum products" total end-use consumption.	Thousand barrels	P1TXPZZ = ARTXPZZ + AVTXPZZ + KSTXPZZ + LUTXPZZ + OPTXPZZ + PCTXPZZ P1TXPUS = ΣP1TXPZZ
PAACB	All petroleum products consumed by the transportation sector.	Billion Btu	PAACBZZ = AVACBZZ + DFACBZZ + HLACBZZ + JFACBZZ + LUACBZZ+ MGACBZZ + RFACBZZ PAACBUS = ΣPAACBZZ
PAACKUS	Factor for converting all petroleum products consumed by the transportation sector from physical units to Btu.	Million Btu per barrel	PAACKUS = PAACBUS / PAACPUS
PAACP	All petroleum products consumed by the transportation sector.	Thousand barrels	PAACPZZ = AVACPZZ + DFACPZZ + HLACPZZ + JFACPZZ + LUACPZZ + MGACPZZ + RFACPZZ PAACPUS = ΣPAACPZZ
PACCB	All petroleum products consumed by the commercial sector.	Billion Btu	PACCBZZ = DFCCBZZ + HLCCBZZ + KSCCBZZ + MGCCBZZ + PCCCBZZ + RFCCBZZ PACCBUS = ΣPACCBZZ
PACCKUS	Factor for converting all petroleum products consumed by the commercial sector from physical units to Btu.	Million Btu per barrel	PACCKUS = PACCBUS / PACCPUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
PACCP	All petroleum products consumed by the commercial sector.	Thousand barrels	PACCPZZ = DFCCPZZ + HLCCPZZ + KSCCPZZ + MGCCPZZ + PCCCPZZ + RFCCPZZ PACCPUS = ΣPACCPZZ
PAEIB	All petroleum products consumed by the electric power sector.	Billion Btu	PAEIBZZ = DFEIBZZ + JKEUBZZ + PCEIBZZ + RFEIBZZ PAEIBUS = ΣPAEIBZZ
PAEIKUS	Factor for converting all petroleum products consumed by the electric power sector from physical units to Btu.	Million Btu per barrel	PAEIKUS = PAEIBUS / PAEIPUS
PAEIP	All petroleum products consumed by the electric power sector.	Thousand barrels	PAEIPZZ = DFEIPZZ + JKEUPZZ + PCEIPZZ + RFEIPZZ PAEIPUS = ΣPAEIPZZ
PAHCBUS	All petroleum products consumed by the residential and commercial sectors combined.	Billion Btu	PAHCBUS = PACCBUS + PARCBUS
PAHCKUS	Factor for converting all petroleum products consumed by the residential and commercial sectors combined from physical units to Btu.	Million Btu per barrel	PAHCKUS = PAHCBUS / PAHCPUS
PAHCPUS	All petroleum products consumed by the residential and commercial sectors combined.	Thousand barrels	PAHCPUS = PACCPUS + PARCPUS
PAICB	All petroleum products consumed by the industrial sector.	Billion Btu	PAICBZZ = ARICBZZ + DFICBZZ + HLICBZZ + KSICBZZ + LUICBZZ + MGICBZZ + OPICBZZ + PCICBZZ + RFICBZZ PAICBUS = ΣPAICBZZ
PAICKUS	Factor for converting all petroleum products consumed by the industrial sector from physical units to Btu.	Million Btu per barrel	PAICKUS = PAICBUS / PAICPUS
PAICP	All petroleum products consumed by the industrial sector.	Thousand barrels	PAICPZZ = ARICPZZ + DFICPZZ + HLICPZZ + KSICPZZ + LUICPZZ + MGICPZZ + OPICPZZ + PCICPZZ + RFICPZZ PAICPUS = ΣPAICPZZ
PARCB	All petroleum products consumed by the residential sector.	Billion Btu	PARCBZZ = DFRCBZZ + HLRCBZZ + KSRCBZZ PARCBUS = ΣPARCBZZ
PARCKUS	Factor for converting all petroleum products consumed by the residential sector from physical units to Btu.	Million Btu per barrel	PARCKUS = PARCBUS / PARCPUS
PARCP	All petroleum products consumed by the residential sector.	Thousand barrels	PARCPZZ = DFRCPZZ + HLRCPZZ + KSRCPZZ PARCPUS = ΣPARCPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
PATCB	All petroleum products total consumption.	Billion Btu	PATCBZZ = ARTCBZZ + AVTCBZZ + DFTCBZZ + HLTCBZZ + JFTCBZZ + KSTCBZZ + LUTCBZZ + MGTCBZZ + OPTCBZZ + PCTCBZZ + RFTCBZZ PATCBUS = ΣPATCBZZ
PATCKUS	Factor for converting all petroleum products consumed by all sectors from physical units to Btu.	Million Btu per barrel	PATCKUS = PATCBUS / PATCPUS
PATCP	All petroleum products total consumption.	Thousand barrels	PATCPZZ = ARTCPZZ + AVTCPZZ + DFTCPZZ + HLTCPZZ + JFTCPZZ + KSTCPZZ + LUTCPZZ + MGTCPZZ + OPTCPZZ + PCTCPZZ + RFTCPZZ PATCPUS = ARTCPUS + AVTCPUS + DFTCPUS + HLTCPUS + JFTCPUS + KSTCPUS + LUTCPUS + MGTCPUS + OPTCPUS + PCTCPUS + RFTCPUS
PATPB	All petroleum products total consumption per capita.	Million Btu	PATPB = PATCB / TPOPP
PATPP	All petroleum products total consumption per capita.	Barrels	PATPP = PATCP / TPOPP
PATXB	All petroleum products total end-use consumption.	Billion Btu	PATXBZZ = ARTXBZZ + AVTXBZZ + DFTXBZZ + HLTXBZZ + JFTXBZZ + KSTXBZZ + LUTXBZZ + MGTXBZZ + OPTXBZZ + PCTXBZZ + RFTXBZZ PATXBUS = ΣPATXBZZ
PATXP	All petroleum products total end-use consumption.	Thousand barrels	PATXPZZ = ARTXPZZ + AVTXPZZ + DFTXPZZ + HLTXPZZ + JFTXPZZ + KSTXPZZ + LUTXPZZ + MGTXPZZ + OPTXPZZ + PCTXPZZ + RFTXPZZ PATXPUS = ΣPATXPZZ
PCC3M	Petroleum coke consumed for combined-heat-and-power in the commercial sector.	Thousand tons	PCC3MZZ is independent. PCC3MUS = ΣPCC3MZZ
PCCCB	Petroleum coke consumed by the commercial sector.	Billion Btu	PCCCBZZ = PCCCPZZ * PCMKKUS PCCCBUS = ΣPCCCBZZ
PCCCP	Petroleum coke consumed by the commercial sector.	Thousand barrels	PCCCPZZ = PCC3MZZ * 5 PCCCPUS = ΣPCCCPZZ
PCCTKUS	Factor for converting petroleum coke, catalyst coke from physical units to Btu.	Million Btu per barrel	PCCTKUS is independent.
PCEIB	Petroleum coke consumed by the electric power sector.	Billion Btu	PCEIBZZ = PCEIPZZ * PCMKKUS PCEIBUS = ΣPCEIBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
PCEIM	Petroleum coke consumed by the electric power sector.	Thousand tons	PCEIMZZ is independent. PCEIMUS = ΣPCEIMZZ
PCEIP	Petroleum coke consumed by the electric power sector.	Thousand barrels	PCEIPZZ = PCEIMZZ * 5 PCEIPUS = ΣPCEIPZZ
PCI3B	Petroleum coke consumed for combined-heat-and-power in the industrial sector.	Billion Btu	PCI3BZZ = PCI3PZZ * PCMKKUS PCI3BUS = ΣPCI3BZZ
PCI3M	Petroleum coke consumed for combined-heat-and-power in the industrial sector.	Thousand tons	PCI3MZZ is independent. PCI3MUS = ΣPCI3MZZ
PCI3P	Petroleum coke consumed for combined-heat-and-power in the industrial sector.	Thousand barrels	PCI3PZZ = PCI3MZZ * 5 PCI3PUS = ΣPCI3PZZ
PCICB	Petroleum coke consumed in the industrial sector.	Billion Btu	PCICBZZ = PCI3BZZ + PCOCBZZ + PCRFBZZ PCICBUS = ΣPCICBZZ
PCICP	Petroleum coke consumed in the industrial sector.	Thousand barrels	PCICPZZ = PCI3PZZ + PCOCPZZ + PCRFPZZ PCICPUS = PCTCPUS - PCCCPUS - PCEIPUS
PCMKKUS	Factor for converting petroleum coke, marketable coke from physical units to Btu.	Million Btu per barrel	PCMKKUS is independent.
PCOCB	Petroleum coke consumed in the industrial sector other than for refinery use and combined-heat-and-power.	Billion Btu	PCOCBZZ = PCOCPZZ * PCMKKUS PCOCBUS = ΣPCOCBZZ
PCOCP	Petroleum coke consumed in the industrial sector other than for refinery use and combined-heat-and-power.	Thousand barrels	PCOCPZZ = (AICAPZZ / AICAPUS) * PCOCPUS PCOCPUS = PCICPUS - PCI3PUS - PCRFPUS
PCRFB	Petroleum coke consumed as refinery fuel.	Billion Btu	PCRFBZZ = PCRFPZZ * PCCTKUS PCRFBUS = ΣPCRFBZZ
PCRFP	Petroleum coke consumed as refinery fuel.	Thousand barrels	Before 1981: PCRFPZZ is independent for selected states. PCRFPZZ = (CTCAPZZ / CTCAPGZ) * PCRFPGZ for states belonging to a specific state group, GZ. 1981 through 2012: PCRFPZZ = (CTCAPZZ / CTCAPPZ) * PCRFPPZ for states belonging to a specific PADD, PZ. 2013 forward: PCRFPZZ is independent. PCRFPUS = ΣPCRFPZZ for all years.

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
PCTCB	Petroleum coke total consumption.	Billion Btu	PCTCBZZ = PCCCBZZ + PCEIBZZ + PCICBZZ PCTCBUS = ΣPCTCBZZ
PCTCP	Petroleum coke total consumption.	Thousand barrels	PCTCPZZ = PCCCPZZ + PCEIPZZ + PCICPZZ PCTCPUS is independent.
PCTXB	Petroleum coke total end-use consumption.	Billion Btu	PCTXBZZ = PCCCBZZ + PCICBZZ PCTXBUS = ΣPCTXBZZ
PCTXP	Petroleum coke total end-use consumption.	Thousand barrels	PCTXPZZ = PCCCPZZ + PCICPZZ PCTXPUS = ΣPCTXPZZ
PIVAV	Value of shipments (value added prior to 2001) for the paint and coating manufacturing industry.	Million dollars	PIVAVZZ is independent. PIVAVUS = ΣPIVAVZZ
PLICB	Plant condensate consumed by the industrial sector (through 1983).	Billion Btu	PLICBZZ = PLTCBZZ PLICBUS = PLTCBUS
PLICP	Plant condensate consumed by the industrial sector (through 1983).	Thousand barrels	PLICPZZ = PLTCPZZ PLICPUS = PLTCPUS
PLTCB	Plant condensate total consumption (through 1983).	Billion Btu	PLTCBZZ = PLTCPZZ * 5.418 PLTCBUS = ΣPLTCBZZ
PLTCP	Plant condensate total consumption (through 1983).	Thousand barrels	PLTCPZZ = PLTCPUS * FNCASZZ PLTCPUS is independent.
PMTCB	All petroleum products total consumption, excluding biofuels.	Billion Btu	PMTCBZZ = ARTCBZZ + AVTCBZZ + DMTCBZZ + HLTCBZZ + JFTCBZZ + KSTCBZZ + LUTCBZZ + MMTCBZZ + OPTCBZZ + PCTCBZZ + RFTCBZZ PMTCBUS = ΣPMTCBZZ
PPICB	Natural gasoline (pentanes plus) consumed by the industrial sector.	Billion Btu	PPICBZZ = PPTCBZZ PPICBUS = PPTCBUS
PPICP	Natural gasoline (pentanes plus) consumed by the industrial sector.	Thousand barrels	PPICPZZ = PPTCPZZ PPICPUS = PPTCPUS
PPTCB	Natural gasoline (pentanes plus) total consumption.	Billion Btu	PPTCBZZ = PPTCPZZ * 4.638 PPTCBUS = ΣPPTCBZZ
PPTCP	Natural gasoline (pentanes plus) total consumption.	Thousand barrels	PPTCPZZ = PPTCPUS * FNCASZZ PPTCPUS is independent.
PQACB	Propane consumed by the transportation sector.	Billion Btu	PQACBZZ = PQACPZZ * 3.841 PQACBUS = ΣPQACBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
PQACP	Propane consumed by the transportation sector.	Thousand barrels	PQACPZZ is independent. PQACPUS is independent.
PQCCB	Propane consumed by the commercial sector.	Billion Btu	PQCCBZZ = PQCCPZZ * 3.841 PQCCBUS = ΣPQCCBZZ
PQCCP	Propane consumed by the commercial sector.	Thousand barrels	PQCCPZZ is independent. PQCCPUS is independent.
PQICB	Propane consumed by the industrial sector.	Billion Btu	PQICBZZ = PQICPZZ * 3.841 PQICBUS = ΣPQICBZZ
PQICP	Propane consumed by the industrial sector.	Thousand barrels	PQICPZZ is independent. PQICPUS is independent.
PQRCB	Propane consumed by the residential sector.	Billion Btu	PQRCBZZ = PQRCPZZ * 3.841 PQRCBUS = ΣPQRCBZZ
PQRCP	Propane consumed by the residential sector.	Thousand barrels	PQRCPZZ is independent. PQRCPUS is independent.
PQTCB	Propane total consumption.	Billion Btu	PQTCBZZ = PQACBZZ + PQCCBZZ + PQICBZZ + PQRCBZZ PQTCBUS = ΣPQTCBZZ
PQTCP	Propane total consumption.	Thousand barrels	PQTCPZZ = PQACPZZ + PQCCPZZ + PQICPZZ + PQRCPZZ PQTCPUS is independent.
PQTXB	Propane total end-use consumption.	Billion Btu	PQTXBZZ = PQACBZZ + PQCCBZZ + PQICBZZ + PQRCBZZ PQTXBUS = ΣPQTXBZZ
PQTXP	Propane total end-use consumption.	Thousand barrels	PQTXPZZ = PQTCPZZ PQTXPUS = ΣPQTXPZZ
PYICB	Propylene from refineries consumed by the industrial sector.	Billion Btu	PYICBZZ = PYTCBZZ PYICBUS = PYTCBUS
PYICP	Propylene from refineries consumed by the industrial sector.	Thousand barrels	PYICPZZ = PYTCPZZ PYICPUS = PYTCPUS
PYTCB	Propylene from refineries total consumption.	Billion Btu	PYTCBZZ = PYTCPZZ * 3.835 PYTCBUS = ΣPYTCBZZ
PYTCP	Propylene from refineries total consumption.	Thousand barrels	PYTCPZZ is independent. PYTCPUS is independent.
RDICP	Road oil consumed by the industrial sector (through 1982).	Thousand barrels	RDICPZZ = (RDINPZZ / RDINPUS) * RDTCPUS RDICPUS = ΣRDICPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
RDINP	Road oil sold to the industrial sector (through 1982).	Short tons	RDINPZZ is independent. RDINPUS = ΣRDINPZZ
RDTCP	Road oil total consumption (through 1982).	Thousand barrels	RDTCPZZ = RDICPZZ RDTCPUS is independent.
REACB	Renewable energy sources consumed by the transportation sector.	Billion Btu	REACBZZ = BDACBZZ + EMACBZZ REACBUS = BDACBUS + EMACBUS
RECCB	Renewable energy sources consumed by the commercial sector.	Billion Btu	RECCBZZ = EMCCBZZ + GECCBZZ + HYCCBZZ + SOCCBZZ + WWCCBZZ + WYCCBZZ RECCBUS = EMCCBUS + GECCBUS + HYCCBUS + SOCCBUS + WWCCBUS + WYCCBUS
REEIB	Renewable energy sources consumed by the electric power sector.	Billion Btu	REEIBZZ = GEEGBZZ + HYEGBZZ + SOEGBZZ + WWEIBZZ + WYEGBZZ REEIBUS = GEEGBUS + HYEGBUS + SOEGBUS + WWEIBUS + WYEGBUS
REICB	Renewable energy sources consumed by the industrial sector.	Billion Btu	REICBZZ = BDLCBZZ + EMICBZZ + EMLCBZZ + GEICBZZ + HYICBZZ + SOICBZZ + WWICBZZ + WYICBZZ REICBUS = BDLCBUS + EMICBUS + EMLCBUS + GEICBUS + HYICBUS + SOICBUS + WWICBUS + WYICBUS
RERCB	Renewable energy sources consumed by the residential sector.	Billion Btu	RERCBZZ = GERCBZZ + SORCBZZ + WDRCBZZ RERCBUS = GERCBUS + SORCBUS + WDRCBUS
RETCB	Renewable energy sources total consumption.	Billion Btu	RETCBZZ = BDLCBZZ + BDTCBZZ + EMLCBZZ + EMTCBZZ + GETCBZZ + HYTCBZZ + SOTCBZZ + WWTCBZZ + WYTCBZZ RETCBUS = BDLCBUS + BDTCBUS + EMLCBUS + EMTCBUS + GETCBUS + HYTCBUS + SOTCBUS + WWTCBUS + WYTCBUS
RFACB	Residual fuel oil consumed by the transportation sector.	Billion Btu	RFACBZZ = RFACPZZ * 6.287 RFACBUS = ΣRFACBZZ
RFACP	Residual fuel oil consumed by the transportation sector.	Thousand barrels	RFACPZZ = (RFTRPZZ / RFNDPZZ) * RFNCPZZ RFACPUS = ΣRFACPZZ
RFBKP	Residual fuel oil sold for vessel bunkering use, excluding deliveries to the military.	Thousand barrels	RFBKPZZ is independent. RFBKPUS = ΣRFBKPZZ
RFCCB	Residual fuel oil consumed by the commercial sector.	Billion Btu	RFCCBZZ = RFCCPZZ * 6.287 RFCCBUS = ΣRFCCBZZ
RFCCP	Residual fuel oil consumed by the commercial sector.	Thousand barrels	RFCCPZZ = (RFCMPZZ / RFNDPZZ) * RFNCPZZ RFCCPUS = ΣRFCCPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
RFCMP	Residual fuel oil sold to the commercial sector.	Thousand barrels	RFCMPZZ is independent. RFCMPUS = ΣRFCMPZZ
RFEIB	Residual fuel oil consumed by the electric power sector.	Billion Btu	RFEIBZZ = RFEIPZZ * 6.287 RFEIBUS = ΣRFEIBZZ
RFEIP	Residual fuel oil consumed by the electric power sector.	Thousand barrels	RFEIPZZ is independent. RFEIPUS = ΣRFEIPZZ
RFIBP	A portion of residual fuel oil sold for industrial use, including industrial space heating.	Thousand barrels	RFIBPZZ is independent. RFIBPUS = ΣRFIBPZZ
RFICB	Residual fuel oil consumed by the industrial sector.	Billion Btu	RFICBZZ = RFICPZZ * 6.287 RFICBUS = ΣRFICBZZ
RFICP	Residual fuel oil consumed by the industrial sector.	Thousand barrels	RFICPZZ = (RFINPZZ / RFNDPZZ) * RFNCPZZ RFICPUS = ΣRFICPZZ
RFINP	Residual fuel oil sold to the industrial sector.	Thousand barrels	RFINPZZ = RFIBPZZ + RFMSPZZ + RFOCPZZ RFINPUS = ΣRFINPZZ
RFMIP	Residual fuel oil sold to the military, regardless of use.	Thousand barrels	RFMIPZZ is independent. RFMIPUS = ΣRFMIPZZ
RFMSP	Residual fuel oil sold for miscellaneous uses.	Thousand barrels	RFMSPZZ is independent. RFMSPUS = ΣRFMSPZZ
RFNCP	Residual fuel oil consumption by all sectors other than the electric power sector.	Thousand barrels	RFNCPZZ = (RFNDPZZ / RFNDPUS) * RFNCPUS RFNCPUS = RFTCPUS - RFEIPUS
RFNDP	Residual fuel oil sold to all sectors other than the electric power sector.	Thousand barrels	RFNDPZZ = RFCMPZZ + RFINPZZ + RFTRPZZ RFNDPUS = ΣRFNDPZZ
RFOCP	Residual fuel oil sold for use by oil companies.	Thousand barrels	RFOCPZZ is independent. RFOCPUS = ΣRFOCPZZ
RFRRP	Residual fuel oil sold for use by railroads.	Thousand barrels	RFRRPZZ is independent. RFRRPUS = ΣRFRRPZZ
RFTCB	Residual fuel oil total consumption.	Billion Btu	RFTCBZZ = RFACBZZ + RFCCBZZ + RFEIBZZ + RFICBZZ RFTCBUS = ΣRFTCBZZ
RFTCP	Residual fuel oil total consumption.	Thousand barrels	RFTCPZZ = RFEIPZZ + RFNCPZZ RFTCPUS is independent.
RFTRP	Residual fuel oil sold to the transportation sector.	Thousand barrels	RFTRPZZ = RFBKPZZ + RFMIPZZ + RFRRPZZ RFTRPUS = SRFTRPZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
RFTXB	Residual fuel oil total end-use consumption.	Billion Btu	RFTXBZZ = RFACBZZ + RFCCBZZ + RFICBZZ RFTXBUS = ΣRFTXBZZ
RFTXP	Residual fuel oil total end-use consumption.	Thousand barrels	RFTXPZZ = RFACPZZ + RFCCPZZ + RFICPZZ RFTXPUS = ΣRFTXPZZ
SFCCB	Supplemental gaseous fuels consumed by the commercial sector.	Billion Btu	SFCCBZZ = SFCCPZZ * NGTXKZZ SFCCBUS = ΣSFCCBZZ
SFCCP	Supplemental gasesous fuels consumed by the commercial sector.	Million cubic feet	SFCCPZZ = NGSFPZZ * (NGCCPZZ / NGTZPZZ) SFCCPUS = ΣSFCCPZZ
SFEIB	Supplemental gaseous fuels consumed by the electric power sector.	Billion Btu	SFEIBZZ = SFEIPZZ * NGEIKZZ SFEIBUS = ΣSFEIBZZ
SFEIP	Supplemental gaseous fuels consumed by the electric power sector.	Million cubic feet	SFEIPZZ = NGSFPZZ * (NGEIPZZ / NGTZPZZ) SFEIPUS = ΣSFEIPZZ
SFINB	Supplemental gaseous fuels consumed by the industrial sector.	Billion Btu	SFINBZZ = SFINPZZ * NGTXKZZ SFINBUS = ΣSFINBZZ
SFINP	Supplemental gaseous fuels consumed by the industrial sector.	Million cubic feet	SFINPZZ = NGSFPZZ * (NGINPZZ / NGTZPZZ) SFINPUS = ΣSFINPZZ
SFRCB	Supplemental gaseous fuels consumed by the residential sector.	Billion Btu	SFRCBZZ = SFRCPZZ * NGTXKZZ SFRCBUS = ΣSFRCBZZ
SFRCP	Supplemental gaseous fuels consumed by the residential sector.	Million cubic feet	SFRCPZZ = NGSFPZZ * (NGRCPZZ / NGTZPZZ) SFRCPUS = ΣSFRCPZZ
SFTCB	Supplemental gaseous fuels total consumption.	Billion Btu	SFTCBZZ = SFCCBZZ + SFEIBZZ + SFINBZZ + SFRCBZZ SFTCBUS = ΣSFTCBZZ
SFTCP	Supplemental gaseous fuels total consumption.	Million cubic feet	SFTCPZZ = SFCCPZZ + SFEIPZZ + SFINPZZ + SFRCPZZ SFTCPUS = ΣSFTCPZZ
SGICB	Still gas consumed by the industrial sector.	Billion Btu	SGICBZZ = SGTCBZZ SGICBUS = SGTCBUS
SGICP	Still gas consumed by the industrial sector.	Thousand barrels	SGICPZZ = SGTCPZZ SGICPUS = SGTCPUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
SGTCB	Still gas total consumption.	Billion Btu	Before 2016: SGTCBZZ = SGTCPZZ * 6.000 SGTCBUS = ΣSGTCBZZ 2016 forward: SGTCBZZ = SGTCPZZ * 6.287 SGTCBUS = ΣSGTCBZZ
SGTCP	Still gas total consumption.	Thousand barrels	SGTCPZZ = (COCAPZZ / COCAPUS) * SGTCPUS SGTCPUS is independent.
SNICB	Special naphthas consumed by the industrial sector.	Billion Btu	SNICBZZ = SNTCBZZ SNICBUS = SNTCBUS
SNICP	Special naphthas consumed by the industrial sector.	Thousand barrels	SNICPZZ = SNTCPZZ SNICPUS = SNTCPUS
SNTCB	Special naphthas total consumption.	Billion Btu	SNTCBZZ = SNTCPZZ * 5.248 SNTCBUS = ΣSNTCBZZ
SNTCP	Special naphthas total consumption.	Thousand barrels	SNTCPZZ = (PIVAVZZ / PIVAVUS) * SNTCPUS SNTCPUS is independent.
SOC5B	Solar energy consumed for electricity generation at utility-scale commercial CHP and electricity-only facilities.	Billion Btu	SOC5BZZ = SOC5PZZ * FFETKUS SOC5BUS = ΣSOC5BZZ
SOC5P	Solar thermal and photovoltaic electricity net generation at utility-scale commercial CHP and electricity-only facilities.	Million kilowatthours	SOC5PZZ is independent. SOC5PUS = ΣSOC5PZZ
SOC7B	Solar energy consumed for electricity generation at small-scale commercial facilities.	Billion Btu	SOC7BZZ = SOC7PZZ * FFETKUS SOC7BUS = ΣSOC7BZZ
SOC7P	Photovoltaic electricity generation at small-scale commercial facilities.	Million kilowatthours	SOC7PZZ is independent. SOC7PUS = ΣSOC7PZZ
SOCCB	Solar energy consumed by the commercial sector.	Billion Btu	SOCCBZZ = SOC5BZZ + SOC7BZZ SOCCBUS = ΣSOCCBZZ
SOCCP	Solar thermal and photovoltaic electricity net generation in the commercial sector.	Million kilowatthours	SOCCPZZ = SOC5PZZ + SOC7PZZ SOCCPUS = ΣSOCCPZZ
SOEGB	Solar energy consumed for electricity generation by the electric power sector.	Billion Btu	SOEGBZZ = SOEGPZZ * FFETKUS SOEGBUS = ΣSOEGBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
SOEGP	Solar thermal and photovoltaic electricity net generation in the electric power sector.	Million kilowatthours	SOEGPZZ is independent. SOEGPUS = ΣSOEGPZZ
SOI5B	Solar energy consumed for electricity generation at utility-scale industrial CHP and electricity-only facilities.	Billion Btu	SOI5BZZ = SOI5PZZ * FFETKUS SOI5BUS = ΣSOI5BZZ
SOI5P	Solar thermal and photovoltaic electricity net generation at utility-scale industrial CHP and electricity-only facilities.	Million kilowatthours	SOI5PZZ is independent. SOI5PUS = ΣSOI5PZZ
SOI7B	Solar energy consumed for electricity generation at small-scale industrial facilities.	Billion Btu	SOI7BZZ = SOI7PZZ * FFETKUS SOI7BUS = ΣSOI7BZZ
SOI7P	Photovoltaic electricity generation at small-scale industrial facilities.	Million kilowatthours	SOI7PZZ is independent. SOI7PUS = ΣSOI7PZZ
SOICB	Solar energy consumed by the industrial sector.	Billion Btu	SOICBZZ = SOI5BZZ + SOI7BZZ SOICBUS = ΣSOICBZZ
SOICP	Solar thermal and photovoltaic electricity net generation in the industrial sector.	Million kilowatthours	SOICPZZ = SOI5PZZ + SOI7PZZ SOICPUS = ΣSOICPZZ
SOR7B	Solar energy consumed for electricity generation by small-scale applications in the residential sector.	Billion Btu	SOR7BZZ = SOR7PZZ * FFETKUS SOR7BUS = ΣSOR7BZZ
SOR7P	Photovoltaic electricity generation by small-scale applications in the residential sector.	Million kilowatthours	SOR7PZZ is independent. SOR7PUS = ΣSOR7PZZ
SORCB	Solar energy consumed by the residential sector.	Billion Btu	SORCBZZ = SOR7BZZ + SOT8BZZ SORCBUS = ΣSORCBZZ
SOT8B	Solar thermal energy consumed as heat.	Billion Btu	SOT8BZZ = (SOTTPZZ / SOTTPUS) * SOT8BUS SOT8BUS is independent.
SOTCB	Solar energy total consumption.	Billion Btu	SOTCBZZ = SOCCBZZ + SOEGBZZ + SOICBZZ + SORCBZZ SOTCBUS = ΣSOTCBZZ
SOTGP	Solar thermal and photovoltaic electricity total net generation.	Million kilowatthours	SOTGPZZ = SOCCPZZ + SOEGPZZ + SOICPZZ + SOR7PZZ SOTGPUS = ΣSOTGPZZ
SOTTP	Rolling 20-year accumulation of shipments of solar thermal energy collectors.	Square feet	SOTTPZZ is independent. SOTTPUS = ΣSOTTPZZ
SOTXB	Solar energy total end-use consumption.	Billion Btu	SOTXBZZ = SOCCBZZ + SOICBZZ + SORCBZZ SOTXBUS = ΣSOTXBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
TEACB	Total energy consumption in the transportation sector.	Billion Btu	Before 1993: TEACBZZ = CLACBZZ + EMACBZZ + ESACBZZ + LOACBZZ + NGACBZZ + PAACBZZ TEACBUS = CLACBUS + EMACBUS + ESACBUS + LOACBUS + NGACBUS + PAACBUS From 1993 through 2008: TEACBZZ = BDACBZZ + CLACBZZ + ESACBZZ + LOACBZZ + NGACBZZ + PAACBZZ TEACBUS = BDACBUS + CLACBUS + ESACBUS + LOACBUS + NGACBUS + PAACBUS 2009 forward: TEACBZZ = CLACBZZ + ESACBZZ + LOACBZZ + NGACBZZ + PAACBZZ TEACBUS = CLACBUS + ESACBUS + LOACBUS + NGACBUS + PAACBUS
TEAPB	Total energy consumption per capita in the transportation sector.	Million Btu	TEAPBZZ = TEACBZZ / TPOPPZZ TEAPBUS = TEACBUS / TPOPPUS
TECCB	Total energy consumption in the commercial sector.	Billion Btu	Before 1993: TECCBZZ = CLCCBZZ + EMCCBZZ + ESCCBZZ + GECCBZZ + HYCCBZZ + LOCCBZZ + NGCCBZZ + PACCBZZ + SOCCBZZ + WWCCBZZ - SFCCBZZ TECCBUS = CLCCBUS + EMCCBUS + ESCCBUS + GECCBUS + HYCCBUS + LOCCBUS + NGCCBUS + PACCBUS + SOCCBUS + WWCCBUS - SFCCBUS 1993 forward: TECCBZZ = CLCCBZZ + ESCCBZZ + GECCBZZ + HYCCBZZ + LOCCBZZ + NGCCBZZ + PACCBZZ + SOCCBZZ + WWCCBZZ + WYCCBZZ- SFCCBZZ TECCBUS = CLCCBUS + ESCCBUS + GECCBUS + HYCCBUS + LOCCBUS + NGCCBUS + PACCBUS + SOCCBUS + WWCCBUS + WYCCBUS - SFCCBUS
TECPB	Total energy consumption per capita in the commercial sector.	Million Btu	TECPBZZ = TECCBZZ / TPOPPZZ TECPBUS = TECCBUS / TPOPPUS
TEEIB	Total energy consumption in the electric power sector plus net imports of electricity into the United States.	Billion Btu	TEEIBZZ = CLEIBZZ + ELNIBZZ + GEEGBZZ + HYEGBZZ + NGEIBZZ + NUEGBZZ + PAEIBZZ + SOEGBZZ + WWEIBZZ + WYEGBZZ - SFEIBZZ TEEIBUS = ΣTEEIBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
TEESB	Total energy used to generate the electricity consumed in a state.	Billion Btu	TEESBZZ = ELISBZZ + TEEIBZZ TEESBUS = TEEIBUS
TEICB	Total energy consumption in the industrial sector.	Billion Btu	Before 1993: TEICBZZ = CLICBZZ + NGICBZZ + PAICBZZ + EMICBZZ + EMLCBZZ + GEICBZZ + HYICBZZ + SOICBZZ + WWICBZZ + ESICBZZ + LOICBZZ - SFINBZZ TEICBUS = CLICBUS + CCNIBUS + NGICBUS + PAICBUS + EMICBUS + EMLCBUS + GEICBUS + HYICBUS + SOICBUS + WWICBUS + ESICBUS + LOICBUS - SFINBUS From 1993 through 2000: TEICBZZ = CLICBZZ + NGICBZZ + PAICBZZ + EMLCBZZ + GEICBZZ + HYICBZZ + SOICBZZ + WWICBZZ + WYICBZZ + ESICBZZ + LOCIBZZ - SFINBZZ TEICBUS = CLICBUS + CCNIBUS + NGICBUS + PAICBUS + EMLCBUS + GEICBUS + HYICBUS + SOICBUS + WWICBUS + WYICBUS + ESICBUS + LOICBUS - SFINBUS From 2001 forward: TEICBZZ = CLICBZZ + NGICBZZ + PAICBZZ + BFLCBZZ + GEICBZZ + HYICBZZ + SOICBZZ + WWICBZZ + WYICBZZ + ESICBZZ + LOCIBZZ - SFINBZZ TEICBUS = CLICBUS + CCNIBUS + NGICBUS + PAICBUS + BFLCBUS + GEICBUS + HYICBUS + SOICBUS + WWICBUS + WYICBUS + ESICBUS + LOICBUS - SFINBUS
TEIPB	Total energy consumption per capita in the industrial sector.	Million Btu	TEIPBZZ = TEICBZZ / TPOPPZZ TEIPBUS = TEICBUS / TPOPPUS
TERCB	Total energy consumption in the residential sector.	Billion Btu	TERCBZZ = CLRCBZZ + ESRCBZZ + GERCBZZ + LORCBZZ + NGRCBZZ + PARCBZZ + SORCBZZ + WDRCBZZ - SFRCBZZ TERCBUS = CLRCBUS + ESRCBUS + GERCBUS + LORCBUS + NGRCBUS + PARCBUS + SORCBUS + WDRCBUS - SFRCBUS
TERPB	Total energy consumption per capita in the residential sector.	Million Btu	TERPBZZ = TERCBZZ / TPOPPZZ TERPBUS = TERCBUS / TPOPPUS
TETCB	Total energy consumption.	Billion Btu	TETCBZZ = ELISBZZ + ELNIBZZ + FFTCBZZ + NUETBZZ + RETCBZZ TETCBUS = ELNIBUS + FFTCBUS + NUETBUS + RETCBUS
TETGR	Total energy consumption per dollar of real gross domestic product.	Thousand Btu per chained (2012) dollars	TETGRZZ = TETCBZZ / GDPRXZZ TETGRUS = TETCBUS / GDPRXUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
TETPB	Total energy consumption per capita.	Million Btu	TETPBZZ = TETCBZZ / TPOPPZZ TETPBUS = TETCBUS / TPOPPUS
TETXB	Total end-use energy consumption.	Billion Btu	TETXBZZ = TEACBZZ + TECCBZZ + TEICBZZ + TERCBZZ TETXBUS = ΣTETXBZZ
TNACB	Total net energy consumption in the transportation sector excluding the sector's share of electrical system energy losses.	Billion Btu	TNACBZZ = TEACBZZ - LOACBZZ TNACBUS = TEACBUS - LOACBUS
TNCCB	Total net energy consumption in the commercial sector excluding the sector's share of electrical system energy losses.	Billion Btu	TNCCBZZ = TECCBZZ - LOCCBZZ TNCCBUS = TECCBUS - LOCCBUS
TNICB	Total net energy consumption in the industrial sector excluding the sector's share of electrical system energy losses.	Billion Btu	TNICBZZ = TEICBZZ - LOICBZZ TNICBUS = TEICBUS - LOICBUS
TNRCB	Total net energy consumption in the residential sector excluding the sector's share of electrical system energy losses.	Billion Btu	TNRCBZZ = TERCBZZ - LORCBZZ TNRCBUS = TERCBUS - LORCBUS
TNTXB	Total primary energy and electricity consumption in the end-use sectors.	Billion Btu	TNTXBZZ = TNACBZZ + TNCCBZZ + TNICBZZ + TNRCBZZ TNTXBUS = ΣTNTXBZZ
TPOPP	Resident population including Armed Forces.	Thousand	TPOPPZZ is independent. TPOPPUS is independent.
UOICB	Unfinished oils consumed by the industrial sector.	Billion Btu	UOICBZZ = UOTCBZZ UOICBUS = UOTCBUS
UOICP	Unfinished oils consumed by the industrial sector.	Thousand barrels	UOICPZZ = UOTCPZZ UOICPUS = UOTCPUS
UOTCB	Unfinished oils total consumption.	Billion Btu	UOTCBZZ = UOTCPZZ * 5.825 UOTCBUS = ΣUOTCBZZ
UOTCP	Unfinished oils total consumption.	Thousand barrels	UOTCPZZ = (COCAPZZ / COCAPUS) * UOTCPUS UOTCPUS is independent.
USICB	Unfractionated streams consumed by the industrial sector (through 1983).	Billion Btu	USICBZZ = USTCBZZ USICBUS = USTCBUS
USICP	Unfractionated streams consumed by the industrial sector (through 1983).	Thousand barrels	USICPZZ = USTCPZZ USICPUS = USTCPUS

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
USTCB	Unfractionated streams total consumption (through 1983).	Billion Btu	USTCBZZ = USTCPZZ * 5.418 USTCBUS = ΣUSTCBZZ
USTCP	Unfractionated streams total consumption (through 1983).	Thousand barrels	USTCPZZ = USTCPUS * FNCASZZ USTCPUS is independent.
WDC3B	Wood consumed by CHP and electricity-only facilities in the commercial sector.	Billion Btu	WDC3BZZ is independent. WDC3BUS = ΣWDC3BZZ
WDC4B	Wood energy consumed for other uses in the commercial sector.	Billion Btu	WDC4BZZ = (WDRCPZZ / WDRCPUS) * WDC4BUS WDC4BUS = WDCCBUS - WDC3BUS
WDCCB	Wood energy consumed by the commercial sector.	Billion Btu	WDCCBZZ = WDC3BZZ + WDC4BZZ WDCCBUS is independent.
WDEIB	Wood consumed by the electric power sector.	Billion Btu	WDEIBZZ is independent. WDEIBUS = ΣWDEIBZZ
WDI3B	Wood consumed by CHP and electricity-only facilities in the industrial sector.	Billion Btu	WDI3BZZ is independent. WDI3BUS = ΣWDI3BZZ
WDI4B	Wood energy consumed for other uses in the industrial sector.	Billion Btu	WDI4BZZ is independent. WDI4BUS = ΣWDI4BZZ
WDICB	Wood energy consumed by the industrial sector.	Billion Btu	WDICBZZ = WDI3BZZ + WDI4BZZ WDICBUS = ΣWDICBZZ
WDRCB	Wood energy consumed by the residential sector.	Billion Btu	Before 2015: WDRCBZZ = WDRCPZZ * 20 2015 forward: WDRCBZZ is independent. WDRCBUS = ΣWDRCBZZ for all years.
WDRCP	Wood energy consumed by the residential sector (through 2014).	Thousand cords	WDRCPZZ is independent. WDRCPUS = ΣWDRCPZZ
WDTCB	Wood energy total consumption.	Billion Btu	WDTCBZZ = WDCCBZZ + WDEIBZZ + WDICBZZ + WDRCBZZ WDTCBUS = ΣWDTCBZZ
WSC3B	Waste consumed by CHP and electricity-only facilities in the commercial sector.	Billion Btu	WSC3BZZ is independent. WSC3BUS = ΣWSC3BZZ
WSCCB	Waste energy consumed by the commercial sector.	Billion Btu	WSCCBZZ = WSC3BZZ WSCCBUS = ΣWSCCBZZ
WSEIB	Waste consumed by the electric power sector.	Billion Btu	WSEIBZZ is independent. WSEIBUS = ΣWSEIBZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
WSI3B	Waste consumed by CHP and electricity-only facilities in the industrial sector.	Billion Btu	WSI3BZZ is independent. WSI3BUS = ΣWSI3BZZ
WSI4B	Waste energy consumed for other uses in the industrial sector.	Billion Btu	WSI4BZZ is independent. WSI4BUS = ΣWSI4BZZ
WSICB	Waste energy consumed by the industrial sector.	Billion Btu	WSICBZZ = WSI3BZZ + WSI4BZZ WSICBUS = ΣWSICBZZ
WSTCB	Waste energy total consumption.	Billion Btu	WSTCBZZ = WSCCBZZ + WSEIBZZ + WSICBZZ WSTCBUS = ΣWSTCBZZ
WWCCB	Wood and waste consumed in the commercial sector.	Billion Btu	WWCCBZZ = WDCCBZZ + WSCCBZZ WWCCBUS = ΣWWCCBZZ
WWEIB	Wood and waste consumed by the electric power sector.	Billion Btu	WWEIBZZ = WDEIBZZ + WSEIBZZ WWEIBUS = ΣWWEIBZZ
WWI4B	Wood and waste consumed in manufacturing processes in the industrial sector.	Billion Btu	WWI4BZZ = WDI4BZZ + WSI4BZZ WWI4BUS = ΣWWI4BZZ
WWICB	Wood and waste consumed in the industrial sector.	Billion Btu	WWICBZZ = WDICBZZ + WSICBZZ WWICBUS = ΣWWICBZZ
WWTCB	Wood and waste total consumption.	Billion Btu	WWTCBZZ = WDTCBZZ + WSTCBZZ WWTCBUS =ΣWWTCBZZ
WWTXB	Wood and waste total end-use consumption.	Billion Btu	WWTXBZZ = WDCCBZZ + WDICBZZ + WDRCBZZ + WSCCBZZ + WSICBZZ WWTXBUS = ΣWWTXBZZ
WXICB	Waxes consumed by the industrial sector.	Billion Btu	WXICBZZ = WXTCBZZ WXICBUS = WXTCBUS
WXICP	Waxes consumed by the industrial sector.	Thousand barrels	WXICPZZ = WXTCPZZ WXICPUS = WXTCPUS
WXTCB	Waxes total consumption.	Billion Btu	WXTCBZZ = WXTCPZZ * 5.537 WXTCBUS = ΣWXTCBZZ
WXTCP	Waxes total consumption.	Thousand barrels	WXTCPZZ = (CGVAVZZ / CGVAVUS) * WXTCPUS WXTCPUS is independent.
WYC5B	Wind energy consumed at commercial CHP and electricity-only facilities.	Billion Btu	WYC5BZZ = WYC5PZZ * FFETKUS WYC5BUS = ΣWYC5BZZ

Table A1. Consumption Variables (cont.)

MSN	Description	Unit	Formula
WYC5P	Wind electricity net generation at utility-scale commercial CHP and electricity-only facilities.	Million kilowatthours	WYC5PZZ is independent. WYC5PUS = ΣWYC5PZZ
WYCCB	Wind energy consumed by the commercial sector.	Billion Btu	WYCCBZZ = WYC5BZZ WYCCBUS = ΣWYCCBZZ
WYCCP	Wind electricity net generation in the commercial sector.	Million kilowatthours	WYCCPZZ = WYC5PZZ WYCCPUS = ΣWYCCPZZ
WYEGB	Wind energy consumed for electricity generation by the electric power sector.	Billion Btu	WYEGBZZ = WYEGPZZ * FFETKUS WYEGBUS = ΣWYEGBZZ
WYEGP	Wind electricity net generation in the electric power sector.	Million kilowatthours	WYEGPZZ is independent. WYEGPUS = ΣWYEGPZZ
WYI5B	Wind energy consumed for electricity generation at industrial CHP and electricity-only facilities.	Billion Btu	WYI5BZZ = WYI5PZZ * FFETKUS WYI5BUS = ΣWYI5BZZ
WYI5P	Wind electricity net generation at utility-scale industrial CHP and electricity-only facilities.	Million kilowatthours	WYI5PZZ is independent. WYI5PUS = ΣWYI5PZZ
WYICB	Wind energy consumed by the industrial sector.	Billion Btu	WYICBZZ = WYI5BZZ WYICBUS = ΣWYICBZZ
WYICP	Wind electricity net generation in the industrial sector.	Million kilowatthours	WYICPZZ = WYI5PZZ WYICPUS = ΣWYICPZZ
WYTCB	Wind energy total consumption.	Billion Btu	WYTCBZZ = WYCCBZZ + WYEGBZZ + WYICBZZ WYTCBUS = ΣWYTCBZZ
WYTCP	Wind electricity total net generation.	Million kilowatthours	WYTCPZZ = WYCCPZZ + WYEGPZZ + WYICPZZ WYTCPUS = ΣWYTCPZZ
WYTXB	Wind energy total end-use consumption.	Billion Btu	WYTXBZZ = WYCCBZZ + WYICBZZ WYTXBUS = ΣWYTXBZZ
WYTXP	Wind energy total end-use net generation.	Million kilowatthours	WYTXPZZ = WYCCPZZ + WYICPZZ WYTXPUS = ΣWYTXPZZ

Appendix B. Thermal Conversion Factors

Table B1. Approximate Heat Content of Petroleum and Heat Rates for Electricity, Selected Years, 1960-2018

Year	Petroleum Consumption					Electricity Net Generation	
	Distillate Fuel Oil, All Sectors (DFTCKUS)	Hydrocarbon Gas Liquids, Industrial Sector (HLICKUS)	Hydrocarbon Gas Liquids, All Sectors (HLTCKUS)	Motor Gasoline, All Sectors (MGTCKUS)	Total Petroleum Products, All Sectors [a] (PATCKUS)	Fossil-Fueled Steam-Electric Plants [b] (FFETKUS)	Nuclear Steam-Electric Plants (NUETKUS)
	Million Btu per Barrel					Btu per Kilowatthour	
1960	5.825	3.783	3.810	5.253	5.542	10,760	11,629
1965	5.825	3.786	3.810	5.253	5.517	10,453	11,804
1970	5.825	3.648	3.731	5.253	5.499	10,494	10,977
1975	5.825	3.575	3.671	5.253	5.489	10,406	11,013
1976	5.825	3.533	3.645	5.253	5.499	10,373	11,047
1977	5.825	3.464	3.598	5.253	5.512	10,435	10,769
1978	5.825	3.447	3.584	5.253	5.512	10,361	10,941
1979	5.825	R 3.596	R 3.644	5.253	5.487	10,353	10,879
1980	5.825	R 3.629	3.669	5.253	5.472	10,388	10,908
1981	5.825	R 3.583	R 3.632	5.253	5.440	10,453	11,030
1982	5.825	R 3.532	3.588	5.253	5.406	10,454	11,073
1983	5.825	3.447	3.535	5.253	5.396	10,520	10,905
1984	5.825	3.527	3.580	5.253	5.385	10,440	10,843
1985	5.825	3.527	3.584	5.253	5.377	10,447	10,622
1986	5.825	3.582	3.631	5.253	5.410	10,446	10,579
1987	5.825	3.622	3.663	5.253	5.395	10,419	10,442
1988	5.825	3.598	3.643	5.253	5.402	10,324	10,602
1989	5.825	3.637	3.679	5.253	5.403	10,432	10,583
1990	5.825	3.578	3.630	5.253	5.403	10,402	10,582
1991	5.825	3.575	3.626	5.253	5.375	10,436	10,484
1992	5.825	3.599	3.643	5.253	5.369	10,342	10,471
1993	5.825	3.577	3.628	5.217	5.354	10,309	10,504
1994	5.820	3.616	3.657	5.214	5.345	10,316	10,452
1995	5.820	3.598	3.641	5.204	5.327	10,312	10,507
1996	5.820	3.578	3.629	5.211	5.324	10,340	10,503
1997	5.820	3.577	3.627	5.205	5.322	10,213	10,494
1998	5.819	3.568	3.619	5.203	5.335	10,197	10,491
1999	5.819	3.574	3.628	5.202	5.313	10,226	10,450
2000	5.819	3.549	3.610	5.201	5.311	10,201	10,429
2001	5.819	3.537	3.604	5.201	5.331	10,333	10,443
2002	5.819	3.519	3.588	5.199	5.309	10,173	10,442
2003	5.819	3.539	3.610	5.197	5.326	10,125	10,422
2004	5.818	3.523	3.591	5.196	5.330	10,016	10,428
2005	5.818	3.517	3.589	5.192	5.342	9,999	10,436
2006	5.803	3.479	3.551	5.185	5.323	9,919	10,435
2007	5.784	3.468	3.544	5.142	5.293	9,884	10,489
2008	5.780	3.446	3.549	5.106	5.268	9,854	10,452
2009	5.777	3.375	3.487	R 5.090	5.218	9,760	10,459
2010	5.775	3.394	3.489	5.067	5.204	9,756	10,452
2011	5.770	3.313	3.421	5.063	5.194	9,716	10,464
2012	5.767	3.360	3.440	5.062	5.175	9,516	10,479
2013	5.763	3.388	3.468	5.060	5.157	9,541	10,449
2014	5.763	3.344	3.439	5.059	5.161	9,510	10,459
2015	5.762	3.385	3.462	5.057	5.154	9,319	10,458
2016	5.757	3.341	3.423	5.055	R 5.162	9,232	10,459
2017	5.757	3.317	3.401	5.053	R 5.152	9,213	10,459
2018	5.759	3.290	3.380	5.054	5.123	9,104	10,455

[a] This factor is not actually applied in SEDS but is displayed here for information.
[b] This factor is the average for electricity generated at U.S. fossil-fueled steam-electric plants. In SEDS, it is applied to convert hydroelectricity, electricity generated for distribution from geothermal, solar, and wind energy. Through 2000, it is also used as the thermal conversion factor for wood and waste electricity net generation at electric utilities; beginning in 2001, Btu data for wood and biomass waste consumed by the electric power sector are available from surveys.

Where shown, R = Revised data, NA = Not available.
Sources: See source listing at the end of this appendix.

Table B2. Approximate Heat Content of Natural Gas Consumed by the Electric Power Sector, Selected Years, 1960-2005

(Thousand Btu per Cubic Foot)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	1.035	1.034	1.031	1.033	1.133	1.099	1.029	1.023	1.027	1.040	1.025	1.027	1.025	1.027
Alaska	--	1.010	1.005	1.006	1.006	1.006	1.027	1.003	1.003	1.004	1.009	1.004	1.007	1.006
Arizona	1.035	1.076	1.059	1.071	1.057	1.059	1.031	1.021	1.016	1.023	1.018	1.008	1.020	1.024
Arkansas	1.035	1.001	1.004	1.011	1.026	1.055	1.018	1.019	1.020	1.037	1.016	1.032	1.030	1.029
California	1.035	1.073	1.054	1.063	1.052	1.051	1.032	1.028	1.020	1.027	1.022	1.023	1.029	1.029
Colorado	1.035	0.912	0.974	0.996	0.981	0.989	1.041	1.063	1.056	1.047	1.017	1.034	1.041	1.035
Connecticut	1.035	1.022	1.016	1.005	--	1.031	1.031	1.021	1.012	1.014	1.021	1.008	1.015	1.011
Delaware	1.035	1.043	1.020	1.073	1.042	1.038	1.070	1.032	1.017	1.037	1.017	1.043	1.032	1.037
District of Columbia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Florida	1.035	1.037	1.041	1.009	1.015	1.011	1.013	1.014	1.036	1.042	1.025	1.034	1.031	1.034
Georgia	1.035	1.040	1.031	1.029	1.035	1.024	1.024	1.027	1.016	1.019	1.022	1.024	1.030	1.046
Hawaii	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Idaho	--	--	--	1.053	1.037	1.049	--	--	1.040	1.029	0.979	1.002	1.028	1.021
Illinois	1.035	1.029	1.025	1.029	1.024	1.027	1.023	1.017	1.020	1.022	1.012	1.015	1.025	1.020
Indiana	1.035	0.999	1.006	1.000	1.004	1.005	1.003	1.020	1.017	1.020	1.026	1.021	1.015	1.018
Iowa	1.035	1.010	1.009	1.008	1.008	1.021	1.014	1.009	1.009	1.014	1.007	1.011	0.999	1.003
Kansas	1.035	0.995	0.998	0.991	0.960	0.968	0.998	0.989	1.011	1.010	1.001	1.003	1.005	1.009
Kentucky	1.035	1.028	1.017	1.017	1.024	1.024	1.023	1.020	1.020	1.025	1.024	1.023	1.026	1.032
Louisiana	1.035	1.042	1.029	1.059	1.041	1.047	1.045	1.042	1.034	1.041	1.027	1.032	1.029	1.030
Maine	--	--	--	--	--	--	1.010	1.009	1.021	1.034	1.038	1.037	1.039	1.052
Maryland	1.035	1.025	1.022	0.943	1.023	1.025	1.034	1.035	1.041	1.033	1.043	1.038	1.040	1.049
Massachusetts	1.035	1.013	1.012	1.002	1.000	1.039	1.047	1.026	1.035	1.037	1.017	1.028	1.032	1.033
Michigan	1.035	1.014	1.015	0.834	0.737	0.460	0.813	0.855	0.934	0.990	1.008	1.013	1.017	1.016
Minnesota	1.035	0.998	1.002	0.984	0.994	1.002	1.015	1.011	1.018	1.022	1.005	1.004	1.006	1.009
Mississippi	1.035	1.029	1.025	1.030	1.017	1.039	1.034	1.034	1.028	1.029	1.025	1.033	1.032	1.032
Missouri	1.035	1.020	1.007	0.977	0.979	0.992	1.018	1.008	1.014	1.099	1.009	1.016	1.022	1.021
Montana	1.035	1.001	1.032	1.149	1.049	1.204	1.159	1.038	1.018	1.015	1.004	0.961	1.018	1.013
Nebraska	1.035	0.991	1.008	0.982	0.950	0.957	0.959	1.007	1.015	1.022	0.976	0.997	0.987	0.998
Nevada	1.035	1.062	1.082	1.067	1.071	1.065	1.031	1.033	1.024	1.026	1.020	1.024	1.030	1.037
New Hampshire	--	--	--	1.000	--	--	--	1.018	1.069	1.074	1.047	1.046	1.046	1.044
New Jersey	1.035	1.045	1.026	1.028	1.034	1.046	1.036	1.032	1.032	1.032	1.031	1.035	1.038	1.035
New Mexico	1.035	1.108	1.083	1.033	1.029	1.013	1.034	1.019	0.992	0.982	1.002	1.000	1.021	1.005
New York	1.035	1.026	1.021	1.025	1.036	1.035	1.032	1.022	1.018	1.019	1.019	1.025	1.022	1.021
North Carolina	1.035	1.033	1.024	1.031	1.034	1.033	1.027	1.026	1.017	1.024	1.010	1.007	1.009	1.014
North Dakota	1.035	1.000	1.031	1.054	1.054	1.054	1.038	1.066	--	1.028	1.010	1.025	1.050	1.116
Ohio	1.035	1.033	1.023	0.864	1.004	1.014	1.011	1.023	1.019	1.019	1.024	1.034	1.029	1.029
Oklahoma	1.035	1.026	1.032	1.038	1.048	1.044	1.042	1.034	1.029	1.031	1.025	1.029	1.031	1.030
Oregon	1.035	1.070	1.045	1.037	0.998	--	1.027	1.011	1.018	1.021	1.017	1.021	1.020	1.020
Pennsylvania	1.035	1.038	1.033	1.000	1.020	1.000	0.935	1.030	1.034	1.033	1.028	1.039	1.037	1.036
Rhode Island	1.035	1.042	1.021	1.042	1.022	1.034	1.032	1.021	1.031	1.032	1.018	1.022	1.021	1.021
South Carolina	1.035	1.042	1.028	1.028	1.030	1.029	1.024	1.023	1.038	1.037	1.028	1.028	1.034	1.035
South Dakota	1.035	0.997	1.004	1.000	0.988	1.010	1.028	1.017	1.020	1.027	0.980	0.960	0.983	1.009
Tennessee	1.035	1.046	1.022	--	1.016	--	1.027	1.019	1.033	1.040	1.023	1.032	1.026	1.023
Texas	1.035	1.037	1.027	1.019	1.037	1.036	1.035	1.025	1.021	1.030	1.019	1.021	1.023	1.028
Utah	1.035	0.925	0.938	0.941	0.955	1.075	1.027	1.049	1.044	1.046	1.005	1.004	1.000	1.044
Vermont	--	--	--	1.000	1.000	1.000	1.027	1.001	1.012	1.012	1.018	1.019	1.020	0.890
Virginia	1.035	1.031	1.026	1.098	1.104	1.040	1.030	1.032	1.037	1.030	1.024	1.028	1.027	1.032
Washington	--	--	--	--	1.030	1.033	1.029	1.028	1.025	1.028	1.026	1.021	1.024	1.023
West Virginia	1.035	1.071	1.029	0.575	1.000	1.000	1.000	1.028	1.006	1.026	1.036	1.057	1.060	1.039
Wisconsin	1.035	1.018	1.019	1.016	1.007	1.000	1.016	1.015	1.012	1.016	0.975	0.986	0.998	1.010
Wyoming	1.035	0.926	1.023	0.843	0.847	1.048	1.035	1.043	1.027	1.031	0.923	0.935	0.946	0.925
U.S. Average	1.035	1.038	1.029	1.023	1.033	1.037	1.027	1.021	1.021	1.029	1.021	1.024	1.027	1.028

-- = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B3. Approximate Heat Content of Natural Gas Consumed by the Electric Power Sector, 2006-2018

(Thousand Btu per Cubic Foot)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	1.029	1.033	1.028	1.025	1.020	1.019	1.016	1.018	1.026	1.032	1.031	1.031	1.029
Alaska	1.007	1.007	1.006	1.006	1.006	1.015	1.013	1.002	1.001	1.001	1.000	1.002	0.999
Arizona	1.021	1.022	1.027	1.022	1.016	1.016	1.021	1.024	1.029	1.038	1.035	1.039	1.041
Arkansas	1.028	1.026	1.032	1.025	1.020	1.020	1.021	1.025	1.033	1.032	1.027	1.025	1.021
California	1.032	1.031	1.029	1.027	1.026	1.022	1.025	1.029	1.033	1.035	1.034	1.034	1.032
Colorado	1.039	1.038	1.037	1.034	1.028	1.036	1.044	1.050	1.054	1.077	1.083	1.084	1.100
Connecticut	1.010	1.012	1.013	1.012	1.017	1.024	1.031	1.029	1.026	1.027	1.026	1.027	1.028
Delaware	1.037	1.036	1.034	1.024	1.021	1.021	1.026	1.052	1.057	1.047	1.040	1.035	1.036
District of Columbia	--	--	--	--	--	1.020	--	--	--	--	1.000	--	--
Florida	1.028	1.028	1.029	1.024	1.018	1.015	1.014	1.016	1.021	1.024	1.022	1.023	1.022
Georgia	1.040	1.040	1.035	1.035	1.023	1.017	1.015	1.017	1.024	1.030	1.032	1.032	1.029
Hawaii	--	--	--	--	--	--	--	--	--	--	--	--	--
Idaho	1.027	1.025	1.016	1.014	1.017	1.011	1.012	1.011	1.014	1.013	1.014	1.020	1.023
Illinois	1.022	1.023	1.019	1.019	1.015	1.018	1.012	1.014	1.014	1.018	1.021	1.023	1.027
Indiana	1.015	1.014	1.014	1.013	1.008	1.011	1.011	1.019	1.030	1.044	1.045	1.054	1.051
Iowa	1.004	1.008	1.010	1.008	1.010	1.011	1.022	1.024	1.047	1.058	1.057	1.062	1.079
Kansas	1.015	1.020	1.016	1.014	1.017	1.018	1.020	1.019	1.020	1.043	1.037	1.033	1.033
Kentucky	1.028	1.027	1.025	1.024	1.022	1.018	1.022	1.030	1.032	1.025	1.033	1.046	1.045
Louisiana	1.037	1.033	1.032	1.030	1.023	1.022	1.018	1.021	1.031	1.029	1.031	1.028	1.027
Maine	1.056	1.058	1.058	1.049	1.049	1.053	1.036	1.022	1.023	1.020	1.021	1.017	1.051
Maryland	1.047	1.045	1.032	1.048	1.034	1.021	1.034	1.057	1.048	1.052	1.051	1.046	1.037
Massachusetts	1.032	1.037	1.034	1.034	1.037	1.039	1.036	1.036	1.030	1.028	1.030	1.030	1.032
Michigan	1.011	1.015	1.015	1.016	1.014	1.015	1.017	1.021	1.022	1.027	1.036	1.035	1.046
Minnesota	1.007	1.008	1.013	1.011	1.010	1.009	1.019	1.026	1.041	1.052	1.049	1.052	1.070
Mississippi	1.032	1.031	1.024	1.016	1.009	1.005	1.010	1.017	1.028	1.032	1.033	1.030	1.026
Missouri	1.025	1.023	1.018	1.018	1.017	1.022	1.027	1.028	1.027	1.031	1.028	1.030	1.032
Montana	1.011	1.045	1.021	1.019	1.019	1.016	1.025	1.022	1.020	1.023	1.034	1.035	1.042
Nebraska	1.005	1.016	1.006	0.998	1.003	1.009	1.022	1.026	1.036	1.061	1.066	1.065	1.060
Nevada	1.029	1.030	1.042	1.032	1.031	1.024	1.026	1.034	1.034	1.043	1.041	1.039	1.037
New Hampshire	1.043	1.055	1.049	1.036	1.040	1.041	1.032	1.030	1.031	1.030	1.028	1.029	1.030
New Jersey	1.035	1.035	1.032	1.029	1.026	1.026	1.031	1.036	1.036	1.041	1.037	1.035	1.035
New Mexico	1.008	1.018	1.017	1.028	1.022	1.022	1.027	1.029	1.033	1.037	1.050	1.044	1.038
New York	1.019	1.021	1.020	1.020	1.019	1.022	1.029	1.030	1.029	1.031	1.030	1.031	1.030
North Carolina	1.013	1.013	1.011	1.007	1.007	1.005	1.006	1.007	1.016	1.035	1.035	1.036	1.029
North Dakota	1.080	1.082	1.077	1.039	1.178	1.107	1.127	1.112	1.109	1.077	1.045	1.043	1.066
Ohio	1.031	1.032	1.034	1.033	1.029	1.028	1.025	1.035	1.041	1.060	1.059	1.059	1.057
Oklahoma	1.030	1.029	1.033	1.033	1.034	1.036	1.027	1.037	1.041	1.048	1.050	1.041	1.031
Oregon	1.025	1.033	1.021	1.022	1.024	1.018	1.021	1.026	1.030	1.043	1.044	1.051	1.053
Pennsylvania	1.034	1.030	1.034	1.029	1.027	1.028	1.033	1.043	1.042	1.042	1.038	1.035	1.036
Rhode Island	1.017	1.026	1.020	1.022	1.013	1.018	1.031	1.033	1.027	1.028	1.027	1.028	1.028
South Carolina	1.049	1.038	1.036	1.038	1.031	1.032	1.027	1.023	1.025	1.030	1.028	1.030	1.026
South Dakota	1.005	1.010	1.006	0.994	1.007	1.001	1.025	1.030	1.040	1.056	1.060	1.061	1.079
Tennessee	1.028	1.026	1.028	1.029	1.020	1.005	1.010	1.019	1.020	1.006	1.006	1.003	1.000
Texas	1.026	1.023	1.023	1.020	1.020	1.020	1.022	1.023	1.026	1.032	1.030	1.030	1.028
Utah	1.050	1.041	1.049	1.035	1.038	1.032	1.034	1.032	1.028	1.036	1.033	1.036	1.033
Vermont	1.016	1.018	1.000	1.005	1.007	1.008	1.020	1.015	1.016	1.037	1.020	1.038	1.030
Virginia	1.029	1.030	1.040	1.038	1.032	1.028	1.033	1.035	1.040	1.056	1.055	1.051	1.048
Washington	1.026	1.024	1.030	1.030	1.030	1.028	1.021	1.022	1.043	1.068	1.076	1.080	1.088
West Virginia	1.046	1.040	1.043	1.050	1.047	1.036	1.039	1.042	1.041	1.068	1.072	1.075	1.075
Wisconsin	1.012	1.017	1.014	1.015	1.010	1.012	1.016	1.018	1.022	1.025	1.018	1.017	1.018
Wyoming	0.991	0.977	0.976	0.987	0.990	0.983	0.977	0.966	1.004	1.041	1.047	1.049	1.050
U.S. Average	1.028	1.027	1.027	1.025	1.022	1.021	1.022	1.025	1.029	1.035	1.034	1.034	1.033

-- = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B4. Approximate Heat Content of Natural Gas Consumed by All Sectors Except Electric Power, Selected Years, 1960-2005

(Thousand Btu per Cubic Foot)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	1.035	1.034	1.031	1.029	1.033	1.038	1.029	1.029	1.044	1.032	1.029	1.030	1.025	1.030
Alaska	1.035	1.010	1.005	1.005	1.002	1.006	0.946	1.006	1.027	1.011	1.004	1.004	1.004	1.004
Arizona	1.035	1.076	1.059	1.050	1.046	1.046	1.032	1.038	1.010	1.006	1.017	1.013	1.017	1.023
Arkansas	1.035	1.001	1.004	0.995	0.994	1.017	1.008	1.084	1.019	1.013	1.024	1.031	1.009	1.010
California	1.035	1.073	1.054	1.056	1.044	1.038	1.032	1.011	0.956	1.015	1.019	1.020	1.020	1.023
Colorado	1.035	0.912	0.974	0.896	0.995	0.999	1.003	1.014	0.998	1.005	1.007	1.010	1.006	1.028
Connecticut	1.035	1.022	1.016	1.005	1.022	1.030	1.033	1.030	1.028	1.023	1.024	1.026	1.024	1.025
Delaware	1.035	1.043	1.020	1.015	1.033	1.022	1.009	1.036	1.041	1.033	1.037	1.038	1.036	1.037
District of Columbia	1.035	1.024	1.016	1.012	1.003	1.015	1.008	1.006	1.027	1.026	1.024	1.027	1.027	1.052
Florida	1.035	1.037	1.041	1.078	1.070	1.109	1.084	1.070	1.108	1.065	1.036	1.042	1.036	1.038
Georgia	1.035	1.040	1.031	1.027	1.032	1.028	1.027	1.026	1.018	1.035	1.026	1.029	1.029	1.035
Hawaii	--	--	--	--	0.963	1.082	1.070	1.048	1.047	1.036	1.060	1.047	1.048	1.037
Idaho	1.035	1.065	1.061	1.055	1.053	1.049	1.028	1.030	1.025	1.018	1.030	1.031	1.041	1.053
Illinois	1.035	1.029	1.025	1.026	1.022	1.040	1.022	1.020	1.022	1.020	1.013	1.015	1.014	1.015
Indiana	1.035	0.999	1.006	0.990	0.989	1.008	1.018	1.012	1.025	1.024	1.007	1.091	1.009	1.018
Iowa	1.035	1.010	1.009	1.008	1.003	1.011	1.007	1.005	1.005	1.004	1.003	1.003	1.003	1.006
Kansas	1.035	0.995	0.998	0.982	0.994	1.000	0.999	1.003	1.008	1.005	1.009	1.012	1.013	1.014
Kentucky	1.035	1.028	1.017	1.008	1.009	1.030	1.040	1.096	1.040	1.037	1.037	1.037	1.035	1.029
Louisiana	1.035	1.042	1.029	1.032	1.037	1.038	1.041	1.033	1.064	1.024	1.032	1.032	1.033	1.044
Maine	--	--	1.012	1.024	1.024	1.035	1.005	1.016	1.153	1.177	1.042	1.046	1.042	1.047
Maryland	1.035	1.025	1.022	1.013	1.020	1.034	1.027	1.025	1.033	1.037	1.036	1.038	1.037	1.048
Massachusetts	1.035	1.013	1.012	1.004	1.016	1.024	1.035	1.026	1.044	1.045	1.035	1.028	1.028	1.015
Michigan	1.035	1.014	1.015	1.024	1.020	1.023	1.044	1.040	1.036	1.031	1.021	1.030	1.025	1.015
Minnesota	1.035	0.998	1.002	1.002	0.997	1.004	1.004	1.013	1.015	1.012	1.007	1.008	1.007	1.012
Mississippi	1.035	1.029	1.025	1.022	1.034	1.025	1.033	1.021	1.043	1.022	1.036	1.036	1.029	1.029
Missouri	1.035	1.020	1.007	1.008	1.016	1.017	1.011	1.007	1.015	1.006	1.012	1.014	1.020	1.020
Montana	1.035	1.001	1.032	1.019	1.009	0.999	1.027	1.030	1.024	1.022	1.021	1.023	1.026	1.040
Nebraska	1.035	0.991	1.008	0.997	0.980	0.982	0.984	0.979	1.005	1.017	1.008	1.007	1.010	1.010
Nevada	1.035	1.062	1.082	1.067	1.052	1.061	1.031	1.033	1.030	1.023	1.033	1.035	1.032	1.044
New Hampshire	1.035	1.012	1.010	1.010	1.020	1.027	1.014	1.010	1.058	1.062	1.050	1.040	1.043	1.020
New Jersey	1.035	1.045	1.026	1.031	1.033	1.022	1.024	1.035	1.036	1.038	1.039	1.039	1.039	1.040
New Mexico	1.035	1.108	1.083	1.076	1.048	1.088	1.056	1.020	0.968	0.973	0.972	1.023	1.026	1.025
New York	1.035	1.026	1.021	1.015	1.023	1.027	1.029	1.031	1.032	1.033	1.025	1.028	1.027	1.026
North Carolina	1.035	1.033	1.024	1.018	1.012	1.034	1.032	1.033	1.031	1.042	1.037	1.042	1.036	1.037
North Dakota	1.035	1.000	1.031	1.001	1.052	1.062	1.032	1.050	1.035	1.029	1.003	1.009	1.021	1.036
Ohio	1.035	1.033	1.023	1.024	1.016	1.044	1.040	1.038	1.042	1.042	1.038	1.036	1.045	1.043
Oklahoma	1.035	1.026	1.032	0.996	1.002	1.020	1.021	1.015	1.008	1.027	1.030	1.030	1.031	1.030
Oregon	1.035	1.070	1.045	1.039	1.046	1.030	1.023	1.045	1.031	1.029	1.025	1.007	1.009	1.036
Pennsylvania	1.035	1.038	1.033	1.025	1.022	1.034	1.039	1.035	1.035	1.055	1.038	1.040	1.039	1.041
Rhode Island	1.035	1.042	1.021	1.014	1.021	1.033	1.027	1.029	1.047	1.029	1.030	1.026	1.027	1.021
South Carolina	1.035	1.042	1.028	1.023	1.033	1.028	1.028	1.027	1.029	1.038	1.033	1.037	1.035	1.038
South Dakota	1.035	0.997	1.004	1.000	0.998	1.010	1.016	1.014	1.003	0.995	1.000	1.003	1.003	1.007
Tennessee	1.035	1.046	1.022	1.031	1.016	1.034	1.035	1.031	1.037	1.037	1.032	1.033	1.033	1.035
Texas	1.035	1.037	1.027	1.030	1.031	1.039	1.042	1.042	1.033	1.024	1.033	1.029	1.031	1.028
Utah	1.035	0.925	0.938	0.950	1.092	1.075	1.088	1.064	1.051	1.053	1.060	1.067	1.056	1.054
Vermont	--	--	1.006	1.009	0.989	0.992	0.982	0.996	1.012	1.012	1.004	1.006	1.004	1.004
Virginia	1.035	1.031	1.026	1.019	1.015	1.039	1.043	1.031	1.035	1.038	1.036	1.037	1.031	1.042
Washington	1.035	1.075	1.055	1.042	1.052	1.040	1.030	1.042	1.042	1.035	1.030	1.026	1.028	1.030
West Virginia	1.035	1.071	1.029	1.038	1.032	1.067	1.071	1.061	1.068	1.068	1.062	1.066	1.058	1.068
Wisconsin	1.035	1.018	1.019	1.020	1.008	1.010	1.006	1.011	1.010	1.009	1.009	1.009	1.008	1.013
Wyoming	1.035	0.926	1.023	0.935	1.061	1.051	1.099	1.063	1.046	1.056	1.044	1.046	1.045	1.043
U.S. Average	1.035	1.032	1.025	1.022	1.024	1.032	1.031	1.030	1.026	1.026	1.025	1.029	1.026	1.028

-- = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B5. Approximate Heat Content of Natural Gas Consumed by All Sectors Except Electric Power, 2006-2018

(Thousand Btu per Cubic Foot)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	1.027	1.026	1.023	1.027	1.016	1.016	1.016	1.016	1.021	1.028	1.026	1.028	1.027
Alaska	1.005	1.006	1.006	1.005	1.005	1.013	1.012	1.001	1.001	1.001	1.001	0.988	0.973
Arizona	1.019	1.026	1.026	1.018	1.017	1.013	1.021	1.026	1.032	1.044	1.042	1.046	1.040
Arkansas	1.031	1.009	1.009	1.012	1.007	1.015	1.010	1.019	1.011	1.013	1.012	1.015	1.014
California	1.023	1.029	1.028	1.027	1.022	1.019	1.020	1.026	1.028	1.037	1.035	1.036	1.034
Colorado	1.030	1.028	1.015	1.015	1.017	1.031	1.038	1.034	1.045	1.056	1.057	1.060	1.070
Connecticut	1.026	1.024	1.020	1.023	1.025	1.028	1.031	1.020	1.028	1.027	1.028	1.029	1.030
Delaware	1.037	1.038	1.033	1.032	1.025	1.029	1.028	1.047	1.055	1.053	1.052	1.048	1.044
District of Columbia	1.025	1.027	1.028	1.035	1.014	1.016	1.029	1.030	1.043	1.044	1.044	1.039	1.036
Florida	1.032	1.036	1.032	1.031	1.024	1.015	1.019	1.018	1.030	1.025	1.027	1.033	1.028
Georgia	1.030	1.029	1.023	1.023	1.022	1.018	1.015	1.015	1.017	1.023	1.028	1.028	1.027
Hawaii	1.047	1.037	1.043	1.040	1.040	1.048	1.046	1.006	0.959	0.982	0.981	0.975	0.962
Idaho	1.047	1.024	1.024	1.023	1.022	1.018	1.016	1.025	1.018	1.036	1.045	1.046	1.041
Illinois	1.016	1.014	1.014	1.013	1.008	1.011	1.011	1.016	1.023	1.030	1.033	1.030	1.029
Indiana	1.017	1.023	1.013	1.015	1.012	1.012	1.012	1.014	1.018	1.023	1.036	1.040	1.046
Iowa	1.013	1.010	1.010	1.007	1.006	1.009	1.014	1.029	1.040	1.053	1.056	1.055	1.059
Kansas	1.019	1.018	1.036	1.020	1.019	1.020	1.022	1.018	1.024	1.035	1.034	1.034	1.039
Kentucky	1.029	1.027	1.035	1.037	1.031	1.028	1.031	1.025	1.026	1.021	1.029	1.046	1.051
Louisiana	1.038	1.034	1.036	1.029	1.024	1.018	1.014	1.017	1.026	1.024	1.022	1.021	1.021
Maine	1.054	1.071	1.067	1.043	1.039	1.042	1.029	1.031	1.033	1.031	1.030	1.036	1.037
Maryland	1.037	1.037	1.035	1.036	1.026	1.028	1.038	1.043	1.054	1.056	1.051	1.047	1.044
Massachusetts	1.010	1.016	1.013	1.031	1.034	1.029	1.034	1.033	1.024	1.029	1.030	1.030	1.031
Michigan	1.018	1.022	1.024	1.022	1.016	1.014	1.017	1.021	1.019	1.033	1.043	1.046	1.047
Minnesota	1.017	1.020	1.024	1.030	1.010	1.010	1.019	1.023	1.032	1.038	1.035	1.031	1.046
Mississippi	1.024	1.029	1.027	1.022	1.020	1.017	1.016	1.013	1.028	1.026	1.027	1.035	1.026
Missouri	1.020	1.019	1.006	1.006	1.005	1.008	1.008	1.014	1.013	1.009	1.023	1.006	1.022
Montana	1.017	1.017	1.016	1.011	1.012	1.016	1.025	1.034	1.025	1.033	1.034	1.041	1.043
Nebraska	1.012	1.018	1.011	1.012	1.004	1.011	1.019	1.036	1.042	1.057	1.059	1.061	1.060
Nevada	1.037	1.036	1.033	1.030	1.037	1.024	1.036	1.035	1.033	1.040	1.041	1.040	1.036
New Hampshire	1.019	1.025	1.020	1.034	1.032	1.037	1.032	1.030	1.031	1.030	1.030	1.031	1.032
New Jersey	1.036	1.035	1.033	1.029	1.026	1.026	1.028	1.048	1.045	1.048	1.044	1.041	1.040
New Mexico	1.021	1.026	1.028	1.028	1.021	1.022	1.023	1.030	1.034	1.038	1.044	1.041	1.035
New York	1.022	1.024	1.022	1.022	1.023	1.027	1.032	1.035	1.033	1.033	1.032	1.033	1.033
North Carolina	1.035	1.033	1.030	1.026	1.018	1.014	1.014	1.014	1.025	1.035	1.035	1.036	1.029
North Dakota	1.044	1.046	1.042	1.055	1.055	1.073	1.065	1.069	1.086	1.087	1.088	1.083	1.081
Ohio	1.039	1.037	1.040	1.041	1.034	1.031	1.034	1.037	1.060	1.070	1.075	1.073	1.067
Oklahoma	1.033	1.029	1.035	1.033	1.031	1.029	1.032	1.035	1.038	1.046	1.048	1.043	1.033
Oregon	1.036	1.033	1.025	1.026	1.008	1.022	1.022	1.009	1.028	1.053	1.071	1.070	1.068
Pennsylvania	1.039	1.039	1.039	1.040	1.037	1.040	1.044	1.050	1.051	1.048	1.043	1.043	1.039
Rhode Island	1.017	1.027	1.024	1.024	1.023	1.024	1.030	1.031	1.029	1.028	1.031	1.031	1.030
South Carolina	1.038	1.036	1.033	1.031	1.023	1.021	1.020	1.018	1.023	1.030	1.032	1.032	1.026
South Dakota	1.003	1.002	1.003	1.002	1.005	1.005	1.018	1.031	1.041	1.054	1.056	1.055	1.067
Tennessee	1.038	1.038	1.037	1.028	1.023	1.015	1.015	1.019	1.028	1.036	1.039	1.040	1.041
Texas	1.026	1.026	1.027	1.025	1.033	1.028	1.029	1.025	1.034	1.035	1.030	1.028	1.028
Utah	1.057	1.056	1.062	1.047	1.047	1.039	1.045	1.050	1.045	1.047	1.045	1.043	1.042
Vermont	1.001	1.001	1.005	1.005	1.007	1.008	1.012	1.015	1.017	1.025	1.024	1.030	1.034
Virginia	1.035	1.037	1.037	1.035	1.026	1.026	1.035	1.037	1.050	1.048	1.050	1.055	1.058
Washington	1.030	1.025	1.030	1.030	1.033	1.029	1.029	1.033	1.044	1.064	1.079	1.080	1.087
West Virginia	1.119	1.075	1.074	1.082	1.076	1.084	1.081	1.077	1.092	1.099	1.099	R 1.084	1.092
Wisconsin	1.011	1.014	1.014	1.014	1.010	1.014	1.020	1.027	1.037	1.047	1.046	1.040	1.048
Wyoming	1.041	1.037	1.031	1.031	1.031	1.034	1.034	1.042	1.040	1.060	1.074	1.060	1.064
U.S. Average	1.027	1.027	1.027	1.025	1.023	1.022	1.024	1.027	1.033	1.038	1.038	1.038	1.038

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B6. Approximate Heat Content of Natural Gas Total Consumption, Selected Years, 1960-2005

(Thousand Btu per Cubic Foot)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	1.035	1.034	1.031	1.029	1.034	1.038	1.029	1.029	1.042	1.034	1.028	1.029	1.025	1.029
Alaska	1.035	1.010	1.005	1.005	1.003	1.006	0.954	1.006	1.025	1.010	1.004	1.004	1.004	1.004
Arizona	1.035	1.076	1.059	1.052	1.049	1.050	1.032	1.035	1.013	1.015	1.018	1.010	1.019	1.024
Arkansas	1.035	1.001	1.004	0.997	1.001	1.019	1.009	1.076	1.019	1.016	1.023	1.031	1.013	1.014
California	1.035	1.073	1.054	1.057	1.046	1.043	1.032	1.016	0.979	1.020	1.020	1.021	1.023	1.025
Colorado	1.035	0.912	0.974	0.913	0.993	0.999	1.005	1.018	1.008	1.013	1.009	1.014	1.013	1.029
Connecticut	1.035	1.022	1.016	1.005	1.022	1.030	1.033	1.028	1.025	1.021	1.023	1.021	1.021	1.020
Delaware	1.035	1.043	1.020	1.020	1.035	1.025	1.026	1.034	1.037	1.034	1.030	1.039	1.035	1.037
District of Columbia	1.035	1.024	1.016	1.012	1.003	1.015	1.008	1.006	1.027	1.026	1.024	1.027	1.027	1.052
Florida	1.035	1.037	1.041	1.043	1.041	1.053	1.043	1.033	1.060	1.049	1.028	1.036	1.032	1.035
Georgia	1.035	1.040	1.031	1.027	1.032	1.028	1.027	1.026	1.018	1.033	1.025	1.029	1.029	1.037
Hawaii	1.035	– –	0.962	0.947	0.963	1.082	1.070	1.048	1.047	1.036	1.060	1.047	1.048	1.037
Idaho	1.035	1.065	1.061	1.055	1.053	1.049	1.028	1.030	1.025	1.019	1.028	1.027	1.039	1.048
Illinois	1.035	1.029	1.025	1.026	1.022	1.040	1.022	1.020	1.022	1.020	1.013	1.015	1.014	1.015
Indiana	1.035	0.999	1.006	0.990	0.989	1.008	1.018	1.012	1.025	1.024	1.008	1.087	1.009	1.018
Iowa	1.035	1.010	1.009	1.008	1.003	1.011	1.007	1.005	1.005	1.004	1.003	1.003	1.003	1.006
Kansas	1.035	0.995	0.998	0.984	0.987	0.998	0.999	1.002	1.008	1.005	1.008	1.012	1.013	1.014
Kentucky	1.035	1.028	1.017	1.008	1.009	1.030	1.040	1.096	1.040	1.037	1.036	1.037	1.035	1.029
Louisiana	1.035	1.042	1.029	1.037	1.038	1.040	1.042	1.035	1.058	1.027	1.031	1.032	1.032	1.041
Maine	1.035	– –	1.012	1.024	1.024	1.035	1.005	1.016	1.073	1.057	1.039	1.038	1.040	1.051
Maryland	1.035	1.025	1.022	1.013	1.020	1.034	1.028	1.026	1.034	1.037	1.037	1.038	1.037	1.048
Massachusetts	1.035	1.013	1.012	1.004	1.016	1.027	1.038	1.026	1.042	1.043	1.029	1.028	1.030	1.022
Michigan	1.035	1.014	1.015	1.012	1.011	1.015	1.022	1.017	1.022	1.025	1.019	1.028	1.024	1.015
Minnesota	1.035	0.998	1.002	1.001	0.997	1.004	1.004	1.013	1.015	1.012	1.007	1.008	1.007	1.012
Mississippi	1.035	1.029	1.025	1.023	1.028	1.028	1.033	1.026	1.038	1.025	1.031	1.035	1.030	1.030
Missouri	1.035	1.020	1.007	1.006	1.014	1.017	1.011	1.007	1.015	1.017	1.012	1.014	1.020	1.020
Montana	1.035	1.001	1.032	1.021	1.012	1.001	1.028	1.030	1.024	1.022	1.021	1.023	1.026	1.040
Nebraska	1.035	0.991	1.008	0.994	0.978	0.982	0.983	0.980	1.005	1.017	1.007	1.007	1.009	1.009
Nevada	1.035	1.062	1.082	1.067	1.061	1.062	1.031	1.033	1.026	1.025	1.025	1.028	1.031	1.039
New Hampshire	1.035	1.012	1.010	1.010	1.020	1.027	1.014	1.011	1.058	1.062	1.050	1.043	1.045	1.036
New Jersey	1.035	1.045	1.026	1.031	1.033	1.026	1.026	1.034	1.035	1.037	1.037	1.038	1.039	1.039
New Mexico	1.035	1.108	1.083	1.064	1.043	1.074	1.054	1.020	0.972	0.975	0.977	1.019	1.025	1.021
New York	1.035	1.026	1.021	1.015	1.025	1.029	1.030	1.028	1.028	1.029	1.023	1.027	1.026	1.025
North Carolina	1.035	1.033	1.024	1.018	1.012	1.034	1.032	1.033	1.030	1.041	1.033	1.040	1.033	1.034
North Dakota	1.035	1.000	1.031	1.001	1.052	1.062	1.032	1.050	1.035	1.029	1.003	1.009	1.021	1.036
Ohio	1.035	1.033	1.023	1.023	1.016	1.044	1.040	1.038	1.042	1.042	1.038	1.036	1.045	1.043
Oklahoma	1.035	1.026	1.032	1.015	1.023	1.028	1.027	1.020	1.015	1.028	1.028	1.030	1.031	1.030
Oregon	1.035	1.070	1.045	1.039	1.046	1.030	1.023	1.040	1.027	1.026	1.023	1.012	1.013	1.030
Pennsylvania	1.035	1.038	1.033	1.025	1.022	1.034	1.037	1.035	1.035	1.054	1.037	1.040	1.039	1.040
Rhode Island	1.035	1.042	1.021	1.014	1.021	1.033	1.028	1.026	1.038	1.031	1.023	1.024	1.024	1.021
South Carolina	1.035	1.042	1.028	1.024	1.033	1.028	1.028	1.027	1.029	1.038	1.032	1.036	1.035	1.037
South Dakota	1.035	0.997	1.004	1.000	0.998	1.010	1.016	1.014	1.005	0.999	0.999	1.001	1.002	1.007
Tennessee	1.035	1.046	1.022	1.031	1.016	1.034	1.035	1.031	1.037	1.037	1.032	1.033	1.033	1.035
Texas	1.035	1.037	1.027	1.026	1.033	1.038	1.040	1.037	1.029	1.026	1.028	1.026	1.028	1.028
Utah	1.035	0.925	0.938	0.950	1.086	1.075	1.088	1.063	1.051	1.052	1.055	1.061	1.053	1.053
Vermont	1.035	– –	1.006	1.008	0.990	0.992	0.987	0.996	1.012	1.012	1.004	1.006	1.004	1.004
Virginia	1.035	1.031	1.026	1.019	1.016	1.039	1.042	1.031	1.035	1.037	1.034	1.036	1.030	1.040
Washington	1.035	1.075	1.055	1.042	1.052	1.040	1.030	1.040	1.038	1.033	1.029	1.025	1.027	1.028
West Virginia	1.035	1.071	1.029	1.037	1.032	1.067	1.071	1.061	1.068	1.067	1.062	1.066	1.058	1.067
Wisconsin	1.035	1.018	1.019	1.020	1.008	1.010	1.006	1.011	1.010	1.009	1.007	1.008	1.007	1.013
Wyoming	1.035	0.926	1.023	0.934	1.060	1.051	1.099	1.063	1.046	1.055	1.040	1.044	1.045	1.042
U.S. Average	1.035	1.033	1.026	1.022	1.025	1.033	1.030	1.028	1.025	1.027	1.024	1.028	1.026	1.028

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B7. Approximate Heat Content of Natural Gas Total Consumption, 2006-2018

(Thousand Btu per Cubic Foot)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	1.028	1.029	1.025	1.026	1.018	1.018	1.016	1.017	1.024	1.030	1.029	1.030	1.028
Alaska	1.005	1.006	1.006	1.005	1.005	1.013	1.012	1.001	1.001	1.001	1.001	0.989	0.975
Arizona	1.020	1.023	1.027	1.021	1.016	1.015	1.021	1.025	1.030	1.040	1.037	1.041	1.041
Arkansas	1.030	1.014	1.015	1.016	1.012	1.017	1.015	1.021	1.017	1.020	1.019	1.019	1.017
California	1.026	1.030	1.028	1.027	1.023	1.020	1.022	1.027	1.030	1.036	1.035	1.035	1.033
Colorado	1.032	1.030	1.020	1.019	1.019	1.032	1.039	1.037	1.047	1.060	1.063	1.065	1.078
Connecticut	1.019	1.019	1.018	1.019	1.022	1.026	1.031	1.024	1.027	1.027	1.027	1.028	1.029
Delaware	1.037	1.037	1.033	1.030	1.023	1.025	1.027	1.049	1.056	1.050	1.046	1.042	1.041
District of Columbia	1.025	1.027	1.028	1.035	1.014	1.016	1.029	1.030	1.043	1.044	1.044	1.039	1.036
Florida	1.029	1.029	1.029	1.025	1.019	1.015	1.015	1.016	1.022	1.024	1.023	1.024	1.023
Georgia	1.032	1.032	1.026	1.027	1.022	1.018	1.015	1.016	1.020	1.027	1.030	1.030	1.028
Hawaii	1.047	1.037	1.043	1.040	1.040	1.048	1.046	1.006	0.959	0.982	0.981	0.975	0.962
Idaho	1.044	1.024	1.023	1.022	1.021	1.017	1.015	1.022	1.017	1.030	1.038	1.041	1.037
Illinois	1.016	1.015	1.014	1.013	1.008	1.011	1.011	1.016	1.023	1.029	1.031	1.029	1.029
Indiana	1.017	1.022	1.013	1.015	1.012	1.012	1.012	1.015	1.019	1.027	1.038	1.043	1.047
Iowa	1.012	1.010	1.010	1.007	1.006	1.009	1.014	1.029	1.040	1.053	1.056	1.056	1.061
Kansas	1.019	1.018	1.034	1.019	1.019	1.020	1.022	1.018	1.024	1.035	1.034	1.034	1.038
Kentucky	1.029	1.027	1.035	1.036	1.030	1.027	1.030	1.025	1.027	1.022	1.030	1.046	1.049
Louisiana	1.038	1.034	1.035	1.029	1.024	1.019	1.015	1.018	1.027	1.025	1.024	1.022	1.022
Maine	1.055	1.064	1.062	1.046	1.044	1.047	1.032	1.028	1.029	1.027	1.026	1.030	1.041
Maryland	1.038	1.038	1.035	1.037	1.027	1.027	1.037	1.045	1.053	1.055	1.051	1.047	1.042
Massachusetts	1.020	1.025	1.021	1.032	1.035	1.033	1.035	1.034	1.026	1.029	1.030	1.030	1.031
Michigan	1.017	1.021	1.023	1.021	1.016	1.014	1.017	1.021	1.019	1.032	1.041	1.043	1.047
Minnesota	1.016	1.019	1.023	1.029	1.010	1.010	1.019	1.023	1.033	1.040	1.037	1.033	1.049
Mississippi	1.028	1.030	1.026	1.019	1.014	1.010	1.012	1.015	1.028	1.030	1.031	1.032	1.026
Missouri	1.021	1.020	1.008	1.007	1.007	1.010	1.012	1.016	1.015	1.012	1.024	1.010	1.024
Montana	1.017	1.017	1.016	1.011	1.012	1.016	1.025	1.033	1.025	1.032	1.034	1.041	1.043
Nebraska	1.012	1.018	1.011	1.012	1.004	1.011	1.019	1.036	1.042	1.057	1.059	1.061	1.060
Nevada	1.032	1.032	1.039	1.031	1.033	1.024	1.029	1.034	1.034	1.042	1.041	1.039	1.037
New Hampshire	1.035	1.044	1.040	1.035	1.037	1.040	1.032	1.030	1.031	1.030	1.029	1.030	1.031
New Jersey	1.036	1.035	1.033	1.029	1.026	1.026	1.029	1.044	1.042	1.045	1.041	1.039	1.038
New Mexico	1.018	1.024	1.025	1.028	1.021	1.022	1.024	1.030	1.034	1.038	1.046	1.042	1.036
New York	1.021	1.023	1.021	1.021	1.022	1.025	1.031	1.033	1.032	1.032	1.031	1.032	1.032
North Carolina	1.032	1.030	1.027	1.023	1.015	1.011	1.011	1.011	1.021	1.035	1.035	1.036	1.029
North Dakota	1.044	1.046	1.042	1.055	1.055	1.073	1.065	1.069	1.086	1.086	1.083	1.080	1.080
Ohio	1.039	1.037	1.040	1.041	1.034	1.031	1.032	1.037	1.057	1.068	1.071	1.070	1.064
Oklahoma	1.032	1.029	1.034	1.033	1.032	1.032	1.030	1.036	1.039	1.047	1.049	1.042	1.032
Oregon	1.032	1.033	1.023	1.024	1.015	1.021	1.022	1.016	1.029	1.048	1.059	1.062	1.061
Pennsylvania	1.038	1.037	1.038	1.037	1.034	1.036	1.040	1.048	1.048	1.046	1.041	1.040	1.038
Rhode Island	1.017	1.026	1.022	1.023	1.017	1.020	1.031	1.032	1.028	1.028	1.029	1.029	1.029
South Carolina	1.041	1.037	1.034	1.034	1.026	1.026	1.023	1.020	1.024	1.030	1.030	1.031	1.026
South Dakota	1.003	1.003	1.003	1.002	1.005	1.005	1.018	1.031	1.041	1.054	1.056	1.055	1.068
Tennessee	1.038	1.038	1.037	1.028	1.023	1.014	1.014	1.019	1.027	1.029	1.030	1.031	1.030
Texas	1.026	1.025	1.025	1.023	1.028	1.025	1.026	1.024	1.031	1.034	1.030	1.029	1.028
Utah	1.056	1.052	1.059	1.044	1.045	1.038	1.043	1.046	1.041	1.044	1.042	1.042	1.040
Vermont	1.001	1.001	1.005	1.005	1.007	1.008	1.012	1.015	1.017	1.025	1.024	1.030	1.034
Virginia	1.034	1.035	1.038	1.036	1.028	1.027	1.034	1.036	1.046	1.052	1.053	1.053	1.052
Washington	1.029	1.025	1.030	1.030	1.032	1.029	1.028	1.030	1.044	1.065	1.078	1.080	1.087
West Virginia	1.117	1.074	1.073	1.082	1.076	1.083	1.080	1.076	1.090	1.097	1.097	1.083	1.091
Wisconsin	1.011	1.014	1.014	1.014	1.010	1.014	1.019	1.026	1.035	1.042	1.039	1.035	1.041
Wyoming	1.041	1.036	1.031	1.031	1.031	1.034	1.034	1.042	1.040	1.060	1.074	1.060	1.064
U.S. Average	1.027	1.027	1.027	1.025	1.023	1.022	1.023	1.026	1.032	1.037	1.037	1.036	1.036

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B8. Approximate Heat Content of Coal Consumed by the Residential and Commercial Sectors, Selected Years, 1960-2005

(Million Btu per Short Ton)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	24.910	24.779	23.933	23.520	24.042	24.407	24.629	24.646	25.450	18.845	24.232	24.224	24.224	25.130
Alaska	18.906	18.807	18.165	17.683	--	15.800	15.800	15.800	15.600	15.600	15.600	15.600	15.600	15.600
Arizona	--	--	--	--	--	19.788	18.698	21.962	21.956	18.819	18.963	18.657	18.780	18.959
Arkansas	--	--	--	--	23.900	22.990	24.834	--	--	--	25.202	--	25.202	--
California	23.013	22.892	22.111	--	23.109	23.555	23.184	23.296	23.790	23.546	25.202	24.578	22.400	22.690
Colorado	22.953	22.833	22.053	20.826	21.461	21.217	21.435	22.169	21.706	22.429	22.401	22.500	22.460	22.383
Connecticut	24.868	24.402	23.476	22.272	22.719	23.031	25.199	23.804	24.842	25.190	25.202	25.174	25.202	25.202
Delaware	24.721	24.316	23.476	22.272	23.143	24.117	24.856	24.696	26.118	25.202	--	--	--	--
District of Columbia	25.109	24.977	24.124	23.241	24.541	24.888	24.961	25.178	25.300	24.694	24.694	24.694	24.694	24.694
Florida	--	--	--	--	24.283	24.882	24.861	24.644	25.750	23.495	24.355	24.704	--	25.202
Georgia	24.742	24.613	23.772	23.494	24.321	24.832	25.143	24.980	25.642	25.716	25.716	--	25.714	24.872
Hawaii	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Idaho	24.831	24.701	23.858	22.663	22.292	22.832	22.478	21.717	22.060	22.348	22.074	21.644	18.444	21.283
Illinois	24.042	23.915	23.099	22.523	22.069	22.269	22.452	22.516	21.955	23.096	23.073	22.944	22.887	22.904
Indiana	24.065	23.938	23.121	22.132	21.881	22.259	22.461	22.290	23.519	22.303	22.272	22.389	22.343	22.455
Iowa	21.321	21.210	20.485	18.277	20.223	21.402	23.960	24.361	26.101	23.868	24.179	24.055	23.393	23.535
Kansas	21.788	21.674	20.934	--	21.182	21.146	24.280	23.945	24.156	24.172	24.025	23.546	--	--
Kentucky	24.431	24.284	23.454	23.178	23.837	24.344	24.450	24.928	26.408	24.901	24.704	24.378	24.093	24.067
Louisiana	--	--	--	--	21.365	--	--	25.078	23.482	--	--	--	--	--
Maine	24.964	24.702	23.612	22.519	23.546	24.278	24.937	24.696	25.922	25.198	25.196	25.202	25.202	25.202
Maryland	25.033	24.875	23.944	22.938	24.043	24.749	25.067	24.838	25.072	24.922	24.616	24.796	24.700	24.709
Massachusetts	24.894	24.493	23.557	22.430	23.417	23.778	25.070	24.834	27.070	25.395	24.648	24.997	24.469	24.969
Michigan	24.759	24.628	23.787	23.466	24.353	24.460	24.812	24.662	25.100	24.087	23.595	23.703	24.503	24.357
Minnesota	21.971	21.856	21.109	19.257	20.829	19.142	17.892	20.258	19.294	24.331	17.382	18.744	20.360	19.429
Mississippi	--	--	--	--	22.993	24.541	24.852	--	--	--	--	--	--	--
Missouri	22.942	22.821	22.042	21.404	21.807	22.802	21.936	22.634	22.014	22.981	23.147	23.251	23.195	23.216
Montana	21.336	21.224	20.499	20.389	22.042	17.680	18.781	21.228	16.016	18.223	18.514	18.413	18.118	18.121
Nebraska	20.913	20.804	20.093	18.406	18.038	21.526	21.374	20.321	--	22.347	22.394	22.439	22.396	22.370
Nevada	25.114	25.049	24.211	23.327	22.430	23.562	24.010	23.443	23.108	19.617	18.118	18.118	18.118	18.118
New Hampshire	24.721	24.316	23.476	22.272	22.719	23.031	25.171	24.868	25.922	25.202	25.202	25.202	25.202	25.202
New Jersey	24.724	24.354	23.481	22.263	22.719	23.218	25.173	24.696	25.500	25.202	25.202	25.202	25.202	25.202
New Mexico	22.993	22.873	22.091	--	19.786	19.817	18.698	19.232	25.212	18.819	18.785	19.009	19.246	18.813
New York	24.700	24.360	23.496	22.574	23.337	23.819	24.856	24.958	25.311	24.846	25.094	25.202	24.992	25.010
North Carolina	24.762	24.632	23.791	23.493	24.422	24.859	25.187	25.164	27.000	25.080	24.825	25.329	24.772	25.373
North Dakota	15.550	15.469	14.940	13.757	13.243	13.138	13.910	15.535	14.228	16.003	16.228	16.379	16.982	18.098
Ohio	23.862	23.732	22.921	22.325	23.207	23.837	24.144	24.439	24.013	24.111	24.202	24.149	21.335	23.981
Oklahoma	22.727	22.608	21.836	20.673	23.291	23.394	24.834	25.894	--	24.215	24.215	24.215	--	24.276
Oregon	24.605	24.476	23.640	22.383	22.722	22.607	23.184	23.296	23.309	--	--	--	--	--
Pennsylvania	24.731	24.365	23.542	22.487	23.150	23.724	25.118	24.830	26.386	25.137	25.110	25.124	25.105	25.132
Rhode Island	24.721	24.316	23.476	22.272	22.719	23.031	25.199	24.696	25.922	25.202	25.202	25.202	25.202	25.202
South Carolina	24.762	24.632	23.791	23.493	24.414	24.854	24.875	25.503	--	--	25.202	--	--	--
South Dakota	19.412	19.310	18.650	16.860	18.426	19.369	18.375	19.072	20.868	23.506	17.381	17.381	17.381	17.381
Tennessee	24.715	24.584	23.745	23.480	23.970	24.389	24.741	25.276	26.045	24.457	24.553	23.831	23.497	24.704
Texas	14.952	14.873	14.366	--	15.200	22.511	25.896	--	16.280	25.623	18.685	19.228	25.683	25.716
Utah	25.892	25.756	24.877	23.740	23.179	23.562	23.150	23.296	23.210	23.544	23.546	23.547	23.547	23.551
Vermont	24.721	24.316	23.476	22.272	22.719	24.399	25.199	24.696	25.922	25.202	25.202	25.202	25.202	25.202
Virginia	24.785	24.652	23.810	23.462	24.414	24.864	25.087	24.997	26.174	25.042	25.045	24.925	25.004	24.859
Washington	22.909	22.789	22.011	19.968	22.771	23.452	21.737	22.634	25.961	23.488	23.506	23.519	23.510	--
West Virginia	24.997	24.866	24.017	23.709	24.059	24.860	25.017	24.822	25.742	24.765	24.746	24.765	24.712	24.697
Wisconsin	21.923	21.806	21.061	18.980	24.265	24.568	24.978	25.078	27.659	24.448	24.309	24.717	24.326	18.945
Wyoming	20.625	20.517	19.817	18.572	17.809	17.262	19.935	18.241	20.116	17.746	17.837	17.860	17.879	17.869
U.S. Average	23.943	23.776	22.990	22.120	22.892	22.682	23.021	23.027	23.364	22.706	22.449	22.488	22.314	22.053

-- = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B9. Approximate Heat Content of Coal Consumed by the Residential and Commercial Sectors, 2006-2018

(Million Btu per Short Ton)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	24.295	25.195	--	--	--	--	--	--	--	--	--	--	--
Alaska	15.600	15.600	15.280	15.356	15.302	15.184	15.268	15.272	15.278	15.186	15.118	14.995	15.126
Arizona	18.914	19.703	--	--	--	--	--	--	--	--	--	--	--
Arkansas	25.202	22.932	--	--	--	--	--	--	--	--	--	--	--
California	23.546	--	--	--	--	--	--	--	--	--	--	--	--
Colorado	22.324	22.419	24.195	22.928	22.968	22.898	23.679	22.752	23.219	23.104	23.848	23.565	--
Connecticut	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
Delaware	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
District of Columbia	--	24.694	27.395	28.028	27.658	27.658	27.273	26.598	27.102	26.146	26.520	26.312	26.445
Florida	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
Georgia	--	24.331	28.000	28.000	28.000	28.000	28.000	28.000	28.000	26.184	--	--	--
Hawaii	--	--	--	--	--	--	--	--	--	--	--	--	--
Idaho	21.546	23.007	23.491	23.088	23.088	23.131	22.871	23.377	23.161	--	--	--	--
Illinois	22.934	22.915	22.227	22.245	22.292	22.211	22.352	22.454	22.356	22.212	22.432	22.685	22.785
Indiana	22.372	22.352	23.073	23.152	23.132	22.932	22.390	22.544	22.558	22.339	22.717	22.662	22.573
Iowa	23.407	23.408	23.154	23.082	23.070	23.059	23.039	22.872	22.832	22.740	22.894	22.891	23.050
Kansas	23.546	--	--	--	--	--	--	--	--	--	--	--	--
Kentucky	23.668	23.698	27.274	27.316	27.393	27.315	27.357	27.090	25.959	26.409	26.410	26.217	27.133
Louisiana	--	24.355	--	--	--	--	--	--	--	--	--	--	--
Maine	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
Maryland	24.733	24.745	26.138	26.569	26.113	26.650	27.000	27.000	27.000	22.069	--	--	--
Massachusetts	24.773	24.637	--	--	--	--	--	--	--	--	--	--	--
Michigan	24.375	24.469	25.594	26.016	25.863	24.926	23.625	23.526	23.299	24.748	24.540	--	--
Minnesota	17.782	19.324	18.049	17.967	18.077	17.888	18.871	19.508	18.377	17.934	17.962	17.826	18.482
Mississippi	--	--	--	--	--	--	--	--	--	--	--	--	--
Missouri	23.195	23.080	22.716	22.954	22.924	22.878	22.789	22.916	22.727	22.700	22.666	22.814	22.653
Montana	18.118	18.118	25.046	24.274	24.730	25.239	25.487	17.129	17.299	21.600	22.385	20.960	22.042
Nebraska	22.295	22.349	--	--	--	--	--	--	--	--	--	--	--
Nevada	18.118	22.349	--	--	--	--	--	--	--	--	--	--	--
New Hampshire	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
New Jersey	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
New Mexico	18.929	18.581	--	--	--	--	--	--	--	--	--	--	--
New York	24.860	24.918	25.253	25.363	25.374	24.600	--	--	--	--	--	--	--
North Carolina	25.113	25.318	26.738	26.803	26.520	26.696	26.741	26.657	26.350	26.651	26.400	26.144	25.758
North Dakota	17.847	15.916	17.123	17.231	17.475	17.103	17.294	17.184	17.230	17.188	17.137	17.343	17.245
Ohio	24.194	24.122	26.652	26.850	26.677	26.636	26.710	26.614	26.643	26.822	27.014	24.572	--
Oklahoma	24.557	24.694	--	--	--	--	--	--	--	--	--	--	--
Oregon	--	--	--	--	--	--	--	--	--	--	--	--	--
Pennsylvania	25.125	25.126	25.729	25.958	25.713	25.507	25.065	25.791	26.246	26.273	26.139	26.221	25.779
Rhode Island	25.202	25.202	--	--	--	--	--	--	--	--	--	--	--
South Carolina	24.331	25.202	27.542	27.512	27.020	--	26.560	--	--	--	--	--	--
South Dakota	17.381	17.381	25.893	24.900	24.900	--	16.574	--	--	--	--	--	--
Tennessee	24.386	24.540	25.613	25.660	25.827	25.400	25.597	25.283	25.362	25.756	--	--	--
Texas	25.202	25.202	27.483	27.250	27.250	26.846	26.757	26.559	27.044	26.616	--	--	--
Utah	23.542	23.539	--	--	--	--	--	--	--	--	--	--	--
Vermont	25.202	25.363	--	--	--	--	--	--	--	--	--	--	--
Virginia	24.745	24.777	26.520	26.007	26.727	26.468	26.388	26.196	26.432	26.444	26.229	25.741	26.445
Washington	17.381	17.381	--	--	--	--	--	--	--	--	--	--	--
West Virginia	24.716	24.704	--	--	--	--	--	--	--	--	--	--	--
Wisconsin	24.354	24.335	26.890	26.865	27.012	26.990	26.771	26.851	26.671	26.782	26.750	26.750	26.750
Wyoming	17.895	17.907	21.850	21.271	19.878	19.415	19.109	17.761	20.397	21.173	20.994	23.075	23.189
U.S. Average	21.915	22.179	22.941	22.820	22.590	22.105	21.350	21.259	21.442	20.667	20.316	19.608	19.321

-- = Not applicable.
Where shown, R = Revised data.
Note: Beginning in 2008, commercial sector only.
Sources: See source listing at the end of this appendix.

Table B10. Approximate Heat Content of Coal Consumed by Other Industrial Users, Selected Years, 1960-2005

(Million Btu per Short Ton)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	25.178	24.960	23.542	22.990	24.106	24.383	24.679	24.848	25.450	25.563	25.611	25.605	25.336	24.568
Alaska	19.428	19.257	18.140	17.684	– –	– –	– –	– –	15.710	15.600	15.600	15.600	15.600	15.600
Arizona	21.614	21.424	20.181	19.778	20.373	20.257	20.071	19.962	22.164	21.907	22.345	22.407	21.938	22.163
Arkansas	25.428	25.204	– –	21.336	21.406	21.310	22.808	23.957	25.154	24.929	24.797	24.305	24.404	25.230
California	26.052	25.823	24.325	22.985	22.173	23.299	22.522	23.296	23.790	24.128	23.883	24.164	24.130	23.658
Colorado	23.558	23.351	21.996	21.392	21.818	21.568	21.105	21.702	21.706	21.768	23.371	23.218	22.776	23.140
Connecticut	25.780	25.553	24.071	23.627	– –	24.419	25.199	– –	– –	– –	– –	– –	– –	24.694
Delaware	25.359	25.129	23.743	23.441	24.472	24.720	24.938	25.192	26.151	26.089	25.917	25.689	26.082	26.369
District of Columbia	25.884	25.655	24.167	23.786	24.357	– –	– –	– –	– –	– –	– –	– –	– –	– –
Florida	– –	– –	– –	23.541	22.892	24.778	25.005	25.107	25.750	25.729	25.618	25.503	25.850	25.824
Georgia	25.423	25.199	23.737	23.508	24.331	24.818	25.148	25.198	25.642	25.719	25.891	25.861	25.665	25.582
Hawaii	– –	– –	– –	– –	– –	24.688	24.810	21.500	19.518	18.140	13.214	26.400	23.760	23.876
Idaho	22.544	22.345	21.049	19.935	17.684	17.762	17.858	19.035	22.060	20.562	20.873	20.277	20.349	20.574
Illinois	23.848	23.631	22.267	21.694	22.357	22.799	22.556	22.837	22.552	22.275	22.001	21.637	21.350	21.606
Indiana	24.011	23.799	22.419	21.824	22.253	22.431	22.712	23.055	23.866	24.728	24.566	24.093	24.364	23.449
Iowa	23.565	23.335	21.983	21.320	21.517	22.611	22.586	20.978	20.980	20.990	20.467	20.790	20.237	20.183
Kansas	22.671	22.471	21.168	20.480	21.568	21.506	24.224	24.241	24.156	23.384	24.013	24.286	24.855	24.511
Kentucky	24.734	24.497	23.119	22.904	24.059	24.518	24.633	24.847	26.408	26.080	26.732	26.189	26.299	26.090
Louisiana	– –	– –	– –	– –	22.153	24.054	19.979	18.136	24.502	24.796	24.387	24.232	24.621	24.268
Maine	25.889	25.626	24.134	23.975	24.439	24.861	24.924	25.102	25.922	25.871	25.855	26.136	25.577	25.270
Maryland	25.904	25.676	24.190	23.658	24.485	24.728	25.118	25.324	25.072	26.150	25.736	25.395	25.122	24.441
Massachusetts	26.150	25.906	24.402	23.798	24.602	24.850	24.877	25.176	27.070	26.975	27.055	27.054	27.232	27.447
Michigan	24.831	24.610	23.187	22.892	24.044	24.741	24.451	24.026	24.912	25.098	25.518	25.637	25.187	25.025
Minnesota	19.521	19.349	18.227	18.917	17.084	20.690	18.563	19.078	19.294	19.465	19.335	18.938	18.999	18.990
Mississippi	25.681	25.455	23.978	23.213	23.442	23.399	23.254	24.073	23.922	24.178	24.369	24.143	23.326	23.650
Missouri	23.601	23.392	22.036	21.430	22.003	22.329	22.988	23.175	23.128	22.979	23.155	23.061	23.001	22.796
Montana	22.827	22.626	21.313	20.879	19.035	18.068	18.376	18.100	16.016	16.457	14.694	14.624	14.878	14.694
Nebraska	21.975	21.781	20.517	19.285	19.194	18.597	19.053	19.359	20.508	19.559	20.501	20.268	20.106	19.898
Nevada	26.496	26.144	24.783	23.422	23.161	23.562	23.184	22.668	23.280	23.380	23.055	23.276	23.025	22.615
New Hampshire	24.450	24.233	22.945	23.364	24.112	24.624	24.939	25.216	– –	– –	– –	– –	– –	– –
New Jersey	25.388	25.156	23.712	23.377	23.526	24.453	25.236	23.983	25.500	24.800	25.200	25.244	25.233	25.202
New Mexico	23.038	22.834	21.510	– –	21.867	21.625	21.388	22.008	25.212	25.066	24.751	25.195	24.675	24.588
New York	25.719	25.486	24.054	23.635	24.454	24.858	25.108	25.117	26.294	25.536	25.970	26.079	26.150	26.377
North Carolina	25.446	25.222	23.759	23.490	24.419	24.880	24.938	25.269	26.492	26.750	26.397	26.461	26.329	26.211
North Dakota	14.812	14.681	13.830	13.039	13.120	13.160	13.489	13.353	14.228	14.177	13.984	14.310	14.344	14.278
Ohio	24.789	24.568	23.149	22.676	23.339	24.178	24.304	24.512	24.816	25.040	25.142	25.086	25.230	25.105
Oklahoma	25.383	25.160	– –	23.439	21.212	21.434	22.802	22.675	19.882	19.973	20.142	20.433	21.175	21.156
Oregon	22.677	22.477	21.173	20.348	17.693	17.868	17.352	19.026	– –	– –	22.269	23.089	21.855	23.532
Pennsylvania	25.479	25.249	23.889	23.430	24.110	24.678	24.920	25.135	24.476	24.318	24.116	24.043	23.716	23.085
Rhode Island	24.721	24.316	23.476	22.963	24.099	24.419	25.199	– –	– –	– –	– –	– –	– –	– –
South Carolina	25.421	25.194	23.756	23.473	24.399	24.861	25.118	25.193	26.270	26.078	26.334	26.196	25.986	25.827
South Dakota	19.909	19.734	18.589	18.765	19.220	17.262	17.338	17.258	20.868	16.861	16.855	16.763	16.615	16.630
Tennessee	25.056	24.833	23.413	23.129	24.145	24.579	25.133	25.135	26.088	25.742	26.037	26.002	25.991	25.909
Texas	16.854	16.902	17.885	18.825	16.296	15.577	14.790	14.965	16.280	17.000	17.701	17.545	17.100	17.166
Utah	26.198	25.967	24.461	23.644	22.331	22.274	23.189	23.003	23.210	23.453	23.017	23.158	21.029	23.055
Vermont	26.525	26.291	24.766	24.056	24.888	24.265	25.079	– –	– –	– –	– –	– –	– –	– –
Virginia	25.461	25.237	23.777	23.473	24.448	24.900	25.070	25.085	26.386	26.218	25.654	26.316	26.259	26.113
Washington	25.955	25.726	24.234	23.546	21.363	21.634	22.707	19.006	22.332	22.658	22.070	23.180	21.867	20.752
West Virginia	25.516	25.293	23.830	23.522	24.347	24.849	24.888	24.975	25.742	25.532	25.445	25.177	24.563	24.807
Wisconsin	24.597	24.380	22.966	21.957	22.735	23.323	24.150	24.219	23.698	23.545	23.451	23.185	23.152	23.100
Wyoming	20.539	20.357	19.177	18.356	17.955	17.555	22.178	21.941	20.116	19.987	20.148	19.848	19.914	19.753
U.S. Average	24.657	24.460	23.064	22.290	22.696	22.249	22.430	22.112	22.476	22.652	22.575	22.511	22.464	22.174

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B11. Approximate Heat Content of Coal Consumed by Other Industrial Users, 2006-2018

(Million Btu per Short Ton)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	24.709	24.934	25.218	25.353	25.006	25.388	25.483	25.253	25.370	25.796	25.642	26.466	26.019
Alaska	15.600	15.600	15.600	15.600	15.600	15.600	15.268	15.272	15.278	15.186	15.118	14.995	15.126
Arizona	22.048	21.488	20.597	20.257	20.098	19.937	20.835	23.893	23.457	23.148	23.292	23.284	23.308
Arkansas	24.904	24.609	24.636	24.921	25.247	23.894	23.741	23.613	24.090	23.748	24.077	23.692	23.266
California	24.092	23.728	23.353	23.549	23.401	23.164	23.186	23.090	23.315	23.207	23.099	22.995	23.121
Colorado	22.748	22.947	23.171	22.999	21.910	22.172	22.275	22.159	22.492	22.703	23.029	21.711	21.461
Connecticut	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Delaware	26.410	26.374	25.788	25.527	– –	– –	– –	– –	– –	– –	22.968	– –	– –
District of Columbia	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Florida	25.410	25.431	25.432	25.780	25.677	25.803	25.451	26.081	25.897	26.017	26.176	25.207	25.151
Georgia	25.677	25.724	25.257	25.440	25.490	25.209	25.451	25.512	25.880	26.184	25.718	24.995	25.093
Hawaii	27.965	24.964	23.356	23.117	23.303	22.325	22.886	22.330	22.378	22.580	22.580	– –	– –
Idaho	20.358	20.116	19.827	19.968	20.044	20.099	20.420	21.894	21.196	22.106	22.676	22.908	23.187
Illinois	21.657	21.591	21.349	20.916	20.623	20.675	21.376	21.209	21.270	21.078	20.798	20.723	20.615
Indiana	23.483	23.723	24.152	23.686	24.007	25.432	25.846	26.270	25.504	25.225	26.366	26.512	26.442
Iowa	19.832	20.216	19.793	19.614	19.717	19.855	19.009	18.736	18.968	18.439	18.274	18.505	18.306
Kansas	24.002	23.955	24.705	23.495	23.815	23.971	22.741	23.890	24.371	24.006	22.017	21.816	21.584
Kentucky	26.103	25.463	25.915	25.669	25.707	26.111	25.994	25.914	25.840	26.472	26.153	26.510	25.898
Louisiana	24.094	24.343	24.254	23.563	23.855	16.485	15.555	15.723	15.538	15.554	15.289	15.710	16.166
Maine	25.438	26.226	26.241	26.022	25.489	25.259	25.343	25.259	25.063	24.999	25.238	25.369	25.496
Maryland	24.174	24.465	24.303	24.374	23.956	22.772	22.530	21.799	22.170	22.069	21.851	21.858	22.069
Massachusetts	26.267	26.115	26.539	26.451	26.651	26.519	27.104	27.131	27.003	27.002	25.097	24.716	24.581
Michigan	24.878	25.233	24.942	24.185	24.369	23.518	23.166	23.497	24.070	24.296	24.540	25.314	25.006
Minnesota	18.932	19.049	19.223	19.193	19.100	19.098	18.907	18.939	18.766	18.261	18.571	18.259	18.226
Mississippi	24.160	23.873	23.364	23.504	23.042	23.027	22.987	22.856	22.932	23.130	– –	– –	– –
Missouri	22.735	22.464	22.508	22.536	22.662	22.448	22.471	22.228	22.154	22.257	22.529	22.581	22.450
Montana	14.470	14.787	15.339	14.815	14.955	14.995	17.594	17.129	17.299	17.838	17.883	17.982	18.219
Nebraska	19.428	18.919	18.789	18.547	18.263	18.330	18.232	18.054	18.057	18.028	17.977	17.924	17.864
Nevada	22.656	22.868	21.829	22.115	21.856	22.684	23.177	22.698	22.104	22.672	22.579	22.449	23.192
New Hampshire	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
New Jersey	25.064	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
New Mexico	24.569	24.649	24.445	24.661	24.922	24.804	24.445	24.248	24.317	24.657	24.616	24.522	24.461
New York	25.928	26.254	26.176	25.990	25.890	25.504	25.765	25.653	25.515	26.059	26.302	26.069	26.048
North Carolina	26.254	26.223	26.125	26.201	26.102	25.890	25.983	27.001	26.616	25.957	26.455	27.291	27.065
North Dakota	14.293	14.290	14.377	14.456	14.388	14.386	14.352	14.368	14.465	14.453	14.456	14.462	14.407
Ohio	25.037	25.195	25.020	24.797	24.976	24.987	24.932	24.922	24.695	24.619	24.419	24.572	24.796
Oklahoma	20.513	20.643	20.469	19.145	19.085	18.887	19.041	19.218	19.256	19.149	18.974	18.665	19.735
Oregon	24.541	24.536	24.351	24.481	24.183	23.974	23.368	23.211	23.150	23.521	– –	23.299	23.374
Pennsylvania	22.686	22.341	22.142	22.155	22.184	22.468	22.989	23.261	23.331	23.620	23.378	22.312	23.479
Rhode Island	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
South Carolina	25.742	25.915	25.862	25.858	25.842	25.479	25.472	26.343	26.185	25.762	26.038	26.865	26.630
South Dakota	16.648	16.916	16.810	16.613	16.520	16.544	16.574	16.529	16.427	17.024	16.377	16.751	16.713
Tennessee	25.925	25.936	26.067	26.160	26.139	25.950	26.054	25.982	26.181	26.191	26.410	26.396	26.056
Texas	17.290	21.648	21.587	20.482	14.524	20.339	20.950	21.565	21.205	21.465	20.514	19.871	20.297
Utah	23.160	22.799	22.717	22.427	23.059	23.035	23.031	22.825	22.660	22.852	22.853	22.923	23.025
Vermont	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
Virginia	26.054	26.077	25.892	25.723	25.733	25.669	25.917	25.701	25.784	26.166	26.173	26.507	26.250
Washington	21.288	23.389	19.961	20.691	19.306	18.797	19.167	19.011	19.155	18.815	18.781	18.772	18.791
West Virginia	24.952	24.970	24.981	25.360	25.216	25.010	25.324	25.145	25.225	25.639	27.214	27.886	27.614
Wisconsin	22.717	22.779	22.794	22.493	22.323	22.171	22.507	22.411	22.244	22.284	21.312	21.583	21.758
Wyoming	19.828	19.847	19.643	19.614	19.666	19.432	19.647	19.777	19.567	19.610	19.878	19.551	19.789
U.S. Average	22.035	22.371	22.275	21.867	21.722	21.686	21.518	21.611	21.489	21.260	21.086	20.856	20.698

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B12. Approximate Heat Content of Coal Consumed by the Electric Power Sector, Selected Years, 1960-2005

(Million Btu per Short Ton)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	24.126	23.704	23.314	23.164	23.912	24.111	24.299	23.718	22.062	21.892	22.452	21.793	21.475	21.613
Alaska	17.729	17.858	17.080	17.400	15.800	15.800	15.800	15.800	16.571	16.534	16.135	16.264	16.041	15.277
Arizona	--	20.850	21.238	21.090	21.243	20.986	20.951	20.578	20.426	20.305	20.306	20.192	20.399	20.287
Arkansas	--	--	--	--	17.009	17.207	17.478	17.370	17.352	17.411	17.281	17.018	16.979	16.955
California	--	--	--	--	--	--	20.703	22.066	23.506	23.533	23.597	24.409	24.378	23.715
Colorado	20.546	21.322	21.530	19.808	19.992	19.497	19.660	19.778	19.685	19.566	19.574	19.465	19.663	19.817
Connecticut	26.548	25.908	23.548	23.904	--	26.317	25.808	25.612	24.542	24.573	22.618	20.358	20.585	20.229
Delaware	25.982	26.392	24.186	24.534	24.922	25.924	26.063	26.173	25.900	22.854	24.640	24.862	24.572	24.289
District of Columbia	27.460	26.948	25.920	25.619	--	--	--	--	--	--	--	--	--	--
Florida	24.606	23.762	22.748	23.093	23.686	24.450	24.818	24.301	24.397	24.197	24.478	24.542	24.310	24.235
Georgia	25.042	24.932	23.756	23.751	23.805	24.241	23.638	22.993	23.176	23.323	23.276	23.193	21.870	21.879
Hawaii	--	--	--	--	--	--	17.568	22.462	21.963	21.959	22.856	22.780	22.382	22.184
Idaho	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Illinois	21.694	21.448	21.002	20.259	20.593	20.969	21.587	20.232	19.008	18.963	17.986	18.052	17.941	17.681
Indiana	22.640	22.466	22.030	21.229	21.632	21.314	21.125	20.725	21.188	21.074	20.637	20.779	20.930	21.191
Iowa	20.768	21.218	20.888	20.385	18.633	18.197	17.826	17.464	17.742	17.752	17.459	17.407	17.368	17.283
Kansas	23.754	24.192	24.100	19.957	18.370	17.537	17.841	17.465	17.358	17.408	17.096	17.078	17.185	17.001
Kentucky	22.972	22.892	21.852	21.481	22.917	22.769	23.091	23.299	23.220	22.856	23.026	22.910	22.742	22.820
Louisiana	--	16.038	--	--	--	16.907	16.420	16.167	16.064	16.023	15.784	15.834	15.941	15.955
Maine	28.580	--	--	--	--	--	28.000	25.500	25.502	25.509	25.675	26.343	25.706	25.853
Maryland	26.616	26.372	24.612	24.323	24.757	25.326	25.479	25.928	25.581	25.394	25.942	25.265	25.166	25.239
Massachusetts	26.352	26.072	23.260	24.347	26.751	26.561	26.122	25.400	25.136	24.581	24.983	24.272	23.582	23.163
Michigan	24.884	24.804	24.202	23.662	24.025	23.393	22.243	21.377	20.876	20.353	19.803	19.723	19.574	19.801
Minnesota	22.390	22.176	20.274	17.940	17.557	17.451	17.644	17.700	17.883	17.847	17.529	17.688	17.630	17.644
Mississippi	24.858	24.890	24.098	23.164	23.994	24.252	25.115	22.432	23.072	23.344	19.152	18.378	18.217	17.767
Missouri	21.904	21.550	21.518	21.494	21.306	21.289	20.758	18.509	17.838	17.835	17.589	17.522	17.543	17.626
Montana	13.500	13.140	15.474	15.959	17.003	17.307	17.105	16.995	16.762	16.768	16.921	17.004	16.984	16.876
Nebraska	24.782	24.568	23.914	20.954	18.809	17.299	17.125	17.191	17.264	17.169	17.186	17.239	17.084	17.132
Nevada	--	25.488	25.654	22.388	22.078	22.768	22.191	22.120	22.465	22.428	20.354	22.531	22.199	22.407
New Hampshire	25.448	27.904	27.432	26.701	26.816	26.905	26.645	26.269	26.264	26.103	26.034	26.067	26.148	25.584
New Jersey	26.768	26.458	24.944	25.401	26.182	26.475	26.831	26.513	26.106	26.006	25.706	25.498	25.385	25.046
New Mexico	25.000	18.004	17.966	17.849	17.695	18.376	18.234	18.061	18.388	18.503	18.572	18.352	18.448	18.546
New York	26.505	26.678	24.664	24.050	24.635	25.200	25.718	25.912	26.096	26.039	25.592	25.100	24.074	23.489
North Carolina	26.242	25.814	24.114	23.788	24.538	24.975	25.191	25.056	24.966	24.696	24.611	24.699	24.592	24.638
North Dakota	13.836	13.918	13.666	13.344	13.234	13.150	13.268	13.166	13.057	13.082	13.002	12.840	12.933	13.196
Ohio	23.770	23.564	22.500	21.919	22.880	23.625	23.775	24.243	23.549	23.094	23.278	23.483	23.419	23.034
Oklahoma	25.942	24.000	25.076	25.076	17.393	17.168	17.792	17.463	17.717	17.641	17.635	17.582	17.590	17.401
Oregon	--	--	--	--	16.393	16.584	16.696	17.765	17.273	17.412	17.000	17.127	16.880	16.839
Pennsylvania	23.436	24.095	23.341	23.498	24.176	24.445	23.352	22.654	23.163	22.445	23.565	22.983	22.900	22.490
Rhode Island	28.152	27.468	--	--	--	--	--	--	--	--	--	--	--	--
South Carolina	26.734	25.822	24.274	24.161	24.843	25.132	25.303	25.706	25.407	25.122	24.673	24.992	24.892	24.838
South Dakota	17.168	17.904	16.572	12.616	12.599	12.210	13.203	14.276	17.189	17.082	16.955	16.942	16.956	17.196
Tennessee	24.040	23.590	22.594	21.983	23.254	23.657	23.944	24.297	24.203	24.172	23.036	22.899	22.645	22.027
Texas	--	--	--	13.103	14.791	14.807	14.578	14.726	15.193	15.330	15.443	15.247	15.279	15.385
Utah	24.940	25.184	24.812	23.650	22.900	23.607	23.002	22.789	22.926	22.748	22.518	22.303	22.082	21.702
Vermont	27.760	27.340	24.870	25.744	25.926	25.628	--	--	--	--	--	--	--	--
Virginia	26.726	26.474	24.782	23.930	25.013	25.628	25.461	25.539	25.674	25.372	25.420	24.397	24.470	24.703
Washington	--	--	--	16.200	16.200	16.200	16.270	16.538	16.193	16.002	16.000	15.799	16.014	15.839
West Virginia	23.908	23.736	23.318	23.221	24.269	24.827	24.931	24.482	24.333	24.147	24.206	24.184	24.056	23.710
Wisconsin	24.208	24.036	22.446	21.236	20.523	19.547	19.111	18.563	18.886	18.710	19.230	18.276	18.348	19.316
Wyoming	14.846	15.990	16.534	16.626	17.590	17.510	17.682	17.542	17.633	17.727	17.439	17.790	17.645	17.563
U.S. Average	23.922	23.781	22.575	21.650	21.357	21.023	20.777	20.542	20.511	20.337	20.238	20.082	19.980	19.988

-- = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B13. Approximate Heat Content of Coal Consumed by the Electric Power Sector, 2006-2018

(Million Btu per Short Ton)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	21.541	21.674	21.261	20.714	20.974	20.818	20.593	20.025	20.444	20.206	19.806	19.472	19.540
Alaska	15.306	15.085	14.457	14.546	14.538	14.599	14.748	14.674	15.109	15.060	14.963	14.792	14.793
Arizona	20.270	19.972	19.676	19.484	19.370	19.378	19.191	19.339	19.321	19.200	19.220	19.448	19.327
Arkansas	16.958	16.970	17.175	17.117	17.319	17.208	17.129	17.161	17.310	17.340	17.177	17.304	17.194
California	24.388	24.311	23.802	23.989	24.409	24.266	24.383	23.954	24.711	--	--	--	--
Colorado	19.606	19.605	19.673	19.623	19.447	19.333	18.938	18.909	19.129	18.938	18.899	18.608	18.383
Connecticut	20.326	20.586	20.345	21.959	21.024	18.685	22.384	18.347	18.219	18.220	18.240	18.240	18.240
Delaware	24.637	24.816	24.548	24.681	24.598	24.940	25.499	25.774	25.780	25.882	25.820	25.785	25.790
District of Columbia	--	--	--	--	--	--	--	--	--	--	--	--	--
Florida	24.052	24.036	23.716	23.755	23.959	23.684	23.591	23.447	23.547	23.570	23.337	23.343	23.558
Georgia	21.908	21.955	21.608	21.250	21.476	20.949	19.853	19.744	20.362	19.811	20.142	20.030	19.567
Hawaii	22.077	22.125	21.306	21.414	21.150	20.398	20.481	20.154	20.629	20.800	20.839	19.694	19.564
Idaho	--	--	--	--	--	--	--	--	--	--	--	--	--
Illinois	17.559	17.495	17.487	17.461	17.499	17.478	17.580	17.550	17.561	17.528	17.493	17.549	17.522
Indiana	21.079	20.923	20.869	20.807	20.841	20.721	20.844	21.092	21.276	21.395	21.556	21.627	21.160
Iowa	17.294	17.238	17.053	17.068	17.016	17.071	17.067	17.076	17.137	17.328	17.469	17.467	17.212
Kansas	17.176	17.145	17.015	17.014	17.041	17.091	17.207	17.170	17.233	17.074	17.196	17.087	17.087
Kentucky	22.855	23.225	22.889	22.724	22.880	22.604	22.571	22.459	22.603	22.388	22.318	22.293	22.261
Louisiana	16.126	16.053	15.959	16.040	15.984	16.077	16.040	16.374	16.390	15.821	15.925	16.491	16.503
Maine	25.646	26.246	25.767	25.195	26.147	25.276	25.502	25.269	25.070	24.929	25.150	25.695	25.283
Maryland	25.191	25.009	25.291	24.886	24.675	24.550	24.736	24.685	25.017	25.007	25.169	25.049	25.054
Massachusetts	23.106	22.921	22.852	23.317	23.475	23.448	23.455	23.623	22.774	22.841	22.067	22.015	--
Michigan	19.852	19.723	19.530	19.317	19.372	19.186	18.866	18.604	18.849	18.822	18.689	18.538	18.666
Minnesota	17.633	17.686	17.703	17.592	17.474	17.573	17.665	17.691	17.520	17.563	17.643	17.630	17.506
Mississippi	17.965	18.345	18.324	16.512	16.953	16.915	15.237	16.187	17.406	14.299	13.539	13.914	13.319
Missouri	17.539	17.553	17.526	17.444	17.467	17.484	17.559	17.546	17.525	17.513	17.491	17.436	17.515
Montana	16.854	16.834	16.783	16.913	16.830	16.831	16.893	16.899	16.747	16.872	16.856	16.938	16.940
Nebraska	17.014	17.011	16.979	17.086	17.069	16.953	17.043	17.225	16.931	16.897	16.886	16.928	16.876
Nevada	22.799	22.688	21.725	21.043	21.191	21.029	20.342	19.521	20.869	19.781	20.396	19.591	19.940
New Hampshire	27.363	27.573	27.171	27.190	27.122	27.259	27.306	27.235	27.337	27.095	27.210	26.984	26.546
New Jersey	25.009	23.931	23.451	23.443	23.348	25.103	25.405	25.482	25.315	25.660	26.160	26.146	25.815
New Mexico	18.525	18.430	18.365	18.453	18.325	18.338	18.158	17.880	17.954	18.012	18.515	18.805	18.595
New York	22.916	22.947	22.021	21.585	22.175	21.602	21.874	21.194	21.333	21.155	23.906	25.892	25.682
North Carolina	24.389	24.581	24.430	24.610	24.477	24.426	24.631	24.637	24.662	24.723	24.639	24.898	24.790
North Dakota	13.072	13.171	13.302	13.326	13.513	13.624	13.643	13.619	13.665	13.657	13.736	13.614	13.470
Ohio	22.817	22.705	22.428	22.901	22.907	22.907	23.737	23.717	23.870	24.061	24.498	24.566	24.032
Oklahoma	17.431	17.413	17.174	17.234	17.231	17.202	17.227	17.226	17.221	17.206	17.307	17.319	17.216
Oregon	16.720	16.736	16.675	16.837	16.837	16.771	16.749	16.911	17.106	17.243	17.286	17.236	17.258
Pennsylvania	22.223	22.286	22.013	21.924	22.004	21.694	21.735	21.572	21.256	21.319	20.854	20.578	19.911
Rhode Island	--	--	--	--	--	--	--	--	--	--	--	--	--
South Carolina	24.936	24.881	24.611	24.782	24.725	24.549	24.506	24.471	24.692	24.782	24.580	24.323	24.134
South Dakota	16.945	16.935	16.786	16.723	16.731	16.403	16.503	16.695	16.586	16.433	16.533	16.509	16.471
Tennessee	21.970	21.698	21.208	21.033	21.519	20.656	20.472	19.992	20.415	21.019	20.756	20.298	20.759
Texas	15.446	15.243	15.383	15.517	15.496	15.218	15.196	15.373	15.328	15.209	15.201	15.397	15.528
Utah	22.047	22.304	22.217	21.908	22.295	22.153	21.906	21.928	21.918	21.599	21.322	21.202	21.442
Vermont	--	--	--	--	--	--	--	--	--	--	--	--	--
Virginia	24.825	25.056	24.782	24.806	24.750	24.508	23.606	22.752	22.916	23.058	22.534	21.962	21.385
Washington	16.278	16.289	15.902	16.191	16.101	16.095	16.209	16.471	16.501	16.549	16.724	16.647	16.477
West Virginia	23.832	24.064	23.653	23.774	23.947	23.791	23.874	24.077	24.204	24.444	24.411	24.445	24.541
Wisconsin	17.809	17.813	17.697	17.515	17.637	17.996	17.696	17.836	18.088	17.654	17.815	17.608	17.555
Wyoming	17.386	17.281	17.294	17.368	17.342	17.304	17.461	17.510	17.382	17.393	17.398	17.290	17.403
U.S. Average	19.930	19.908	19.713	19.521	19.623	19.341	19.211	19.174	19.290	19.146	19.153	18.981	18.915

-- = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B14. Approximate Heat Content of Hydrocarbon Gas Liquids Consumed by the Industrial Sector, Selected Years, 1960-2005

(Million Btu per Barrel)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Alaska	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Arizona	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Arkansas	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
California	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Colorado	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Connecticut	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Delaware	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
District of Columbia	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Florida	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Georgia	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Hawaii	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Idaho	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Illinois	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Indiana	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Iowa	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Kansas	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Kentucky	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Louisiana	3.783	3.786	3.648	3.630	R 3.804	3.666	3.819	3.816	3.635	3.631	3.570	3.662	3.623	3.606
Maine	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Maryland	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Massachusetts	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Michigan	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Minnesota	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Mississippi	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Missouri	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Montana	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Nebraska	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Nevada	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
New Hampshire	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
New Jersey	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
New Mexico	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
New York	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
North Carolina	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
North Dakota	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Ohio	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Oklahoma	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Oregon	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Pennsylvania	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Rhode Island	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
South Carolina	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
South Dakota	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Tennessee	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Texas	3.783	3.786	3.648	3.589	R 3.669	3.542	3.572	3.589	3.560	3.548	3.534	3.547	3.532	3.528
Utah	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Vermont	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Virginia	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Washington	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
West Virginia	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Wisconsin	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
Wyoming	3.783	3.786	3.648	3.534	3.526	3.421	3.448	3.462	3.420	3.426	3.430	3.447	3.434	3.433
U.S. Average	3.783	3.786	3.648	3.575	R 3.629	3.527	3.578	3.598	3.549	3.537	3.519	3.539	3.523	3.517

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B15. Approximate Heat Content of Hydrocarbon Gas Liquids Consumed by the Industrial Sector, 2006-2018

(Million Btu per Barrel)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Alaska	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Arizona	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Arkansas	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
California	3.420	3.392	3.370	3.313	3.838	3.838	3.838	3.838	3.838	3.838	3.838	3.838	3.838
Colorado	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Connecticut	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Delaware	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
District of Columbia	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	– –	3.841	3.841	3.841
Florida	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Georgia	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Hawaii	3.420	3.392	3.370	3.313	3.841	3.841	– –	3.841	3.841	3.841	3.841	3.841	3.841
Idaho	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Illinois	3.420	3.392	3.370	3.313	3.140	3.132	3.141	3.218	3.141	3.093	3.078	3.079	3.093
Indiana	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Iowa	3.420	3.392	3.370	3.313	3.193	3.160	3.210	3.224	3.228	3.181	3.182	3.194	3.198
Kansas	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Kentucky	3.420	3.392	3.370	3.313	3.840	3.840	3.840	3.773	3.075	3.066	3.073	3.038	3.015
Louisiana	3.526	3.527	3.430	3.353	R 3.273	R 3.226	R 3.228	R 3.259	R 3.200	R 3.227	R 3.207	R 3.193	3.193
Maine	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Maryland	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Massachusetts	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Michigan	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Minnesota	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Mississippi	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Missouri	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Montana	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Nebraska	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Nevada	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
New Hampshire	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
New Jersey	3.420	3.392	3.370	3.313	3.835	3.835	3.836	3.836	3.836	3.836	3.836	3.835	3.835
New Mexico	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
New York	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
North Carolina	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
North Dakota	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Ohio	3.420	3.392	3.370	3.313	3.838	3.838	3.838	3.838	3.838	3.838	3.838	3.838	3.838
Oklahoma	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Oregon	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Pennsylvania	3.420	3.392	3.370	3.313	3.836	3.836	3.837	3.836	3.837	3.836	3.836	3.836	3.836
Rhode Island	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
South Carolina	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
South Dakota	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Tennessee	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Texas	3.489	3.479	3.467	3.396	R 3.377	R 3.272	R 3.345	R 3.378	R 3.338	R 3.399	R 3.343	R 3.318	3.283
Utah	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Vermont	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Virginia	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Washington	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
West Virginia	3.420	3.392	3.370	3.313	3.835	3.835	3.835	3.835	3.835	3.835	3.835	3.835	3.835
Wisconsin	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Wyoming	3.420	3.392	3.370	3.313	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
U.S. Average	3.479	3.468	3.446	3.375	3.394	3.313	3.360	3.388	3.344	3.385	3.341	3.317	3.290

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B16. Approximate Heat Content of Hydrocarbon Gas Liquids Total Consumption, Selected Years, 1960-2005

(Million Btu per Barrel)

State	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
Alabama	3.828	3.828	3.798	3.754	3.723	3.722	3.756	3.717	3.753	3.697	3.740	3.744	3.750	3.733
Alaska	3.836	3.841	3.765	3.651	3.645	3.725	3.815	3.722	3.841	3.830	3.780	3.798	3.776	3.831
Arizona	3.823	3.833	3.804	3.723	3.694	3.718	3.699	3.695	3.799	3.778	3.820	3.740	3.728	3.785
Arkansas	3.827	3.830	3.807	3.753	3.703	3.718	3.705	3.675	3.630	3.656	3.688	3.705	3.707	3.709
California	3.813	3.817	3.727	3.591	3.629	3.575	3.599	3.623	3.642	3.602	3.584	3.662	3.709	3.783
Colorado	3.830	3.830	3.802	3.750	3.689	3.729	3.715	3.716	3.639	3.628	3.666	3.708	3.664	3.726
Connecticut	3.822	3.818	3.748	3.663	3.676	3.678	3.706	3.746	3.737	3.722	3.787	3.738	3.708	3.627
Delaware	3.795	3.798	3.691	3.592	3.571	3.717	3.704	3.745	3.782	3.764	3.805	3.771	3.783	3.741
District of Columbia	3.811	3.815	3.735	3.692	3.618	3.602	3.616	3.639	3.559	3.608	3.712	3.693	3.696	3.710
Florida	3.832	3.834	3.818	3.790	3.684	3.736	3.757	3.695	3.722	3.694	3.759	3.746	3.780	3.737
Georgia	3.821	3.823	3.778	3.710	3.706	3.720	3.716	3.714	3.679	3.673	3.671	3.719	3.729	3.689
Hawaii	3.819	3.820	3.762	3.674	3.632	3.813	3.807	3.493	3.805	3.797	3.709	3.766	3.782	3.828
Idaho	3.831	3.827	3.802	3.757	3.651	3.661	3.720	3.696	3.778	3.817	3.824	3.794	3.819	3.765
Illinois	3.808	3.807	3.720	3.632	3.566	3.491	3.577	3.533	3.558	3.538	3.565	3.594	3.559	3.542
Indiana	3.824	3.825	3.810	3.732	3.685	3.667	3.623	3.715	3.720	3.721	3.724	3.732	3.708	3.708
Iowa	3.828	3.827	3.789	3.715	3.656	3.599	3.650	3.567	3.554	3.532	3.547	3.609	3.538	3.532
Kansas	3.827	3.828	3.793	3.733	3.622	3.452	3.487	3.599	3.495	3.511	3.534	3.514	3.507	3.818
Kentucky	3.807	3.804	3.729	3.659	3.601	3.570	3.589	3.645	3.560	3.520	3.524	3.572	3.550	3.537
Louisiana	3.789	3.790	3.662	3.640	R 3.805	3.668	3.820	3.816	3.639	3.637	3.574	3.666	3.626	3.611
Maine	3.836	3.831	3.786	3.761	3.697	3.686	3.740	3.788	3.813	3.793	3.739	3.822	3.832	3.792
Maryland	3.824	3.825	3.776	3.727	3.663	3.705	3.714	3.742	3.710	3.738	3.777	3.762	3.776	3.740
Massachusetts	3.828	3.826	3.768	3.695	3.647	3.732	3.696	3.773	3.747	3.719	3.726	3.812	3.827	3.788
Michigan	3.830	3.827	3.814	3.790	3.718	3.583	3.658	3.715	3.763	3.788	3.773	3.784	3.741	3.730
Minnesota	3.830	3.832	3.813	3.775	3.670	3.652	3.679	3.670	3.694	3.686	3.627	3.699	3.651	3.652
Mississippi	3.826	3.828	3.793	3.738	3.678	3.644	3.596	3.593	3.730	3.696	3.687	3.614	3.709	3.718
Missouri	3.837	3.838	3.822	3.801	3.731	3.741	3.737	3.701	3.697	3.775	3.691	3.697	3.656	3.641
Montana	3.832	3.831	3.805	3.802	3.704	3.624	3.679	3.703	3.769	3.760	3.743	3.802	3.813	3.793
Nebraska	3.831	3.836	3.813	3.744	3.654	3.621	3.612	3.638	3.648	3.650	3.627	3.652	3.626	3.652
Nevada	3.808	3.833	3.818	3.774	3.707	3.742	3.718	3.749	3.626	3.631	3.760	3.722	3.753	3.804
New Hampshire	3.836	3.831	3.779	3.709	3.714	3.694	3.767	3.789	3.741	3.779	3.803	3.811	3.811	3.783
New Jersey	3.799	3.796	3.679	3.585	3.566	3.491	3.552	3.638	3.565	3.556	3.542	3.738	3.709	3.728
New Mexico	3.818	3.819	3.762	3.669	3.623	3.778	3.553	3.513	3.776	3.811	3.802	3.795	3.781	3.781
New York	3.834	3.833	3.793	3.756	3.696	3.757	3.795	3.788	3.742	3.750	3.779	3.771	3.767	3.722
North Carolina	3.825	3.826	3.775	3.665	3.660	3.640	3.677	3.681	3.667	3.680	3.691	3.739	3.746	3.709
North Dakota	3.829	3.829	3.818	3.804	3.674	3.581	3.664	3.662	3.680	3.607	3.687	3.739	3.683	3.698
Ohio	3.816	3.814	3.752	3.717	3.549	3.486	3.638	3.624	3.693	3.650	3.626	3.594	3.664	3.623
Oklahoma	3.827	3.829	3.795	3.767	3.607	3.553	3.639	3.617	3.643	3.660	3.632	3.659	3.568	3.520
Oregon	3.813	3.839	3.808	3.719	3.698	3.641	3.627	3.631	3.674	3.770	3.741	3.796	3.651	3.789
Pennsylvania	3.816	3.816	3.744	3.667	3.613	3.585	3.643	3.725	3.737	3.690	3.714	3.660	3.656	3.619
Rhode Island	3.832	3.826	3.758	3.658	3.680	3.715	3.719	3.743	3.729	3.703	3.689	3.755	3.756	3.709
South Carolina	3.830	3.830	3.790	3.739	3.705	3.730	3.727	3.715	3.649	3.636	3.710	3.739	3.767	3.717
South Dakota	3.837	3.837	3.820	3.786	3.705	3.709	3.667	3.733	3.740	3.753	3.689	3.738	3.676	3.698
Tennessee	3.829	3.826	3.819	3.804	3.732	3.713	3.738	3.755	3.735	3.723	3.704	3.764	3.738	3.722
Texas	3.794	3.796	3.678	3.618	R 3.675	3.551	3.578	3.592	3.568	3.559	3.543	3.555	3.537	3.535
Utah	3.825	3.835	3.817	3.711	3.629	3.652	3.649	3.531	3.592	3.684	3.679	3.816	3.796	3.753
Vermont	3.827	3.831	3.798	3.775	3.725	3.804	3.817	3.791	3.788	3.789	3.801	3.812	3.811	3.794
Virginia	3.827	3.831	3.786	3.723	3.709	3.659	3.694	3.735	3.707	3.748	3.708	3.766	3.784	3.753
Washington	3.827	3.834	3.809	3.740	3.701	3.588	3.630	3.675	3.580	3.583	3.740	3.764	3.757	3.806
West Virginia	3.811	3.805	3.699	3.616	3.570	3.525	3.572	3.559	3.656	3.774	3.738	3.758	3.773	3.748
Wisconsin	3.826	3.832	3.816	3.768	3.713	3.715	3.746	3.750	3.715	3.732	3.725	3.751	3.715	3.713
Wyoming	3.821	3.817	3.781	3.745	3.655	3.557	3.635	3.599	3.630	3.707	3.734	3.743	3.780	3.745
U.S. Average	3.810	3.810	3.731	3.671	3.669	3.584	3.630	3.641	3.610	3.604	3.588	3.610	3.591	3.589

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Table B17. Approximate Heat Content of Hydrocarbon Gas Liquids Total Consumption, 2006-2018

(Million Btu per Barrel)

State	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	3.721	3.674	3.747	3.754	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Alaska	3.803	3.806	3.828	3.786	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Arizona	3.763	3.729	3.751	3.746	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Arkansas	3.694	3.666	3.718	3.699	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
California	3.736	3.766	3.724	3.660	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840
Colorado	3.615	3.657	3.789	3.798	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Connecticut	3.598	3.635	3.830	3.824	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Delaware	3.715	3.754	3.773	3.774	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
District of Columbia	3.707	3.650	3.733	3.704	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Florida	3.712	3.729	3.755	3.763	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Georgia	3.673	3.678	3.712	3.691	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Hawaii	3.804	3.779	3.838	3.820	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Idaho	3.756	3.726	3.777	3.804	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Illinois	3.541	3.528	3.567	3.513	3.367	3.345	3.321	3.450	3.330	3.292	3.277	3.288	3.321
Indiana	3.684	3.689	3.767	3.708	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Iowa	3.516	3.523	3.520	3.480	3.365	3.352	3.386	3.379	3.383	3.335	3.338	3.342	3.403
Kansas	3.826	3.454	3.793	3.770	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Kentucky	3.522	3.504	3.516	3.497	3.840	3.840	3.840	3.792	3.261	3.238	3.226	3.164	3.164
Louisiana	3.531	3.531	3.434	3.358	R 3.278	R 3.232	R 3.231	R 3.262	R 3.204	R 3.230	R 3.210	R 3.197	3.197
Maine	3.764	3.795	3.831	3.824	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Maryland	3.719	3.738	3.780	3.772	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Massachusetts	3.705	3.722	3.816	3.819	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Michigan	3.717	3.727	3.803	3.797	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Minnesota	3.650	3.642	3.683	3.626	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Mississippi	3.681	3.711	3.760	3.755	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Missouri	3.669	3.637	3.761	3.733	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Montana	3.785	3.740	3.794	3.835	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Nebraska	3.607	3.646	3.720	3.638	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Nevada	3.788	3.783	3.738	3.731	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
New Hampshire	3.755	3.788	3.810	3.807	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
New Jersey	3.725	3.716	3.769	3.784	3.837	3.837	3.837	3.837	3.837	3.837	3.837	3.837	3.837
New Mexico	3.775	3.525	3.787	3.807	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
New York	3.738	3.765	3.799	3.804	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
North Carolina	3.678	3.676	3.741	3.708	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
North Dakota	3.684	3.658	3.729	3.681	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Ohio	3.613	3.700	3.766	3.742	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840
Oklahoma	3.488	3.746	3.762	3.774	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Oregon	3.774	3.751	3.698	3.694	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Pennsylvania	3.603	3.607	3.585	3.573	3.838	3.838	3.839	3.839	3.839	3.839	3.839	3.839	3.839
Rhode Island	3.682	3.716	3.743	3.729	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
South Carolina	3.702	3.722	3.753	3.720	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
South Dakota	3.682	3.686	3.737	3.703	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Tennessee	3.704	3.712	3.764	3.799	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Texas	3.496	3.485	3.476	3.405	R 3.385	R 3.280	R 3.351	R 3.384	R 3.346	R 3.405	R 3.349	R 3.323	3.289
Utah	3.721	3.701	3.783	3.788	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Vermont	3.765	3.795	3.807	3.821	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Virginia	3.722	3.748	3.782	3.778	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Washington	3.798	3.784	3.712	3.726	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
West Virginia	3.723	3.741	3.759	3.780	3.837	3.837	3.837	3.837	3.837	3.837	3.837	3.836	3.837
Wisconsin	3.701	3.701	3.781	3.754	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
Wyoming	3.689	3.748	3.771	3.809	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
U.S. Average	3.551	3.544	3.549	3.487	3.489	3.421	3.440	3.468	3.439	3.462	3.423	3.401	3.380

– – = Not applicable.
Where shown, R = Revised data.
Sources: See source listing at the end of this appendix.

Thermal Conversion Factor Source Documentation

The heat content per unit of physical unit (i.e., thermal conversion factors) provided in this section represents the gross (or higher or upper) energy content of the fuel. Gross heat content is applied in all Btu calculations for the State Energy Data System and is commonly used in energy calculations in the United States; net (or lower) heat content is typically used in European energy calculations. See "Heat Content" and "British Thermal Unit (Btu)" in the Glossary for more information.

Approximate Heat Content of Petroleum and Natural Gas Plant Liquids

Asphalt. EIA adopted the thermal conversion factor of 6.636 million British thermal units (Btu) per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956*.

Aviation gasoline. EIA adopted the Bureau of Mines thermal conversion factor of 5.048 million Btu per barrel for "Gasoline, Aviation" as published by the Texas Eastern Transmission Corporation in Appendix V of *Competition and Growth in American Energy Markets 1947-1985*, a 1968 release of historical and projected statistics.

Aviation gasoline blending components. Assumed by EIA to be 5.048 million Btu per barrel or equal to the thermal conversion factor of aviation gasoline. See **aviation gasoline**.

Butylene. EIA estimated the thermal conversion factor to be 4.377 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute.

Crude oil (including lease condensate) used directly. EIA adopted the thermal conversion factor of 5.800 million Btu per barrel as reported in a Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."

Distillate fuel oil. (DFTCKUS)

- 1960 through 1993: EIA adopted the Bureau of Mines thermal conversion factor of 5.285 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, adopted January 3, 1950."
- 1994 forward: EIA calculates the national annual average thermal conversion factor, which includes biodiesel blended into distillate fuel oil, by using the heat content values of three sulfur-content categories of distillate fuel oil, weighted by quantity consumed.

Ethane. EIA estimated the thermal conversion factor to be 2.783 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute.

Ethylene. EIA adopted the thermal conversion factor of 2.436 million Btu per barrel (0.058 million Btu per gallon) as published in the Federal Register EPA; 40 CFR Part 98; e-CRF; Table C1; April 5, 2019, http://www.ecfr.gov/cgi-bin/text-idx?SID=ae265d7d6f98ec86fcd8640b9793a3f6&mc=true&node=pt40.23.98&rgn=div5#ap40.23.98_19.1. The ethylene higher heating value is determined at 41 degrees Fahrenheit at saturation pressure.

Hydrocarbon gas liquids. (HLTCKUS and HLTCKZZ)

- 1960 through 2009: Calculated using consumption-weighted average of liquefied petroleum gases (LPG) and natural gasoline (pentanes plus).
- 2010 forward: Calculated using consumption-weighted average of nine HGL products: normal butane, butylene, ethane, ethylene, isobutane, isobutylene, natural gasoline, propane, and propylene.

Isobutane. EIA estimated the thermal conversion factor to be 4.183 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum

Institute.

Isobutylene. EIA estimated the thermal conversion factor to be 4.355 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, NIST Chemistry WebBook, *NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute.

Jet fuel, kerosene type. EIA adopted the Bureau of Mines thermal conversion factor of 5.670 million Btu per barrel for "Jet Fuel, Commercial" as published by the Texas Eastern Transmission Corporation in Appendix V of *Competition and Growth in American Energy Markets 1947-1985*, a 1968 release of historical and projected statistics.

Jet fuel, naphtha type. EIA adopted the Bureau of Mines thermal conversion factor of 5.355 million Btu per barrel for "Jet Fuel, Millitary" as published by the Texas Eastern Transmission Corporation in Appendix V of *Competition and Growth in American Energy Markets 1947-1985*, a 1968 release of historical and projected statistics.

Kerosene. EIA adopted the thermal conversion factor of 5.670 million Btu per barrel as reported in a Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950."

Liquefied petroleum gases. (LGTCKUS)

- 1960 through 1966: EIA adopted the 1967 calculated average heat content of 3.810 million Btu per barrel
- 1967 through 2009: Calculated annually by EIA as a weighted average by multiplying the quantity consumed of each of the component products by each product's conversion factor, listed in this appendix, and dividing the sum of those heat contents by the sum of the quantities consumed. The component products are ethane (including ethylene), propane (including propylene), normal butane (including butylene), butane-propane mixtures, ethane-propane mixtures, and isobutane. Quantities consumed are from: EIA, *Energy Data Reports*, "Petroleum Statement, Annual," Table 1 (1967 through 1980), EIA, *Petroleum Supply Annual*, Table 2 (1981 through 2004), and EIA, *Petroleum Supply Annual*, Table 1 (2005 forward).

Lubricants. EIA adopted the thermal conversion factor of 6.065 million Btu per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956*.

Miscellaneous products. EIA adopted the thermal conversion factor of 5.796 million Btu per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956*.

Motor gasoline. (MGTCKUS)

- 1960 through 1992: EIA adopted the Bureau of Mines thermal conversion factor of 5.253 million Btu per barrel for "Gasoline, Motor Fuel" as published by the Texas Eastern Transmission Corporation in Appendix V of *Competition and Growth in American Energy Markets 1947-1985*, a 1968 release of historical and projected statistics. The factor excludes oxygenates.
- 1993 forward: EIA calculates national annual average thermal conversion factor, which includes fuel ethanol blended into motor gasoline (shown in Appendix B Table B1 on page 185). For 1993-2006, it also includes methyl tertiary butyl ether (MTBE) and other oxygenates blended into motor gasoline.

Motor gasoline blending components. (MBTCKUS)

- 1960 through 2006: EIA adopted the Bureau of Mines thermal conversion factor of 5.253 million Btu per barrel for "Gasoline, Motor Fuel" as published by the Texas Eastern Transmission Corporation in Appendix V of Competition and Growth in American Markets 1947-1985, a 1968 release of historical and projected statistics.
- 2007 forward: EIA adopted the thermal conversion factor of 5.222 million Btu per barrel (124,340 Btu per gallon) for gasoline blendstock from U.S. Department of Energy, Argonne National Laboratory, "The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model" (GREET), version GREET1_2013, October 2013.

Natural gasoline. EIA estimated the thermal conversion factor to be 4.638 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute. EIA assumes a natural gasoline ratio of 29% isopentane, 29% neopentane, 20% normal pentane, 13% normal hexane, 4% cyclohexane, 3% benzene, and 2% toluene in these calculations.

Normal butane. EIA estimated the thermal conversion factor to be 4.353 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook,*

NIST Standard Reference Database Number 69, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute.

Pentanes plus. EIA estimated the thermal conversion factor to be 4.638 million Btu per barrel. based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute. EIA assumes a pentanes plus ratio of 29% isopentane, 29% neopentane, 20% normal pentane, 13% normal hexane, 4% cyclohexane, 3% benzene, and 2% toluene in these calculations, see **natural gasoline**.

Petrochemical feedstocks, naphtha less than 401°F. EIA assumed the thermal conversion factor to be 5.248 million Btu per barrel, equal to that for special naphthas. See **special naphthas**.

Petrochemical feedstock, other oils equal to or greater than 401°F. EIA assumed the thermal conversion factor to be 5.825 million Btu per barrel, equal to that for distillate fuel oil. See **distillate fuel oil**.

Petrochemical feedstock, still gas. Assumed by EIA to be 6.000 million Btu per barrel, equal to the thermal conversion factor for still gas. See **still gas**.

Petroleum coke, catalyst. (PCCTKUS)

- 1960 through 2003: EIA adopted the Bureau of Mines thermal conversion factor of 6.024 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."
- 2004 forward: Assumed by EIA to be 6.287 million Btu per barrel or equal to the thermal conversion factor for residual fuel oil.

Petroleum coke, marketable. (PCMKKUS)

- 1960 through 2003: EIA adopted the Bureau of Mines thermal conversion factor of 6.024 million Btu per barrel, from the Bureau of Mines internal memorandum "Bureau of Mines Standard Average Heating Value of Various Fuels, Adopted January 3, 1950."
- 2004 forward: EIA adopted the thermal conversion factor of 5.719 million Btu per barrel, calculated by dividing 28,595,925 Btu per short ton for petroleum coke (from U.S. Department of Energy, Argonne National Laboratory, "The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model" (GREET), version GREET1_ October 2013) by 5.0 barrels per short ton (as given in the Bureau of Mines Form 6-1300-M and successor EIA forms).

Plant condensate. (1973—1983) EIA estimated 5.418 million Btu per barrel from data provided by McClanahan Consultants, Inc., Houston, Texas.

Propane. EIA estimated the thermal conversion factor to be 3.841 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute.

Propylene. EIA estimated the thermal conversion factor to be 3.835 million Btu per barrel, based on data for enthalpy of combustion from the National Institute of Standards and Technology, *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, 2018; and data for density of liquids at 60 degrees Fahrenheit and equilibrium pressure from the American Petroleum Institute.

Residual fuel oil. EIA adopted the thermal conversion factor of 6.287 million Btu per barrel as reported in a Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950."

Road oil. EIA adopted the Bureau of Mines thermal conversion factor of 6.636 million Btu per barrel, equal to that of asphalt and first published by the Bureau of Mines in the *Petroleum Statement, Annual, 1970*. See **asphalt**.

Special naphthas. EIA adopted the Bureau of Mines thermal conversion factor of 5.248 million Btu per barrel, equal to that of total gasoline (aviation and motor) and first published in the *Petroleum Statement, Annual, 1970*.

Still gas.

- 1960 through 2015: EIA adopted the Bureau of Mines estimated thermal conversion factor of 6.000 million Btu per barrel, first published in the *Petroleum Statement, Annual*, 1970.
- 2016 forward: Assumed by EIA to be 6.287 million Btu per barrel or equal to the thermal conversion factor for residual fuel oil.

Unfinished oil. EIA assumed the thermal conversion factor to be 5.825 million Btu per barrel, equal to that for distillate fuel oil and first published in the Annual Report to Congress, Volume 3, 1977. See **distillate fuel oil**.

Unfractionated streams. (1979—1982) EIA assumed the thermal conversion factor to be 3.800 million Btu per barrel, the average of all natural gas plant

liquids calculated on their contribution to total barrels produced.

Waxes. EIA adopted the thermal conversion factor of 5.537 million Btu per barrel as estimated by the Bureau of Mines and first published in the EIA, *Petroleum Statement, Annual, 1956*.

Approximate Heat Content of Natural Gas

Natural gas, total consumption. (NGTCKZZ)

- 1960 through 1962: EIA adopted the thermal conversion factor of 1,035 Btu per cubic foot as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956*.
- 1963 through 1979: EIA adopted the thermal conversion factors calculated annually by the American Gas Association (AGA) and published in *Gas Facts*, an AGA annual.
- 1980 through 1996: EIA, *Historical Natural Gas Annual 1930 Through 2000*, Table 16.
- 1997 forward: EIA, *Natural Gas Annual*, Table 16, http://www.eia.gov/naturalgas/annual/ and unpublished revisions. Data from 2007 forward are also available at http://www.eia.gov/dnav/ng/ng_cons_heat_a_EPG0_VGTH_btucf_a.htm.

Natural gas, consumption by the electric power sector. (NGEIKZZ)

- 1960 through 1971: Assumed by EIA to be equal to the thermal conversion factor for the consumption of natural gas by all users. See **natural gas, total consumption.**
- 1972 through 1982: Calculated annually by EIA by dividing the total heat content of natural gas received at steam electric plants 25 megawatts or greater by the total quantity received at those electric plants. The heat contents and quantities received are from the Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."
- 1983 through 1988: The average heat content of natural gas received at steam electric plants 50 megawatts capacity or larger from FERC Form 423 and published from 1993 forward in Btu per cubic foot in the EIA, *Cost and Quality of Fuels for Electric Utility Plants*, Table 14. Note: For states that reported consumption on EIA-759 but were not large enough to report on FERC Form 423, factors were estimated by using previous years' factors or the factor for total natural gas consumption in the state.
- 1989 forward: Calculated by dividing the total heat content of natural gas received at electric power plants (including electric utilities and independent power producers) by the total quantity consumed in physical units collected by EIA on Form EIA-923, "Power Plant Operations Report," and predecessor forms, https://www.eia.gov/

electricity/data/eia923/.

Approximate Heat Content of Coal and Coal Coke

Coal, consumption at coke plants. (CLKCKZZ)

- 1960 through 1997: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS—Anthracite conversion factor (for all end-use sectors) sources: 1960 through 1997: Calculated annually by EIA by dividing the heat content of anthracite produced less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumption by all sectors other than the electric utility sector less the quantity of anthracite stock changes, losses, and "unaccounted for." Bituminous coal and lignite conversion factor sources: 1960 through 1972: U.S. Department of the Interior, Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite," sum of columns "Beehive coke plants" and "Ovencoke plants." 1973 through 1984: EIA, *Weekly Coal Production*, August 9, 1986, Table 8. 1985 through 1987: EIA, *Weekly Coal Production*, July 16, 1988, Table 7. 1988 through 1997: EIA, Unpublished data from Form EIA-5.
- 1998 through 2000: Average total coal factors by state calculated by EIA using unpublished data from Form EIA-5. The 1998 state factors are used for 1999 and 2000.
- 2001 forward: Calculated by EIA from data reported on Form EIA-5, "Quarterly Coal Consumption and Quality Report, Coke Plants" (through 2013) and Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users," after Form EIA-5 was folded into Form EIA-3 in 2014. Coke plant data on tons of coal carbonized to create coke, the volatilities of the coal carbonized, and conversion factors based on coal volatility are used to calculate average conversion factors by state.

Coal, consumption by the electric power sector. (CLEIKZZ)

- 1960 through 1988: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS—Anthracite conversion factor sources: 1960 through

1972: U.S. Energy Information Administration (EIA) assumed that all anthracite consumed at electric utilities was recovered from culm banks and river dredging and was estimated to have an average heat content of 17.500 million Btu per short ton. 1973 through 1988: Calculated annually by EIA by dividing the heat content of anthracite receipts at electric utilities by the quantity of anthracite received at electric utilities. These data are reported on the Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," and predecessor forms. Bituminous coal and lignite conversion factor sources: 1960 through 1972: EIA adopted the average thermal conversion factor of the Bureau of Mines, which used the National Coal Association (NCA) average thermal conversion factor for electric utilities calculated from the Federal Power Commission's (FPC) Form 1 and published in *Steam Electric Plant Factors*, an NCA annual report. The specific tables are: 1960 and 1961, Table 1. 1962 through 1972, Table 2. 1973 through 1982: The average heat content of coal received at steam electric plants 25 megawatts or greater from FPC Form 423 and published in Btu per pound in EIA, *Cost and Quality of Fuels for Electric Utility Plants*, tables titled "Destination and Origin of Coal 'Delivered to' (1973-1979) 'Receipts to' (1980) 'Received at' (1981-1982) Steam-Electric Plants 25-MW or Greater." 1983 through 1988: The average heat content of coal received at steam electric plants 50 megawatts capacity or larger from FERC Form 423 and published in Btu per pound in the EIA, *Cost and Quality of Fuels for Electric Utility Plants*. The specific tables are: 1983 and 1984, Table 58. 1985 through 1988, Table 48.

Notes: The state conversion factors for 1960 through 1972 were derived from actual consumption data, while the conversion factors for 1973 to 1988 were based on receipts of coal. The factors for 1960 through 1972 may also have included some quantities of anthracite. These breaks in the series create some data discrepancies. In instances where a state had no receipts for a particular year but did report consumption, it was assumed that the coal received in one year was consumed during the following year and the Btu value of the previous year's receipts was used.

- 1989 forward: Calculated by dividing the total heat content of coal received at electric power plants (including electric utilities, nonutility power plants, and combined heat-and-power plants) by the total quantity consumed in physical units collected on Form EIA-923, "Power Plant Operations Report," and predecessor forms, https://www.eia.gov/electricity/data/eia923/.
- Alaska factors: The sources used to develop thermal conversion factors for bituminous coal and lignite consumed by the electric power sector—the National Coal Association report and the Federal Power Commission's (FPC) Form 423 and FERC Form 423 published in the *Cost and Quality of Fuels for Electric Utility Plants*—exclude Alaska. However, Alaska reported consumption of bituminous coal and lignite at electric utilities for all years, 1960 forward. Unpublished FPC heat rates for coal at electric utilities in Alaska were used for 1960 through 1972. The 1972 conversion factor (the last year for which a conversion factor was reported for Alaska) was used for 1973 through 1978. According to industry sources, new mines were opened in 1978 and a more representative factor was used for 1979 through 1997. From 1998 forward, the Alaska factor is calculated using the same methodology as is used for other states, described above.

Coal, consumption by other industrial users. (CLOCKZZ)

- 1960 through 1997: Calculated by EIA as the consumption-weighted average of national level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS—Anthracite conversion factor sources: 1960 through 1997: Calculated annually by EIA by dividing the heat content of anthracite produced less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumption by all sectors other than the electric utility sector less the quantity of anthracite stock changes, losses, and "unaccounted for." Bituminous coal and lignite conversion factor sources: 1960 through 1973: Estimated by EIA by adjusting the 1974 average heat value of bituminous coal and lignite consumed by industrial users other than coke plants by the ratios of 1960 through 1973 national averages for the other industrial users to its 1974 average. 1974 through 1997: Calculated by EIA by assuming that the bituminous coal and lignite consumed by industrial users other than coke plants in each state contained heating values equal to those of bituminous coal and lignite received at electric utilities in each state from identified coal-producing districts as reported on Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." The average Btu content of coal delivered from each coal-producing district was applied to deliveries to other industrial users in each State and the sum total of

the heat content was divided by total tonnages, yielding a weighted average. The coal distribution data by coal-producing district are reported on Form EIA-6, "Coal Distribution Report," and predecessor Bureau of Mines Form 6-1419-Q.

- 1998 through 2000: The average heat content of coal received at manufacturing plants (other than coke plants) consuming more than 1,000 short tons of coal during the year from Form EIA-3A and published in Btu per pound in the EIA *Annual Coal Report* and predecessor publications.
- 2001 forward: Calculated by EIA using unpublished data as the average heat content of (1) coal received at manufacturing plants (other than coke plants) consuming more than 1,000 short tons of coal annually from Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users," and predecessor forms; (2) coal distributed to agricultural, mining, and construction sectors reported on Form EIA-6A, "Coal Distribution Report—Annual" with heat contents for the coal producing state reported on FERC Form 423 and Form EIA-423, "Monthly Cost and Quality of Fuels for Electric Plants" (discontinued after 2007); and (3) coal consumed by coal mining facilities reported on Form EIA-7A, "Coal Production Report," with heat contents for the coal producing state reported on Form EIA-923, "Power Plant Operations Report," and predecessor forms.

Coal, consumption by residential and commercial users. (CLHCKZZ)

- 1960 through 1997: Calculated by EIA as the consumption-weighted average of national-level anthracite conversion factors and state-level bituminous coal and lignite factors using factors and consumption from SEDS—Anthracite conversion factor sources: 1960 through 1997: Calculated annually by EIA by dividing the heat content of anthracite produced less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumption by all sectors other than the electric utility sector less the quantity of anthracite stock changes, losses, and "unaccounted for." Bituminous coal and lignite conversion factor sources: 1960 through 1973: Estimated by EIA by adjusting the 1974 average heat value of bituminous coal and lignite consumed in the residential and commercial sector by the ratios of 1960 through 1973 national averages for the sector to its 1974 average. 1974 through 1997: Calculated by EIA by assuming that the bituminous coal and lignite consumed in the residential and commercial sector in each state contained heating values equal to those of bituminous coal and lignite received at electric utilities in each state from identified coal-producing districts as reported on the Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." The average Btu content of coal delivered from each coal-producing district was applied to deliveries to the residential and commercial sector in each state and the sum total of the heat content was divided by total tonnages, yielding a weighted average. The coal distribution data by coal-producing district are reported on Form EIA-6, "Coal Distribution Report," and predecessor Bureau of Mines Form 6-1419-Q.
- 1998 through 2000: The average heat content of coal received for the residential and commercial sectors as reported on Form EIA-860. For states that are not represented in data on Form EIA-860, it is assumed that the heat content of the coal receipts in theses sectors is equal to the heat content of coal received in the other industrial sector. For states that are not represented in either the Form EIA-3A data or the Form EIA-860 data (CT, NH, VT, and DC), the heat content of coal receipts in MA is used for CT, NH, and VT, and the heat content of coal receipts in MD is used for DC, because the origin of the coal receipts are similar.
- 2001 through 2007: Calculated by EIA from the coal distribution data reported on Form EIA-6A, "Coal Distribution Report—Annual," and the average heat content of coal reported on FERC Form 423 and Form EIA-423, "Monthly Cost and Quality of Fuels for Electric Plants." Form EIA-6A provides distribution data for the combined residential and commercial sectors by state of origin to the destination state. FERC Form 423 and Form EIA-423 provide the average heat content of coal produced in the state of origin.
- 2008 forward: Calculated by EIA using unpublished data as the average heat content of coal received at commercial and institutional establishments consuming more than 1,000 short tons of coal annually from Form EIA-3, "Quarterly Survey of Industrial, Commercial & Institutional Coal Users."

Coal, consumption by transportation users. (CLACKZZ)

- 1960 through 1977: Assumed by EIA to be equal to the Btu conversion factor for bituminous coal and lignite consumption by industrial users

other than coke plants: 1960 through 1973: Estimated by EIA by adjusting the 1974 average heat value of bituminous coal and lignite consumed by industrial users other than coke plants by the ratios of 1960 through 1973 national averages for the other industrial users to its 1974 average. 1974 through 1977: Calculated by EIA by assuming that the bituminous coal and lignite consumed by industrial users other than coke plants in each state contained heating values equal to those of bituminous coal and lignite received at electric utilities in each state from identified coal-producing districts as reported on Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." The average Btu content of coal delivered from each coal-producing district was applied to deliveries to other industrial users in each state and the sum total of the heat content was divided by total tonnages, yielding a weighted average. The coal distribution data by coal-producing district are reported on Form EIA-6, "Coal Distribution Report," and predecessor Bureau of Mines Form 6-1419-Q.

- 1978 forward: Transportation sector coal is included in the other industrial category. Zero is entered for this variable.

Coal coke, imports and exports. EIA adopted the Bureau of Mines estimate of 24.800 million Btu per short ton.

Approximate Heat Content of Renewable Energy Sources

Biodiesel. EIA estimated the thermal conversion factor for biodiesel to be 5.359 million Btu per barrel, published in EIA's *Monthly Energy Review*, Table A1, https://www.eia.gov/totalenergy/data/monthly/pdf/sec12_2.pdf.

Fuel ethanol. EIA adopted the annual denatured fuel ethanol thermal conversion factors in million Btu per barrel published in EIA's *Monthly Energy Review*, Table A3, https://www.eia.gov/totalenergy/data/monthly/pdf/sec12_4.pdf. This factor is calculated by EIA using the 2009 quantity-weighted average of the thermal conversion factors for undenatured ethanol (3.539 million Btu per barrel), natural gasoline used as denaturant (4.638 million Btu per barrel), and conventional motor gasoline used as denaturant (5.253 million Btu per barrel). The undenatured ethanol thermal conversion factor of 3.539 million Btu per barrel is published in "Oxygenate Flexibility for Future Fuels," a paper presented by William J. Piel of the ARCO Chemical Company at the National Conference on Reformulated Gasolines and Clean Air Act Implementation, Washington, D.C., October 1991.

Wood, consumption by the residential and commercial sectors. Estimated by EIA to be 20 million Btu per cord of wood. This rough average factor takes into account a number of variables, such as moisture content and species of wood, as explained in the EIA, *Household Energy Consumption and Expenditures 1993*, page 314.

Approximate Heat Rates for Electricity

Fossil-fueled steam-electric plant generation. (FFETKUS) There is no generally accepted practice for measuring the thermal conversion rates for power plants that generate electricityfrom hydroelectric, biomass fuels, geothermal, solar, and wind energy sources. Therefore, EIA uses data from Form EIA-767 to calculate a rate factor that is equal to the prevailing annual averageheat rate factor for fossil-fueled steam-electric power plants in the United States. By using that factor, it is possible to evaluate fossil fuel requirements for replacing those sources during periods of interruption, such as droughts. The heat content of a kilowatthour of electricity produced, regardless of the generation process, is 3,412 Btu per kilowatthour.

- 1960 through 1988: The weighted annual average heat rate for fossil-fueled steam-electric power plants in the United States, as published by EIA in *Electric Plant Cost and Power Production Expenses 1991*, Table 9.
- 1989 through 2000: Calculated annually by EIA by using heat rate data reported on Form EIA-860, "Annual Electric Generator Report" (and predecessor forms); and net generation data reported on Form EIA-759, "Monthly Power Plant Report." The computation includes data for all electric utility steam-electric plants using fossil fuels.
- 2001 forward: Calculated annually by EIA by using fuel consumption and net generation data reported on Form EIA-923, "Power Plant Operations Report," and predeccessor forms. The computation includes data for all electric utilities and electricity-only independent power producers using fossil fuels.

Nuclear steam-electric plant generation. (NUETKUS)

- 1960 through 1984: Calculated annually by EIA by dividing the total heat content consumed in nuclear generating units by the total (net) electricity generated by nuclear generating units. The heat content and electricity generation data are reported on FERC Form 1, Form EIA-412, and predecessor forms. The factors for 1982 through 1991 are published in the following EIA reports—1982: *Historical Plant Cost and Annual Production Expenses for Selected Electric Plants 1982*, page 215; 1983 and 1984: *Electric Plant Cost and Power Production Expenses 1991*, Table 13.
- 1985 forward: Calculated annually by EIA 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).

Appendix C. Resident Population

The population data used in the U.S. Energy Information Administration State Energy Data System (SEDS) to calculate per capita consumption are shown in Tables C1 through C6. The data are the U.S. Department of Commerce, Census Bureau, resident population estimates by state. The reference date for the estimates is July 1 of each year.

Before 1980, the sum of the state estimates may not match the U.S. estimates. More recent revisions to the U.S. estimates may have been incorporated into the U.S. tables available on the U.S. Census Bureau website that are not included in the state estimates.

Data Sources

TPOPPUS — Resident population estimates of the United States.

- 1960 through 2009: U.S. Department of Commerce, Census Bureau, National Intercensal Tables, http://www.census.gov/programs-surveys/popest/data/tables.All.html.
- 2010 forward: U.S. Department of Commerce, Census Bureau, http://www.census.gov/data/datasets/time-series/demo/popest/2010s-state-total.html.

TPOPPZZ — Resident population estimates by state.

- 1960 through 2009: U.S. Department of Commerce, Census Bureau, State Intercensal Tables, http://www.census.gov/programs-surveys/popest/data/tables.All.html.
- 2010 forward: U.S. Department of Commerce, Census Bureau, http://www.census.gov/data/datasets/time-series/demo/popest/2010s-state-total.html.

Table C1. Resident Population Estimates by State, 1960-1969

(Thousand People)

State	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Alabama	3,274	3,316	3,323	3,358	3,395	3,443	3,464	3,458	3,446	3,440
Alaska	229	238	246	256	263	271	271	278	285	296
Arizona	1,321	1,407	1,471	1,521	1,556	1,584	1,614	1,646	1,682	1,737
Arkansas	1,789	1,806	1,853	1,875	1,897	1,894	1,899	1,901	1,902	1,913
California	15,870	16,497	17,072	17,668	18,151	18,585	18,858	19,176	19,394	19,711
Colorado	1,769	1,844	1,899	1,936	1,970	1,985	2,007	2,053	2,120	2,166
Connecticut	2,544	2,586	2,647	2,727	2,798	2,857	2,903	2,935	2,964	3,000
Delaware	449	461	469	483	497	507	516	525	534	540
District of Columbia	765	778	788	798	798	797	791	791	778	762
Florida	5,004	5,243	5,458	5,628	5,781	5,954	6,104	6,242	6,433	6,641
Georgia	3,956	4,015	4,086	4,172	4,258	4,332	4,379	4,408	4,482	4,551
Hawaii	642	659	684	682	700	704	710	723	734	750
Idaho	671	684	692	683	680	686	689	688	695	707
Illinois	10,086	10,130	10,280	10,402	10,580	10,693	10,836	10,947	10,995	11,039
Indiana	4,674	4,730	4,736	4,799	4,856	4,922	4,999	5,053	5,093	5,143
Iowa	2,756	2,756	2,750	2,747	2,746	2,742	2,762	2,793	2,803	2,805
Kansas	2,183	2,215	2,231	2,217	2,209	2,206	2,200	2,197	2,216	2,236
Kentucky	3,041	3,054	3,079	3,096	3,129	3,140	3,147	3,172	3,195	3,198
Louisiana	3,260	3,287	3,345	3,377	3,446	3,496	3,550	3,581	3,603	3,619
Maine	975	995	994	993	993	997	999	1,004	994	992
Maryland	3,113	3,176	3,263	3,386	3,492	3,600	3,695	3,757	3,815	3,868
Massachusetts	5,160	5,219	5,263	5,344	5,448	5,502	5,535	5,594	5,618	5,650
Michigan	7,834	7,893	7,933	8,058	8,187	8,357	8,512	8,630	8,696	8,781
Minnesota	3,425	3,470	3,513	3,531	3,558	3,592	3,617	3,659	3,703	3,758
Mississippi	2,182	2,206	2,243	2,244	2,241	2,246	2,245	2,228	2,219	2,220
Missouri	4,326	4,349	4,357	4,392	4,442	4,467	4,523	4,539	4,568	4,640
Montana	679	696	698	703	706	706	707	701	700	694
Nebraska	1,417	1,446	1,464	1,476	1,482	1,471	1,456	1,457	1,467	1,474
Nevada	291	315	352	397	426	444	446	449	464	480
New Hampshire	609	618	632	649	663	676	681	697	709	724
New Jersey	6,103	6,265	6,376	6,531	6,660	6,767	6,851	6,928	7,005	7,095
New Mexico	954	965	979	989	1,006	1,012	1,007	1,000	994	1,011
New York	16,838	17,061	17,301	17,461	17,589	17,734	17,843	17,935	18,051	18,105
North Carolina	4,573	4,663	4,707	4,742	4,802	4,863	4,896	4,952	5,004	5,031
North Dakota	634	641	637	644	649	649	647	626	621	621
Ohio	9,734	9,854	9,929	9,986	10,080	10,201	10,330	10,414	10,516	10,563
Oklahoma	2,336	2,380	2,427	2,439	2,446	2,440	2,454	2,489	2,503	2,535
Oregon	1,772	1,787	1,818	1,853	1,888	1,937	1,969	1,979	2,004	2,062
Pennsylvania	11,329	11,392	11,355	11,424	11,519	11,620	11,664	11,681	11,741	11,741
Rhode Island	855	858	871	876	885	893	899	909	922	932
South Carolina	2,392	2,409	2,423	2,460	2,475	2,494	2,520	2,533	2,559	2,570
South Dakota	683	693	705	708	701	692	683	671	669	668
Tennessee	3,575	3,622	3,673	3,718	3,771	3,798	3,822	3,859	3,878	3,897
Texas	9,624	9,820	10,053	10,159	10,270	10,378	10,492	10,599	10,819	11,045
Utah	900	936	958	974	978	991	1,009	1,019	1,029	1,047
Vermont	389	390	393	397	399	404	413	423	430	437
Virginia	3,986	4,095	4,180	4,276	4,357	4,411	4,456	4,508	4,558	4,614
Washington	2,855	2,882	2,942	2,955	2,961	2,967	3,057	3,174	3,270	3,343
West Virginia	1,853	1,828	1,809	1,796	1,797	1,786	1,775	1,769	1,763	1,746
Wisconsin	3,962	4,009	4,049	4,112	4,165	4,232	4,274	4,303	4,345	4,378
Wyoming	331	337	333	336	339	332	323	322	324	329
United States	180,671	183,691	186,538	189,242	191,889	194,303	196,560	198,712	200,706	202,677

Where shown, R = Revised data.
Source: See first page of this appendix.

Table C2. Resident Population Estimates by State, 1970-1979

(Thousand People)

State	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Alabama	3,451	3,497	3,539	3,580	3,626	3,679	3,735	3,780	3,832	3,866
Alaska	304	316	324	331	341	376	401	403	405	403
Arizona	1,792	1,896	2,008	2,124	2,223	2,285	2,346	2,425	2,515	2,636
Arkansas	1,932	1,972	2,019	2,059	2,101	2,160	2,170	2,209	2,243	2,271
California	20,007	20,346	20,585	20,869	21,174	21,538	21,936	22,352	22,836	23,257
Colorado	2,223	2,304	2,405	2,496	2,541	2,586	2,632	2,696	2,767	2,849
Connecticut	3,041	3,061	3,069	3,068	3,074	3,082	3,083	3,086	3,092	3,096
Delaware	551	565	573	578	581	587	590	592	595	595
District of Columbia	756	750	742	731	718	707	692	677	665	650
Florida	6,848	7,158	7,511	7,914	8,299	8,518	8,667	8,856	9,102	9,426
Georgia	4,607	4,712	4,809	4,910	4,999	5,064	5,133	5,220	5,296	5,401
Hawaii	774	802	828	852	868	886	904	918	932	953
Idaho	718	739	763	782	808	832	857	883	911	933
Illinois	11,128	11,202	11,252	11,251	11,262	11,292	11,343	11,386	11,413	11,397
Indiana	5,202	5,253	5,302	5,338	5,362	5,366	5,389	5,426	5,470	5,501
Iowa	2,832	2,852	2,860	2,864	2,868	2,881	2,903	2,914	2,918	2,916
Kansas	2,249	2,247	2,256	2,266	2,269	2,281	2,301	2,321	2,336	2,351
Kentucky	3,231	3,298	3,336	3,371	3,416	3,468	3,529	3,574	3,610	3,642
Louisiana	3,652	3,710	3,762	3,788	3,820	3,886	3,951	4,014	4,069	4,138
Maine	997	1,015	1,034	1,046	1,059	1,072	1,088	1,104	1,114	1,123
Maryland	3,938	4,018	4,073	4,098	4,119	4,139	4,151	4,170	4,184	4,191
Massachusetts	5,706	5,738	5,760	5,781	5,774	5,758	5,744	5,738	5,736	5,738
Michigan	8,890	8,974	9,029	9,078	9,118	9,118	9,129	9,171	9,218	9,266
Minnesota	3,815	3,853	3,870	3,889	3,904	3,933	3,965	3,989	4,015	4,050
Mississippi	2,220	2,265	2,307	2,350	2,378	2,399	2,430	2,459	2,488	2,507
Missouri	4,688	4,726	4,759	4,783	4,796	4,808	4,839	4,863	4,889	4,912
Montana	698	711	719	727	736	748	757	770	782	787
Nebraska	1,488	1,505	1,519	1,530	1,539	1,543	1,551	1,557	1,564	1,567
Nevada	493	520	547	569	597	620	647	678	719	765
New Hampshire	742	762	781	801	816	829	845	870	892	909
New Jersey	7,193	7,281	7,335	7,333	7,332	7,338	7,340	7,337	7,351	7,367
New Mexico	1,023	1,054	1,079	1,106	1,131	1,160	1,189	1,216	1,238	1,285
New York	18,268	18,358	18,339	18,177	18,050	18,003	17,941	17,813	17,681	17,584
North Carolina	5,098	5,204	5,301	5,390	5,471	5,547	5,608	5,686	5,759	5,823
North Dakota	620	627	631	633	635	639	646	650	651	653
Ohio	10,664	10,735	10,747	10,767	10,766	10,770	10,753	10,771	10,796	10,798
Oklahoma	2,567	2,619	2,659	2,696	2,735	2,775	2,827	2,870	2,917	2,975
Oregon	2,101	2,151	2,197	2,242	2,285	2,330	2,378	2,447	2,518	2,588
Pennsylvania	11,813	11,886	11,908	11,891	11,871	11,906	11,897	11,894	11,879	11,888
Rhode Island	951	963	975	976	951	943	946	950	952	950
South Carolina	2,597	2,662	2,719	2,777	2,845	2,902	2,944	2,992	3,044	3,090
South Dakota	668	671	677	679	680	681	686	688	689	688
Tennessee	3,937	4,014	4,095	4,147	4,214	4,276	4,347	4,423	4,486	4,560
Texas	11,236	11,510	11,759	12,020	12,269	12,569	12,904	13,193	13,500	13,888
Utah	1,066	1,101	1,135	1,170	1,200	1,236	1,275	1,320	1,368	1,420
Vermont	446	454	463	468	473	480	485	492	498	505
Virginia	4,659	4,751	4,824	4,901	4,971	5,047	5,122	5,193	5,270	5,308
Washington	3,413	3,448	3,448	3,479	3,550	3,621	3,694	3,776	3,889	4,018
West Virginia	1,751	1,771	1,798	1,806	1,815	1,842	1,880	1,908	1,923	1,942
Wisconsin	4,429	4,462	4,502	4,524	4,546	4,579	4,596	4,627	4,646	4,683
Wyoming	334	340	347	354	366	382	397	413	433	454
United States	205,052	207,661	209,896	211,909	213,854	215,973	218,035	220,239	222,585	225,055

Where shown, R = Revised data.
Source: See first page of this appendix.

Table C3. Resident Population Estimates by State, 1980-1989

(Thousand People)

State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Alabama	3,900	3,919	3,925	3,934	3,952	3,973	3,992	4,015	4,024	4,030
Alaska	405	418	450	488	514	532	544	539	542	547
Arizona	2,738	2,810	2,890	2,969	3,067	3,184	3,308	3,437	3,535	3,622
Arkansas	2,289	2,293	2,294	2,306	2,320	2,327	2,332	2,342	2,343	2,346
California	23,801	24,286	24,820	25,360	25,844	26,441	27,102	27,777	28,464	29,218
Colorado	2,909	2,978	3,062	3,134	3,170	3,209	3,237	3,260	3,262	3,276
Connecticut	3,113	3,129	3,139	3,162	3,180	3,201	3,224	3,247	3,272	3,283
Delaware	595	596	599	605	612	618	628	637	648	658
District of Columbia	638	637	634	632	633	635	638	637	630	624
Florida	9,840	10,193	10,471	10,750	11,040	11,351	11,668	11,997	12,306	12,638
Georgia	5,486	5,568	5,650	5,728	5,835	5,963	6,085	6,208	6,316	6,411
Hawaii	968	978	994	1,013	1,028	1,040	1,052	1,068	1,080	1,095
Idaho	948	962	974	982	991	994	990	985	986	994
Illinois	11,435	11,443	11,423	11,409	11,412	11,400	11,387	11,391	11,390	11,410
Indiana	5,491	5,480	5,468	5,450	5,458	5,459	5,454	5,473	5,492	5,524
Iowa	2,914	2,908	2,888	2,871	2,859	2,830	2,792	2,767	2,768	2,771
Kansas	2,369	2,385	2,401	2,416	2,424	2,427	2,433	2,445	2,462	2,473
Kentucky	3,664	3,670	3,683	3,694	3,695	3,695	3,688	3,683	3,680	3,677
Louisiana	4,223	4,283	4,353	4,395	4,400	4,408	4,407	4,344	4,289	4,253
Maine	1,127	1,133	1,137	1,145	1,156	1,163	1,170	1,185	1,204	1,220
Maryland	4,228	4,262	4,283	4,313	4,365	4,413	4,487	4,566	4,658	4,727
Massachusetts	5,746	5,769	5,771	5,799	5,841	5,881	5,903	5,935	5,980	6,015
Michigan	9,256	9,209	9,115	9,048	9,049	9,076	9,128	9,187	9,218	9,253
Minnesota	4,085	4,112	4,131	4,141	4,158	4,184	4,205	4,235	4,296	4,338
Mississippi	2,525	2,539	2,557	2,568	2,578	2,588	2,594	2,589	2,580	2,574
Missouri	4,922	4,932	4,929	4,944	4,975	5,000	5,023	5,057	5,082	5,096
Montana	789	795	804	814	821	822	814	805	800	800
Nebraska	1,572	1,579	1,582	1,584	1,589	1,585	1,574	1,567	1,571	1,575
Nevada	810	848	882	902	925	951	981	1,023	1,075	1,137
New Hampshire	924	937	948	958	977	997	1,025	1,054	1,083	1,105
New Jersey	7,376	7,407	7,431	7,468	7,515	7,566	7,622	7,671	7,712	7,726
New Mexico	1,309	1,333	1,364	1,394	1,417	1,438	1,463	1,479	1,490	1,504
New York	17,567	17,568	17,590	17,687	17,746	17,792	17,833	17,869	17,941	17,983
North Carolina	5,899	5,957	6,019	6,077	6,164	6,254	6,322	6,404	6,481	6,565
North Dakota	654	660	669	677	680	677	670	661	655	646
Ohio	10,801	10,788	10,757	10,738	10,738	10,735	10,730	10,760	10,799	10,829
Oklahoma	3,041	3,096	3,206	3,290	3,286	3,271	3,253	3,210	3,167	3,150
Oregon	2,641	2,668	2,665	2,653	2,667	2,673	2,684	2,701	2,741	2,791
Pennsylvania	11,868	11,859	11,845	11,838	11,815	11,771	11,783	11,811	11,846	11,866
Rhode Island	949	953	954	956	962	969	977	990	996	1,001
South Carolina	3,135	3,179	3,208	3,234	3,272	3,303	3,343	3,381	3,412	3,457
South Dakota	691	690	691	693	697	698	696	696	698	697
Tennessee	4,600	4,628	4,646	4,660	4,687	4,715	4,739	4,783	4,822	4,854
Texas	14,338	14,746	15,331	15,752	16,007	16,273	16,561	16,622	16,667	16,807
Utah	1,473	1,515	1,558	1,595	1,622	1,643	1,663	1,678	1,689	1,706
Vermont	513	516	519	523	527	530	534	540	550	558
Virginia	5,368	5,444	5,493	5,565	5,644	5,715	5,812	5,932	6,037	6,120
Washington	4,155	4,236	4,277	4,300	4,344	4,400	4,453	4,532	4,640	4,746
West Virginia	1,951	1,954	1,950	1,945	1,928	1,907	1,882	1,858	1,830	1,807
Wisconsin	4,712	4,726	4,729	4,721	4,736	4,748	4,756	4,778	4,822	4,857
Wyoming	474	492	506	510	505	500	496	477	465	458
United States	227,225	229,466	231,664	233,792	235,825	237,924	240,133	242,289	244,499	246,819

Where shown, R = Revised data.
Source: See first page of this appendix.

Table C4. Resident Population Estimates by State, 1990-1999

(Thousand People)

State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Alabama	4,050	4,099	4,154	4,214	4,260	4,297	4,331	4,368	4,405	4,430
Alaska	553	570	589	599	603	604	609	613	620	625
Arizona	3,684	3,789	3,916	4,065	4,245	4,432	4,587	4,737	4,883	5,024
Arkansas	2,357	2,383	2,416	2,456	2,494	2,535	2,572	2,601	2,626	2,652
California	29,960	30,471	30,975	31,275	31,484	31,697	32,019	32,486	32,988	33,499
Colorado	3,308	3,387	3,496	3,614	3,724	3,827	3,920	4,018	4,117	4,226
Connecticut	3,292	3,303	3,301	3,309	3,316	3,324	3,337	3,349	3,365	3,386
Delaware	670	683	695	706	718	730	741	751	763	775
District of Columbia	605	601	598	595	589	581	572	568	565	570
Florida	13,033	13,370	13,651	13,927	14,239	14,538	14,853	15,186	15,487	15,759
Georgia	6,513	6,653	6,817	6,978	7,157	7,328	7,501	7,685	7,864	8,046
Hawaii	1,113	1,137	1,159	1,173	1,188	1,197	1,204	1,212	1,215	1,210
Idaho	1,012	1,041	1,072	1,109	1,145	1,177	1,203	1,229	1,252	1,276
Illinois	11,453	11,569	11,694	11,810	11,913	12,008	12,102	12,186	12,272	12,359
Indiana	5,558	5,616	5,675	5,739	5,794	5,851	5,906	5,955	5,999	6,045
Iowa	2,781	2,798	2,818	2,837	2,851	2,867	2,880	2,891	2,903	2,918
Kansas	2,481	2,499	2,532	2,557	2,581	2,601	2,615	2,635	2,661	2,678
Kentucky	3,694	3,722	3,765	3,812	3,849	3,887	3,920	3,953	3,985	4,018
Louisiana	4,222	4,253	4,293	4,316	4,347	4,379	4,399	4,421	4,440	4,461
Maine	1,232	1,237	1,239	1,242	1,243	1,243	1,249	1,255	1,259	1,267
Maryland	4,800	4,868	4,923	4,972	5,023	5,070	5,112	5,157	5,204	5,255
Massachusetts	6,023	6,018	6,029	6,061	6,095	6,141	6,180	6,226	6,272	6,317
Michigan	9,311	9,400	9,479	9,540	9,598	9,676	9,759	9,809	9,848	9,897
Minnesota	4,390	4,441	4,496	4,556	4,610	4,660	4,713	4,763	4,813	4,873
Mississippi	2,579	2,599	2,624	2,655	2,689	2,723	2,748	2,777	2,805	2,828
Missouri	5,129	5,171	5,217	5,271	5,324	5,378	5,432	5,481	5,522	5,562
Montana	800	810	826	845	861	877	886	890	892	898
Nebraska	1,582	1,596	1,612	1,626	1,639	1,657	1,674	1,686	1,696	1,705
Nevada	1,221	1,296	1,351	1,411	1,499	1,582	1,666	1,764	1,853	1,935
New Hampshire	1,112	1,110	1,118	1,129	1,143	1,158	1,175	1,189	1,206	1,222
New Jersey	7,763	7,815	7,881	7,949	8,014	8,083	8,150	8,219	8,287	8,360
New Mexico	1,522	1,555	1,595	1,636	1,682	1,720	1,752	1,775	1,793	1,808
New York	18,021	18,123	18,247	18,375	18,459	18,524	18,588	18,657	18,756	18,883
North Carolina	6,664	6,784	6,897	7,043	7,187	7,345	7,501	7,657	7,809	7,949
North Dakota	638	636	638	641	645	648	650	650	648	644
Ohio	10,864	10,946	11,029	11,101	11,152	11,203	11,243	11,277	11,312	11,335
Oklahoma	3,149	3,175	3,221	3,252	3,281	3,308	3,340	3,373	3,405	3,437
Oregon	2,860	2,929	2,992	3,060	3,121	3,184	3,247	3,304	3,352	3,394
Pennsylvania	11,903	11,982	12,049	12,120	12,166	12,198	12,220	12,228	12,246	12,264
Rhode Island	1,006	1,011	1,013	1,015	1,016	1,017	1,021	1,025	1,031	1,040
South Carolina	3,501	3,570	3,620	3,663	3,705	3,749	3,796	3,860	3,919	3,975
South Dakota	697	704	713	722	731	738	742	744	746	750
Tennessee	4,894	4,967	5,050	5,138	5,231	5,327	5,417	5,499	5,570	5,639
Texas	17,057	17,398	17,760	18,162	18,564	18,959	19,340	19,740	20,158	20,558
Utah	1,731	1,780	1,837	1,898	1,960	2,014	2,068	2,120	2,166	2,203
Vermont	565	569	573	578	584	589	594	597	600	605
Virginia	6,217	6,301	6,414	6,510	6,593	6,671	6,751	6,829	6,901	7,000
Washington	4,903	5,026	5,161	5,279	5,375	5,481	5,570	5,675	5,770	5,843
West Virginia	1,793	1,799	1,806	1,818	1,820	1,824	1,823	1,819	1,816	1,812
Wisconsin	4,905	4,964	5,025	5,085	5,134	5,185	5,230	5,266	5,298	5,333
Wyoming	454	459	466	473	480	485	488	489	491	492
United States	249,623	252,981	256,514	259,919	263,126	266,278	269,394	272,647	275,854	279,040

Where shown, R = Revised data.
Source: See first page of this appendix.

Table C5. Resident Population Estimates by State, 2000-2009

(Thousand People)

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Alabama	4,452	4,468	4,480	4,503	4,531	4,570	4,629	4,673	4,718	4,758
Alaska	628	634	642	648	659	667	675	680	687	699
Arizona	5,161	5,273	5,396	5,510	5,652	5,839	6,029	6,168	6,280	6,343
Arkansas	2,679	2,692	2,706	2,725	2,750	2,781	2,822	2,849	2,875	2,897
California	33,988	34,479	34,872	35,253	35,575	35,828	36,021	36,250	36,604	36,961
Colorado	4,327	4,426	4,490	4,529	4,575	4,632	4,720	4,804	4,890	4,972
Connecticut	3,412	3,433	3,459	3,484	3,496	3,507	3,517	3,527	3,546	3,562
Delaware	786	796	806	818	831	845	859	872	884	892
District of Columbia	572	575	573	569	568	567	571	574	580	592
Florida	16,048	16,357	16,689	17,004	17,415	17,842	18,167	18,368	18,527	18,653
Georgia	8,227	8,377	8,508	8,623	8,769	8,926	9,156	9,350	9,505	9,621
Hawaii	1,214	1,226	1,240	1,251	1,274	1,293	1,310	1,316	1,332	1,347
Idaho	1,299	1,320	1,340	1,363	1,392	1,428	1,469	1,505	1,534	1,554
Illinois	12,434	12,488	12,526	12,556	12,590	12,610	12,644	12,696	12,747	12,797
Indiana	6,092	6,128	6,156	6,197	6,233	6,279	6,333	6,380	6,425	6,459
Iowa	2,929	2,932	2,934	2,942	2,954	2,964	2,983	2,999	3,017	3,033
Kansas	2,694	2,702	2,714	2,723	2,734	2,745	2,763	2,784	2,808	2,833
Kentucky	4,049	4,068	4,090	4,117	4,146	4,183	4,219	4,257	4,290	4,317
Louisiana	4,472	4,478	4,497	4,521	4,552	4,577	4,303	4,376	4,436	4,492
Maine	1,277	1,286	1,296	1,307	1,314	1,319	1,324	1,327	1,331	1,330
Maryland	5,311	5,375	5,440	5,496	5,547	5,592	5,627	5,653	5,685	5,730
Massachusetts	6,361	6,398	6,417	6,423	6,412	6,403	6,410	6,432	6,469	6,518
Michigan	9,952	9,991	10,016	10,041	10,055	10,051	10,036	10,001	9,947	9,902
Minnesota	4,934	4,983	5,019	5,054	5,088	5,120	5,164	5,207	5,247	5,281
Mississippi	2,848	2,853	2,859	2,868	2,889	2,906	2,905	2,928	2,948	2,959
Missouri	5,607	5,641	5,675	5,709	5,748	5,790	5,843	5,888	5,924	5,961
Montana	904	907	912	920	930	940	953	965	976	984
Nebraska	1,714	1,720	1,728	1,739	1,749	1,761	1,773	1,783	1,796	1,813
Nevada	2,019	2,098	2,174	2,249	2,346	2,432	2,523	2,601	2,654	2,685
New Hampshire	1,240	1,256	1,269	1,280	1,290	1,298	1,308	1,313	1,316	1,316
New Jersey	8,431	8,493	8,553	8,601	8,635	8,652	8,662	8,678	8,711	8,756
New Mexico	1,821	1,832	1,855	1,878	1,904	1,932	1,962	1,990	2,011	2,037
New York	19,002	19,083	19,138	19,176	19,172	19,133	19,105	19,132	19,212	19,307
North Carolina	8,082	8,210	8,326	8,423	8,553	8,705	8,917	9,118	9,309	9,450
North Dakota	642	639	638	639	645	646	649	653	658	665
Ohio	11,364	11,387	11,408	11,435	11,452	11,463	11,481	11,500	11,515	11,529
Oklahoma	3,454	3,467	3,489	3,505	3,525	3,549	3,594	3,634	3,669	3,718
Oregon	3,430	3,468	3,513	3,547	3,569	3,613	3,671	3,722	3,769	3,809
Pennsylvania	12,284	12,299	12,331	12,375	12,411	12,450	12,511	12,564	12,612	12,667
Rhode Island	1,050	1,057	1,066	1,071	1,075	1,068	1,063	1,057	1,055	1,054
South Carolina	4,024	4,065	4,108	4,150	4,211	4,270	4,358	4,444	4,529	4,590
South Dakota	756	758	760	764	770	775	783	792	799	807
Tennessee	5,704	5,751	5,796	5,848	5,911	5,991	6,089	6,176	6,247	6,306
Texas	20,944	21,320	21,690	22,031	22,394	22,778	23,360	23,832	24,309	24,802
Utah	2,245	2,284	2,325	2,360	2,402	2,458	2,526	2,598	2,663	2,723
Vermont	610	612	615	618	620	621	623	623	624	625
Virginia	7,106	7,198	7,287	7,367	7,476	7,577	7,674	7,751	7,833	7,926
Washington	5,911	5,986	6,052	6,104	6,179	6,257	6,371	6,462	6,562	6,667
West Virginia	1,807	1,801	1,805	1,812	1,816	1,820	1,828	1,834	1,840	1,848
Wisconsin	5,374	5,407	5,445	5,479	5,514	5,546	5,578	5,611	5,641	5,669
Wyoming	494	495	500	503	509	514	523	535	546	560
United States	282,162	284,969	287,625	290,108	292,805	295,517	298,380	301,231	304,094	306,772

Where shown, R = Revised data.
Source: See first page of this appendix.

Table C6. Resident Population Estimates by State, 2010-2018

(Thousand People)

State	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	4,785	4,799	4,816	4,830	4,842	R 4,852	R 4,864	R 4,874	4,888
Alaska	714	722	730	737	736	R 737	R 741	740	735
Arizona	R 6,407	6,473	R 6,555	R 6,633	R 6,730	R 6,830	R 6,941	R 7,044	7,158
Arkansas	2,922	2,941	2,952	R 2,959	R 2,967	2,978	2,990	R 3,001	3,010
California	R 37,320	37,638	R 37,949	R 38,261	R 38,597	R 38,918	R 39,167	R 39,358	39,462
Colorado	R 5,047	5,121	R 5,193	R 5,269	R 5,350	R 5,451	R 5,539	R 5,612	5,691
Connecticut	3,579	3,588	R 3,595	3,595	3,595	R 3,587	R 3,578	R 3,573	3,572
Delaware	900	907	915	924	R 932	941	949	957	965
District of Columbia	605	620	635	R 651	R 662	675	R 686	R 695	702
Florida	18,846	19,053	R 19,298	R 19,546	R 19,846	R 20,209	R 20,613	R 20,964	21,244
Georgia	9,712	9,802	9,901	R 9,972	R 10,067	R 10,178	R 10,302	R 10,410	10,511
Hawaii	1,364	1,379	1,395	1,408	1,415	1,422	1,428	1,424	1,421
Idaho	1,571	1,584	1,595	R 1,611	1,631	R 1,651	R 1,682	R 1,718	1,751
Illinois	12,841	12,867	R 12,883	R 12,895	R 12,884	R 12,859	R 12,821	R 12,779	12,723
Indiana	6,490	6,517	6,538	R 6,569	6,594	6,608	R 6,634	R 6,658	6,695
Iowa	3,051	3,066	3,076	3,093	R 3,109	3,121	R 3,131	R 3,142	3,149
Kansas	2,858	2,869	2,885	R 2,893	R 2,900	R 2,909	2,911	R 2,909	2,911
Kentucky	4,348	4,370	4,386	4,405	4,414	4,426	4,438	R 4,452	4,461
Louisiana	4,545	4,576	4,601	4,625	4,644	4,665	4,678	4,671	4,660
Maine	1,328	1,328	1,328	1,328	1,331	1,328	1,331	1,335	1,339
Maryland	5,789	5,839	5,887	R 5,923	R 5,957	R 5,986	R 6,003	R 6,024	6,036
Massachusetts	6,566	6,614	6,663	R 6,713	R 6,763	R 6,794	R 6,824	R 6,860	6,883
Michigan	9,878	9,882	9,897	9,913	R 9,930	R 9,932	R 9,951	R 9,973	9,984
Minnesota	5,311	5,346	5,377	R 5,413	R 5,451	R 5,482	5,523	R 5,566	5,606
Mississippi	2,971	2,979	2,984	2,989	R 2,990	R 2,988	2,988	R 2,989	2,981
Missouri	5,996	6,010	6,024	6,041	6,056	6,072	6,087	R 6,107	6,122
Montana	991	997	1,004	1,014	1,022	R 1,030	1,041	R 1,052	1,061
Nebraska	1,830	1,841	1,853	1,865	R 1,879	R 1,891	1,906	R 1,916	1,926
Nevada	2,702	2,713	R 2,744	R 2,776	R 2,818	R 2,867	R 2,918	R 2,970	3,027
New Hampshire	1,317	1,320	1,324	R 1,327	1,333	1,336	1,342	R 1,349	1,353
New Jersey	R 8,799	8,828	8,845	R 8,857	R 8,865	R 8,868	R 8,871	R 8,886	8,886
New Mexico	2,065	2,080	R 2,087	R 2,092	2,090	R 2,089	R 2,092	R 2,092	2,093
New York	19,400	19,499	R 19,573	R 19,624	R 19,651	R 19,655	R 19,633	R 19,590	19,530
North Carolina	9,574	9,658	9,749	R 9,843	R 9,933	R 10,032	R 10,155	R 10,268	10,382
North Dakota	675	685	701	722	737	754	754	755	758
Ohio	11,539	11,545	R 11,549	11,577	11,603	11,618	R 11,634	R 11,660	11,676
Oklahoma	3,760	3,788	3,819	3,853	3,878	3,910	R 3,926	R 3,931	3,940
Oregon	R 3,837	3,872	3,899	R 3,922	R 3,963	R 4,016	R 4,090	R 4,144	4,182
Pennsylvania	12,711	12,746	12,767	R 12,776	R 12,788	R 12,785	R 12,782	R 12,788	12,801
Rhode Island	1,054	1,054	1,055	1,055	1,056	1,056	1,057	1,056	1,058
South Carolina	4,636	4,672	4,717	4,764	4,824	4,892	4,958	5,021	5,084
South Dakota	816	824	R 834	842	849	854	863	873	879
Tennessee	6,355	6,399	R 6,454	R 6,494	6,541	6,591	R 6,646	6,709	6,772
Texas	R 25,242	25,646	R 26,084	R 26,480	R 26,964	R 27,470	R 27,914	R 28,295	28,629
Utah	2,775	2,814	2,853	2,898	2,937	2,982	R 3,042	R 3,101	3,154
Vermont	626	627	626	626	625	625	624	R 624	624
Virginia	8,024	8,101	8,185	R 8,252	R 8,311	R 8,362	R 8,410	R 8,464	8,501
Washington	6,743	6,827	R 6,897	R 6,964	R 7,055	7,164	7,295	R 7,423	7,524
West Virginia	1,854	1,856	1,857	1,854	1,849	1,842	1,831	1,817	1,804
Wisconsin	5,690	5,705	5,720	5,737	5,752	5,761	5,773	R 5,790	5,807
Wyoming	564	567	576	582	583	586	584	579	578
United States	R 309,322	R 311,557	R 313,831	R 315,994	R 318,301	R 320,635	R 322,941	R 324,986	326,688

Where shown, R = Revised data.
Source: See first page of this appendix.

Appendix D. Real Gross Domestic Product by State

The real gross domestic product (GDP) data used in the U.S. Energy Information Administration State Energy Data System (SEDS) to calculate total energy consumed per chained (2012) dollar of output are shown in Tables D1 and D2. The data are the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), real GDP estimates by state, beginning in 1997.

Both the national-level and state-level real GDP data are available from the U.S. Department of Commerce, Bureau of Economic Analysis "Regional Economic Accounts" dataset. There is a difference in the coverage between the two series. The difference between the sum of the states GDP and the U.S-level GDP reflects federal military and civilian activity located overseas. For details, see BEA Regional Economic Accounts: Methodologies, http://www.bea.gov/regional/methods.cfm.

Additional note

BEA reports real GDP for 1997 forward based on the North American Industry Classification System (NAICS) and real GDP before 1997 based on the Standard Industrial Classification (SIC). Through the 2012 data cycle, SEDS published real GDP by state from 1977 forward. In 2014, BEA completed a comprehensive revision of the state GDP and only revised the data for 1997 forward. Because of the incompatibility between the two sets of data, state GDP data before 1997 were removed from SEDS.

Data sources

GDPRXUS — Real gross domestic product of the United States in millions of chained (2012) dollars.

- 1997 forward: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey.

GDPRXZZ — Real gross domestic product by state in millions of chained (2012) dollars.

- 1997 forward: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1, select Annual Gross Domestic Product by State, Gross Domestic Product (GDP) summary (SAGDP1), All Areas, and Real GDP (millions of chained 2012 dollars).

Table D1. Real Gross Domestic Product by State, 1997-2007

(Billion Chained (2012) Dollars)

State	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Alabama	143.6	148.6	154.1	156.6	156.4	160.9	165.0	175.5	181.4	184.8	185.9
Alaska	42.3	41.2	40.7	39.5	41.0	42.9	42.2	43.7	45.1	48.5	51.1
Arizona	168.6	183.1	198.1	207.8	212.7	219.3	233.3	243.2	263.1	277.3	284.9
Arkansas	82.8	84.8	89.3	90.2	89.9	92.9	96.5	101.2	104.7	106.9	106.2
California	1,378.7	1,470.4	1,582.4	1,709.9	1,702.8	1,743.7	1,825.4	1,902.3	1,990.1	2,072.2	2,103.6
Colorado	184.2	201.1	216.3	232.8	236.4	236.8	238.5	240.8	250.8	256.1	264.6
Connecticut	190.8	196.2	202.2	216.4	220.3	220.0	222.2	237.1	242.5	251.6	261.1
Delaware	45.2	49.7	53.9	56.1	58.9	56.8	58.0	60.7	60.0	61.5	61.2
District of Columbia	79.6	81.2	84.7	85.3	88.5	91.2	93.0	97.8	100.0	100.2	103.0
Florida	560.9	590.1	616.6	642.7	658.6	685.3	715.4	757.1	806.3	834.3	835.9
Georgia	329.0	352.7	377.6	393.2	396.9	400.1	410.6	429.3	445.5	450.6	453.1
Hawaii	55.7	54.4	55.2	56.4	56.0	57.9	60.8	64.9	68.6	70.4	71.2
Idaho	37.0	38.8	42.5	47.3	46.1	47.2	48.5	51.2	55.4	57.6	58.7
Illinois	577.8	595.8	617.3	641.7	644.2	647.9	655.8	673.3	685.9	704.5	712.7
Indiana	232.2	246.4	254.5	263.7	258.7	265.1	275.2	284.7	285.5	291.3	299.4
Iowa	113.4	114.2	116.7	122.2	120.7	124.1	129.3	139.7	143.9	145.9	152.3
Kansas	104.8	108.5	111.2	114.0	113.9	115.6	117.5	117.9	122.3	128.9	135.7
Kentucky	147.0	151.6	156.3	152.1	151.9	155.7	159.2	163.4	168.8	173.3	171.9
Louisiana	201.8	208.7	213.0	206.7	209.0	213.1	221.2	231.6	245.5	243.3	234.6
Maine	43.0	44.2	46.4	48.5	49.4	50.6	51.7	53.5	53.6	54.3	54.0
Maryland	221.2	231.8	240.9	251.0	260.8	270.9	278.0	292.1	306.0	311.7	312.1
Massachusetts	302.8	314.9	331.7	359.5	362.4	364.8	373.8	383.5	390.8	397.7	408.0
Michigan	397.3	406.3	429.4	438.3	423.6	435.3	443.8	444.2	450.7	443.3	441.1
Minnesota	211.9	223.0	230.7	246.0	246.1	252.4	263.9	274.7	282.1	282.0	283.2
Mississippi	83.2	85.3	87.6	88.1	87.2	88.1	91.7	93.7	95.2	97.7	100.2
Missouri	228.3	232.1	238.4	246.0	244.4	246.8	251.8	257.3	261.5	263.2	264.4
Montana	29.2	30.5	30.6	31.4	31.7	32.5	33.8	35.4	37.1	38.4	40.4
Nebraska	70.7	72.3	73.9	76.6	78.3	79.7	84.1	86.1	88.9	91.4	93.4
Nevada	90.4	94.9	101.3	105.3	106.7	110.0	115.6	128.9	139.7	145.2	144.4
New Hampshire	48.4	51.6	53.1	56.7	57.4	59.0	61.6	63.5	64.4	65.9	65.7
New Jersey	426.2	433.8	448.8	473.0	476.5	487.1	499.7	507.6	513.5	524.1	526.8
New Mexico	67.4	67.1	70.7	72.0	72.1	74.3	77.1	82.8	83.8	85.9	86.5
New York	976.9	996.7	1,048.1	1,088.0	1,112.2	1,102.1	1,104.9	1,132.5	1,171.1	1,199.9	1,202.7
North Carolina	316.4	326.2	344.4	354.8	361.4	366.0	374.5	388.7	407.5	432.6	436.4
North Dakota	22.4	23.7	23.7	24.6	25.0	26.4	28.0	28.3	29.1	30.3	31.7
Ohio	471.9	487.9	499.1	509.0	501.8	514.8	522.6	534.4	543.7	541.2	541.4
Oklahoma	115.4	117.9	119.7	124.1	128.7	131.1	133.1	137.4	143.1	152.7	155.5
Oregon	118.5	124.2	126.9	137.8	136.7	139.7	145.6	152.8	158.5	167.9	171.1
Pennsylvania	495.8	508.5	523.6	537.2	544.8	550.2	562.4	578.0	588.1	592.0	612.0
Rhode Island	40.2	41.8	43.2	45.2	45.9	47.6	49.4	51.6	52.3	53.5	52.1
South Carolina	134.9	140.1	146.5	150.5	151.1	154.7	160.1	162.2	166.6	170.3	175.1
South Dakota	25.0	26.5	27.5	29.4	29.7	33.0	33.7	35.1	35.9	36.5	38.1
Tennessee	210.8	223.8	230.4	233.2	232.7	240.5	247.8	259.3	264.7	271.5	268.8
Texas	872.8	928.4	965.7	998.3	1,021.9	1,041.8	1,048.3	1,102.7	1,132.8	1,210.3	1,274.3
Utah	80.7	85.7	89.3	92.5	93.9	95.7	97.6	102.7	109.1	118.7	124.5
Vermont	20.0	20.7	21.8	23.0	23.7	24.5	25.3	26.6	26.9	27.1	26.8
Virginia	301.6	317.2	332.1	346.2	358.5	362.3	376.1	393.4	415.1	423.7	427.0
Washington	271.6	289.1	310.3	312.2	305.1	310.3	316.2	322.0	343.4	356.7	378.2
West Virginia	59.2	60.2	62.2	62.1	62.0	62.8	62.8	63.7	65.5	66.4	66.5
Wisconsin	209.3	217.3	226.3	233.1	236.1	241.0	247.9	256.0	262.2	266.5	267.9
Wyoming	25.2	25.8	26.8	27.7	29.2	29.9	30.6	31.5	33.1	37.5	40.3
United States	11,521.9	12,038.3	12,610.5	13,131.0	13,262.1	13,493.1	13,879.1	14,406.4	14,912.5	15,338.3	15,626.0

Where shown, R = Revised data.
Source: See first page of this appendix.

Table D2. Real Gross Domestic Product by State, 2008-2018

(Billion Chained (2012) Dollars)

State	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alabama	185.3	178.0	182.3	185.1	186.3	188.2	R 186.8	R 189.3	R 190.7	R 193.0	198.4
Alaska	50.9	55.8	54.2	54.6	57.7	54.8	R 53.3	R 53.8	R 52.7	R 52.7	53.1
Arizona	277.5	255.1	257.5	263.2	268.3	270.1	R 273.7	R 280.2	R 289.2	R 299.4	311.7
Arkansas	105.8	102.5	105.9	108.3	108.7	111.8	R 112.9	R 113.9	R 114.5	R 115.3	117.3
California	2,111.1	2,026.5	2,058.1	2,091.6	2,144.5	2,220.9	R 2,312.5	R 2,428.6	R 2,501.0	R 2,610.7	2,721.7
Colorado	267.7	262.4	264.8	268.7	273.5	282.5	R 295.7	R 309.2	R 316.8	R 329.6	341.1
Connecticut	259.7	248.0	247.5	242.0	243.8	241.1	R 237.8	R 242.9	R 242.8	R 243.7	244.9
Delaware	58.7	60.4	60.0	62.0	62.0	59.2	R 63.5	R 65.9	R 63.1	R 62.7	62.8
District of Columbia	106.7	106.4	110.0	112.0	112.7	112.7	R 114.9	R 117.2	R 119.6	R 121.0	124.0
Florida	803.2	758.3	766.2	763.7	769.3	784.1	R 805.3	R 839.1	R 866.7	R 896.1	924.9
Georgia	443.4	426.3	433.0	439.9	444.1	450.8	R 465.6	R 481.6	R 498.3	R 516.6	529.0
Hawaii	71.7	69.1	71.0	72.1	73.6	74.3	74.5	R 77.2	R 78.9	R 80.7	82.7
Idaho	59.7	57.1	57.9	57.8	57.8	59.8	61.4	R 63.1	R 65.5	R 67.8	70.5
Illinois	699.4	683.0	695.0	707.1	720.7	724.6	R 735.0	R 744.5	R 747.2	R 753.6	769.8
Indiana	298.3	277.5	295.1	296.5	297.6	303.9	R 313.7	R 311.6	R 316.6	R 322.7	329.3
Iowa	149.1	145.6	149.5	151.2	157.3	156.6	R 165.1	R 169.4	168.9	R 168.4	172.1
Kansas	138.7	133.3	134.9	138.6	140.5	140.5	R 143.4	R 146.2	R 149.9	R 151.5	154.6
Kentucky	172.2	165.0	172.0	174.1	176.3	179.4	R 180.0	R 181.3	R 182.6	R 184.5	187.2
Louisiana	235.3	238.7	247.4	234.1	233.6	226.6	R 233.7	R 232.5	R 228.3	R 231.4	237.4
Maine	53.9	53.1	53.8	53.1	52.9	52.5	53.4	R 53.8	R 55.0	R 56.2	57.5
Maryland	315.9	314.9	327.2	334.3	334.8	334.9	338.7	R 345.2	R 356.8	R 360.0	368.9
Massachusetts	412.6	408.1	424.6	434.7	444.3	444.9	R 453.9	R 471.1	R 479.0	R 490.8	506.1
Michigan	416.7	380.1	400.9	411.5	418.9	424.3	R 431.5	R 442.5	R 452.3	R 459.1	470.5
Minnesota	285.8	275.5	284.9	290.6	294.3	300.6	R 309.2	R 313.1	R 319.1	R 325.3	333.9
Mississippi	104.4	99.5	100.0	98.7	99.6	99.6	R 100.1	R 100.2	R 100.7	R 101.5	102.8
Missouri	270.6	265.3	269.7	266.7	268.8	271.9	R 273.2	R 276.7	R 275.5	R 278.2	284.9
Montana	40.2	39.3	40.5	41.5	42.0	42.4	R 43.2	R 44.9	R 44.3	R 45.0	46.2
Nebraska	93.6	94.0	97.9	102.3	102.3	105.0	R 107.2	R 110.3	R 110.8	R 113.1	114.2
Nevada	138.9	127.2	128.8	129.7	128.0	128.3	R 130.0	R 135.4	R 139.3	R 143.7	149.8
New Hampshire	65.0	64.4	66.4	66.8	67.7	68.8	69.5	R 71.5	R 72.8	R 74.1	75.8
New Jersey	533.1	511.1	516.6	510.9	519.7	523.3	R 525.7	R 535.3	R 539.9	R 543.5	555.8
New Mexico	86.0	87.7	87.0	87.2	87.6	86.5	R 89.3	R 91.2	R 91.3	R 91.3	93.6
New York	1,175.5	1,223.2	1,269.5	1,269.2	1,322.4	1,319.3	R 1,349.3	R 1,372.2	R 1,389.7	R 1,418.9	1,435.6
North Carolina	446.9	427.1	433.4	439.1	439.6	445.4	R 455.0	R 469.5	R 475.3	R 485.5	497.3
North Dakota	34.2	35.0	37.7	41.9	51.3	52.5	R 56.5	R 54.9	R 51.0	R 51.0	52.9
Ohio	537.2	509.2	521.1	538.7	540.8	550.8	R 571.9	R 580.4	R 585.1	R 594.3	605.4
Oklahoma	161.4	159.2	159.2	165.2	173.5	177.6	R 187.7	R 195.9	R 190.1	R 191.5	196.5
Oregon	174.0	166.7	169.0	173.9	174.5	175.8	R 181.9	R 192.0	R 200.9	R 208.6	216.6
Pennsylvania	623.8	605.5	622.5	631.4	641.3	651.3	R 666.5	R 681.2	R 689.8	R 693.7	711.8
Rhode Island	50.4	50.2	51.5	51.3	51.6	52.1	R 52.1	R 53.1	R 53.1	R 53.0	53.6
South Carolina	174.6	166.8	170.2	174.1	175.4	178.9	R 183.6	R 189.9	R 195.5	R 201.9	207.2
South Dakota	39.6	39.7	40.1	42.8	43.4	43.6	R 44.2	R 45.4	R 45.7	R 45.6	46.5
Tennessee	272.0	263.0	266.7	274.8	283.7	286.8	R 291.7	R 301.6	R 308.0	R 313.8	323.7
Texas	1,275.8	1,271.4	1,301.7	1,343.8	1,411.4	1,472.1	R 1,523.1	R 1,596.4	R 1,600.3	R 1,646.3	1,712.8
Utah	123.5	120.8	123.3	127.1	128.7	131.9	R 136.1	R 141.7	R 147.4	R 153.1	158.8
Vermont	27.4	27.0	28.1	28.7	28.9	28.5	28.5	R 28.9	R 29.4	R 29.4	29.8
Virginia	425.8	425.6	437.3	441.6	445.0	446.6	R 445.9	R 455.0	R 456.7	R 464.8	477.0
Washington	382.4	372.7	381.3	387.8	400.9	411.1	R 425.8	R 444.3	R 459.8	R 483.8	511.7
West Virginia	67.9	67.6	68.4	69.7	69.4	70.2	R 69.9	R 69.8	R 68.9	R 69.9	71.5
Wisconsin	264.6	257.1	264.8	270.4	274.3	276.2	R 282.1	R 287.2	R 290.8	R 294.7	301.6
Wyoming	42.6	41.4	39.8	39.4	38.4	38.5	R 38.7	R 39.7	38.1	R 38.0	38.0
United States	15,604.7	15,208.8	15,598.8	15,840.7	16,197.0	16,495.4	R 16,912.0	R 17,403.8	R 17,688.9	R 18,108.1	18,638.2

Where shown, R = Revised data.
Source: See first page of this appendix.

Appendix E. 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 E1 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 E2.

The conversion factors presented in Table E3 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).

Table E1. 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.

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 E2. 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

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 E3. 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.

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 F. 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.

Petroleum

Aviation gasoline

Beginning in 2015, a new method is used to estimate state-level aviation gasoline consumption. State allocators are developed using EIA's prime supplier sales volumes and information on Alaska and Hawaii from the Alaska Department of Revenue and Federal Aviation Administration, respectively.

Hydrocarbon gas liquids (HGL)

Beginning in 2010, a new method is used to estimate state-level ethane consumption, causing a revision in total HGL consumption and expenditures. Unpublished ethane plant capacity data in Louisiana is revised and the remainder is allocated to Texas.

Still gas

EIA has revised the heat content of still gas from 2016 forward. The factor to convert still gas consumption from barrels to British thermal units (Btu) is assumed to be 6.287 million Btu per barrel.

Renewable energy

Biodiesel

Biodiesel consumption estimates by state are available for 2001 forward. For 2011 forward, total biodiesel consumption by state is estimated using (1) reported data for specific states, (2) assumptions based on biodiesel blend ratio mandates for selected states, and (3) distillate fuel oil shares among the remaining states in the same Petroleum Administration for Defense District (PADD). For 2001 through 2010, the state estimates are calculated using the 2011 state consumption shares. Although there is biodiesel use in other sectors, all biodiesel consumption is assigned to the transportation sector.

Key statistics and indicators

A new section is added to the SEDS Complete webpage, including new data series, current year PDF and HTML rankings tables, and full time series Excel data files.

New consumption data series include: petroleum consumption per capita, natural gas consumption per capita, total electricity retail sales per capita, and residential electricity retail sales per capita.

New current year rankings tables and accompanying full time series Excel data files on consumption include: renewable energy consumption by source; petroleum consumption, total and per capita; natural gas consumption, total and per capita; and electricity retail sales; total, residential, and per capita.

A new Excel data file is also added for the population and GDP data series.

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.

Biodiesel: A fuel typically made from soybean, canola, or other vegetable oils; animal fats; and recycled grease. It can serve as a substitute for petroleum-derived diesel or distillate fuel. For EIA reporting, it is a fuel composed of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM (American Society for Testing materials) D 6751.

Biofuels: Liquid fuels and blending components produced from biomass feedstocks, used primarily for transportation.

Biomass: Organic non-fossil material of biological origin constituting a renewable 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 (about 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.

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.

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 from a single heat source. *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 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.

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 fuel 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 also **combined heat and power (CHP) plant**.

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.

Electrical system energy losses: The amount of energy lost during generation, transmission, and distribution of electricity, including plant and unaccounted for uses.

Electricity sales: The amount of kilowatthours sold in a given period of time; usually grouped by classes of service, such as residential, commercial, industrial, and other. "Other" sales include sales for public street and highway lighting and other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

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-consuming sectors: See **energy-use sectors**.

Energy-use sectors: A group of major energy-consuming components of U.S. society developed to measure and analyze energy use. The sectors most commonly referred to in EIA are: residential, commercial, industrial, transportation, and electric power.

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.

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.

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 reservoirs in the Earth's crust. Water or steam extracted from geothermal reservoirs 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.

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 on whether 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.

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 electric power.

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 gasoline, alkylate, reformate, benzene, toluene, xylene) used for blending or compounding into finished motor gasoline. These components include reformulated 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 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.

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.

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.

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 hydrocarbons, mostly pentanes and heavier, extracted from natural gas. 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 supplied. 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.

Primary energy consumption: Consumption of primary energy. The U.S. Energy Information Administration includes the following in U.S. primary energy consumption:

- Coal consumption
- Coal coke net imports
- Petroleum consumption (petroleum products supplied)
- Dry natural gas—excluding supplemental gaseous fuels—consumption
- 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 average annual heat rate of fossil-fuel fired plants)
- Geothermal electricity net generation (converted to Btu using the average annual heat rate of fossil-fuel fired plants), geothermal heat pump energy and geothermal direct-use energy
- Solar thermal and photovoltaic electricity net generation (converted to Btu using the average annual heat rate of fossil-fuel fired plants)
- Solar thermal direct-use energy
- Wind electricity net generation (converted to Btu using the average annual heat rate of fossil-fuel fired plants)
- Wood and wood-derived fuels consumption
- Biomass waste consumption
- Fuel ethanol and biodiesel consumption
- Losses and co-products from the production of fuel ethanol and biodiesel

- Electricity net imports (converted to Btu using the electricity heat content of 3,412 Btu per kilowatthour)

Primary energy consumption also includes all non-combustion uses of fossil fuels. Energy sources produced from other energy sources—e.g., 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.

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 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**.

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.

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 vessels, 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.