

# Introduction to the Technical Notes

## Purpose

The State Energy Data System (SEDS) was developed and 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.

## The report

SEDS provides annual energy price and expenditure estimates for all energy sources by major economic sectors for the 50 states and the District of Columbia and in aggregate for the United States. These data are available on the EIA website at <http://www.eia.gov/state/seds/seds-data-complete.php>. Companion tables containing state-level consumption data can also be found at the same website. 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?sid=US>.

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 1970 through 1995; thereafter, estimates are shown consecutively. However, estimates for all years from 1970 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.

## Price estimates

Price estimates in SEDS are expressed in current dollars per million Btu (British thermal units) to facilitate comparison across energy sources. Gross

heat content is used in converting prices in physical units to prices in million Btu. See Appendix B of the SEDS Consumption Technical Notes at [http://www.eia.gov/state/seds/sep\\_use/notes/use\\_b.pdf](http://www.eia.gov/state/seds/sep_use/notes/use_b.pdf). There is no adjustment for general inflation over time.

Sections 2 through 6 of the Technical Notes describe how the price estimates are developed, including sources of data, methods of estimation, and conversion factors applied.

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

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

### *Estimation methodologies*

Most fuel prices from the sources are reported in physical units. They are divided by the appropriate conversion factors to create the Btu prices. Estimated prices are used only when specific state-level prices are not

available for a given energy source and sector. In some cases, prices for energy consumed in one sector in a state are assigned to another sector in the same state. Specific examples are: industrial steam coal prices are assigned to the commercial and transportation sectors' steam coal use; industrial lubricants prices are assigned to transportation lubricants uses; and transportation motor gasoline prices are assigned to commercial and industrial use of motor gasoline.

In addition, there are a few cases where state-level prices could not be identified for any economic sector for a given energy source for some or all years. In these instances, a national-level price is used for all states for a given year. The procedures for estimating these national-level prices are presented in the body of the Technical Notes under each energy source as appropriate. The cases where a national-level price is assigned to all states in all years are: transportation use of aviation gasoline; industrial and transportation use of lubricants; and some components of other petroleum products used in the industrial sector.

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

Three state groupings used in SEDS—U.S. Census regions and divisions, federal regions, and Petroleum Administration for Defense districts—are shown in Figures TN1, TN2, and TN3, respectively, on the following pages. States are often designated by their two-letter postal code abbreviations shown in the map legends. Throughout the Technical Notes, the term "state" includes the District of Columbia.

## Expenditure estimates

Expenditure estimates are expressed in millions of current dollars. There is no adjustment for general inflation over time. All expenditures are consumer expenditures; that is, they represent estimates of money spent directly by consumers to purchase energy, generally including taxes (see box on page 6).

Expenditure estimates at the most detailed level of SEDS are computed by

multiplying Btu consumption estimates by the corresponding price estimates. The Btu consumption estimates are adjusted to remove quantities of process fuel and intermediate products (such as refinery fuels and biofuels blended into petroleum products) that are not purchased directly by end users.

Electricity exported to Canada and Mexico are excluded from expenditure calculations. Use of hydroelectric, geothermal, wind, and solar energy sources are also removed from SEDS expenditure calculations because there are no direct fuel costs for those energy sources. SEDS consumption of wood in the residential sector and wood and waste consumption in the industrial and commercial sectors are adjusted to remove estimated quantities that were obtained at no cost.

Adjusted energy consumption estimates used to calculate expenditures are explained in Section 7 of the Technical Notes, also available at [http://www.eia.gov/state/seds/sep\\_prices/notes/pr\\_consum\\_adjust.pdf](http://www.eia.gov/state/seds/sep_prices/notes/pr_consum_adjust.pdf).

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

## Energy-consuming sectors

The five energy-consuming sectors used in the SEDS price and expenditure tables correspond to those used in the consumption tables as follows:

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

Although end-use allocations of energy consumption and expenditures follow those guidelines as closely as possible, some data are collected by using different classifications. For example, electric utilities often classify commercial and industrial users by the quantity of electricity purchases rather than by the business activity of the purchaser. Agricultural use of natural gas is collected and reported in the commercial sector through 1995 and in the industrial sector for 1996 forward. Because agricultural use of natural gas

cannot be identified separately, the discrepancy cannot be reconciled. Another example is master-metered condominiums, apartments, and buildings with a combination of residential and commercial units. In many cases, billing and metering practices cause residential energy usage of electricity, natural gas, or fuel oil to be included in the commercial sector. In those cases, there is no basis for separating residential from commercial use. Readers are advised to consult the SEDS Consumption Technical Notes for specific assumptions regarding the consumption estimates.

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

## Taxes in the price and expenditure data

The objective in developing state energy prices is to provide estimates that include all taxes, but data sources often do not treat taxes uniformly. Where taxes are included in the source data, they are included in the price and expenditure tables. Where taxes are not included but can be separately estimated, they are added, with some exceptions listed below. In many cases, states and some localities provide tax exemptions for various kinds of activities or classes of end users. These complex exemptions are not incorporated into the state energy prices. EIA is continuing to analyze these cases to see if a better representation can be made. A comprehensive and detailed study of taxes in EIA data is available in the report *End-Use Taxes: Current EIA Practices*, DOE/EIA-0583 (Washington, DC, August 1994). The report is available from EIA's Internet site at <http://www.eia.gov/finance/archive/0583.pdf>.

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

### *Energy sources consumed by the end-use sectors*

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

**Natural Gas.** Natural gas prices are intended to include all federal, state, and local taxes, surcharges, and adjustments billed to consumers. Although the EIA data collection form states that taxes are to be included in the reported gross revenues, it is most likely that respondents would not consider sales taxes as part of their companies'

gross revenues, and some may not be reporting them. As a result, consumer sales taxes may not be covered in full. For more information see *End-Use Taxes: Current EIA Practices*, page 23 of 134 in the PDF file, <http://www.eia.gov/finance/archive/0583.pdf>.

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

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

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

### *Fuels consumed by the electric power sector*

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

Figure TN1. U.S. Census regions and divisions



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

Figure TN2. Federal regions



**Region 1  
New England**

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

**Region 2  
New York/New Jersey**

New Jersey (NJ)  
New York (NY)

**Region 3  
Mid Atlantic**

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

**Region 4  
South Atlantic**

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

**Region 5  
Midwest**

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

**Region 6  
Southwest**

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

**Region 7  
Central**

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

**Region 8  
North Central**

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

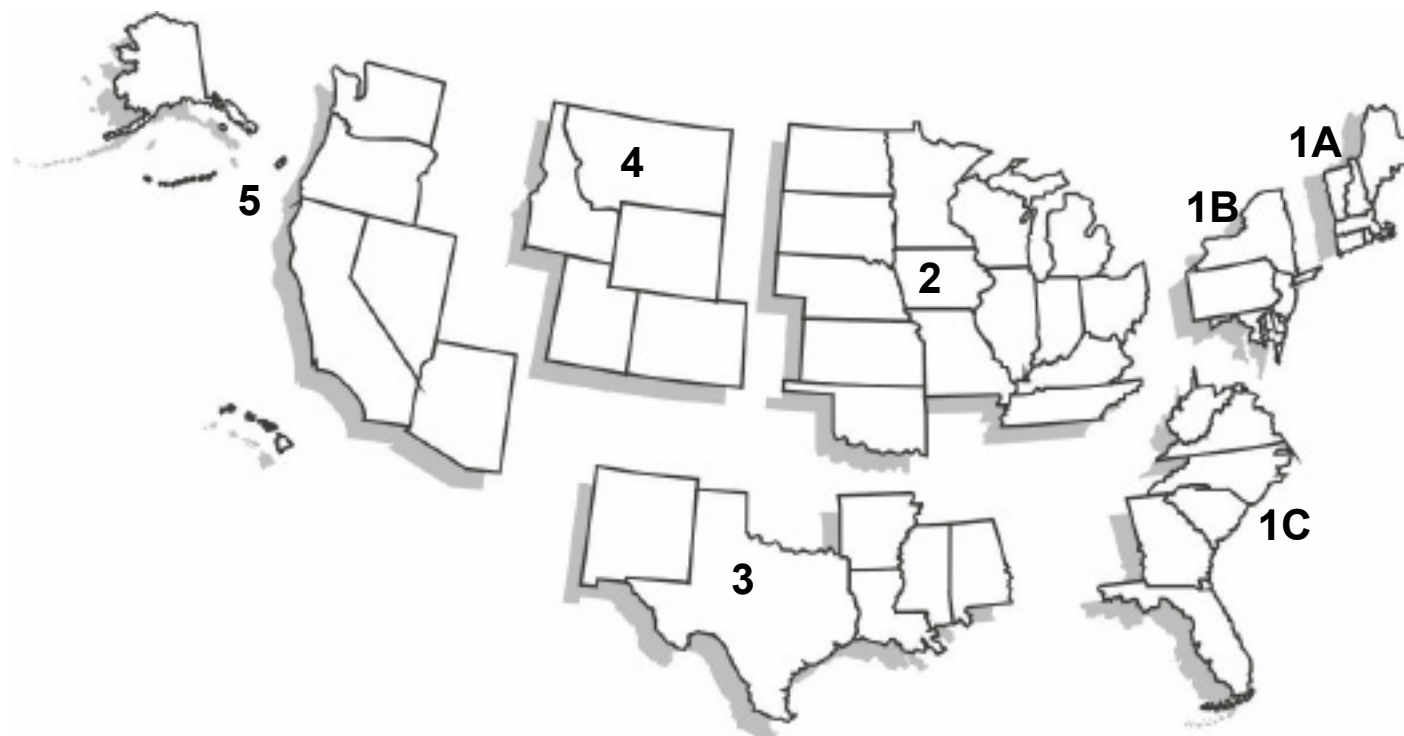
**Region 9  
West**

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

**Region 10  
Northwest**

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

Figure TN3. Petroleum Administration for Defense districts and subdistricts



**Subdistrict 1A**

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

**Subdistrict 1B**

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

**Subdistrict 1C**

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

**District 2**

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

**District 3**

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

**District 4**

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

**District 5**

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