

Appendix G

Summary of Changes Since the *State Energy Data Report 1997*

Modifications to the Combined State Energy Data System (CSEDS) that are incorporated in this edition of the *State Energy Data Report (SEDR)* are summarized in this appendix. The constraint of page size in *SEDR* does not allow for all 40 years of CSEDS data to be included in the published tables. Data for selected years 1960 through 1997 are shown in the report tables; data for all years are included in the data files and html-formatted tables available via the Internet and are covered by this documentation.

Natural Gas

Commercial and Transportation Sectors, 1997. Deliveries of natural gas to the commercial sector are published in the Energy Information Administration (EIA) *Historical Natural Gas Annual* and include revisions for two States in 1997; consumption in Kansas increased by 246 million cubic feet to 41,482 million cubic feet and consumption in New Mexico decreased by 3,940 million cubic feet to 27,403 million cubic feet, causing a 0.1-percent decrease in the U.S. total. Natural gas used as pipeline fuel, shown in CSEDS transportation sector, decreased for New Mexico by 125 million cubic feet to 61,772 million cubic feet in 1997 causing the same small decrease in the U.S. total.

Industrial Sector, 1995 Through 1997. Data for natural gas used as lease fuel are published in the EIA *Historical Natural Gas Annual* and include revisions for Missouri and Nevada in 1995, West Virginia in 1996, and South Dakota in 1997. Additional revisions to deliveries of natural gas to industrial customers in 1997 occur in Kansas, New Mexico, Oklahoma, and South Dakota. These revisions cause industrial natural gas

consumption estimates in CSEDS to be revised by less than 1 percent (too small to be seen in *SEDR* tables) in Missouri and Nevada in 1995, West Virginia in 1996, Oklahoma in 1997, and the U.S. total industrial natural gas for 1995 and 1996. Natural gas industrial use in 1997 decreases by 14 percent in New Mexico, increases by 10 percent in South Dakota, and increases by 3 percent in Kansas, causing a net decrease in the U.S. total of 0.1 percent.

Thermal Conversion Factors, 1997. In addition to the data revisions described above, the factors for converting cubic feet of natural gas into equivalent British thermal units (Btu) were revised in the EIA *Historical Natural Gas Annual* for Kansas (from 1,000 to 1,001 Btu per cubic foot) and New Mexico (from 1,021 to 1,019 Btu per cubic foot) in 1997. These revisions cause small changes in the natural gas Btu values for all sectors in those two States in 1997.

Coal

Coal Coke Imports and Exports, 1991 Through 1997

The Energy Information Administration reviewed the U.S. coal coke imports and exports data that it provides to international statistical organizations and revised the data for 1991 through 1997. These data are included in CSEDS U.S. industrial sector and total energy, but are not available by State and not included in the State data. All U.S. values increase, and imports increase more than exports. Coal coke imports double for 1994 through 1997, while increases in exports range from 45 percent in 1996 to

81 percent in 1995. The smallest increases of 7 percent for exports and 8 percent for imports occur in 1991.

Petroleum

Aviation Gasoline, 1996 and 1997

Although the U.S. total aviation gasoline consumption values are not revised for 1996 and 1997, replacement of preliminary estimates for military use of aviation gasoline in the six States with military consumption causes all State aviation gasoline consumption estimates to be reallocated and revised by less than 1 percent in both years.

Liquefied Petroleum Gases, 1995 Through 1997

Hawaii and California, 1995. The American Petroleum Institute (API) revised internal combustion engine use of liquefied petroleum gases (LPG) in 1995. Consumption was decreased by 15 thousand gallons in Hawaii to 793 thousand gallons and increased by 15 thousand gallons in California to 56,935 thousand gallons. These revisions cause small shifts in industrial, transportation, and total consumption estimates of LPG for both States but do not affect other State data or the U.S. total.

All Sectors, 1996. The U.S. total consumption of LPG for 1996 remains unchanged, but API data series that are used as allocators for estimating the State and consuming sector portions of the total were revised; therefore, estimates of LPG consumption for all sectors in all States are revised for 1996 in CSEDS. Total LPG consumption for most of the States in Petroleum Administration for Defense District (PADD) I increase by 2 percent; in PADD II increase by 10 percent; and in PADD's III, IV, and V decrease by 3 percent. The exceptions are increases of 1 percent in Delaware, 5 percent in Illinois, 3 percent in Kansas, 9 percent in Kentucky, and 12 percent in North Dakota. Although residential and commercial estimates are not revised for all States, they do increase by 13 percent in nearly all 15 States in PADD II; the one exception is a 3-percent increase in North Dakota. Residential and commercial LPG estimates also increased by 5 percent in all 18 States in PADD I. Estimates of transportation use of LPG decreased by 1 percent for all States in PADD I and by 6 percent for all States in PADD II and PADD V (with the exception of North Dakota's

increase from 8,424 barrels to 20,966 barrels). Industrial sector consumption for each State is estimated by subtracting the consumption of the other sectors from the State total; therefore, all States have revisions to industrial consumption and the size of the revisions range from a 1-percent increase in Delaware to a 12-percent increase in North Dakota.

All Sectors 1997. In the previous edition of *SEDR*, 1997 State-level estimates of LPG consumption were not available, and 1996 data were repeated for 1997. In this edition, the use of actual 1997 estimates causes revisions to all sectors in all States, although the U.S. total consumption remains the same. Revisions in total consumption values range from decreases of 83 percent (the largest percentage, equivalent to 1,400 thousand barrels) in Montana to a 1-percent decrease in Iowa (the smallest percentage equaling 128 thousand barrels) and from an increase of 39,594 thousand barrels (the largest quantity, equivalent to a 10-percent change) in Texas to an increase of 2 thousand barrels (the smallest quantity, equaling a 29-percent change) in the District of Columbia.

Motor Gasoline, 1994 Through 1997

Although motor gasoline consumption in thousand barrels for 1994 through 1997 has not changed in CSEDS, the equivalent values expressed in British thermal units (Btu) are revised due to a change in the factor used to convert barrels to Btu. For 1994 forward, the constant factor has been replaced with a factor that varies from year to year and is a quantity-weighted average that takes into account the increased use of motor gasoline additives. The new factors, shown in Table G1, are applied to all motor gasoline consumption in 1994 through 1997, causing Btu values for

Table G1. Revisions to Motor Gasoline Thermal Conversion Factors

| Year | Previous | Current | Percent Change |
|------|--------------------------|---------|----------------|
| | (Million Btu per barrel) | | |
| 1994 | 5.253 | 5.230 | -0.4 |
| 1995 | 5.253 | 5.215 | -0.7 |
| 1996 | 5.253 | 5.216 | -0.7 |
| 1997 | 5.253 | 5.213 | -0.8 |

all States in a year to be reduced by the same percentages as shown in the table.

Other Petroleum Products

Petroleum Coke, 1960 Through 1997. U.S. total petroleum coke consumption at refineries was previously allocated to the States in CSEDS on the basis of each State's petroleum refinery catalytic cracking capacity. Investigation of data sources revealed that refinery use of petroleum coke was available by groups of States and by some individual States for 1960 through 1982 and by Petroleum Administration for Defense Districts (PADD) for 1983 forward. By using the State-level data or allocating the smaller State groupings to the States based on their catalytic cracking capacity, more accurate estimates of refinery use of petroleum coke are incorporated in this version of CSEDS. Petroleum coke industrial sector and total consumption estimates for all States 1960 through 1997 are revised. The largest revisions occur where individual State data replace calculated estimates in 1960 through 1982. Refinery use of petroleum coke in Arkansas for 1973 through 1989 and West Virginia from 1960 through 1962 are revised to zero. Mississippi's refinery petroleum coke in 1960 through 1962 is increased from around 95 thousand barrels to approximately 900 thousand barrels. Colorado refinery use of petroleum coke in 1980 is revised from 79 to 260 thousand barrels. Estimates of consumption in Delaware, Massachusetts, and Virginia are doubled or tripled in the 1960's and 1970's because their combined reported petroleum coke consumption is larger than their portions of the U.S. total refinery catalytic cracking capacity, the previous allocator. A few States' petroleum coke consumption is revised by as little as 1 percent in some years; Arkansas, Kentucky, Tennessee, and Washington are among those States.

A review of aluminum ingot production capacity, which is the allocating series for all other industrial uses of petroleum coke, the capacity for the Washington, and, as a result, the U.S. total, was reduced by 1 metric ton in 1995 through 1997 to be consistent with the intended methodology. This change caused insignificant decreases in Washington's industrial petroleum coke consumption and insignificant increases in the other 13 States with that type of petroleum coke consumption in 1995, 1996, and 1997. The revisions can be seen only in the CSEDS full precision data files available on the Internet.

Special Naphthas, Waxes, and Petrochemical Industry Feedstocks, 1996 and 1997. Although the U.S. total consumption of special naphthas, waxes, petrochemical feedstocks, and other minor petroleum products is not changed in this edition of *SEDR*, the State-level estimates are revised due to revisions in the State-level allocating data series. State estimates of consumption of these petroleum products are based on three data series that are measures of industrial activity from the U.S. Department of Commerce, Bureau of the Census. The series are from the Economic Census, previously called the Census of Manufactures, and are available every 5 years. In this version of CSEDS, the 1997 Census replaces the 1992 Census data for 1996 and 1997. Since the same allocating series is used for both years, the percentage changes for each State are the same in both years.

The most significant changes in estimates of special naphthas consumption, which is generally used in paint and varnish manufacturing, occur in Arkansas, Colorado, Delaware, and Mississippi where consumption estimates more than double in 1996 and 1997 and in South Carolina where consumption decreases by 89 percent. Estimates of special naphthas consumption in Nevada, Rhode Island, and West Virginia are revised from zero to small amounts in 1996 and 1997.

The Bureau of the Census data series that is used to allocate the U.S. totals of petrochemical feedstocks, miscellaneous petroleum products, natural gasoline, plant condensate, pentanes plus, and unfractionated stream to the States was changed by the conversion from Standard Industrial Categories to North American Industrial Codes causing a discontinuity in the data series. Consumption estimates based on the new series are revised for the 39 States with consumption of those petroleum products in 1996 and 1997. Oregon's consumption is revised to zero, while consumption changes from zero to small quantities in Arizona, Colorado, and Wyoming. Estimates for Texas, the State with the most consumption in the old and new series, increase by 10 percent in 1996 and 1997. Estimates for Louisiana and New Jersey the second- and third-largest consuming States in the previous CSEDS, are decreased by 81 percent and 47 percent, respectively. Estimates for Kentucky and New York, the second- and third-largest consumers in the new series increase by 75 percent and 180 percent, respectively. The smallest revisions to estimates occur in Maryland and Mississippi, with increases of 2 percent and 4 percent, respectively.

Revisions to estimates of waxes consumption in the 43 States where it occurs are smaller than revisions to the other petroleum products, with half of the estimates changing by 10 percent or less. Consumption estimates in South Dakota decrease by 51 percent in 1996 and 1997, the largest decrease. The largest increase is 24 percent in West Virginia in 1996 and 1997.

Nuclear Electric Power

G Industrial Sector, 1989 Through 1997. Electricity generation by nuclear plants that are not owned by traditional electric utilities are added to the industrial sector of this version of CSEDS for 1989 through 1997. The U.S. sums of the additional generation range from 47 million kilowatthours in 1989 to 113 million kilowatthours in 1990 (representing less than 0.02 percent of the U.S. total nuclear generation) and are zero in 1995 through 1997.

Renewable Energy Sources

Ethanol

Ethanol consumption in the transportation sector for 1981 through 1988 have been included in this version of CSEDS. The data, previously shown in thousand gallons in the *SEDR* tables, are now in thousand barrels in the tables and data system to be comparable to the motor gasoline data. A new data series is used as a State allocator for the U.S. total in 1989 through 1992. A different conversion factor of 3.539 million Btu per barrel, which represents gross heat content, is applied to data for all years in this edition of CSEDS.

All of these revisions have no effect on consumption estimates in CSEDS since quantities of ethanol actually consumed are included in the motor gasoline volumes in the system. This ethanol data series, which is shown separately in the report tables and data system, is included only to indicate trends in ethanol use as a renewable energy source.

Geothermal

Residential, Commercial, and Industrial Sectors, 1990 Through 1993, 1995 Through 1997. U.S. totals for the residential, commercial, and industrial use of geothermal energy for 1990 Through 1993 and 1995 through 1997 are revised in this edition of CSEDS to be consistent with U.S. totals published in the *EIA Annual Energy Review 1999*. This causes all State-level estimates for those sectors to be revised by the same percentage each year, 1990 through 1993 and 1995 through 1997. The percentage changes vary from year to year, but all are by 3 percent or less.

Industrial Sector, 1989 Through 1997. In addition to the industrial sector revisions above, electricity generation from geothermal energy by nonutility power producers is revised in this edition of CSEDS. Some of the revisions are caused by a review of the data collected on Form EIA-867 and Form EIA-860B. In addition, the gross electricity generation estimates previously used are replaced with net generation for 1989 through 1997. Estimates of generation by smaller facilities, with capacities of 1 to 5 megawatts, are added for 1989 through 1991. These revisions cause the U.S. total nonutility geothermal-based generation estimates to be revised by 3 percent or less in 1989 through 1997. Most State revisions are also small with the exception of a 42-percent decrease in Hawaii in 1992 and a 42-percent decrease in Illinois in 1991.

Hydroelectric Power

Industrial Sector, 1989 Through 1997. Estimates of electricity generation from hydropower by nonutility power producers are revised in this edition of CSEDS. There were a number of revisions caused by a review of the data collected on Form EIA-867 and Form EIA-860B. In addition, the gross electricity generation estimates previously used are replaced with net generation for 1989 through 1997. Estimates of generation by smaller facilities, with capacities of 1 to 5 megawatts, are added for 1989 through 1991. The addition of smaller facilities adds Nevada and Rhode Island to the list of 29 other States with nonutilities hydropower generation in 1989 through 1991 and causes the U.S. total to increase by 15 to 20 percent for those 3 years. In 1992 through 1997 the revised estimates affect all 32 States with nonutility hydropower generation, some by only 1 percent while other State generation values more than doubled.

Hydroelectricity Imports and Exports, 1990 Through 1997. Although there are no revisions to electricity generation from hydropower at electric utilities in kilowatthours in 1990 through 1997, revisions can be seen in the “Hydroelectric Power” column of the *SEDR* tables titled “Estimates of Energy Input at Electric Utilities.” The revisions to electricity imports and exports from Canada and Mexico described on page 509 affect the estimates of the hydro-based electricity imports and exports. These trade estimates are added to the electric utilities’ hydroelectric generation to be shown in the “Hydroelectric Power” column. Data for as many as 27 States are affected by the revised hydro-based electricity imports and exports; some State trade data change by as little as 2 percent while others more than double. The U.S. total values decrease by as much as 42 percent in 1990 and 1991 and by as little as 2 percent in 1994 and 1995.

Conversion Factors, 1996 and 1997. The factor used to convert kilowatthours to British thermal units (Btu) is revised for 1996 and 1997. This factor, FFEOKUS, is the U.S. average heat content of fossil fuels consumed at steam-electric power plants. The Btu values for electricity generated from hydropower in all sectors, as well as imports and exports, are revised by the small percentages shown in Table G2.

Solar

Residential/Commercial Sector, 1989 Through 1997. The method of estimating residential (including the commercial) use of solar energy is revised in this edition of CSEDS to be more consistent with other EIA reports. The U.S. totals are revised to be the same as those published in the EIA *Annual Energy Review 1999*, Table 10.2. The U.S. data are allocated to the States by a State-level series compiled from data collected on Form EIA-63A, “Annual Solar Thermal Collector Manufacturers Survey,” which is published in the EIA *Renewable Energy Annual* (and predecessor reports). Adjustments are made to the compiled State series to account for

an estimated 20-year period for equipment replacement and retirement. Increases in the estimates of residential/commercial solar energy use for all States in 1989 through 1995 range from 12 percent to 16 percent. In 1996 increases in all States ranged from 16 percent in Montana to 9 percent in South Dakota, and in 1997 increases ranged from 16 percent in Montana to 2 percent in South Dakota.

Industrial Sector, 1989 Through 1997. Electricity generation from solar energy by nonutility power producers is revised in this edition of CSEDS. The gross electricity generation estimates previously used are replaced with net generation for 1989 through 1997. Estimates of generation by smaller facilities, with capacities of 1 to 5 megawatts, are added for 1989 through 1991. These revisions cause the California and U.S. total industrial solar generation to be increased by 27 percent in 1989 and reduced by 3 percent in 1990 through 1997. Small revisions also occur in the Btu values in 1996 and 1997 due to the conversion factor change described in the next paragraph and shown in Table G2.

Electric Utilities, 1996 and 1997. Although there are no revisions to electricity generation by electric utilities from solar energy in kilowatthours, the factor used to convert kilowatthours to British thermal units (Btu) is revised for 1996 and 1997. This factor, FFEOKUS, is the U.S. average heat content of fossil fuels consumed at steam-electric power plants. The Btu values for electricity generated from solar energy in California and Texas, as well as the U.S. total, are revised by the percentages shown in Table G2.

Wind

Industrial Sector, 1989 Through 1997. Electricity generation from wind energy by nonutility power producers is revised in this edition of CSEDS. The gross electricity generation estimates previously used are replaced with net generation for 1989 through 1997. Estimates of generation by smaller facilities, with capacities of 1 to 5 megawatts, are added for 1989 through 1991. The addition of smaller facilities increases wind-power generation estimates for California, Hawaii, and Oregon in 1989 through 1991 and causes the U.S. total nonutilities wind generation to increase in those 3 years by 24 percent, 35 percent, and 16 percent, respectively. Revisions from gross to net generation causes the U.S. total nonutilities wind generation to decrease by less than 5 percent in 1992 through 1997 even with the addition of facilities in Minnesota, Iowa, and Texas. Small revisions occur

Table G2. Revisions to Fossil-Fueled Steam-Electric Plants Thermal Conversion Factors

| Year | Previous | Current | Percent Change |
|------|------------------------|---------|----------------|
| | (Btu per Kilowatthour) | | |
| 1996 | 10,335 | 10,340 | + 0.05 |
| 1997 | 10,311 | 10,357 | + 0.45 |

in the comparable Btu values in 1996 and 1997 due to the conversion factor change described in the next paragraph and shown in Table G2.

Electric Utilities, 1996 and 1997. Although there are no revisions to electricity generated from wind energy at electric utilities in kilowatthours, the factor used to convert kilowatthours to Btu is revised. This factor, FFEOKUS, is the U.S. average heat content of fossil fuels consumed at steam-electric power plants. The Btu values for wind-generated electricity in California, Iowa, and Minnesota, as well as the U.S. total, are revised by the percentages shown in Table G2.

Wood and Waste

Residential Sector, 1980, 1990 Through 1997. A small revision to the 1980 U.S. total wood consumption published in the EIA *Annual Energy Review 1999* causes a 0.1-percent increase in consumption estimates for all States. Revisions to the U.S. Bureau of the Census's number of housing units for April 1, 1990, July 1, 1993, and July 1, 1997, cause revisions to residential wood consumption estimates to all years 1990 forward. In 1990 through 1992, only Alabama, Kentucky, Mississippi, and Tennessee are affected and the revisions are too small to be seen in the *SEDR* tables, although they may be noticed in the full-precision data files available via the Internet. All States' residential wood consumption estimates are revised in 1993 through 1996, but all revisions are less than 1 percent. The estimates for 1997 are affected by both a revision in the U.S. total and revisions in the State-level allocating series causing changes to consumption for all States ranging from a 93-percent increase in New York to 1-percent decreases in Georgia, North Carolina, and South Dakota.

Commercial Sector, 1980, 1985 Through 1992, 1996, and 1997. U.S. total commercial sector wood consumption as published in the EIA *Annual Energy Review 1999 (AER)* were revised for 1980, 1996, and 1997. This edition of CSEDS also includes estimates for commercial wood consumption in 1985 through 1992, as published in the *AER*, which were previously unavailable. State-level residential wood consumption is used to allocate the U.S. total commercial wood use to the States; therefore, the revisions in the residential sector data described above cause proportional State-level commercial sector revisions for 1993 through 1996. In 1997 the 12-percent increase in the estimate of U.S. total consumption from the *AER*, in addition to the revisions to residential sector State allocators, cause revisions to

all State commercial wood consumption estimates. The 1997 State revisions range from a more than doubling of commercial wood use in New York to a 32-percent decrease in Oklahoma with the smallest revision being a 1-percent increase in Rhode Island.

Industrial Sector, 1980 Through 1997. All three data series used to estimate wood and waste consumption were revised in their source documents and affect CSEDS estimates. (1) Small revisions in the estimates of U.S. total industrial wood and waste use as published in the EIA *Annual Energy Review 1999* are reflected in CSEDS data for 1980 through 1997, all of which are less than 1 percent. (2) State-level series that are measures of industrial activity in each State from the U.S. Department of Commerce, Bureau of the Census, are used to allocate the U.S. total wood and waste consumption to the States. A different series is used to represent waste wood consumed by furniture manufacturing industries for 1980 through 1995. In addition, the Census series used to estimate all types of wood and waste consumption are changed in 1996 and 1997 to adopt the new North American Industry Classification System data categories used in the 1997 Economic Census, which replaced the Standard Industrial Code groups used in previous Censuses. (3) Electricity generation from wood and waste by nonutility power producers is revised in this CSEDS. The gross electricity generation estimates previously used are replaced with net generation for 1989 through 1997. Estimates of generation by smaller facilities, with capacities of 1 to 5 megawatts, are added for 1989 through 1991. All State industrial wood and waste consumption estimates are revised from 1980 through 1997 by these three series changes. Most revisions are by more than 10 percent and estimates more than double for several States in some years. Additional small revisions occur in the corresponding Btu values in 1996 and 1997 due to the conversion factor change described in the next paragraph and shown in Table G2.

Electric Utilities, 1996 and 1997. Although there are no revisions to electricity generated from wood and waste at electric utilities in kilowatthours, the factor used to convert kilowatthours to Btu is revised. This factor, FFEOKUS, is the U.S. average heat content of fossil fuels consumed at steam-electric power plants. The Btu values for electricity generated from wood and waste in the 12 States with that type of generation, and the U.S. totals, are revised by the percentages shown in Table G2.

Electricity Imports and Exports, 1990 Through 1997

The Energy Information Administration reviewed the methodology for estimating electricity imports and exports from Canada and Mexico and developed a new methodology that is less complex. The trade estimates are revised in this edition of CSEDS for the 20 States with electricity trade activity in 1990 through 1997. The revisions range from less than 1 percent to more than 200 percent with about half the estimates changing by less than 40 percent. These electricity imports and exports data are not shown separately in *SEDR* tables, but are included in the values shown in “Estimates of Energy Input at Electric Utilities” table columns for geothermal, hydroelectric power, and total energy input. Small revisions occur in the corresponding Btu values for hydroelectricity and total energy input for 1996 and 1997 due to the revised conversion factors shown in Table G2.

Electrical System Energy Losses, 1990 Through 1997

Electrical system energy losses are estimated at the national level and allocated to the States in proportion to electricity sales. Revisions to the fossil-fueled steam-electric power plant factor for 1996 and 1997, shown in Table G2, and the estimates of electricity international trade in 1990 through 1997, described in the preceding paragraph, affect estimates of electrical system energy losses. The annual percentage shares of electrical system losses that are used to allocate total losses to all States and sectors are revised by less than 0.2 percent for 1990 through 1997 causing revisions

in electrical system energy losses that are too small to be seen in most of the report tables, but can be seen in the data files available via the Internet.

Net Interstate Flow of Electricity, 1990 Through 1997

The revisions to electricity international trade in 1990 through 1997, described in the preceding paragraphs, affect the calculated estimates of net interstate flow of electricity for all States in those years. Most State’s revisions are small, but for the 20 States with international electricity trade, the size of the revisions to net interstate flow is directly comparable to the size of the revisions in their international trade. In 1996 and 1997, additional changes in net interstate flow estimates for all States are caused by the revisions to the factor used to convert kilowatthours of electricity generated from wood, waste, hydroelectric, solar, and wind energy sources into British thermal units. Those revisions are shown in Table G2.

Population, 1990 Through 1997

The U.S. Department of Commerce, Bureau of the Census, revised the resident population series for 1990 through 1997. The revisions are by less than 1 percent in all States and years. The population estimates, which are used in the calculation of the data shown in the “Total Energy per Capita” ranking column of Table 9, are shown in Appendix D and are included in the Internet data files.