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Contacts

The *Electric Power Annual* is prepared by the U.S. Department of Energy's Energy Information Administration. Questions and comments concerning the contents of the *Electric Power Annual Volume I* may be directed to:

Dean Fennell, Program Manager
Energy Information Administration, EI-53.1
Electric Power Division
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC, 20585

Telephone number: (202)426-1157
Internet E-Mail number: DEAN.FENNELL@EIA.DOE.GOV

or the following subject specialists:

Subject	Contact	Phone Number	Internet E-Mail
Nonutility Power Producers Data	Betty Williams	202-426-1169	BETTY.WILLIAMS@EIA.DOE.GOV
Generating Capability at U.S. Electric Utilities	Elsie Bess	202-426-1242	ELSIE.BESS@EIA.DOE.GOV
U.S. Electric Utility Net Generation	Melvin E. Johnson	202-426-1172	MELVIN.JOHNSON@EIA.DOE.GOV
U.S. Electric Utility Consumption of Fuels	Melvin E. Johnson	202-426-1172	MELVIN.JOHNSON@EIA.DOE.GOV
U.S. Electric Utility Stocks of Fuels	Melvin E. Johnson	202-426-1172	MELVIN.JOHNSON@EIA.DOE.GOV
U.S. Electric Utility Fossil-Fuel Receipts	Kenneth McClevey	202-426-1144	KENNETH.MCCLEVEY@EIA.DOE.GOV
U.S. Electric Utility Fossil-Fuel Delivered Costs	Kenneth McClevey	202-426-1144	KENNETH.MCCLEVEY@EIA.DOE.GOV
U.S. Retail Sales of Electricity, Associated Revenue and Average Revenue per Kilowatthour	Linda Bromley	202-426-1164	LINDA.BROMLEY@EIA.DOE.GOV
Sampling and Estimation Methodologies	James Knaub, Jr.	202-426-1145	JAMES.KNAUB@EIA.DOE.GOV

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- Oxygenate data
  Updated approximately the 25th of the month.
- *Weekly Petroleum Status Report*
  Updated on Wednesdays (Thursdays in the event of a holiday) at 9 a.m.
- *Petroleum Supply Monthly*
  Updated between the 23rd and 26th of the month.
- *Petroleum Marketing Monthly*
  Updated on the 20th of the month.
- *Natural Gas Monthly*
  Updated on the 20th of the month.
- *Weekly Coal Production*
  Updated on Fridays by noon.
- *Quarterly Coal Report*
  Updated 40 days after the end of the quarter.
- *Electric Power Monthly*
  Updated during the first week of the month.
- *Monthly Energy Review*
  Updated the last week of the month.
- *Short-Term Energy Outlook*
  Updated 60 days after the end of the quarter.
- *Electric Power Annual*
  Updated annually.

Office of Coal, Nuclear, Electric and Alternate Fuels
Electric Power Industry Related Data: Available in Electronic Form

(as of June 1998)

	Internet					
	Portable Document Format (PDF)	Executable Data Files	Hypertext Markup Language (HTML)	**CD-ROM**	**EPUB**	**Diskette**
Surveys:						
Form EIA-412: Annual Report of Public Electric Utilities		X				X
Form EIA-759: Monthly Power Plant Report		X		X		X
Form EIA-767: Steam-Electric Operation and Design Report		X				X
Form EIA-826: Monthly Electric Utility Sales and Revenue Report with State Distributions		X		X		X
Form EIA-860: Annual Electric Generator Report		X		X		X
Form EIA-861: Annual Electric Utility Report		X		X		X
FERC Form 1: Annual Report of Major Electric Utilities, Licensees, and Others		X				X
FERC Form 423: Monthly Report of Cost and Quality of Fuels for Electric Plants		X				X
Publications:						
Electric Power Monthly	X		X	X	X	
Electric Power Annual Volume I	X		X	X	X	
Electric Power Annual Volume II	X		X	X	X	
Inventory of Power Plants in the United States	X			X		
Electric Sales and Revenue	X		X	X	X	
Financial Statistics of Major U.S. Investor Owned Electric Utilities	X			X	X	
Financial Statistics of Major U.S. Publicly Owned Electric Utilities	X			X	X	

Note: If you have any questions and/or need additional information, please contact the National Energy Information Center at (202) 586-8800.

Preface

The *Electric Power Annual* presents a summary of electric power industry statistics at national, regional, and State levels. The objective of the publication is to provide industry decisionmakers, government policy-makers, analysts, and the general public with data that may be used in understanding U.S. electricity markets. The *Electric Power Annual* is prepared by the Electric Power Division; Office of Coal, Nuclear, Electric and Alternate Fuels; Energy Information Administration (EIA); U.S. Department of Energy.

In the private sector, the majority of the users of the *Electric Power Annual* are researchers and analysts and, ultimately, individuals with policy- and decisionmaking responsibilities in electric utility companies. Financial and investment institutions, economic development organizations interested in new power plant construction, special interest groups, lobbyists, electric power associations, and the news media will find data in the *Electric Power Annual* useful.

In the public sector, users include analysts, researchers, statisticians, and other professionals with regulatory, policy, and program responsibilities for Federal, State, and local governments. The Congress and other legislative bodies may also be interested in general trends related to electricity at State and national levels. Much of the data in these reports can be used in analytic studies to evaluate new legislation. Public service commissions and other special government groups share an interest in State-level statistics. These groups can also compare the statistics for their States with those of other jurisdictions.

Volume 1—with a focus on U.S. electric utilities—contains final 1997 data on net generation and fossil fuel consumption, stocks, receipts, and cost; preliminary 1997 data on generating unit capability, and retail sales of electricity, associated revenue, and the average revenue per kilowatthour of electricity sold (based on a **monthly sample**: Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions"). Additionally, information on net generation from renewable energy sources and on the associated generating capability is included in Volume 1 of the EPA. Data published in the *Electric Power Annual Volume 1* are compiled from three statistical forms filed monthly and two forms filed annually by electric utilities. These forms are described in detail in the Technical Notes.

Volume 2—expected to be available in November 1998—will present other annual data. The second volume will present annual 1997 summary statistics for the electric power industry, including information on nonutility power producers. Included in the latter volume will be preliminary data for electric utility retail sales of electricity, associated revenue, and average revenue per kilowatthour of electricity sold (based on the **annual census**—Form EIA-861, "Annual Electric Utility Report") and statistics on electric utility financial and environmental aspects, power transactions, and demand-side management. Preliminary 1997 data for U.S. nonutility power producers on installed capacity and gross generation, as well as supply and disposition information, will also be provided in Volume 2 of the EPA.

Contents

Tables

A Review of U.S. Electric Utility Statistics, 1997

Nonutility Power Producers

Nonutility power producers include qualifying cogenerators, qualifying small power producers, and other nonutility generators (including independent power producers) without a designated franchised service area.

For nonutilities (with a nameplate rating of 1 megawatt and greater), the final 1996 and estimated 1997 for year-end nameplate capacity, gross generation, and sales to electric utilities are:

Nonutility Power Producers	Final 1996	Estimated 1997
Nameplate Capacity (gigawatts)	73	79
Gross Generation (gigawatthours)	382,530	421,199
Sales to Electric Utilities (gigawatthours)	224,675	260,760

Source: Form EIA-867, "Annual Nonutility Power Producer Report." For nameplate capacity, the estimate was based on 1996 operable capacity in addition to capacity that was projected to come online in 1997. Estimates for gross generation and sales to electric utilities were derived using the following procedure. An average growth factor based on data filed between 1989 and 1996 was applied to reported 1996 data. More information concerning nonutility power producers will be provided in the *Electric Power Annual Volume II* (DOE/EIA-348), scheduled for release in November 1998. For more information, contact Ms. Betty Williams at (202)426-1269 or E-mail BWilliam@EIA.DOE.GOV..

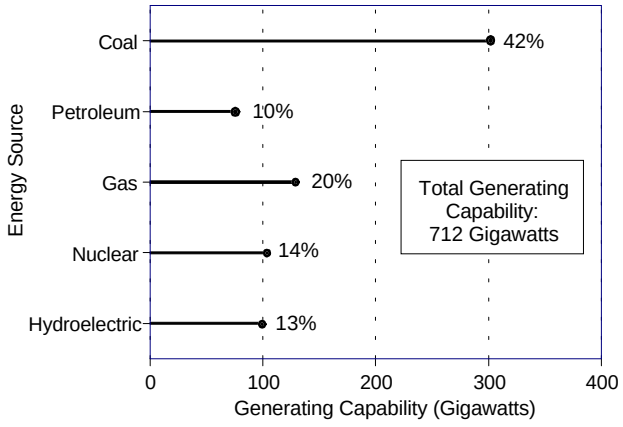
Generating Capability at Electric Utilities

Electric utility generating capability in the United States totaled 712,033 megawatts in 1997.[1] Based on primary energy source, coal-fired capability totaled 302,523 megawatts; gas-fired, 142,566 megawatts; nuclear, 100,756 megawatts; renewables, 75,448 megawatts; petroleum, 69,480 megawatts; and hydroelectric (pumped storage only), 21,110 megawatts. Total capability included 4,794 megawatts of newly added capability. Of that added capability, 34 percent was coal-fired while both gas and nuclear units represented 36 and 23 percent, respectively.

Net Generation at Electric Utilities

In 1997, a record level of net generation was set, when 3,123 billion kilowatthours (kWh) of electricity were produced—an increase of 1 percent from last year. Net generation of electricity from coal was also at a record level when 1,788 billion kWh were produced, an increase of 3 percent from 1996. Generation from petroleum and gas increased 15 and 8 percent, respectively, from the

Figure 1. Generating Capability at U.S. Electric Utilities by Energy Source, 1997



Notes: ●The total generating capability value includes renewable generating capability (excluding hydroelectric) that is 1 percent of the total. ●Preliminary 1997 data are based on final 1996 data and changes (including additions, retirements, and modifications) that occurred in 1997 that were followed up and verified by telephone using the respondents' proposed ten-year changes reported as of January 1, 1997. No updates from responses submitted on Form EIA-860 with data as of January 1, 1998 are included. ●Totals may not equal sum of components because of independent rounding.

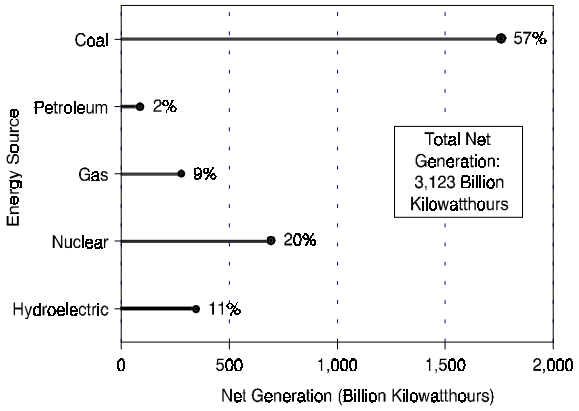
Source: Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

[1] Data on capability for 1997 are preliminary; does not include the estimated 79,000 megawatts of capacity at nonutility facilities.

levels in 1996. A substantial decrease in nuclear power generation during 1997 was largely responsible for the increase in fossil-fired generation. Net generation from nuclear-powered plants was 7 percent lower than in 1996. Most of the decline in nuclear-powered generation was attributed to the fact that many units were out of service for a considerable amount of time during the year for scheduled refueling, maintenance, or repair outage.

Conventional hydroelectric generation increased to 341 billion kWh, 3 percent above the level reported in 1996. The increase in hydroelectric generation was due to higher rain and snowfall levels experienced, primarily in the Pacific Northwest. Hydroelectric plants in the Pacific Contiguous Census Division, which provided 56 percent of total U.S. hydroelectric generation during the year, reported 2 percent more production than during 1996.

Figure 2. U.S. Electric Utility Net Generation by Energy Source, 1997



Notes: ●The total net generation value includes renewable energy sources (excluding hydroelectric), which represent less than 1 percent of total generation. ●Data are final. ●Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Fossil Fuel Receipts and Costs at Electric Utilities

In 1997, electric utilities received 881 million short tons of coal, 118 million barrels of petroleum, and 2,765 billion cubic feet (Bcf) of gas at a total delivered cost of approximately $33 billion.[2] Coal accounted for 84 percent of the total Btu content of fossil fuels delivered in 1997, while gas and petroleum accounted for 13 and 3 percent, respectively.

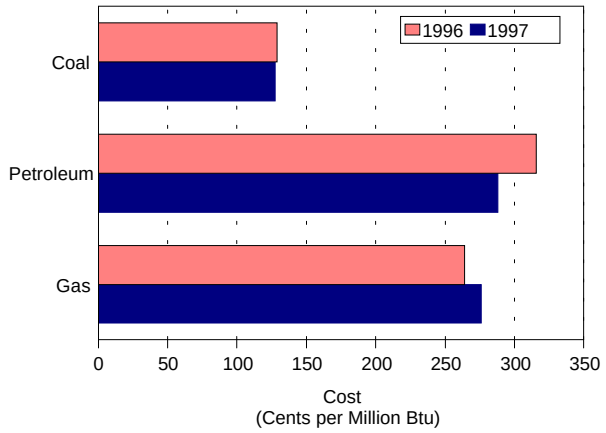
Coal. Electric utilities received a record 881 million short tons of coal in 1997, up from 863 million short tons received in 1996. Receipts of coal were directly affected by a 3-percent increase in coal-fired generation from 1996 levels. This increase was partly the result of a decline in nuclear generation, most of which occurred in the New England, Middle Atlantic, and East North Central Census Divisions. Receipts of coal rose in each of these Census divisions, as well as in the South Atlantic, East South Central, Mountain, and Pacific Contiguous Census Divisions. Also contributing to a need to increase coal receipts in 1997 was the lower level of stocks of coal on-hand at electric utilities at the start of 1997 (115 million short tons), compared with 126 million short tons in 1996.

Mild weather during the first half of the year, combined with scheduled deliveries of coal, allowed electric utilities to rebuild coal stocks to 122 million short tons by June. However, the traditional reduction of stocks during the summer, coupled with rail problems that affected deliveries of western coal, reduced end-of-year stocks to 99 million short tons—the lowest level since 1974. (Note that, as the electric industry transitions into a competitive industry, electric utilities are changing their coal-buying strategies with an emphasis on reducing inventory carrying costs via maintaining lower levels of coal stocks.)

Operational problems at the Union Pacific Railroad (UPR) during 1997 negatively impacted coal receipts during the year. These problems resulted in rail congestion on the UPR lines during the second half of the year, which slowed the delivery of coal from western mines to some electric utilities located primarily in the West North Central and West South Central Census Divisions. End-of-year stocks of coal in these Census divisions fell by 20 and 43 percent, respectively, from prior-year levels since electric plants did not receive all of their contracted coal deliveries. Some plants had to reduce coal-burn in order to conserve coal stocks. To compensate, electric utilities switched to either gas or purchased power from neighboring utilities. According to reports, the problems were related to the 1996 merger of the UPR and the Southern Pacific Rail Corporation. Implementing the merger resulted in crew and

[2] Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." This survey covers over 99 percent of the coal and approximately 95 percent of the petroleum and gas delivered to electric utilities.

Figure 3. Average Cost of Fossil Fuels at U.S. Electric Utilities, 1996 and 1997



Notes: ● Data are final. ● Data are for electric generating plants with a total steam-electric and combined-cycle nameplate capacity of 50 or more megawatts. ● Totals may not equal sum of components because of independent rounding. ● Data do not include petroleum coke.

Source: Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."

locomotive shortages for moving coal and other commodities. Incompatible computer systems and inconsistent labor agreements were also blamed for track congestion that slowed the Nation's largest railroad.

Record hydroelectric generation was a factor in limiting the use of fossil fuels by electric utilities during 1997. Conventional hydroelectric generation totaled 341 billion kWh, up from 331 billion kWh generated during 1996, and surpassing the previous record of 332 billion kWh set in 1983. This was a moderate increase in comparison to those reported for both 1995 and 1996; its affect on fossil fuels is not as evident as in the two previous years. However, the increase did displace the use of fossil fuels. In the western third of the Nation (Mountain and Pacific Contiguous Census Divisions), hydroelectric generation helped meet an increase in demand for electricity, thereby limiting the increase in consumption (and receipts) of coal and gas.

Continuing the downward trend of the last 11 years, the average delivered cost of coal in 1997 was $1.27 per million Btu, down from the $1.29 per million Btu reported for 1996.[3] Contributing to this lower cost of coal were the continuing expiration, renegotiation, and buyouts of older high-priced contracts; improved efficiency in coal production and transportation; and, to some extent, excess production capacity. The average cost of coal delivered under contract in 1997 was $1.29 per million Btu, down from $1.31 per million Btu in 1996. Coal purchased on the spot market (contracts of less than one year duration) and delivered in 1997 increased slightly in cost. On a dollars-per- million-Btu basis, spot-market coal increased to $1.21, up from the $1.20 reported in 1996.

The average sulfur content (measured as percent sulfur by weight) of coal delivered in 1997 was 1.11 percent, up from 1.10 percent in 1996. There has been little change in this measure of the sulfur content since implementation of the Clean Air Act Amendments of 1990 (CAAA90) in January 1995. Previously, the average sulfur content of coal delivered to electric utilities had fallen each year from 1991 through 1995, as utilities had increased purchases of low-sulfur coal while reducing purchases of high-sulfur coal in order to comply with the CAAA90. The average Btu content of coal received in 1997 was 10,275 per pound, nearly unchanged from 10,263 per pound in 1996.

Petroleum. Receipts of petroleum delivered to electric utilities totaled 118 million barrels, up from 107 million barrels and 84 million barrels reported in 1996 and 1995, respectively. This increase in receipts of petroleum over the past 2 years reverses the trend started during the 1970's in which electric utilities had been reducing their use of petroleum as a baseload fuel. However, petroleum use in 1995, and to a lesser degree in 1996, was unusually low due to intense competition from low-cost natural gas and other fuels.

Receipts of petroleum to the New England Census Division soared by 14 million barrels or 64 percent in 1997 from 1996, as electric utilities increased their petroleum-fired generation to make up for a large decline in nuclear generation. Currently, only selected utilities in Connecticut, Massachusetts, New York, Florida, and Hawaii still rely on petroleum for a substantial portion of their fuel requirements. In 1997, these States accounted for 83 percent of all Number 6 fuel oil received at electric utilities.

In 1997, the average cost of petroleum was $2.88 per million Btu, compared with $3.16 per million Btu in 1996. Number 6 fuel oil represented 94 percent of all petroleum products delivered to electric utilities in 1997. The average cost of Number 2 fuel oil, used primarily

[3] The delivered cost of fossil fuels includes all costs (i.e.,transportation, taxes, etc.) incurred by the electric utility for delivery of the fuel to the plant. It does not include unloading charges.

for start-up and flame stabilization at steam-electric plants, was $4.49 per million Btu, down from $4.87 per million Btu reported in 1996. Based on a weighted average cost in cents per million Btu, fuel oil was the most expensive fossil fuel delivered to electric utilities in 1997.

Gas. Receipts of gas totaled 2,765 Bcf in 1997, up from the 2,605 Bcf reported in 1996. In the Middle Atlantic Census Division, receipts of gas totaled 236 Bcf—up 68 Bcf from 1996, as electric utilities increased their gas-fired generation to compensate for a decrease in nuclear-powered and petroleum-fired generation in the Northeast. In the Pacific Contiguous Census Division, gas receipts rose by 56 Bcf (17 percent), due to a drop in hydroelectric generation in California and the need to meet a higher demand for electricity. During 1994 through 1996, gas receipts to California had been reduced by nearly one-half due partly to higher levels of hydroelectric generation. In 1997, however, hydroelectric generation in California fell by 10 percent. For the Pacific Contiguous Census Division as a whole, hydroelectric generation rose by 2 percent. Nationwide, use of gas by electric utilities may have also gained from increases in pipeline capacity and the enactment of the CAAA90, which promotes clean-burning gas as a means of reducing emissions.

On a dollars-per-million-Btu basis, the average cost of gas in 1997 was $2.76, compared with $2.64 in 1996. This was the highest cost for gas since 1985. Uncertainties concerning the availability of gas, stock levels, weather implications, and crude oil prices were the primary factors influencing the price of natural gas.

Weather Conditions Affecting Fossil Fuel Receipts Weather that affected the level of fossil fuels received during 1997 included a mild winter and summer over the eastern one-half of the Nation, and a decrease in precipitation in California from the well-above-normal levels experienced during the previous two years.[4] Additional information can be obtained from the heating and cooling degree-day charts shown in the March 1998 issue of the *Electric Power Monthly*. These charts provide population-weighted data on temperatures at the Census division and national levels for 1997, compared to 1996 and to what is considered normal, based on historical temperature data.

Retail Sales at Electric Utilities

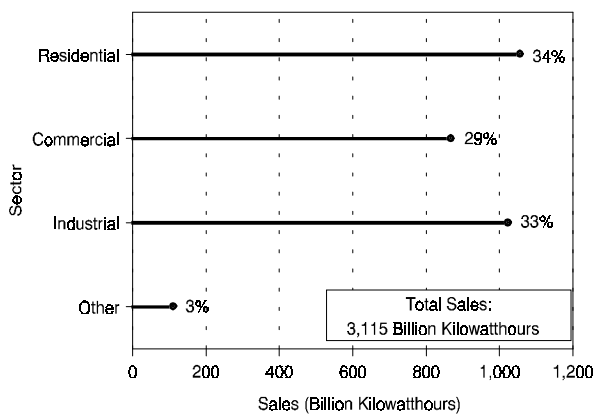
Total sales of electricity to ultimate consumers in the United States in 1997 reached 3,115 billion kWh, an increase of 17 billion kWh, or 1 percent, compared with 1996 (Table 1). In 1997, sales increased in all major end-use sectors, except in the residential sector. The residential sector decreased by 11 billion kWh (1 percent). The commercial sector increased by 26 billion kWh (3 percent). Lastly, the industrial sector increased by 2 billion kWh, less than 1 percent.

Revenue from the sale of electricity to ultimate consumers in the United States in 1997 reached $214 billion, an increase of $2 billion (1 percent), compared with the level in 1996. Electricity revenue in the residential and industrial sectors remained the same compared to last year at this time. Revenue from sales of electricity in the commercial sector increased by $2 billion (3 percent).

Average Revenue per Kilowatthour[5] of electricity sold to ultimate consumers in 1997 was 6.88 cents, an increase of 0.02 cents from 1996. In the residential sector, the average revenue per kWh increased by 0.10 cents. In the commercial sector, average revenue per kWh remained at 7.64 cents. However, average revenue per kWh decreased by 0.04 cents in the industrial sector.

[4] U.S. Department of Agriculture, Weekly Weather and Crop Bulletin, Vol. 85, No. 2, January 13, 1998.
[5] Average revenue per kilowatthour is the ratio of revenue to retail sales.

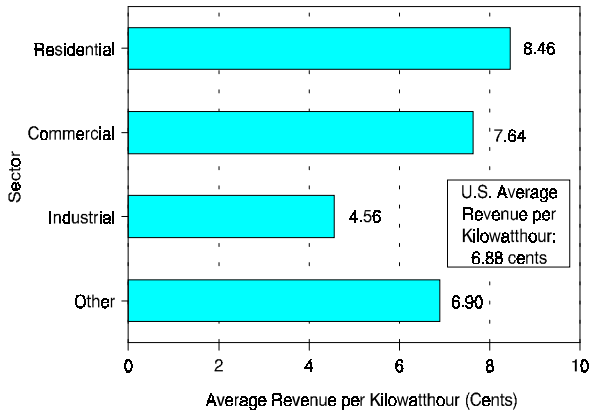
Figure 4. U.S. Electric Utility Retail Sales to Ultimate Consumers by Sector, 1997



Notes: ●Other includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales. ●Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

Figure 5. U.S. Electric Utility Average Revenue per Kilowatthour by Sector, 1997



Notes: ●Other includes sales to public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales. ●Values are weighted and are calculated by dividing total revenue by total sales.

Source: Energy Information Administration, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

Table 1. U.S. Electric Utility Summary Statistics, 1996 and 1997

Item	1996	1997	Percent Change
Generating Capability (megawatts)[1]	**709,942**	**712,033**	**0.3**
Coal	302,420	302,523	.0
Petroleum	70,421	69,480	–1.3
Gas	134,593	137,737	2.3
Nuclear[2]	100,784	100,756	.0
Hydroelectric Pumped Storage	21,110	21,110	.0
Renewable	**75,204**	**75,448**	**.3**
Hydroelectric (conventional)	73,129	73,367	.3
Geothermal	1,622	1,622	.0
Biomass[3]	442	442	.0
Wind	8	14	75.0
Solar Thermal	--	--	--
Photovoltaic	4	4	.0
Net Generation (million kilowatthours)	**3,077,442**	**3,122,523**	**1.5**
Coal	1,737,453	1,787,806	2.9
Petroleum[4]	67,346	77,753	15.5
Gas	262,730	283,625	8.0
Nuclear	674,729	628,644	–6.8
Hydroelectric Pumped Storage[5]	–3,088	–4,040	30.8
Renewable	**338,272**	**348,735**	**3.1**
Hydroelectric (conventional)	331,058	341,273	3.1
Geothermal	5,234	5,469	4.5
Biomass[3]	1,967	1,983	.8
Wind	10	6	–40.0
Solar Thermal	--	--	--
Photovoltaic	3	3	.0
Consumption			
Coal (million short tons)	875	900	2.9
Petroleum (million barrels)[6]	113	125	10.6
Gas (billion cubic feet)	2,732	2,968	8.6
Stocks (Year End)			
Coal (million short tons)	115	99	–13.9
Petroleum (million barrels)[7]	48	49	2.1
Receipts			
Coal (million short tons)	863	881	2.1
Petroleum (million barrels)[8]	107	118	10.3
Gas (billion cubic feet)[9]	2,607	2,766	6.1
Cost (cents per million Btu)[10]			
Coal	128.9	127.3	–1.2
Petroleum[11]	315.7	288.0	–8.8
Gas	264.1	276.0	4.5
Retail Sales			
(million kilowatthours)	**3,097,810**	**3,114,894**	**.6**
Residential	1,082,491	1,071,569	–1.0
Commercial	887,425	913,283	2.9
Industrial	1,030,356	1,032,538	.2
Other[12]	97,539	97,504	.0
Revenue from Retail Sales			
(billion dollars)	**212**	**214**	**.9**
Residential	91	91	.0
Commercial	68	70	2.9
Industrial	47	47	.0
Other[12]	7	7	.0
Average Revenue per Kilowatthour (cents)	**6.86**	**6.88**	**.3**
Residential	8.36	8.46	1.2
Commercial	7.64	7.64	.0
Industrial	4.60	4.56	–.9
Other[12]	6.91	6.90	–.1

1 Waste heat is included in generating capability total. Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone. The Form EIA-860 was revised during 1995 to collect data as of January 1 of the reporting year, where ''reporting year'' is the calendar year in which the report is required to be filed with the Energy Information Administration. No updates from responses submitted on Form EIA-860 with data as of January 1, 1997 are included.

2 For 1996, includes one unit (436 megawatts of capability), which was reported as out of service indefinitely, however, there are no plans to return the unit to service. For 1997, includes two units (927 megawatts of capability) for which an announcement has been made to retire these units.

3 Includes wood, wood waste, peat, wood liquors, railroad ties, pitch, wood sludge, municipal solid waste, agricultural waste, straw, tires, landfill gases, fish oils, and/or other waste.

4 Includes petroleum coke.

5 Represents total pumped storage facility production minus energy used for pumping. Negative generation denotes that electric power consumed for plant use exceeds gross generation.

6 Does not include petroleum coke consumption of 681 thousand short tons in 1996 and 1,400 thousand short tons in 1997.

7 Does not include petroleum coke stocks of 91 thousand short tons at year end 1996 and 469 thousand shorts tons at year end 1997.

8 Does not include petroleum coke receipts of 1.410 million short tons in 1996 and 2.192 million short tons in 1997.

9 Includes small amounts of coke-oven, refinery, and blast furnace gas.

10 Average cost of fuel delivered to electric generating plants with a total steam-electric nameplate capacity of 50 or more megawatts; average cost values are weighted by Btu.

11 Does not include petroleum coke cost of 78.2 cents per million Btu in 1996 and 91.2 cents per million Btu in 1997.

12 Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •Net summer capability values are preliminary for 1997 and final for 1996. •Values for net generation, consumption, and stocks are final. •Values for sales, revenue, and average revenue per kilowatthour for 1996 are final but preliminary for 1997 (that is, the monthly estimates based on a cutoff model sample have been revised --see technical notes for a discussion of the sample design for the Form EIA-826). •Preliminary 1997 values in the commercial and industrial sectors for Maryland, South Atlantic Census Division, and the U.S. total reflect an electric utility's reclassification for this information by Standard Industrial Classification Code (SIC). •Values are based on unrounded values. •Totals may not equal sum of components because of independent rounding. •Percent change is calculated before rounding.

Sources: •Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report''; monthly and annual Form EIA-759, ''Monthly Power Plant Report''; Form EIA-826, ''Monthly Electric Utility Sales Report with State Distributions''; and Form EIA-861, ''Annual Electric Utility Report.'' Report with State Distributions''; and •Federal Energy Regulatory Commission FERC Form 423, ''Monthly Report of Cost and Quality of Fuels for Electric Plants.''

Generating Capability at U.S. Electric Utilities

More than one-third of the primary energy in the Nation is used to generate electricity.[10] Consumers expect electricity to be instantly available; that is, at the flick of a switch. In fact, electricity is so important to the functioning of our society that its unavailability is newsworthy. The U.S. electric power industry is organized to ensure that an adequate supply of electricity is available to meet all demand requirements at any given instant, both now and in the future. This chapter provides an inventory of the capability of various methods for converting energy into electricity, and information regarding industry plans for building additional capability in the future.

The generating units operated by an electric utility vary by intended usage; that is, by the three major types of load (generally categorized as base, intermediate, and peak) requirements the utility must meet. A *baseload generating unit* is normally used to satisfy all or part of the minimum or base load of the system and, as a consequence, produces electricity at an essentially constant rate and runs continuously. Baseload units are generally the newest, largest, and most efficient[11] of the three types of units. A *peakload generating unit*, normally the least efficient of the three unit types, is used to meet requirements during the periods of greatest or peak load on the system. *Intermediate-load generating units* meet system requirements that are greater than base load but less than peak load. Intermediate-load units are used during the transition between baseload and peak load requirements. Utilities also have reserve or standby generating units, which are available to the system in the event of an unexpected increase in load or an unexpected outage within the system. Consequently, an inventory of net capability must account for reserve or standby capability, as well as generating units that are not available to the system for various reasons (such as routine maintenance).

Net capability in this report, unless otherwise stated, refers to that which is *operable* and includes both active and inactive capability. Once a new generator has been declared available to generate power to the electrical grid, it is considered a part of the operable capability of the utility until it is retired from service. Generating units that are used for standby service, cold standby, and generators that are out of service for an extended period (exceeding 1 year) comprise the inactive operable capability.[12] Active operable capability includes generators that are generating or available to generate; this includes generators that may be down for scheduled maintenance, refueling, or forced outages.

An electric utility plant (station) contains generating units and auxiliary equipment that are used to convert various types of energy into electric energy. A fossil-fueled generating unit may be designed to use (burn) one or more fossil fuels to produce electricity. A generating unit capable of burning more than one fossil fuel is referred to as a dual-fired unit. Some dual-fired units can only burn one fuel at a time (that is, the fuels are fired sequentially), while others can burn more than one fuel simultaneously (concurrent firing of different fuels). A sequentially fired unit generally uses one fossil fuel as its primary energy source, but can switch to a second fossil fuel as an alternate energy source. Unless stated otherwise, information regarding generating capability in this report is based on the primary energy source.

Prime Movers

Electric utilities use a variety of prime movers based on the loads, availability of fuels, and energy requirements of the utility. The most common prime movers are the steam turbine, internal-combustion engine, gas combustion turbine, water turbine, and wind turbine.[13] Most prime movers used to produce electricity today are turbines. The energy sources most often used with prime movers are the fossil fuels—coal, petroleum, and natural gas.

[10] Energy Information Administration, *Monthly Energy Review*, DOE/EIA-0035(98/04) (Washington, DC, April 1998), pp. 7 and 33.

[11] The *operating efficiency* of a generating unit is a function of the amount of net heat that it can extract from the energy source for use in the production of electricity.

[12] As of January 1, 1997, about 2 percent of the operable capability was inactive, based on preliminary data from the Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

[13] A turbine converts the kinetic energy of a moving fluid (liquid or gas) to mechanical energy. Turbines have a series of blades mounted on a shaft against which fluids are forced, thus rotating the shaft connected to the generator. The fluids most commonly used in turbines are steam, hot air, or combustion products, and water.

Steam-Turbine Generating Units. Most of the electricity in the United States is produced in steam turbines. In a *fossil-fueled* steam turbine, the fuel is burned in a boiler to produce steam. The resulting steam then turns the turbine blades that turn the shaft of the generator to produce electricity. In a *nuclear-powered* steam turbine, the boiler is replaced by a reactor containing a core of nuclear fuel (primarily enriched uranium). Heat produced in the reactor by fission of the uranium is used to make steam. The steam is then passed through the turbine generator to produce electricity, as in the fossil-fueled steam turbine. Steam-turbine generating units are used primarily to serve the base load of electric utilities. Fossil-fueled steam-turbine generating units range in size (nameplate capacity) from 1 megawatt to more than 1,000 megawatts. The size of nuclear-powered steam-turbine generating units in operation today ranges from 75 megawatts to more than 1,400 megawatts.

Gas Turbine Generating Units. In a gas turbine (combustion-turbine) unit, hot gases produced from the combustion of natural gas and distillate oil in a high-pressure combustion chamber are passed directly through the turbine, which spins the generator to produce electricity. Gas turbines are commonly used to serve the peak loads of the electric utility. Gas-turbine units can be installed at a variety of site locations, because their size is generally less than 100 megawatts. Gas-turbine units also have a quick startup time, compared with steam-turbine units. As a result, gas-turbine units are suitable for peaking, emergency, and reserve-power requirements.

The gas turbine, as is typical with peaking units, has a lower efficiency than the steam turbine used for baseload power. The efficiency of the gas turbine is increased when coupled with a steam turbine in a *combined-cycle* operation. In this operation, hot gases (which have already been used to spin one turbine generator) are moved to a waste-heat recovery steam boiler where the water is heated to produce steam that, in turn, produces electricity by running a second steam-turbine generator. In this way, two generators produce electricity from one initial fuel input. All or part of the heat required to produce steam may come from the exhaust of the gas turbine. Thus, the steam-turbine generator may be supplementarily fired in addition to the waste heat. Combined-cycle generating units generally serve intermediate loads.

Internal-Combustion Engines. These prime movers have one or more cylinders in which the combustion of fuel takes place. The engine, which is connected to the shaft of the generator, provides the mechanical energy to drive the generator to produce electricity. Internal-combustion (or diesel) generators can be easily transported, can be installed upon short notice, and can begin producing electricity nearly at the moment they start. Thus, like gas turbines, they are usually operated during periods of high demand for electricity. They are generally about 5 megawatts in size.

Hydroelectric Generating Units. Hydroelectric power is the result of a process in which flowing water is used to spin a turbine connected to a generator. The two basic types of hydroelectric systems are those based on *falling water* and those based on *natural river current*. In the first system, water accumulates in reservoirs created by the use of dams. This water then falls through conduits (penstocks) and applies pressure against the turbine blades to drive the generator to produce electricity. In the second system, called a *run-of-the-river* system, the force of the river current (rather than falling water) applies pressure to the turbine blades to produce electricity. Since run-of-the-river systems do not usually have reservoirs and cannot store substantial quantities of water, power production from this type of system depends on seasonal changes and stream flow. These conventional hydroelectric generating units range in size from less than 1 megawatt to 700 megawatts. Because of their ability to start quickly and make rapid changes in power output, hydroelectric generating units are suitable for serving peak loads and providing spinning reserve power, as well as serving baseload requirements.

Another kind of hydroelectric power generation is the *pumped storage* hydroelectric system. Pumped storage hydroelectric plants use the same principle for generation of power as the conventional hydroelectric operations based on falling water and river current. However, in a pumped storage operation, low-cost off-peak energy is used to pump water to an upper reservoir where it is stored as potential energy. The water is then released to flow back down through the turbine generator to produce electricity during periods of high demand for electricity.

Other Generating Units. Other methods of electric power generation, which presently contribute only small amounts to total power production, have potential for expansion. These include *geothermal, solar, wind,* and *biomass* (wood, municipal solid waste, agricultural waste, etc.). *Geothermal* power comes from heat energy buried beneath the surface of the earth. Although most of this heat is at depths beyond current drilling methods, in some areas of the country, magma[14] flows close enough

[14] Magma is the molten matter under the earth's crust from which igneous rock is formed by cooling.

to the surface of the earth to produce steam. That steam can then be harnessed for use in conventional steam-turbine plants. *Solar power* is derived from the energy (both light and heat) of the sun. *Photovoltaic conversion* generates electric power directly from the light of the sun; whereas, *solar-thermal* electric generators use the heat from the sun to produce steam to drive turbines. *Wind power* is derived from the conversion of the energy contained in wind into electricity. A wind turbine is similar to a typical wind mill. However, because of the intermittent nature of sunlight and wind, high capacity utilization factors cannot be achieved for these plants. Several electric utilities have incorporated *wood* and *waste* (for example, municipal waste, corn cobs, and oats) as energy sources for producing electricity at their power plants. These sources replace fossil fuels in the boiler. The combustion of wood and waste creates steam that is typically used in conventional steam-electric plants.

Generator Rating

The rating of a generator is a measure of its ability to produce electricity. Generators are rated by nameplate capacity. The *nameplate capacity* is the full-load continuous rating of the generator under specified conditions, as designated by the manufacturer, and is usually indicated on a metal plate attached to the generator. *Net capability* is the steady hourly output that the generating unit is expected to supply to the system load, as demonstrated by test procedures. The capability of the generating unit in the summer is generally less than in the winter due to high ambient-air and cooling-water temperatures, which cause generating units to be less efficient. The measure used in this publication for electric utilities is net summer capability. The nameplate capacity of a generator is generally greater than its net capability.

Data Sources

The following tables contain a summary of the number of electric generators and the amount of electric generating capability in the United States at national, regional, and State levels for the period 1993 through 1997. During the past year, several updates were made for these data.

These changes include the installation of new generators; the retirement of existing generators; the use of a primary energy source for dual-fired units different from that which has been reported in the past; and the modification of generators, such as the rewinding of stators or the retrofitting of associated generator equipment. Respondents that did not meet the reporting requirements of Form EIA-860 were deleted. The capacity of generators sold to nonutilities was also deleted. The inclusion of new respondents also resulted in data changes.

Estimates of net summer capability and net winter capability are made for operable nonnuclear electric generating units with no reported capability. These estimates are calculated using a statistical relationship that exists between the capability (summer and winter) and installed generator nameplate capacity for units that were in commercial operation as of the end of 1992. For a description of the estimation formula, see the technical notes.

Data in the tables were obtained from the Form EIA-860, "Annual Electric Generator Report." Data are reported annually on the Form EIA-860 by approximately 900 electric utilities in the United States that operate power plants. Data from the Form EIA-860 for 1997 are preliminary, based on final 1996 data and respondents' proposed 1997 changes (additions, retirements, and modifications) reported as of January 1, 1997, and verified by telephone. Final data, as well as more detailed statistics on operable capacity and planned capability additions, are published in the *Inventory of Power Plants in the United States*.[15]

Form EIA-860, "Annual Electric Generator Report," was revised during 1995 to collect data as of January 1 of the reporting year, where "reporting year" is the calendar year in which the report is required to be filed with the Energy Information Administration. No updates from responses submitted on Form EIA-860 with data as of January 1, 1998, are included. Data prior to 1995 are as of December 31 of the reporting year.

[15] Energy Information Administration, *Inventory of Power Plants in the United States*, DOE/EIA-0095.

Table 2. Generating Capability at U.S. Electric Utilities by Prime Mover and Primary Energy Source, 1993 Through 1997

(Megawatts)

Prime Mover/Primary Energy Source	1993	1994	1995	1996	1997[4]
Fossil Steam	**446,315**	**445,234**	[3] **446,125**	**443,339**	**444,164**
Coal-Fired	300,795	301,098	300,610	302,420	302,523
Petroleum-Fired	41,905	41,151	36,669	41,885	40,825
Gas-Fired	103,614	102,985	[3] 108,847	99,034	100,816
Gas Turbine/Internal Combustion	**56,494**	**59,577**	[3] **61,484**	**64,094**	**65,573**
Petroleum-Fired	27,614	28,768	27,795	28,537	28,655
Gas-Fired	28,881	30,809	[3] 33,689	35,557	36,919
Nuclear[1]	**99,041**	**99,148**	**99,515**	**100,784**	**100,756**
Hydroelectric Pumped Storage	**21,146**	**21,208**	**21,387**	**21,110**	**21,110**
Renewable	**76,975**	**77,061**	**77,600**	**75,204**	**75,448**
Hydroelectric (conventional)	74,763	74,787	75,274	73,129	73,367
Geothermal	1,747	1,747	1,747	1,622	1,622
Biomass[2]	459	515	567	442	442
Wind	1	8	8	8	14
Solar Thermal	--	--	--	--	--
Photovoltaic	4	4	4	4	4
U.S. Total	**699,971**	**702,229**	**706,111**	**709,942**	**712,033**

1 For 1996, includes one unit (436 megawatts of capability), which was reported as out of service indefinitely, however, there are no plans to return the unit to service. For 1997, includes two units (927 megawatts of capability) for which an announcement has been made to retire these units.

2 Includes wood, wood waste, peat, wood liquors, railroad ties, pitch, wood sludge, municipal solid waste, agricultural waste, straw, tires, landfill gases, fish oils, and/or other waste.

3 These values are different from those previously published because common header steam generators are now included in fossil steam, instead of internal combustion/gas turbine.

4 Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone.

Notes: •Waste heat is included in the original primary energy source category for 1993-1995 and thereafter in U.S. Total. •Data for 1997 are preliminary; prior-year data are final. •Totals may not equal sum of components because of independent rounding. •Generating capability is net summer capability.

Source: Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report.''

Table 3. Summary of Capability Additions, Retirements, and Total Operable Capability at U.S. Electric Utilities by Energy Source, 1997

Primary Energy Source	Added		Retired		Operable	
	Number of Generators	Capability[1] (megawatts)	Number of Generators	Capability[1] (megawatts)	Number of Generators	Capability[1] (megawatts)
Coal	**6**	**1,611**	**1**	**16**	**1,214**	**302,523**
Petroleum	**24**	**321**	**42**	**379**	**3,288**	**69,480**
Gas	**36**	**1,733**	**2**	**2**	**2,225**	**137,737**
Nuclear	**1**	**1,122**	**1**	**560**	**110**	**100,756**
Hydroelectric Pumped Storage	**0**	**0**	**0**	**0**	**140**	**21,110**
Renewable	**5**	**7**	**5**	**126**	**3,423**	**75,448**
Hydroelectric (conventional)	5	7	3	1	3,346	73,367
Geothermal	0	0	2	126	27	1,622
Biomass[2]	0	0	0	0	22	442
Wind	0	0	0	0	19	14
Solar Thermal	0	0	0	0	0	0
Photovoltaic	**0**	**0**	**0**	**0**	**9**	**4**
U.S. Total	**72**	**4,794**	**51**	**1,083**	**10,454**	**712,033**

1 Net summer capability.

2 Includes wood, wood waste, peat, wood liquors, railroad ties, pitch, wood sludge, municipal solid waste, agricultural waste, straw, tires, landfill gases, fish oils, and/or other waste.

Notes: •Data are preliminary. •Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone. •Totals may not equal sum of components because of independent rounding. •Total capability cannot be calculated from the prior year's capability by adjusting for retirements and newly added capability because capability ratings for independent generators change each year and generators are purchased from or sold to nonutilities. •Waste heat is included in U.S. Total.

Source: Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report.''

Table 4. Generating Capability at U.S. Electric Utilities by Census Division and State, 1996 and 1997

Census Division State	1996		1997[2]	
	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)
New England	**660**	**22,119**	**661**	**22,125**
Connecticut	85	6,321	85	6,321
Maine	187	2,387	187	2,387
Massachusetts	193	9,365	193	9,365
New Hampshire	44	2,512	44	2,512
Rhode Island	16	441	16	441
Vermont	135	1,092	136	1,098
Middle Atlantic	**898**	**77,428**	**901**	**77,804**
New Jersey	109	13,645	109	13,645
New York	553	30,060	553	30,242
Pennsylvania	236	33,723	239	33,917
East North Central	**1,695**	**114,974**	**1,701**	**115,326**
Illinois	329	33,164	330	33,541
Indiana	162	20,681	162	20,678
Michigan	558	21,985	558	21,957
Ohio	245	27,278	248	27,282
Wisconsin	401	11,867	403	11,870
West North Central	**1,873**	**55,806**	**1,884**	**56,170**
Iowa	410	8,161	410	8,161
Kansas	412	9,694	413	9,697
Minnesota	346	9,180	351	9,193
Missouri	343	15,978	345	16,252
Nebraska	250	5,632	253	5,706
North Dakota	46	4,207	46	4,207
South Dakota	66	2,954	66	2,954
South Atlantic	**1,373**	**141,032**	**1,377**	**141,740**
Delaware	30	2,239	30	2,239
District of Columbia	4	806	4	806
Florida	371	36,898	372	37,127
Georgia	206	22,782	206	22,782
Maryland	104	10,957	104	10,957
North Carolina	194	20,923	194	20,923
South Carolina	227	17,173	229	17,422
Virginia	190	14,806	191	15,036
West Virginia	47	14,448	47	14,448
East South Central	**486**	**60,808**	**486**	**60,832**
Alabama	157	20,692	157	20,692
Kentucky	114	15,686	114	15,710
Mississippi	53	7,177	53	7,177
Tennessee	162	17,253	162	17,253
West South Central	**809**	**104,647**	**810**	**104,704**
Arkansas	105	9,639	105	9,639
Louisiana	109	17,150	109	17,185
Oklahoma	157	13,091	157	13,091
Texas	438	64,767	439	64,789
Mountain	**817**	**51,047**	**820**	**51,092**
Arizona	128	15,146	128	15,146
Colorado	163	6,794	164	6,819
Idaho	106	2,553	108	2,573
Montana	97	4,943	97	4,943
Nevada	67	5,643	67	5,643
New Mexico	55	5,077	55	5,077
Utah	146	4,926	146	4,926
Wyoming	55	5,966	55	5,966
Pacific Contiguous	**1,158**	**78,737**	**1,161**	**78,895**
California	685	43,934	687	44,084
Oregon	194	10,526	195	10,535
Washington	279	24,276	279	24,276
Pacific Noncontiguous	**653**	**3,344**	**653**	**3,344**
Alaska	554	1,734	554	1,734
Hawaii	99	1,610	99	1,610
U.S. Total[1]	**10,422**	**709,942**	**10,454**	**712,033**

1 For 1996, includes one unit (436 megawatts of capability), which was reported as out of service indefinitely, however, there are no plans to return the unit to service. For 1997, includes two units (927 megawatts of capability) for which an announcement has been made to retire these units.

2 Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone.

3 Net summer capability.

Notes: •Data for 1997 are preliminary; prior-year data are final. •Totals in this table include two gas-fired fuel cells totaling 0.4 megawatts. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report.''

Table 5. Coal-Fired, Nuclear, Hydroelectric, and Renewable Generating Capability at U.S. Electric Utilities by Census Division and State, 1997

Census Division State	Coal		Nuclear[1]		Hydroelectric		Renewable[2]	
	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)
New England	**15**	**2,693**	**7**	**5,828**	**377**	**3,119**	**13**	**89**
Connecticut	1	385	3	2,631	34	136	0	0
Maine	0	0	1	870	142	416	1	32
Massachusetts	9	1,730	1	669	63	1,854	8	*
New Hampshire	5	578	1	1,162	32	284	0	0
Rhode Island	0	0	0	0	1	1	0	0
Vermont	0	0	1	496	105	427	4	56
Middle Atlantic	**98**	**22,983**	**19**	**17,671**	**341**	**7,568**	**0**	**0**
New Jersey	7	1,629	4	3,862	3	400	0	0
New York	32	3,891	6	4,853	293	5,279	0	0
Pennsylvania	59	17,463	9	8,956	45	1,888	0	0
East North Central	**382**	**76,198**	**23**	**20,059**	**483**	**2,838**	**7**	**151**
Illinois	56	15,095	13	12,609	12	13	0	0
Indiana	79	18,902	0	0	21	62	0	0
Michigan	75	11,793	5	3,959	232	2,137	0	0
Ohio	121	23,033	2	2,042	9	119	3	90
Wisconsin	51	7,375	3	1,449	209	506	4	61
West North Central	**187**	**34,569**	**8**	**5,642**	**170**	**3,924**	**12**	**115**
Iowa	53	5,807	1	520	33	139	1	*
Kansas	19	5,256	1	1,163	0	0	0	0
Minnesota	41	5,779	3	1,572	57	144	11	115
Missouri	44	10,557	1	1,137	29	1,110	0	0
Nebraska	15	3,111	2	1,250	20	167	0	0
North Dakota	13	3,585	0	0	5	545	0	0
South Dakota	2	474	0	0	26	1,820	0	0
South Atlantic	**220**	**66,956**	**27**	**23,953**	**433**	**11,857**	**3**	*****
Delaware	5	910	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0	0	0
Florida	31	10,763	5	3,876	6	47	0	0
Georgia	39	13,233	4	3,950	108	3,094	0	0
Maryland	15	4,636	2	1,675	13	530	0	0
North Carolina	45	12,440	5	4,639	82	1,554	0	0
South Carolina	25	5,494	7	6,421	133	3,449	0	0
Virginia	26	5,099	4	3,392	79	3,130	3	*
West Virginia	34	14,381	0	0	12	55	0	0
East South Central	**140**	**36,455**	**9**	**9,363**	**201**	**7,398**	**0**	**0**
Alabama	39	11,515	5	4,839	89	2,881	0	0
Kentucky	58	14,069	0	0	30	792	0	0
Mississippi	6	2,255	1	1,179	0	0	0	0
Tennessee	37	8,615	3	3,345	82	3,725	0	0
West South Central	**57**	**31,552**	**8**	**8,637**	**131**	**3,129**	**1**	*****
Arkansas	5	3,817	2	1,694	43	1,325	0	0
Louisiana	6	3,488	2	2,011	0	0	0	0
Oklahoma	10	4,848	0	0	38	1,121	0	0
Texas	36	19,399	4	4,932	50	683	1	*
Mountain	**105**	**29,165**	**3**	**3,751**	**423**	**10,662**	**9**	**48**
Arizona	14	5,201	3	3,751	47	2,884	0	0
Colorado	31	4,960	0	0	48	1,140	0	0
Idaho	0	0	0	0	104	2,432	0	0
Montana	6	2,260	0	0	83	2,546	2	13
Nevada	9	2,807	0	0	17	1,046	0	0
New Mexico	13	3,901	0	0	6	58	0	0
Utah	12	4,374	0	0	88	262	7	35
Wyoming	20	5,662	0	0	30	294	0	0
Pacific Contiguous	**5**	**1,898**	**6**	**5,853**	**869**	**43,627**	**29**	**1,678**
California	0	0	5	4,746	432	13,535	26	1,597
Oregon	1	508	0	0	176	9,038	2	35
Washington	4	1,390	1	1,107	261	21,054	1	47
Pacific Noncontiguous	**5**	**54**	**0**	**0**	**58**	**356**	**3**	*****
Alaska	5	54	0	0	54	353	3	*
Hawaii	0	0	0	0	4	3	0	0
U.S. Total	**1,214**	**302,523**	**110**	**100,756**	**3,486**	**94,477**	**77**	**2,081**

1 For 1997, includes two units (927 megawatts of capability) for which an announcement has been made to retire these units.
2 Includes geothermal, biomass, wind, solar thermal, and photovoltaic (excludes hydroelectric).
3 Net summer capability.
* =Value less than 0.5.

Notes: •Data are preliminary. •Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report.''

Table 6. Petroleum-, Gas-, and Dual-Fired Steam Generating Capability at U.S. Electric Utilities by Census Division and State, 1997

Census Division State	Petroleum[1]		Gas[2]		Dual-Fired Petroleum/Gas		Total Petroleum and Gas	
	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)
New England	**31**	**4,301**	**0**	**0**	**23**	**4,222**	**54**	**8,523**
Connecticut	14	1,898	0	0	4	742	18	2,640
Maine	11	1,003	0	0	0	0	11	1,003
Massachusetts	6	1,400	0	0	15	2,654	21	4,054
New Hampshire	0	0	0	0	1	406	1	406
Rhode Island	0	0	0	0	3	420	3	420
Vermont	0	0	0	0	0	0	0	0
Middle Atlantic	**32**	**5,635**	**4**	**278**	**44**	**12,550**	**80**	**18,463**
New Jersey	12	1,221	0	0	9	1,241	21	2,462
New York	10	2,841	2	218	31	9,395	43	12,454
Pennsylvania	10	1,574	2	60	4	1,914	16	3,548
East North Central	**20**	**2,744**	**14**	**648**	**22**	**4,086**	**56**	**7,478**
Illinois	9	590	5	211	15	3,107	29	3,908
Indiana	5	188	3	245	1	140	9	573
Michigan	6	1,966	3	38	3	716	12	2,720
Ohio	0	0	1	94	2	117	3	211
Wisconsin	0	0	2	60	1	7	3	67
West North Central	**5**	**365**	**24**	**582**	**53**	**2,037**	**82**	**2,984**
Iowa	0	0	1	18	3	59	4	77
Kansas	0	0	5	210	30	1,575	35	1,785
Minnesota	2	50	9	76	7	57	18	183
Missouri	2	314	8	217	4	95	14	626
Nebraska	0	0	0	0	9	251	9	251
North Dakota	0	0	0	0	0	0	0	0
South Dakota	1	1	1	61	0	0	2	62
South Atlantic	**33**	**7,463**	**5**	**321**	**81**	**11,712**	**119**	**19,496**
Delaware	0	0	0	0	5	655	5	655
District of Columbia	2	550	0	0	0	0	2	550
Florida	19	4,086	2	215	65	9,210	86	13,510
Georgia	2	122	2	28	7	382	11	532
Maryland	2	561	1	78	4	1,465	7	2,104
North Carolina	0	0	0	0	0	0	0	0
South Carolina	4	398	0	0	0	0	4	398
Virginia	4	1,747	0	0	0	0	4	1,747
West Virginia	0	0	0	0	0	0	0	0
East South Central	**2**	**58**	**7**	**366**	**26**	**3,220**	**35**	**3,645**
Alabama	0	0	0	0	1	49	1	49
Kentucky	2	58	1	115	0	0	3	173
Mississippi	0	0	6	251	25	3,171	31	3,423
Tennessee	0	0	0	0	0	0	0	0
West South Central	**0**	**0**	**56**	**7,482**	**260**	**48,560**	**316**	**56,042**
Arkansas	0	0	0	0	15	2,480	15	2,480
Louisiana	0	0	13	504	62	10,893	75	11,398
Oklahoma	0	0	8	612	26	5,525	34	6,137
Texas	0	0	35	6,366	157	29,661	192	36,027
Mountain	**0**	**0**	**10**	**639**	**58**	**3,021**	**68**	**3,660**
Arizona	0	0	0	0	21	1,501	21	1,501
Colorado	0	0	2	12	11	234	13	246
Idaho	0	0	0	0	0	0	0	0
Montana	0	0	0	0	1	70	1	70
Nevada	0	0	1	113	8	612	9	725
New Mexico	0	0	6	414	16	544	22	958
Utah	0	0	1	100	1	60	2	160
Wyoming	0	0	0	0	0	0	0	0
Pacific Contiguous	**0**	**0**	**9**	**695**	**95**	**19,503**	**104**	**20,199**
California	0	0	9	695	95	19,503	104	20,199
Oregon	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0
Pacific Noncontiguous	**25**	**1,152**	**0**	**0**	**0**	**0**	**25**	**1,152**
Alaska	0	0	0	0	0	0	0	0
Hawaii	25	1,152	0	0	0	0	25	1,152
U.S. Total	**148**	**21,719**	**129**	**11,011**	**662**	**108,911**	**939**	**141,641**

1 Includes single-fired petroleum steam and dual-fired steam when the primary energy source is petroleum and the alternate energy source is any fuel other than gas.

2 Includes single-fired gas steam and dual-fired steam when the primary energy source is gas and the alternate energy source is any fuel other than petroleum.

3 Net summer capability.

Notes: •Data are preliminary. •Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone. •Totals may not equal sum of components because of independent rounding. •Due to a change in definition, a substantial shift of data from column to column occurred in this table.

Source: Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report.''

Table 7. Petroleum-, Gas-, and Dual-Fired Gas Turbine/Internal Combustion Generating Capability at U.S. Electric Utilities by Census Division and State, 1997

Census Division State	Petroleum[1]		Gas[2]		Dual-Fired Petroleum/Gas		Total Petroleum and Gas	
	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)	Number of Generators	Capability[3] (megawatts)
New England	**166**	**1,152**	**0**	**0**	**27**	**604**	**193**	**1,756**
Connecticut	25	404	0	0	4	124	29	528
Maine	32	67	0	0	0	0	32	67
Massachusetts	67	477	0	0	22	463	89	940
New Hampshire	4	66	0	0	1	17	5	83
Rhode Island	12	20	0	0	0	0	12	20
Vermont	26	119	0	0	0	0	26	119
Middle Atlantic	**225**	**5,230**	**11**	**372**	**124**	**5,187**	**360**	**10,789**
New Jersey	25	1,543	5	306	42	3,167	72	5,016
New York	106	2,012	3	41	69	1,659	178	3,712
Pennsylvania	94	1,675	3	25	13	361	110	2,062
East North Central	**409**	**3,107**	**49**	**1,697**	**292**	**3,799**	**750**	**8,603**
Illinois	81	655	8	126	131	1,134	220	1,916
Indiana	33	299	3	37	17	805	53	1,140
Michigan	139	526	18	376	77	445	234	1,347
Ohio	61	800	10	480	39	507	110	1,787
Wisconsin	95	828	10	677	28	908	133	2,413
West North Central	**617**	**3,840**	**42**	**910**	**762**	**4,156**	**1,421**	**8,905**
Iowa	172	642	4	52	139	904	315	1,598
Kansas	52	289	11	142	295	1,062	358	1,493
Minnesota	135	993	14	205	71	192	220	1,390
Missouri	134	1,329	5	274	118	1,219	257	2,823
Nebraska	74	257	6	5	127	664	207	927
North Dakota	26	68	0	0	2	10	28	78
South Dakota	24	262	2	232	10	104	36	598
South Atlantic	**268**	**6,056**	**22**	**995**	**266**	**9,342**	**556**	**16,392**
Delaware	15	124	2	224	2	151	19	499
District of Columbia	2	256	0	0	0	0	2	256
Florida	104	3,200	3	245	124	2,802	231	6,247
Georgia	22	939	1	5	21	1,028	44	1,972
Maryland	43	722	9	249	15	1,041	67	2,012
North Carolina	21	340	0	0	38	1,854	59	2,194
South Carolina	10	185	5	27	45	1,449	60	1,660
Virginia	50	279	2	245	21	1,016	73	1,540
West Virginia	1	12	0	0	0	0	1	12
East South Central	**31**	**1,223**	**12**	**392**	**54**	**2,309**	**97**	**3,924**
Alabama	1	20	1	147	18	1,198	20	1,365
Kentucky	8	76	5	92	10	508	23	676
Mississippi	2	31	6	153	6	131	14	315
Tennessee	20	1,096	0	0	20	472	40	1,568
West South Central	**60**	**290**	**60**	**1,390**	**174**	**3,382**	**294**	**5,062**
Arkansas	20	206	4	14	16	102	40	322
Louisiana	1	16	1	90	24	182	26	288
Oklahoma	12	31	17	159	46	796	75	986
Texas	27	37	38	1,127	88	2,301	153	3,466
Mountain	**86**	**345**	**16**	**401**	**106**	**2,875**	**208**	**3,622**
Arizona	3	92	1	10	39	1,707	43	1,809
Colorado	39	141	3	128	30	204	72	473
Idaho	2	6	2	136	0	0	4	142
Montana	3	5	0	0	2	50	5	55
Nevada	16	45	1	14	13	827	30	885
New Mexico	7	24	4	111	1	20	12	154
Utah	11	23	5	3	21	67	37	94
Wyoming	5	10	0	0	0	0	5	10
Pacific Contiguous	**42**	**647**	**18**	**534**	**73**	**3,661**	**133**	**4,842**
California	37	560	13	388	58	2,616	108	3,563
Oregon	0	0	5	146	8	455	13	601
Washington	5	87	0	0	7	590	12	677
Pacific Noncontiguous	**528**	**967**	**20**	**404**	**11**	**308**	**559**	**1,679**
Alaska	459	531	20	404	11	308	490	1,243
Hawaii	69	436	0	0	0	0	69	436
U.S. Total	**2,432**	**22,858**	**250**	**7,094**	**1,889**	**35,622**	**4,571**	**65,573**

1 Includes single-fired petroleum steam and dual-fired steam when the primary energy source is petroleum and the alternate energy source is any fuel other than gas.

2 Includes single-fired gas steam and dual-fired steam when the primary energy source is gas and the alternate energy source is any fuel other than petroleum.

3 Net summer capability.

Notes: •Data are preliminary. •Preliminary 1997 data are based on final 1996 data and respondent's proposed 1997 changes (additions,retirements, and modifications) reported as of January 1, 1997, and verified by telephone. •Totals may not equal sum of components because of independent rounding. •Due to a change in definition, a substantial shift of data from column to column occurred in this table.

Source: Energy Information Administration, Form EIA-860, ''Annual Electric Generator Report.''

Net Generation from U.S. Electric Utilities

This chapter provides summary statistics on the amount of electricity produced by electric utilities in the United States. The different energy sources used by electric utilities to produce electric power are also discussed in this chapter.

The production of electricity is generally referred to as generation and is measured in kilowatthours. Gross generation is the amount of power produced by an electric power plant (station), measured at the terminals of the plant (that is, prior to the point at which the power leaves the station and is available to the system). Some of the electric power generated at a power plant is used to operate equipment at the plant. Power used at the plant generally ranges between 1 percent (for hydroelectric units) and 7 percent (for steam-electric units). Net generation is the power available to the system (gross generation less use at the plant); however, it is greater than that available to consumers due to losses during transmission and distribution (approximately 8 percent to 9 percent). Net generation is the measure used for electric power production by electric utilities in this report.

Generation from Fossil Fuels

Coal. Historically, most generation of electricity in the United States has been from coal. Coal-fired generation became even more important following the Arab oil embargo of 1973 due to concerns over the availability of petroleum imports, increasing petroleum costs, and curtailments of natural gas. In 1978, the passage of the Powerplant and Industrial Fuel Use Act and the Natural Gas Policy Act encouraged further use of coal by electric utilities. Although both Federal and State environmental laws and regulations existed during the 1970's, renewed interest in environmental issues raised concerns about electric power plant emissions, particularly from those plants burning coal. The Clean Air Act Amendments of 1990 established a goal of a 10-million-ton reduction in sulfur dioxide emissions and a 2-million-ton reduction in nitrogen oxide emissions by 2000 from 1980 levels. Coal-fired generation continues to provide more than one-half the total net generation of electricity by electric utilities in the Nation. Most of the electricity production from coal by electric utilities occurs in the East North Central and South Atlantic Census Divisions where substantial amounts of coal are mined.

Petroleum. During the early 1970's, electric utilities used petroleum extensively to generate electricity. However, after the 1973 embargo by the Organization of Petroleum Exporting Countries (OPEC) on petroleum exports to the United States, petroleum prices rose sharply. Further price increases occurred in 1979 and 1980 following the Iranian revolution and subsequent reductions in Iranian petroleum exports. Consequently during the past decade, utilities have not built large, petroleum-fired steam units. In addition, many utilities have either converted steam units to coal or switched fuels where dual-fired capability exists. Most of the utilities that still rely heavily on petroleum to generate electricity are located along the eastern seaboard.

Gas. The demand for gas (primarily natural gas) to heat homes and serve business and industry has historically taken priority over demand from electric utilities under both Federal and State regulations. In the 1970's, many utilities were on occasion denied gas when available pipelines reached capacity in serving heating demand during the months from November to March (the peak heating season). By the middle 1970's, curtailments to electric utilities also occasionally occurred during the nonheating season as producers conserved supply in preparation for heating season demand. In the face of an attractive interstate price structure, but deprived of supplies during many months of the year, utilities in the 1970's used relatively less expensive gas when it was available, then switched to other more expensive fuels when gas supplies were curtailed. Gas became more available to utilities with the passage of the Natural Gas Policy Act of 1978 and more frequent exemptions from the gas-use restrictions of the Powerplant and Industrial Fuel Use Act (Fuel Use Act) of 1978. Amendments to the Fuel Use Act in 1987 created potential for additional use of gas. These amendments eased restrictions on the use of gas by removing a legal requirement to obtain an exemption for the construction of new gas-fired generating capability. The West South Central Census Division, where most of the gas production in the Nation occurs, supplies more than half of the gas-fired generation in the country.

Nuclear-Powered Generation

Generation from nuclear power has generally increased since the 1950's, and this trend continues. Since 1984, nuclear plants have provided the second largest share of total U.S. generation of electricity, after coal-fired plants. Although no new nuclear units have been ordered since 1978 and units ordered after 1974 were not built, many units that were under construction have either been

completed and entered service or will enter service in the near future. Licensing delays, questions about radioactive waste disposal, and concern about nuclear plant safety have slowed these units from entering service and are still major obstacles to additional growth in the use of this energy source for generating electricity. Most of the nuclear-powered generation comes from the Middle Atlantic, East North Central, and South Atlantic Census Divisions (where over 60 percent of the nuclear units in the country are located).

Generation from Renewable Fuels

Hydroelectric. Water is currently the leading renewable energy source used by electric utilities to generate electric power. Hydroelectric plants operate where suitable waterways are available; many of the best of these sites have already been developed. Generating electricity using water has several advantages. The major advantage is that water, a renewable resource, is a source of cheap power. In addition, because there is no fuel combustion, there is little air pollution in comparison with fossil fuel plants and limited thermal pollution compared with nuclear plants. Like other energy sources, the use of water for generation has limitations, including environmental impacts caused by damming rivers and streams, which affects the habitats of the local plant, fish, and animal life. Seventy percent of the hydroelectric power in the United States is generated in the Pacific and Rocky Mountain States.

Other Sources. Other renewable resources—geothermal (heat energy beneath the surface of the earth), wood, waste, wind, and the sun (solar)—are energy sources that are constantly replenished. These energy sources have received increased attention in recent years, but a limited number of such generating facilities are in use today. Currently, renewable resources (other than water) supply less than 1 percent of the electricity generated by electric utilities. Most of the electricity produced from this category is from geothermal power. Electric utilities currently operate geothermal plants in two States (California and Utah). The Geysers, operated by the Pacific Gas and Electric Company, is the largest geothermal plant in the Nation. Only a few utilities operate units that produce electricity from wind and solar energy. Wood and waste resources can be used to replace fossil fuels in utility boilers. To date, just a few electric generating units have been built that use wood or waste products as a primary fuel.

Data Sources

The data in the following tables are aggregated at national, regional, and State levels for the period 1993 through 1997. Data in the tables were obtained from the Form EIA-759, "Monthly Power Plant Report," which is used to collect monthly data from all operators of electric utilities (approximately 700) in the United States. More detailed statistics from the Form EIA-759 are published in the *Electric Power Monthly*.[16]

Table 8. Net Generation from U.S. Electric Utilities by Energy Source, 1993 Through 1997
(Million Kilowatthours)

Energy Source	1993	1994	1995	1996	1997
Coal	**1,639,151**	**1,635,493**	**1,652,914**	**1,737,453**	**1,787,806**
Petroleum[1]	**99,539**	**91,039**	**60,844**	**67,346**	**77,753**
Steam	96,070	86,469	56,265	62,271	73,065
Gas Turbine/Internal Combustion	3,469	4,570	4,579	5,075	4,688
Gas	**258,915**	**291,115**	**307,306**	**262,730**	**283,625**
Steam	237,345	259,554	267,686	218,781	233,256
Gas Turbine/Internal Combustion	21,570	31,560	39,260	43,949	50,369
Hydroelectric Pumped Storage[2]	**-4,036**	**-3,378**	**-2,725**	**-3,088**	**-4,040**
Nuclear	**610,291**	**640,440**	**673,402**	**674,729**	**628,644**
Renewable	**278,664**	**256,004**	**302,787**	**338,272**	**348,735**
Hydroelectric (conventional)	269,098	247,071	296,378	331,058	341,273
Geothermal	7,571	6,941	4,745	5,234	5,469
Wind	*	*	11	10	6
Biomass[3]	1,990	1,988	1,649	1,967	1,983
Solar Thermal	–	–	–	–	–
Photovoltaic	4	3	4	3	3
U.S. Total	**2,882,525**	**2,910,712**	**2,994,529**	**3,077,442**	**3,122,523**

[1] Includes petroleum coke.
[2] Negative generation denotes that electric power consumed for plant use exceeds gross generation.
[3] Includes wood, wood waste, peat, wood liquors, railroad ties, pitch, wood sludge, municipal solid waste, agricultural waste, straw, tires, landfill gases, fish oils, and/or other waste.

* =Value less than 0.5.

Notes: • Data are final. • Totals may not equal sum of components because of independent rounding.
Source: Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

[16] Energy Information Administration, *Electric Power Monthly*, DOE/EIA-0226.

Table 9. Net Generation from U.S. Electric Utilities by Selected Prime Mover, Census Division, and State, 1996 and 1997

(Million Kilowatthours)

Census Division State	Total		Fossil Steam		Gas Turbine/Internal Combustion	
	1996	1997	1996	1997	1996	1997
New England	**75,057**	**73,500**	**34,795**	**47,333**	**4,033**	**4,625**
Connecticut	15,774	13,228	8,396	12,289	185	246
Maine	7,800	3,223	622	1,441	*	2
Massachusetts	27,759	33,899	21,629	28,487	543	801
New Hampshire	15,419	14,264	4,148	5,116	*	4
Rhode Island	3,301	3,563	0	0	3,301	3,563
Vermont	5,004	5,323	*	*	3	10
Middle Atlantic	**299,173**	**309,027**	**154,063**	**165,945**	**2,649**	**3,002**
New Jersey	19,791	23,761	7,917	8,710	960	1,273
New York	104,360	108,099	41,763	49,169	1,362	1,431
Pennsylvania	175,022	177,167	104,384	108,067	327	297
East North Central	**539,380**	**520,978**	**413,324**	**422,923**	**854**	**1,505**
Illinois	144,116	131,138	74,045	79,875	141	154
Indiana	105,557	110,466	105,008	109,756	100	149
Michigan	95,155	89,565	67,387	66,912	99	80
Ohio	142,900	141,249	128,425	125,195	164	216
Wisconsin	51,651	48,560	38,459	41,185	351	905
West North Central	**251,039**	**253,841**	**191,301**	**193,310**	**955**	**1,440**
Iowa	33,387	34,064	28,466	28,959	56	139
Kansas	39,875	37,844	31,302	29,080	367	333
Minnesota	41,792	40,303	28,291	28,127	146	229
Missouri	67,827	71,073	57,431	60,115	235	483
Nebraska	27,323	28,388	16,156	17,317	97	129
North Dakota	30,770	29,720	27,618	26,394	1	6
South Dakota	10,066	12,450	2,036	3,317	53	121
South Atlantic	**616,105**	**633,982**	**411,156**	**428,650**	**18,521**	**21,389**
Delaware	8,122	6,579	5,920	5,226	2,202	1,353
District of Columbia	110	71	102	53	8	17
Florida	145,140	147,984	105,424	107,637	14,031	17,137
Georgia	98,729	101,780	63,518	66,499	350	449
Maryland	44,381	44,553	29,365	29,155	465	597
North Carolina	102,787	107,371	64,245	70,342	307	428
South Carolina	76,326	78,374	30,438	31,174	85	238
Virginia	56,533	58,986	28,663	30,656	1,074	1,170
West Virginia	83,978	88,284	83,481	87,907	*	0
East South Central	**321,017**	**329,763**	**232,810**	**238,144**	**1,871**	**2,283**
Alabama	115,093	113,684	73,886	71,928	418	662
Kentucky	88,438	91,558	84,815	88,039	127	139
Mississippi	28,838	31,228	18,499	19,191	1,114	1,224
Tennessee	88,647	93,293	55,610	58,986	213	258
West South Central	**422,148**	**429,480**	**342,299**	**346,981**	**9,132**	**9,302**
Arkansas	43,678	42,790	27,518	25,060	6	10
Louisiana	58,643	61,120	42,305	46,795	573	814
Oklahoma	47,545	48,380	41,878	42,079	3,589	3,477
Texas	272,283	277,190	230,598	233,047	4,964	5,000
Mountain	**266,925**	**281,927**	**193,139**	**201,779**	**3,113**	**3,931**
Arizona	70,877	78,060	31,795	35,495	763	850
Colorado	33,972	34,376	32,280	32,281	107	159
Idaho	12,231	13,512	—	—	*	*
Montana	26,039	27,807	12,275	14,435	23	24
Nevada	21,362	22,870	17,322	17,698	1,897	2,604
New Mexico	29,364	30,568	28,968	30,132	185	177
Utah	32,229	33,969	30,879	32,353	139	117
Wyoming	40,852	40,765	39,620	39,384	0	0
Pacific Contiguous	**275,196**	**278,704**	**39,777**	**43,350**	**3,616**	**3,088**
California	114,706	112,183	29,868	34,559	1,575	1,884
Oregon	47,884	49,068	1,861	1,819	1,510	967
Washington	112,606	117,453	8,048	6,973	532	238
Pacific Noncontiguous	**11,402**	**11,321**	**5,841**	**5,711**	**4,278**	**4,492**
Alaska	4,982	5,108	724	795	2,993	3,214
Hawaii	6,420	6,213	5,117	4,916	1,285	1,278
U.S. Total	**3,077,442**	**3,122,523**	**2,018,505**	**2,094,127**	**49,024**	**55,057**

* =Value less than 0.5 million kilowatthours.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 10. Net Generation from U.S. Electric Utilities by Energy Source, Census Division, and State, 1996 and 1997

(Million Kilowatthours)

Census Division State	Coal		Petroleum[1]		Gas	
	1996	1997	1996	1997	1996	1997
New England	**17,178**	**19,124**	**13,002**	**22,494**	**8,648**	**10,340**
Connecticut	2,368	2,558	5,255	8,431	959	1,546
Maine	—	—	622	1,443	—	—
Massachusetts	11,501	12,489	6,221	11,586	4,450	5,213
New Hampshire	3,310	4,077	838	1,008	*	35
Rhode Island	—	—	62	17	3,239	3,546
Vermont	—	—	3	10	*	*
Middle Atlantic	**127,128**	**134,019**	**13,149**	**10,834**	**16,436**	**24,094**
New Jersey	5,826	6,822	611	384	2,439	2,777
New York	20,444	21,752	9,325	8,142	13,355	20,706
Pennsylvania	100,858	105,446	3,213	2,307	641	611
East North Central	**408,296**	**416,285**	**2,160**	**2,147**	**3,723**	**5,996**
Illinois	71,515	76,092	796	495	1,875	3,442
Indiana	104,414	108,912	321	607	374	386
Michigan	66,097	65,552	652	602	737	838
Ohio	128,125	124,910	267	273	196	228
Wisconsin	38,145	40,820	124	170	540	1,101
West North Central	**188,131**	**189,797**	**1,064**	**1,204**	**3,061**	**3,749**
Iowa	28,283	28,739	51	82	189	277
Kansas	29,743	27,236	158	110	1,768	2,068
Minnesota	27,329	27,081	640	764	468	512
Missouri	57,176	59,903	96	125	395	570
Nebraska	16,041	17,209	20	31	192	206
North Dakota	27,530	26,314	89	86	*	*
South Dakota	2,030	3,314	9	7	50	117
South Atlantic	**366,611**	**382,150**	**27,154**	**29,754**	**35,913**	**38,136**
Delaware	4,225	3,926	1,188	833	2,708	1,820
District of Columbia	—	—	110	71	—	—
Florida	65,782	66,035	22,891	25,742	30,781	32,998
Georgia	63,231	66,180	292	201	345	568
Maryland	27,780	27,394	1,401	1,479	649	879
North Carolina	64,098	70,181	259	212	195	377
South Carolina	30,307	31,043	126	188	90	181
Virginia	27,930	29,676	683	858	1,124	1,292
West Virginia	83,257	87,715	204	171	20	21
East South Central	**225,773**	**230,861**	**1,722**	**3,070**	**7,186**	**6,495**
Alabama	73,599	71,586	156	119	549	885
Kentucky	84,660	87,875	135	126	146	177
Mississippi	12,010	12,501	1,174	2,633	6,430	5,281
Tennessee	55,504	58,899	258	193	61	152
West South Central	**208,104**	**212,447**	**1,055**	**913**	**142,272**	**142,924**
Arkansas	24,339	22,761	98	67	3,087	2,243
Louisiana	18,633	20,953	273	646	23,972	26,010
Oklahoma	31,877	33,037	125	13	13,465	12,507
Texas	133,255	135,696	559	188	101,748	102,164
Mountain	**186,234**	**194,420**	**306**	**233**	**9,713**	**11,058**
Arizona	30,781	34,219	65	61	1,712	2,065
Colorado	31,952	32,002	16	15	419	424
Idaho	—	—	*	*	—	—
Montana	12,242	14,410	18	17	38	32
Nevada	14,657	15,251	94	31	4,468	5,021
New Mexico	26,357	27,079	22	21	2,773	3,210
Utah	30,693	32,144	31	29	293	297
Wyoming	39,552	39,315	59	59	9	10
Pacific Contiguous	**9,770**	**8,467**	**690**	**169**	**32,934**	**37,803**
California	—	—	675	142	30,768	36,301
Oregon	1,728	1,501	7	11	1,637	1,273
Washington	8,042	6,966	8	16	529	229
Pacific Noncontiguous	**229**	**237**	**7,046**	**6,935**	**2,844**	**3,031**
Alaska	229	237	643	741	2,844	3,031
Hawaii	—	—	6,402	6,194	—	—
U.S. Total	**1,737,453**	**1,787,806**	**67,346**	**77,753**	**262,730**	**283,625**

See notes and footnotes at end of table.

Table 10. Net Generation from U.S. Electric Utilities by Energy Source, Census Division, and State, 1996 and 1997 (Continued)

(Million Kilowatthours)

Census Division State	Nuclear		Hydroelectric[2]		Renewable[3]	
	1996	1997	1996	1997	1996	1997
New England	**30,255**	**16,432**	**5,401**	**4,508**	**572**	**601**
Connecticut	6,225	–125	530	367	437	451
Maine	5,062	0	2,116	1,780	1	—
Massachusetts	5,324	4,310	263	300	—	—
New Hampshire	9,845	7,979	1,426	1,165	—	—
Rhode Island	—	—	0	0	—	—
Vermont	3,799	4,267	1,067	896	135	150
Middle Atlantic	**114,926**	**111,132**	**27,495**	**28,930**	**40**	**18**
New Jersey	11,028	13,908	–114	–130	—	—
New York	35,226	29,570	25,970	27,912	40	18
Pennsylvania	68,672	67,655	1,639	1,148	—	—
East North Central	**120,644**	**92,229**	**4,105**	**3,926**	**452**	**395**
Illinois	69,774	51,069	22	17	134	24
Indiana	—	—	448	562	—	—
Michigan	26,829	21,914	840	658	—	—
Ohio	13,919	15,331	392	507	—	—
Wisconsin	10,121	3,916	2,402	2,182	319	372
West North Central	**42,571**	**41,622**	**15,725**	**16,975**	**488**	**494**
Iowa	3,924	4,149	918	795	23	22
Kansas	8,205	8,430	—	—	—	—
Minnesota	12,095	10,819	837	697	422	429
Missouri	8,890	8,955	1,239	1,478	31	42
Nebraska	9,457	9,269	1,602	1,672	12	1
North Dakota	—	—	3,151	3,320	—	—
South Dakota	—	—	7,978	9,012	—	—
South Atlantic	**171,064**	**171,048**	**15,364**	**12,895**	**0**	**0**
Delaware	—	—	—	—	—	—
District of Columbia	—	—	—	—	—	—
Florida	25,470	22,968	216	241	—	—
Georgia	29,925	30,414	4,936	4,418	—	—
Maryland	12,093	13,213	2,457	1,588	—	—
North Carolina	33,718	32,453	4,517	4,148	—	—
South Carolina	43,571	44,916	2,231	2,047	—	—
Virginia	26,286	27,084	510	76	0	0
West Virginia	—	—	497	377	—	—
East South Central	**61,856**	**65,033**	**24,479**	**24,302**	**—**	**—**
Alabama	29,708	29,573	11,082	11,521	—	—
Kentucky	—	—	3,497	3,380	—	—
Mississippi	9,225	10,813	—	—	—	—
Tennessee	22,924	24,648	9,900	9,401	—	—
West South Central	**64,888**	**65,077**	**5,829**	**8,120**	*****	*****
Arkansas	13,357	14,208	2,797	3,511	—	—
Louisiana	15,765	13,511	—	—	—	—
Oklahoma	—	—	2,078	2,824	—	—
Texas	35,767	37,358	954	1,785	*	*
Mountain	**28,840**	**29,314**	**41,641**	**46,735**	**192**	**169**
Arizona	28,840	29,314	9,480	12,401	—	—
Colorado	—	—	1,585	1,935	0	0
Idaho	—	—	12,231	13,512	—	—
Montana	—	—	13,741	13,348	—	—
Nevada	—	—	2,143	2,567	—	—
New Mexico	—	—	211	259	—	—
Utah	—	—	1,019	1,331	192	169
Wyoming	—	—	1,232	1,381	—	—
Pacific Contiguous	**39,685**	**36,756**	**186,648**	**189,725**	**5,470**	**5,785**
California	34,097	30,512	44,057	39,797	5,110	5,431
Oregon	—	—	44,513	46,283	0	0
Washington	5,588	6,244	98,079	103,645	360	353
Pacific Noncontiguous	**—**	**—**	**1,284**	**1,118**	**—**	**—**
Alaska	—	—	1,266	1,099	—	—
Hawaii	—	—	18	19	—	—
U.S. Total	**674,729**	**628,644**	**327,970**	**337,234**	**7,214**	**7,462**

1 Includes petroleum coke.

2 Station losses include energy used for pumped storage. Energy used in 1997 for pumping was 28,342 million kilowatthours and in 1996 was 28,611 million kilowatthours.

3 Includes geothermal, biomass, wind, solar thermal, and photovoltaic (excludes hydroelectric).

* =Value less than 0.5 million kilowatthours.

Notes: •Data are final. •Negative generation denotes that electric power consumed for plant use exceeds gross generation. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 11. Petroleum-Fired Net Generation from U.S. Electric Utilities by Selected Prime Mover, Census Division, and State, 1996 and 1997

(Million Kilowatthours)

Census Division State	Total[1]		Steam		Gas Turbine/Internal Combustion	
	1996	1997	1996	1997	1996	1997
New England	**13,002**	**22,494**	**12,706**	**22,273**	**295**	**221**
Connecticut	5,255	8,431	5,240	8,403	15	29
Maine	622	1,443	622	1,441	*	2
Massachusetts	6,221	11,586	6,006	11,424	215	162
New Hampshire	838	1,008	838	1,005	*	3
Rhode Island	62	17	0	0	62	17
Vermont	3	10	*	*	3	10
Middle Atlantic	**13,149**	**10,834**	**12,331**	**10,193**	**818**	**641**
New Jersey	611	384	464	275	147	109
New York	9,325	8,142	8,906	7,771	418	371
Pennsylvania	3,213	2,307	2,960	2,147	252	161
East North Central	**2,160**	**2,147**	**1,983**	**1,931**	**177**	**216**
Illinois	796	495	730	445	66	51
Indiana	321	607	309	596	11	11
Michigan	652	602	642	575	10	27
Ohio	267	273	218	219	49	54
Wisconsin	124	170	83	96	41	74
West North Central	**1,064**	**1,204**	**921**	**984**	**143**	**220**
Iowa	51	82	27	25	24	57
Kansas	158	110	124	82	34	28
Minnesota	640	764	612	722	28	42
Missouri	96	125	57	62	39	63
Nebraska	20	31	7	11	13	20
North Dakota	89	86	88	80	1	6
South Dakota	9	7	6	3	3	4
South Atlantic	**27,154**	**29,754**	**25,820**	**28,698**	**1,334**	**1,056**
Delaware	1,188	833	1,167	809	22	24
District of Columbia	110	71	102	53	8	17
Florida	22,891	25,742	22,249	25,181	641	561
Georgia	292	201	102	98	190	102
Maryland	1,401	1,479	1,189	1,317	212	162
North Carolina	259	212	127	135	132	77
South Carolina	126	188	89	111	36	77
Virginia	683	858	590	823	93	35
West Virginia	204	171	204	171	*	0
East South Central	**1,722**	**3,070**	**1,461**	**2,910**	**261**	**161**
Alabama	156	119	92	89	64	30
Kentucky	135	126	97	105	39	21
Mississippi	1,174	2,633	1,167	2,629	7	4
Tennessee	258	193	106	87	152	106
West South Central	**1,055**	**913**	**1,022**	**893**	**34**	**19**
Arkansas	98	67	92	56	6	10
Louisiana	273	646	271	645	3	*
Oklahoma	125	13	118	10	7	2
Texas	559	188	541	181	18	7
Mountain	**306**	**233**	**286**	**221**	**20**	**12**
Arizona	65	61	56	57	9	4
Colorado	16	15	10	10	5	5
Idaho	*	*	—	—	*	*
Montana	18	17	18	17	1	1
Nevada	94	31	92	31	1	*
New Mexico	22	21	22	20	1	1
Utah	31	29	28	27	3	2
Wyoming	59	59	59	59	0	0
Pacific Contiguous	**690**	**169**	**620**	**41**	**70**	**128**
California	675	142	612	26	63	116
Oregon	7	11	3	10	3	*
Washington	8	16	5	5	3	12
Pacific Noncontiguous	**7,046**	**6,935**	**5,121**	**4,921**	**1,924**	**2,013**
Alaska	643	741	4	5	639	736
Hawaii	6,402	6,194	5,117	4,916	1,285	1,278
U.S. Total	**67,346**	**77,753**	**62,271**	**73,065**	**5,075**	**4,688**

[1] Includes petroleum coke.

* =Value less than 0.5 million kilowatthours.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 12. Gas-Fired Net Generation from U.S. Electric Utilities by Selected Prime Mover, Census Division, and State, 1996 and 1997

(Million Kilowatthours)

Census Division State	Total		Steam		Gas Turbine/Internal Combustion	
	1996	1997	1996	1997	1996	1997
New England	**8,648**	**10,340**	**4,911**	**5,936**	**3,737**	**4,404**
Connecticut	959	1,546	789	1,329	170	217
Maine	—	—	—	—	—	—
Massachusetts	4,450	5,213	4,122	4,574	328	639
New Hampshire	*	35	0	34	*	1
Rhode Island	3,239	3,546	0	0	3,239	3,546
Vermont	*	*	*	*	—	—
Middle Atlantic	**16,436**	**24,094**	**14,604**	**21,732**	**1,831**	**2,361**
New Jersey	2,439	2,777	1,626	1,613	813	1,164
New York	13,355	20,706	12,412	19,645	943	1,060
Pennsylvania	641	611	566	474	75	137
East North Central	**3,723**	**5,996**	**3,046**	**4,707**	**677**	**1,289**
Illinois	1,875	3,442	1,800	3,339	75	104
Indiana	374	386	285	248	89	138
Michigan	737	838	648	785	89	53
Ohio	196	228	81	66	115	162
Wisconsin	540	1,101	231	270	310	831
West North Central	**3,061**	**3,749**	**2,249**	**2,529**	**813**	**1,220**
Iowa	189	277	157	194	32	82
Kansas	1,768	2,068	1,435	1,763	333	305
Minnesota	468	512	350	324	117	188
Missouri	395	570	199	150	196	420
Nebraska	192	206	108	97	84	109
North Dakota	*	*	*	*	*	*
South Dakota	50	117	*	*	50	117
South Atlantic	**35,913**	**38,136**	**18,725**	**17,803**	**17,187**	**20,333**
Delaware	2,708	1,820	528	492	2,180	1,329
District of Columbia	—	—	—	—	—	—
Florida	30,781	32,998	17,392	16,422	13,390	16,576
Georgia	345	568	184	221	161	347
Maryland	649	879	396	444	252	435
North Carolina	195	377	20	26	175	351
South Carolina	90	181	42	21	49	160
Virginia	1,124	1,292	143	157	981	1,135
West Virginia	20	21	20	21	—	—
East South Central	**7,186**	**6,495**	**5,576**	**4,373**	**1,610**	**2,122**
Alabama	549	885	195	253	354	632
Kentucky	146	177	58	59	88	118
Mississippi	6,430	5,281	5,323	4,062	1,107	1,220
Tennessee	61	152	0	0	61	152
West South Central	**142,272**	**142,924**	**133,174**	**133,641**	**9,098**	**9,283**
Arkansas	3,087	2,243	3,087	2,243	0	0
Louisiana	23,972	26,010	23,402	25,197	571	814
Oklahoma	13,465	12,507	9,883	9,032	3,582	3,475
Texas	101,748	102,164	96,802	97,170	4,946	4,994
Mountain	**9,713**	**11,058**	**6,619**	**7,138**	**3,093**	**3,919**
Arizona	1,712	2,065	958	1,219	754	846
Colorado	419	424	318	269	101	154
Idaho	—	—	—	—	—	—
Montana	38	32	16	8	23	24
Nevada	4,468	5,021	2,573	2,417	1,896	2,603
New Mexico	2,773	3,210	2,590	3,033	184	177
Utah	293	297	157	182	137	116
Wyoming	9	10	9	10	—	—
Pacific Contiguous	**32,934**	**37,803**	**29,387**	**34,843**	**3,547**	**2,960**
California	30,768	36,301	29,257	34,533	1,512	1,768
Oregon	1,637	1,273	130	307	1,507	966
Washington	529	229	1	2	528	226
Pacific Noncontiguous	**2,844**	**3,031**	**490**	**553**	**2,354**	**2,478**
Alaska	2,844	3,031	490	553	2,354	2,478
Hawaii	—	—	—	—	—	—
U.S. Total	**262,730**	**283,625**	**218,781**	**233,256**	**43,949**	**50,369**

* =Value less than 0.5 million kilowatthours.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

U.S. Electric Utility Fossil Fuel Statistics

This chapter contains statistics on consumption of fossil fuels by U.S. electric utilities to generate electricity, and end-of-year fossil fuel stocks for all U.S. electric utility plants. Statistics are also included for receipts and costs of fossil fuels at power plants with a steam-electric and combined-cycle nameplate capacity of 50 or more megawatts, approximately 86 percent of the total capability at U.S. electric utilities. These data are aggregated to national, Census division, and State levels.

Various sources of energy are used by electric utilities to produce electricity; however, fossil fuels supply about 70 percent of the energy sources for the generation requirements of the Nation. Coal, petroleum, and gas are currently the dominant fossil fuels used by the industry.[17] Statistics on consumption, purchases (receipts), and stocks of fossil fuels at electric utilities are interdependent. That is, the stocks on site at the utility at the end of the current year result from the stocks that were available at the end of the prior year, the amount of fuel purchased during the current year, and the amount of fuel consumed during the year.

Fossil Fuel Consumption and Stocks

Coal, the energy source used by electric utilities to generate more than one-half of the electricity needed in the Nation, is consumed extensively throughout the United States (particularly in the East North Central, West North Central, West South Central, and the South Atlantic Census Divisions). The use of petroleum for generation is not as common on a national level as during the early 1970's; however, some areas of the country (such as in the New England, Middle Atlantic, and South Atlantic Census Divisions) continue to use it extensively. Consumption of gas occurs mostly in areas of the country where it is readily accessible, particularly in the West South Central Census Division, and in dual-fired generator units, which use gas and petroleum as substitute fuels.

The purposes of on-site storage are to provide an uninterrupted supply, to allow bulk shipments, and to take advantage of favorable market conditions. Electric utilities maintain stockpiles of coal and petroleum to minimize the effect of an interruption or curtailment in fuel availability (for example, railroad strikes, coal-mine strikes, or oil embargoes). Since gas is generally not stored, there are no stocks of gas.

Fossil Fuel Receipts and Costs

Statistics on electric utility receipts provide information regarding the delivery of fossil fuels to steam-electric plants. The costs include all costs incurred by an electric utility in the purchase and delivery of fuel to the plant. The type of contract under which a fuel is purchased has a significant effect on the cost of the fuel delivered and can be used as a good indicator of market conditions. Transactions where petroleum and coal are obtained by the utility under purchase orders or contracts with a duration of 1 year or more are referred to as *contract purchases*. Shipments of petroleum and coal under purchase orders or contracts of less than 1-year duration are considered *spot purchases*. Transactions that are conducted under a contract with uninterrupted delivery to secure gas are identified as *firm purchases*. *Interruptible purchases* are those in which the gas is received under a contract that permits curtailment of service under certain circumstances. For example, under both Federal and State regulations, requirements for gas to heat homes and serve industry have priority over requirements of the electric power industry. Consequently, a contract under which gas is purchased is most generally one that allows for an interruption in its accessibility.

Coal. Coal is obtained from three major coal-producing areas in the United States. *Appalachian coal* is mined in both surface and underground mines located in Pennsylvania, Maryland, Virginia, West Virginia, eastern Kentucky, Tennessee, Alabama, and Ohio. This coal is bituminous in rank and of low-to-medium sulfur content. Its heat content in British Thermal Units (Btu) averages over 12,000 Btu per pound. The coal is transported primarily by train, barge, and truck to electric utility plants throughout the Eastern United States. *Interior coal* is mined in both surface and underground mines located primarily in Illinois, Indiana and western Kentucky. It is bituminous coal with a high percentage of sulfur and contains approximately 11,000

[17] Other fossil fuels include petroleum coke, refinery gas, coke oven gas, blast furnace gas, and liquefied petroleum gas.

Btu per pound. Most of this coal is delivered to plants in the Central and Southeastern United States. *Western coal* is mined in Montana, Wyoming, Colorado, Utah, North Dakota, Arizona, and New Mexico. It is delivered to plants throughout the Western and Central United States. Over one-half of the coal in this region is subbituminous coal that is low in sulfur content (less than 0.5 percent) and contains approximately 9,000 Btu per pound. Most of this coal originates in the Powder River basin of northeast Wyoming and southeast Montana. Coal from this region is delivered by unit train to plants as far east as Indiana and Georgia.

The cost of coal delivered to electric utilities can vary significantly from State to State. Coal delivered to the New England Census Division from the Appalachian coal fields may cost as much as $60 per short ton due to transportation costs and the higher cost of producing eastern coal (generally in underground mines). Environmental restrictions within a State may require electric utilities to burn only the more expensive, low-sulfur coal resulting in a higher delivered cost. In the West, especially in the Mountain Census Division, coal-burning plants are often built close to the mine thus reducing transportation costs. In addition, the cost of mining coal from large surface mines located in the Western United States is significantly less than that of underground eastern mines, resulting in a delivered cost of under $15 per short ton for States such as Montana and Wyoming. The cost of coal delivered to electric utilities in States such as North Dakota, South Dakota, and Texas is well below the national average because of the lower cost of low-grade lignite.

Petroleum. Although nationwide receipts at electric utilities are less than one-half the volume of the 1970's, several electric utilities in the New England area, New York, Florida, and Hawaii still depend on petroleum for a significant portion of their fossil fuel requirements. Receipts can vary widely from year to year at electric utilities due to changes in the cost of petroleum. Fuel oil numbers 4, 5, and 6 (heavy oil) constitute the majority of all petroleum receipts at electric utilities. Smaller amounts of fuel oil number 2 (light oil) are also used by electric utilities primarily for start-up and flame stabilization of the boilers.

The cost of petroleum delivered to electric utilities varies considerably from State to State. The most important factor in determining cost is the type of fuel oil that is being delivered. States receiving only low-grade heavy oil will show a delivered cost much lower than a State receiving only light oil. Most of the petroleum delivered to the New England, Middle Atlantic, and South Atlantic Census Divisions, California, and Hawaii for use by electric utilities is the number 6 fuel oil. The cost of fuel oil can also vary because of its sulfur content. Electric utilities that are required to meet stringent environmental standards must purchase low-sulfur fuel oil at premium prices.

Gas. Gas is used extensively as a primary fuel throughout areas of the country where it is readily accessible (for example, the West South Central Census Division and in California). Large volumes of gas are also transported by pipeline to the Middle Atlantic and South Atlantic Census Divisions. Gas receipts in these Census divisions and in California can vary considerably from year to year because some electric utilities switch between use of petroleum and gas in dual-fired generating units. The highest volume of gas receipts at electric utilities occurs during the summer months when demand for electricity peaks and when there is a greater amount available to electric utilities because of lower demands from residential and commercial consumers. In some northern parts of the United States, receipts of gas at electric utilities are limited during the winter months due to the priority for residential heating and industry needs. Many electric utilities have the capability of burning either petroleum or gas. The cost of the fuel is usually the determining factor. One major advantage of gas over all other fossil fuels is that it is a clean burning fuel. Therefore, some electric utilities use gas in order to comply with environmental regulations.

Data Sources

Data in the following tables were obtained from two sources. The first is the Form EIA-759, "Monthly Power Plant Report," which is used to collect monthly data from all operators of power plants (approximately 700) in the United States. More detailed statistics on stocks and consumption are published in the *Electric Power Monthly*.[18] The second source is the Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," which is a restricted census used to collect data from approximately 230 electric utilities.

[18] Energy Information Administration, *Electric Power Monthly*, DOE/EIA-0226.

Caution should be used in comparing stocks, receipts, and consumption data since all operators of power plants are surveyed by the Form EIA-759, while the FERC Form 423 is limited to operators of power plants with a fossil-fueled steam-electric and combined-cycle nameplate capacity of 50 or more megawatts.

Table 13. Consumption of Fossil Fuels and Year-End Stocks of Coal and Petroleum at U.S. Electric Utilities, 1993 Through 1997

Item	1993	1994	1995	1996	1997
Consumption					
Coal (thousand short tons)	813,508	817,270	829,007	874,681	900,361
Petroleum (thousand barrels)[1]	162,454	151,004	102,150	113,274	125,146
Gas (million cubic feet)	2,682,440	2,987,146	3,196,507	2,732,107	2,968,453
Stocks					
Coal (thousand short tons)	111,341	126,897	126,304	114,623	98,826
Petroleum (thousand barrels)[1]	62,443	62,986	50,495	47,690	48,792

1 Does not include petroleum coke.
Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.
Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 14. Receipts and Average Delivered Cost of Fossil Fuels at U.S. Electric Utilities, 1993 Through 1997

Item	1993	1994	1995	1996	1997
Receipts					
Coal (thousand short tons)	769,152	831,929	826,860	862,701	880,588
Petroleum (thousand barrels)	147,902	142,940	84,292	106,629	117,789
Gas (million cubic feet)	2,574,523	2,863,904	3,023,327	2,604,663	2,764,734
Cost (dollars)					
Coal (per short ton)	**28.58**	**28.03**	**27.01**	**26.45**	**26.16**
Contract	28.93	28.53	27.51	26.33	25.93
Spot	27.19	26.26	24.89	26.97	27.19
Petroleum (per barrel)[1]	**15.42**	**15.70**	**16.93**	**19.95**	**18.30**
Contract	15.74	15.86	16.94	20.18	18.64
Spot	14.89	15.48	16.90	19.57	17.96
Gas (per thousand cubic feet)	**2.62**	**2.28**	**2.02**	**2.69**	**2.81**
Firm	2.59	2.33	2.10	2.77	2.95
Interruptible[2]	2.66	2.25	1.96	2.61	2.72

1 Does not include petroleum coke.
2 Includes spot-market purchases.
Notes: •Data are final. •Data are for electric generating plants with a total steam-electric and combined-cycle nameplate capacity of 50 or more megawatts. •Totals may not equal sum of components because of independent rounding.
Source: Federal Energy Regulatory Commission, FERC Form 423, ''Monthly Report of Cost and Quality of Fuels for Electric Plants.''

Table 15. Consumption of Fossil Fuels at U.S. Electric Utilities by Census Division and State, 1996 and 1997

Census Division State	Coal (thousand short tons)		Petroleum[1] (thousand barrels)		Gas (million cubic feet)	
	1996	1997	1996	1997	1996	1997
New England	**6,701**	**7,583**	**21,508**	**35,897**	**80,644**	**96,010**
Connecticut	925	1,058	9,028	14,043	10,455	16,761
Maine	—	—	1,154	2,517	—	—
Massachusetts	4,406	4,826	9,727	17,436	45,091	51,490
New Hampshire	1,369	1,699	1,508	1,843	3	564
Rhode Island	0	0	75	27	25,071	27,159
Vermont	—	—	16	31	24	36
Middle Atlantic	**51,718**	**54,179**	**22,581**	**18,024**	**175,740**	**254,408**
New Jersey	2,387	2,851	1,182	705	25,824	29,534
New York	8,254	8,726	15,998	13,836	142,677	217,504
Pennsylvania	41,076	42,602	5,401	3,483	7,238	7,370
East North Central	**198,900**	**204,251**	**4,354**	**3,626**	**72,482**	**101,815**
Illinois	38,091	41,017	1,732	1,128	25,729	44,607
Indiana	52,855	54,845	353	322	4,355	4,661
Michigan	32,175	31,928	1,524	1,339	32,172	33,286
Ohio	53,543	52,893	584	574	2,897	3,485
Wisconsin	22,236	23,568	161	263	7,328	15,775
West North Central	**122,418**	**123,967**	**1,096**	**1,197**	**40,013**	**47,898**
Iowa	17,864	18,194	134	211	3,367	4,124
Kansas	18,852	17,534	331	252	23,110	25,822
Minnesota	17,459	17,490	141	186	5,296	6,098
Missouri	33,059	35,193	256	300	5,202	7,465
Nebraska	10,091	10,796	47	72	2,311	2,656
North Dakota	23,640	22,754	155	153	3	1
South Dakota	1,453	2,005	33	23	725	1,731
South Atlantic	**149,353**	**155,500**	**45,064**	**46,881**	**334,164**	**350,376**
Delaware	1,787	1,685	1,969	1,435	23,370	16,092
District of Columbia	—	—	290	197	—	—
Florida	27,172	27,372	36,871	39,156	283,539	296,900
Georgia	29,170	30,631	640	451	4,734	7,343
Maryland	10,540	10,417	2,903	3,018	8,454	11,007
North Carolina	25,083	27,206	569	467	2,381	4,512
South Carolina	11,832	12,096	306	457	1,206	2,731
Virginia	10,994	11,605	1,163	1,408	10,276	11,572
West Virginia	32,774	34,487	353	292	205	219
East South Central	**96,808**	**99,620**	**2,860**	**4,956**	**91,799**	**86,911**
Alabama	31,216	30,841	299	230	6,145	9,997
Kentucky	37,071	38,281	308	266	1,836	2,194
Mississippi	5,558	6,035	1,792	4,086	83,246	73,084
Tennessee	22,963	24,464	460	375	572	1,636
West South Central	**140,493**	**144,217**	**1,909**	**1,617**	**1,461,373**	**1,487,614**
Arkansas	14,467	13,772	179	127	33,998	24,805
Louisiana	12,450	13,807	507	1,111	252,132	277,438
Oklahoma	19,386	20,101	217	30	136,071	128,819
Texas	94,190	96,537	1,006	349	1,039,172	1,056,552
Mountain	**101,510**	**105,217**	**601**	**455**	**106,110**	**118,667**
Arizona	16,118	17,504	124	110	19,247	23,385
Colorado	16,841	17,116	51	38	5,488	5,536
Idaho	—	—	*	*	—	—
Montana	7,897	9,286	41	39	470	420
Nevada	7,424	7,261	177	69	46,764	51,777
New Mexico	15,215	15,802	43	42	29,968	33,375
Utah	13,585	14,252	55	52	4,087	4,079
Wyoming	24,430	23,996	110	105	87	95
Pacific Contiguous	**6,551**	**5,592**	**1,148**	**379**	**338,628**	**391,245**
California	—	—	1,122	317	318,025	377,947
Oregon	1,044	822	10	23	14,013	10,681
Washington	5,507	4,771	16	39	6,589	2,618
Pacific Noncontiguous	**229**	**235**	**12,151**	**12,114**	**31,154**	**33,510**
Alaska	229	235	1,171	1,321	31,154	33,510
Hawaii	—	—	10,980	10,793	—	—
U.S. Total	**874,681**	**900,361**	**113,274**	**125,146**	**2,732,107**	**2,968,453**

[1] Does not include petroleum coke. Petroleum coke consumption in 1997 was 1,400 thousand short tons and in 1996 was 681 thousand short tons.

* =Value less than 0.5 thousand barrels or 0.5 million cubic feet.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 16. Petroleum Consumption at U.S. Electric Utilities by Selected Prime Mover, Census Division, and State, 1996 and 1997

(Thousand Barrels)

Census Division State	Total		Steam		Gas Turbine/Internal Combustion	
	1996	1997	1996	1997	1996	1997
New England	**21,508**	**35,897**	**20,945**	**35,399**	**563**	**497**
Connecticut	9,028	14,043	8,983	13,967	45	76
Maine	1,154	2,517	1,152	2,509	2	7
Massachusetts	9,727	17,436	9,299	17,088	428	348
New Hampshire	1,508	1,843	1,507	1,833	2	10
Rhode Island	75	27	0	0	75	27
Vermont	16	31	5	2	11	29
Middle Atlantic	**22,581**	**18,024**	**20,437**	**16,287**	**2,145**	**1,736**
New Jersey	1,182	705	774	361	408	344
New York	15,998	13,836	15,004	12,887	994	949
Pennsylvania	5,401	3,483	4,658	3,040	743	444
East North Central	**4,354**	**3,626**	**3,800**	**2,951**	**555**	**676**
Illinois	1,732	1,128	1,537	951	195	177
Indiana	353	322	322	285	32	37
Michigan	1,524	1,339	1,472	1,240	51	99
Ohio	584	574	419	436	165	138
Wisconsin	161	263	49	39	111	225
West North Central	**1,096**	**1,197**	**666**	**568**	**430**	**629**
Iowa	134	211	56	52	77	159
Kansas	331	252	248	173	82	79
Minnesota	141	186	52	49	89	136
Missouri	256	300	127	130	129	169
Nebraska	47	72	14	21	34	51
North Dakota	155	153	151	137	4	17
South Dakota	33	23	18	6	15	17
South Atlantic	**45,064**	**46,881**	**41,934**	**44,213**	**3,130**	**2,668**
Delaware	1,969	1,435	1,915	1,378	54	57
District of Columbia	290	197	260	133	31	64
Florida	36,871	39,156	35,475	37,893	1,397	1,264
Georgia	640	451	228	207	412	244
Maryland	2,903	3,018	2,354	2,553	549	464
North Carolina	569	467	214	234	355	233
South Carolina	306	457	156	191	150	266
Virginia	1,163	1,408	981	1,332	182	77
West Virginia	353	292	353	292	*	0
East South Central	**2,860**	**4,956**	**2,335**	**4,604**	**525**	**352**
Alabama	299	230	162	159	138	70
Kentucky	308	266	218	219	91	47
Mississippi	1,792	4,086	1,775	4,078	17	8
Tennessee	460	375	181	149	279	226
West South Central	**1,909**	**1,617**	**1,830**	**1,574**	**80**	**42**
Arkansas	179	127	160	103	19	24
Louisiana	507	1,111	496	1,109	11	2
Oklahoma	217	30	205	27	12	3
Texas	1,006	349	968	336	38	13
Mountain	**601**	**455**	**555**	**418**	**46**	**37**
Arizona	124	110	106	102	17	8
Colorado	51	38	37	21	13	17
Idaho	*	*	—	—	*	*
Montana	41	39	39	37	2	2
Nevada	177	69	171	65	7	4
New Mexico	43	42	41	39	2	2
Utah	55	52	50	49	5	4
Wyoming	110	105	110	105	0	0
Pacific Contiguous	**1,148**	**379**	**1,000**	**75**	**148**	**304**
California	1,122	317	984	44	138	273
Oregon	10	23	8	22	3	1
Washington	16	39	9	9	7	30
Pacific Noncontiguous	**12,151**	**12,114**	**8,769**	**8,604**	**3,382**	**3,510**
Alaska	1,171	1,321	17	16	1,154	1,304
Hawaii	10,980	10,793	8,752	8,587	2,228	2,206
U.S. Total	**113,274**	**125,146**	**102,270**	**114,695**	**11,003**	**10,451**

* =Value less than 0.5.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding. •Does not include petroleum coke. Petroleum coke consumption in 1997 was 1,400 thousand short tons and in 1996 was 681 thousand short tons.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 17. Gas Consumption at U.S. Electric Utilities by Selected Prime Mover, Census Division, and State, 1996 and 1997

(Million Cubic Feet)

Census Division State	Total		Steam		Gas Turbine/Internal Combustion	
	1996	1997	1996	1997	1996	1997
New England	**80,644**	**96,010**	**50,476**	**60,448**	**30,168**	**35,562**
Connecticut	10,455	16,761	8,526	14,497	1,929	2,264
Maine	—	—	—	—	—	—
Massachusetts	45,091	51,490	41,926	45,502	3,165	5,988
New Hampshire	3	564	0	413	3	151
Rhode Island	25,071	27,159	0	0	25,071	27,159
Vermont	24	36	24	36	—	—
Middle Atlantic	**175,740**	**254,408**	**154,660**	**227,241**	**21,079**	**27,167**
New Jersey	25,824	29,534	15,531	14,831	10,293	14,703
New York	142,677	217,504	132,776	206,776	9,902	10,728
Pennsylvania	7,238	7,370	6,354	5,635	885	1,736
East North Central	**72,482**	**101,815**	**62,531**	**82,285**	**9,951**	**19,529**
Illinois	25,729	44,607	24,351	42,769	1,378	1,837
Indiana	4,355	4,661	3,180	2,668	1,175	1,993
Michigan	32,172	33,286	31,123	32,461	1,049	825
Ohio	2,897	3,485	1,092	801	1,806	2,685
Wisconsin	7,328	15,775	2,785	3,587	4,543	12,189
West North Central	**40,013**	**47,898**	**28,928**	**31,593**	**11,086**	**16,305**
Iowa	3,367	4,124	2,808	2,838	559	1,286
Kansas	23,110	25,822	18,560	21,897	4,550	3,925
Minnesota	5,296	6,098	3,975	3,920	1,321	2,179
Missouri	5,202	7,465	2,318	1,764	2,884	5,701
Nebraska	2,311	2,656	1,240	1,156	1,070	1,500
North Dakota	3	1	1	1	2	*
South Dakota	725	1,731	26	17	698	1,714
South Atlantic	**334,164**	**350,376**	**191,684**	**181,569**	**142,480**	**168,808**
Delaware	23,370	16,092	5,864	5,786	17,506	10,306
District of Columbia	—	—	—	—	—	—
Florida	283,539	296,900	176,122	165,706	107,417	131,194
Georgia	4,734	7,343	2,538	2,829	2,196	4,514
Maryland	8,454	11,007	5,260	5,536	3,194	5,471
North Carolina	2,381	4,512	0	0	2,381	4,512
South Carolina	1,206	2,731	399	220	807	2,511
Virginia	10,276	11,572	1,296	1,273	8,980	10,299
West Virginia	205	219	205	219	—	—
East South Central	**91,799**	**86,911**	**59,111**	**47,257**	**32,688**	**39,653**
Alabama	6,145	9,997	2,188	2,625	3,957	7,372
Kentucky	1,836	2,194	611	609	1,224	1,585
Mississippi	83,246	73,084	56,311	44,024	26,935	29,060
Tennessee	572	1,636	0	0	572	1,636
West South Central	**1,461,373**	**1,487,614**	**1,360,507**	**1,385,644**	**100,866**	**101,969**
Arkansas	33,998	24,805	33,998	24,805	0	0
Louisiana	252,132	277,438	244,782	267,400	7,351	10,038
Oklahoma	136,071	128,819	104,026	97,380	32,045	31,439
Texas	1,039,172	1,056,552	977,702	996,060	61,470	60,492
Mountain	**106,110**	**118,667**	**72,759**	**77,398**	**33,351**	**41,268**
Arizona	19,247	23,385	11,170	14,103	8,076	9,283
Colorado	5,488	5,536	4,181	3,618	1,307	1,919
Idaho	—	—	—	—	—	—
Montana	470	420	165	93	305	327
Nevada	46,764	51,777	27,423	26,207	19,341	25,571
New Mexico	29,968	33,375	27,724	31,077	2,244	2,298
Utah	4,087	4,079	2,008	2,207	2,078	1,872
Wyoming	87	95	87	95	—	—
Pacific Contiguous	**338,628**	**391,245**	**301,500**	**359,244**	**37,128**	**32,001**
California	318,025	377,947	300,641	356,812	17,384	21,135
Oregon	14,013	10,681	852	2,407	13,161	8,273
Washington	6,589	2,618	7	25	6,582	2,593
Pacific Noncontiguous	**31,154**	**33,510**	**0**	**0**	**31,154**	**33,510**
Alaska	31,154	33,510	0	0	31,154	33,510
Hawaii	—	—	—	—	—	—
U.S. Total	**2,732,107**	**2,968,453**	**2,282,155**	**2,452,679**	**449,952**	**515,774**

* =Value less than 0.5.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 18. Coal and Petroleum Stocks at U.S. Electric Utilities by Census Division and State, as of December 31, 1996 and 1997

Census Division State	Coal (thousand short tons)		Petroleum[1] (thousand barrels)	
	1996	1997	1996	1997
New England	**1,236**	**754**	**4,618**	**4,490**
Connecticut	173	66	1,756	1,803
Maine	—	—	592	265
Massachusetts	704	389	1,660	1,993
New Hampshire	359	298	476	375
Rhode Island	0	0	25	16
Vermont	—	—	110	38
Middle Atlantic	**9,606**	**9,175**	**10,855**	**10,667**
New Jersey	824	566	1,780	1,628
New York	905	819	7,117	7,220
Pennsylvania	7,878	7,790	1,958	1,819
East North Central	**27,618**	**28,051**	**2,257**	**2,547**
Illinois	4,578	4,828	964	1,058
Indiana	7,103	5,822	111	129
Michigan	6,530	7,222	642	646
Ohio	5,229	6,066	326	411
Wisconsin	4,178	4,113	214	303
West North Central	**17,107**	**13,707**	**1,361**	**1,612**
Iowa	4,042	2,447	143	204
Kansas	2,968	2,282	515	606
Minnesota	1,461	1,737	129	166
Missouri	5,159	3,670	317	357
Nebraska	1,691	1,596	135	142
North Dakota	1,642	1,755	34	44
South Dakota	143	219	89	94
South Atlantic	**18,662**	**16,141**	**11,846**	**12,880**
Delaware	322	319	429	703
District of Columbia	—	—	106	117
Florida	3,349	3,441	7,236	7,629
Georgia	3,727	2,278	619	569
Maryland	1,346	1,188	1,345	1,528
North Carolina	2,559	1,912	369	342
South Carolina	1,979	1,809	260	447
Virginia	1,010	1,152	1,353	1,393
West Virginia	4,370	4,042	128	150
East South Central	**8,514**	**9,329**	**1,925**	**2,153**
Alabama	2,526	2,609	225	254
Kentucky	4,119	4,475	195	205
Mississippi	602	614	995	1,344
Tennessee	1,266	1,630	510	351
West South Central	**19,525**	**11,050**	**6,053**	**6,550**
Arkansas	2,701	934	243	253
Louisiana	2,470	1,248	1,125	1,299
Oklahoma	4,067	2,516	368	385
Texas	10,287	6,352	4,317	4,613
Mountain	**11,304**	**9,667**	**934**	**931**
Arizona	1,992	1,386	431	420
Colorado	3,027	2,458	127	142
Idaho	—	—	*	*
Montana	508	410	14	18
Nevada	1,239	812	239	215
New Mexico	815	795	79	74
Utah	1,526	2,309	22	26
Wyoming	2,197	1,498	23	35
Pacific Contiguous	**1,051**	**951**	**6,518**	**5,674**
California	—	—	6,101	5,414
Oregon	203	83	221	199
Washington	848	868	196	62
Pacific Noncontiguous	**1**	*****	**1,322**	**1,289**
Alaska	1	*	284	272
Hawaii	—	—	1,038	1,017
U.S. Total	**114,623**	**98,826**	**47,690**	**48,792**

[1] Does not include petroleum coke. Petroleum coke stocks at the end of 1997 were 469 thousand short tons and in 1996 were 91 thousand short tons.

* =Value less than 0.5.

Notes: •Data are final. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-759, ''Monthly Power Plant Report.''

Table 19. Fossil Fuel Receipts at U.S. Electric Utilities by Census Division and State, 1996 and 1997

Census Division State	Coal (thousand short tons)		Petroleum[1] (thousand barrels)		Gas (million cubic feet)	
	1996	1997	1996	1997	1996	1997
New England	**6,947**	**7,125**	**22,071**	**36,174**	**92,757**	**95,374**
Connecticut	931	952	9,562	13,901	10,327	13,738
Maine	—	—	1,423	2,335	—	—
Massachusetts	4,693	4,545	9,783	18,344	48,011	50,755
New Hampshire	1,324	1,628	1,215	1,594	—	302
Rhode Island	—	—	81	—	34,396	30,544
Vermont	—	—	6	2	24	34
Middle Atlantic	**51,066**	**54,185**	**24,113**	**19,139**	**168,075**	**236,208**
New Jersey	2,412	2,087	2,662	1,516	21,698	17,920
New York	7,896	8,277	16,662	14,556	139,848	215,276
Pennsylvania	40,759	43,821	4,789	3,067	6,529	3,012
East North Central	**194,371**	**202,401**	**3,526**	**3,108**	**56,337**	**79,833**
Illinois	37,441	40,750	1,272	895	24,354	44,986
Indiana	51,680	53,353	431	390	3,213	2,631
Michigan	30,177	32,145	1,362	1,288	25,972	28,208
Ohio	52,268	52,743	403	467	848	719
Wisconsin	22,804	23,410	59	67	1,951	3,289
West North Central	**121,696**	**120,150**	**632**	**976**	**27,345**	**29,509**
Iowa	18,116	16,675	57	88	2,751	2,748
Kansas	17,950	16,672	131	490	17,621	20,050
Minnesota	16,744	17,591	63	39	2,707	2,768
Missouri	33,718	33,553	207	202	3,128	2,889
Nebraska	10,275	10,638	14	21	1,135	1,053
North Dakota	23,586	23,087	153	134	2	1
South Dakota	1,307	1,934	6	—	2	—
South Atlantic	**146,322**	**149,311**	**43,443**	**44,613**	**314,620**	**310,596**
Delaware	1,745	1,682	1,926	1,706	23,165	15,997
District of Columbia	—	—	295	139	—	—
Florida	26,700	27,595	36,449	38,320	272,616	276,254
Georgia	28,870	28,346	485	279	2,619	3,074
Maryland	10,949	10,139	2,492	1,985	5,258	4,864
North Carolina	24,646	26,151	209	350	800	1,220
South Carolina	10,951	11,835	72	137	193	196
Virginia	11,024	11,930	1,186	1,361	9,543	8,619
West Virginia	31,438	31,633	329	336	426	372
East South Central	**96,969**	**102,352**	**2,465**	**4,697**	**63,790**	**49,081**
Alabama	29,510	30,378	178	218	1,443	1,194
Kentucky	38,383	39,550	205	237	616	576
Mississippi	5,428	6,043	1,726	4,081	61,732	47,311
Tennessee	23,649	26,381	355	161	—	—
West South Central	**141,043**	**135,858**	**943**	**1,458**	**1,441,962**	**1,445,739**
Arkansas	14,736	11,879	86	73	32,443	17,490
Louisiana	12,504	13,167	299	846	243,098	264,879
Oklahoma	19,571	18,378	73	39	133,520	133,617
Texas	94,232	92,435	486	500	1,032,900	1,029,752
Mountain	**98,869**	**103,539**	**396**	**363**	**91,680**	**111,722**
Arizona	15,027	16,788	158	123	17,685	22,010
Colorado	16,416	16,711	—	—	2,328	2,361
Idaho	—	—	—	—	—	—
Montana	7,877	9,160	22	16	155	103
Nevada	7,304	6,851	31	38	41,221	52,189
New Mexico	15,003	15,775	48	45	28,218	32,753
Utah	13,695	15,053	31	23	1,985	2,207
Wyoming	23,547	23,201	106	117	88	98
Pacific Contiguous	**5,418**	**5,667**	**16**	**33**	**329,657**	**385,685**
California	—	—	—	—	314,789	374,700
Oregon	838	875	—	17	14,832	10,969
Washington	4,580	4,792	16	15	36	15
Pacific Noncontiguous	**—**	**—**	**9,024**	**7,227**	**18,439**	**20,989**
Alaska	—	—	—	—	18,439	20,989
Hawaii	—	—	9,024	7,227	—	—
U. S. Total	**862,701**	**880,588**	**106,629**	**117,789**	**2,604,663**	**2,764,734**

[1] Does not include petroleum coke. Petroleum coke receipts in 1997 were 2.192 million short tons and in 1996 were 1.410 million short tons.

Notes: •Data are final. •Data are for electric generating plants with a total steam-electric and combined-cycle nameplate capacity of 50 or more megawatts. •Totals may not equal sum of components because of independent rounding.

Source: Federal Energy Regulatory Commission, FERC Form 423, ''Monthly Report of Cost and Quality of Fuels for Electric Plants.''

Table 20. Average Delivered Cost of Fossil Fuel Receipts at U.S. Electric Utilities by Census Division and State, 1996 and 1997

Census Division State	Coal[1]			Petroleum[2]			Gas		
	1996	1997		1996	1997		1996	1997	
	(cents per 10^6 Btu)	(cents per 10^6 Btu)	($ per short ton)	(cents per 10^6 Btu)	(cents per 10^6 Btu)	($ per barrel)	(cents per 10^6 Btu)	(cents per 10^6 Btu)	($ per Mcf)
New England	**170.2**	**171.2**	**43.67**	**307.9**	**274.3**	**17.51**	**266.2**	**300.6**	**3.09**
Connecticut	191.0	190.5	50.02	324.1	292.7	18.74	270.7	242.1	2.47
Maine	—	—	—	293.6	278.9	17.69	—	—	—
Massachusetts	168.8	169.9	42.72	299.2	260.7	16.60	296.2	301.0	3.11
New Hampshire	160.6	163.2	42.62	254.4	263.6	16.89	—	266.6	2.71
Rhode Island	—	—	—	478.7	—	—	222.6	326.4	3.35
Vermont	—	—	—	523.8	453.5	26.04	317.5	312.1	3.16
Middle Atlantic	**140.8**	**138.3**	**34.39**	**328.7**	**285.3**	**18.02**	**287.7**	**282.2**	**2.90**
New Jersey	175.2	175.6	45.94	358.7	298.7	18.63	289.8	295.1	3.06
New York	142.8	142.4	37.32	319.2	284.1	17.94	287.9	281.0	2.88
Pennsylvania	138.2	135.5	33.28	345.2	284.7	18.09	276.9	292.5	3.02
East North Central	**133.3**	**130.7**	**27.68**	**385.8**	**382.3**	**23.20**	**270.7**	**259.7**	**1.99**
Illinois	162.7	155.4	30.41	368.1	375.0	23.14	257.2	251.4	2.55
Indiana	119.1	116.4	24.35	486.9	453.1	26.08	341.2	316.3	3.23
Michigan	139.7	136.9	28.93	340.2	345.1	21.40	269.3	256.3	.80
Ohio	134.0	132.1	31.41	489.6	437.0	25.33	335.0	362.9	3.72
Wisconsin	106.0	109.0	20.43	481.6	462.6	27.13	300.6	314.7	3.17
West North Central	**92.1**	**91.7**	**15.39**	**434.8**	**346.5**	**21.46**	**241.2**	**267.8**	**2.64**
Iowa	94.1	93.7	16.23	507.5	445.2	25.85	322.4	339.8	3.41
Kansas	99.2	102.1	17.91	412.2	282.1	18.26	231.8	258.4	2.53
Minnesota	106.6	109.5	19.47	487.4	483.2	27.74	216.9	243.6	2.45
Missouri	95.5	93.4	16.80	352.2	364.5	22.05	255.2	279.4	2.81
Nebraska	71.9	58.5	10.06	511.4	450.3	26.02	206.1	287.1	2.86
North Dakota	73.7	77.8	10.21	505.1	459.2	26.82	276.6	322.0	3.43
South Dakota	93.7	92.0	15.99	597.9	—	—	233.0	—	—
South Atlantic	**149.3**	**147.6**	**36.34**	**294.7**	**276.1**	**17.63**	**307.9**	**302.9**	**3.16**
Delaware	159.4	157.1	41.05	321.2	277.9	17.68	302.5	304.7	3.15
District of Columbia	—	—	—	378.2	357.7	21.69	—	—	—
Florida	173.9	172.5	41.82	285.4	270.2	17.32	309.7	304.3	3.18
Georgia	157.8	158.6	37.28	430.5	420.8	24.83	281.3	265.5	2.72
Maryland	149.4	150.0	38.75	331.6	296.4	18.79	298.6	285.3	2.97
North Carolina	148.4	142.9	35.35	468.2	427.7	24.84	300.5	310.7	3.22
South Carolina	147.1	144.7	37.21	496.5	454.1	26.33	445.4	397.6	4.07
Virginia	141.8	139.3	34.98	290.0	281.9	17.55	281.6	274.0	2.93
West Virginia	124.9	123.7	30.68	528.7	464.0	27.07	299.0	335.1	3.35
East South Central	**125.3**	**123.9**	**28.70**	**296.1**	**289.8**	**18.82**	**269.0**	**263.4**	**2.73**
Alabama	154.3	153.6	35.58	445.7	405.2	23.77	287.6	277.2	2.86
Kentucky	105.9	104.6	24.20	515.4	482.9	28.28	341.3	337.3	3.45
Mississippi	151.1	154.7	32.44	223.6	269.1	17.73	267.9	262.2	2.72
Tennessee	114.6	112.5	26.67	484.6	439.0	25.80	—	—	—
West South Central	**129.1**	**126.7**	**19.69**	**417.9**	**361.5**	**22.37**	**255.9**	**266.7**	**2.74**
Arkansas	150.3	164.0	28.56	452.5	470.2	27.66	246.6	261.9	2.70
Louisiana	151.4	147.9	23.97	326.8	301.8	19.46	281.6	269.3	2.79
Oklahoma	97.6	91.8	15.87	406.7	409.2	24.08	290.1	287.8	2.97
Texas	129.5	125.9	18.69	473.2	453.6	26.38	245.6	263.3	2.69
Mountain	**112.0**	**110.7**	**21.52**	**551.7**	**532.9**	**31.14**	**231.0**	**245.5**	**2.51**
Arizona	144.4	142.5	28.95	538.6	531.8	31.35	298.2	294.4	2.99
Colorado	102.6	100.9	19.93	—	—	—	209.8	317.5	3.16
Idaho	—	—	—	—	—	—	—	NM	NM
Montana	70.5	68.3	11.52	564.9	529.4	31.35	269.3	1348.5	14.45
Nevada	136.6	139.2	31.10	551.5	507.6	29.59	206.0	211.9	2.18
New Mexico	142.8	133.6	24.23	586.8	574.6	32.82	227.9	259.2	2.64
Utah	107.1	111.3	25.22	579.2	583.6	34.27	179.0	203.0	2.09
Wyoming	82.0	80.6	14.16	545.6	517.0	30.14	NM	NM	NM
Pacific Contiguous	**148.5**	**154.5**	**25.19**	**508.5**	**494.4**	**29.06**	**261.9**	**298.0**	**3.04**
California	—	—	—	—	—	—	267.9	302.2	3.08
Oregon	107.1	113.9	19.95	—	490.2	28.82	132.2	147.6	1.49
Washington	156.9	162.6	26.15	508.5	499.1	29.34	NM	NM	NM
Pacific Noncontiguous	**—**	**—**	**—**	**353.5**	**364.3**	**22.85**	**144.6**	**174.0**	**1.74**
Alaska	—	—	—	—	—	—	144.6	174.0	1.74
Hawaii	—	—	—	353.5	364.3	22.85	—	—	—
U. S. Total	**128.9**	**127.3**	**26.16**	**315.7**	**288.0**	**18.30**	**264.1**	**276.0**	**2.81**

1 Some coal delivered to Alabama, Florida, Kentucky, and Tennessee is reported on FERC Form 423 as delivered to storage facilities. The cost reported for this coal does not include transportation costs incurred later in transporting the coal to the plant.

2 Does not include petroleum coke. Petroleum coke cost in 1997 was 91.2 cents per million Btu and in 1996 was 78.2 cents per million Btu.

Mcf = thousand cubic feet.

NM = Not Meaningful.

Notes: •Data are final. •Data are for electric generating plants with a total steam-electric and combined-cycle nameplate capacity of 50 or more megawatts. •Totals may not equal sum of components because of independent rounding.

Source: Federal Energy Regulatory Commission, FERC Form 423, ''Monthly Report of Cost and Quality of Fuels for Electric Plants.''

U.S. Electric Utility Retail Sales, Revenue, and Average Revenue per Kilowatthour

This chapter provides estimates on the sale of electricity to ultimate consumers by U.S. electric utilities, its associated revenue, and the average revenue per kilowatthour sold[19] at the national, Census, and State levels for 1997 and final data for 1993 through 1997.

Because electricity cannot be stored, it must be generated, transmitted to the consumer, and consumed instantaneously. Electric utility companies were formed to provide these services. U.S. electric utilities are high-investment businesses and historically have been treated as monopolies because duplicate facilities, particularly transmission and distribution lines, would be inefficient. Thus, franchises are granted to electric utilities for given geographical areas by regulatory officials. To obtain a franchise, electric utilities must provide service to all consumers in their territories at a reasonable cost. The service territory of an electric utility is usually composed of many combinations of consumers. Electric utilities classify their consumers within end use sector based on factors such as demand, rate schedule, and Standard Industrial Classification (SIC) code.

Private households and apartment buildings, where energy is consumed primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying are classified as residential consumers. Nonmanufacturing business establishments (including hotels, motels, restaurants, wholesale businesses, retail stores, health, social, and educational institutions) are generally classified as commercial. However, demand or annual usage may be the determining factor used by the electric utility to classify a consumer as commercial. Manufacturing, construction, mining, agriculture, fishing, and forestry establishments (SIC codes 1-39) are included as industrial consumers. Again, electric utilities may instead classify industrial service based on demand or annual usage. Public street and highway lighting, railroads and railways, municipalities, divisions or agencies of State and Federal governments under special contracts or agreements, and other utility departments as defined by the pertinent regulatory agency and/or electric utility within this report are classified as other sales.

The average revenue per kilowatthour of electricity sold by electric utilities is calculated by dividing total annual revenue by total annual retail sales for each sector and State. The resulting measurement is the cost (per kilowatthour of electricity sold) for providing service to a sector, given the rate schedule of the electric utility for that particular sector. The average revenue per kilowatthour is calculated for all consumers and for each sector (residential, commercial, industrial, and other sales). Utilities typically employ a number of rate schedules within a single sector. These alternative rate schedules reflect the varying consumption levels and patterns of these customers and their associated impact on the cost to the electric utility for providing electrical service. The average revenue per kilowatthour by sector reported in this publication represents a weighted average of revenue and sales within and across sectors for all consumers.

To derive the average revenue per kilowatthour, the operating revenue[20] reported by the electric utility is used. Utility operating revenues cover—among other costs of service—State and Federal income taxes and taxes other than income taxes paid by the utility. The Federal component of these taxes are, for the most part, *payroll* taxes. State and local authorities will tax the value of plant (property taxes), the amount of revenues (gross receipts taxes), purchases of materials and services (sales and use taxes), and a potentially long list of other taxes that vary extensively by taxing authority. Taxes deducted from an employee's pay, such as Federal income taxes and the employee's share of social security taxes, are not a part of the utility's "tax costs," but are paid to the taxing authorities in the name of the employees. These taxes are included in the utility's cost of service (for example, revenue requirements) and are included in the amounts recovered from the customer in rates and reported in operating revenues.

[19] Average revenue per kilowatthour is the ratio of revenue to retail sales.
[20] Includes energy charges, demand charges, consumer service charges, environmental surcharges, fuel adjustments, and other miscellaneous charges.

Electric utilities, like many other business enterprises, are required by various taxing authorities to collect and remit taxes assessed on its customers. In this regard, the utility serves as an agent for the taxing authority. Taxes assessed on the consumer, such as a gross receipts tax or sales tax, are referred to as *pass through* taxes. These taxes do not represent a cost of the utility and are not recorded in the operating revenues of the utility. However, taxing authorities differ regarding whether a specific tax is assessed on the utility or on the consumer. That decision, in turn, determines whether or not the tax is included in the electric utility's operating revenue.

Average revenue per kilowatthour from residential consumers is generally higher than for any other sector, in part due to the higher costs associated with serving many consumers who use relatively small amounts of electricity. These higher costs include direct-load costs (such as those for distribution lines) in addition to consumer or administrative costs. The industrial sector, which generally has the highest use of electricity, has the lowest average revenue per kilowatthour.

Data Sources

Preliminary values for 1997 are derived from data collected on the Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions." Respondents to the Form EIA-826 are based on a statistically chosen sample and include 252 U.S. electric utilities from a universe of approximately 3,250 utilities. The sample was designed to obtain estimates of electricity sales, average revenue, and revenue per kilowatthour for all U.S. electric utilities by end use sector. Estimates of coefficients of variation, which indicate possible error caused by sampling, are also published at each level.

Historical census-based statistics on retail sales of electricity, associated revenue, and average revenue per kilowatthour are based on information collected on the Form EIA-861, "Annual Electric Utility Report." **Final** census-based statistics for retail sales of electricity, associated revenue, and average revenue per kilowatthour based on information collected on the Form EIA-861 will be published in the *Electric Sales and Revenue*, DOE/EIA-0540.

Table 21. Retail Sales of Electricity by U.S. Electric Utilities to Ultimate Consumers and Associated Revenue by Sector, 1993 Through 1997

Item	1993	1994	1995	1996	1997
Retail Sales (million kilowatthours)					
Residential	994,781	1,008,482	1,042,501	1,082,491	1,071,569
Commercial	794,573	820,269	862,685	887,425	913,283
Industrial	977,164	1,007,981	1,012,693	1,030,356	1,032,538
Other[1]	94,944	97,830	95,407	97,539	97,504
U.S. Total	**2,861,462**	**2,934,563**	**3,013,287**	**3,097,810**	**3,114,894**
Revenue (million dollars)					
Residential	82,814	84,552	87,610	90,501	90,659
Commercial	61,521	63,396	66,365	67,827	69,768
Industrial	47,357	48,069	47,175	47,385	47,126
Other[1]	6,528	6,689	6,567	6,741	6,727
U.S. Total	**198,220**	**202,706**	**207,717**	**212,455**	**214,280**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •Values for 1997 are preliminary, based on revised Form EIA-826 estimates. Values for 1993-1996 are final. •Revenue and average revenue per kilowatthour do not include taxes such as sales and excise taxes that are assessed on the consumer and collected through the utility. •Weather-related phenomena, reclassification of retail sales, changes in number of customers, prior period adjustments, and changes in billing procedures may contribute to substantial year-to-year changes in the data in this table. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions,'' and Form EIA-861, ''Annual Electric Utility Report.''

Table 22. Average Revenue per Kilowatthour for U.S. Electric Utilities by Sector, 1993 Through 1997

(Cents)

Sector	1993	1994	1995	1996	1997
Residential	8.32	8.38	8.40	8.36	8.46
Commercial	7.74	7.73	7.69	7.64	7.64
Industrial	4.85	4.77	4.66	4.60	4.56
Other[1]	6.88	6.84	6.88	6.91	6.90
All Sectors	**6.93**	**6.91**	**6.89**	**6.86**	**6.88**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •Values for 1997 are preliminary, based on revised Form EIA-826 estimates. Values for 1993-1996 are final. •Revenue and average revenue per kilowatthour do not include taxes such as sales and excise taxes that are assessed on the consumer and collected through the utility. •Weather-related phenomena, reclassification of retail sales, changes in number of customers, prior period adjustments, and changes in billing procedures may contribute to substantial year-to-year changes in the data in this table. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions,'' and Form EIA-861, ''Annual Electric Utility Report.''

Table 23. Retail Sales of Electricity by U.S. Electric Utilities to Ultimate Consumers by Sector, Census Division, and State, 1997

(Million Kilowatthours)

Census Division and State	All Sectors	Residential	Commercial	Industrial	Other[1]
New England	**108,849**	**38,550**	**43,036**	**25,884**	**1,380**
Connecticut	28,377	10,856	11,249	5,899	374
Maine	11,911	3,658	3,272	4,920	61
Massachusetts	47,543	16,207	20,956	9,790	589
New Hampshire	9,062	3,367	3,231	2,322	142
Rhode Island	6,680	2,481	2,649	1,376	174
Vermont	5,275	1,980	1,679	1,578	39
Middle Atlantic	**324,610**	**104,710**	**119,671**	**86,160**	**14,069**
New Jersey	66,495	22,433	29,776	13,780	507
New York	131,602	39,904	54,335	25,100	12,263
Pennsylvania	126,512	42,373	35,559	47,281	1,299
East North Central	**527,859**	**153,590**	**140,764**	**218,140**	**15,365**
Illinois	125,882	36,966	38,143	42,139	8,635
Indiana	88,400	26,294	18,148	43,403	554
Michigan	97,029	28,676	32,448	35,065	840
Ohio	156,606	43,280	36,276	72,458	4,592
Wisconsin	59,943	18,375	15,749	25,074	744
West North Central	**226,703**	**80,754**	**61,563**	**78,655**	**5,732**
Iowa	35,663	11,582	7,409	15,361	1,311
Kansas	32,230	11,124	11,127	9,589	390
Minnesota	55,002	16,899	9,636	27,751	716
Missouri	65,268	26,385	22,843	15,066	974
Nebraska	22,759	8,007	6,491	6,698	1,563
North Dakota	8,085	3,408	1,935	2,279	463
South Dakota	7,696	3,350	2,122	1,910	314
South Atlantic	**641,775**	**255,439**	**205,135**	**160,919**	**20,282**
Delaware	10,025	3,230	3,006	3,734	55
District of Columbia	10,107	1,554	7,925	262	366
Florida	175,059	87,969	64,254	17,230	5,605
Georgia	100,400	36,158	29,729	33,256	1,257
Maryland	56,481	22,090	23,481	10,168	741
North Carolina	108,439	40,281	31,083	35,097	1,978
South Carolina	67,798	21,275	14,962	30,712	850
Virginia	87,242	33,866	24,765	19,274	9,337
West Virginia	26,224	9,016	5,930	11,185	93
East South Central	**274,650**	**93,104**	**44,915**	**131,319**	**5,311**
Alabama	73,410	24,586	14,127	34,155	542
Kentucky	75,748	20,719	10,781	41,188	3,059
Mississippi	39,491	14,517	8,390	15,923	662
Tennessee	86,001	33,282	11,617	40,054	1,048
West South Central	**440,851**	**156,127**	**109,102**	**157,235**	**18,387**
Arkansas	36,315	12,898	7,536	15,247	633
Louisiana	75,465	24,277	16,210	32,442	2,536
Oklahoma	44,148	17,308	11,758	12,601	2,480
Texas	284,923	101,644	73,598	96,944	12,737
Mountain	**199,278**	**63,351**	**61,952**	**66,095**	**7,879**
Arizona	54,035	20,717	17,865	12,886	2,567
Colorado	37,667	12,225	14,852	9,594	996
Idaho	21,288	6,635	5,970	8,356	326
Montana	12,497	3,785	3,328	5,148	237
Nevada	23,871	7,769	5,423	9,770	909
New Mexico	17,307	4,467	5,472	5,855	1,513
Utah	20,449	5,690	6,501	7,393	865
Wyoming	12,164	2,063	2,540	7,093	468
Pacific Contiguous	**356,006**	**121,535**	**122,112**	**103,461**	**8,898**
California	223,857	72,762	86,875	59,685	4,535
Oregon	47,059	17,128	13,567	15,650	714
Washington	85,090	31,644	21,670	28,126	3,650
Pacific Noncontiguous	**14,313**	**4,409**	**5,033**	**4,671**	**201**
Alaska	4,962	1,740	2,257	821	144
Hawaii	9,351	2,669	2,775	3,850	57
U.S. Total	**3,114,894**	**1,071,569**	**913,283**	**1,032,538**	**97,504**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •Values for 1997 are preliminary, based on revised Form EIA-826 estimates. •Revenue and average revenue per kilowatthour do not include taxes such as sales and excise taxes that are assessed on the consumer and collected through the utility. •Weather-related phenomena, reclassification of retail sales, changes in number of customers, prior period adjustments, and changes in billing procedures may contribute to substantial year-to-year changes in the data in this table. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions.''

Table 24. Estimated Coefficients of Variation for U.S. Electric Utility Retail Sales of Electricity by Census Division and State, 1997

(Percent)

Census Division and State	All Sectors	Residential	Commercial	Industrial	Other[1]
New England	**0.2**	**0.2**	**0.2**	**0.3**	**0.4**
Connecticut	.1	.1	.1	.2	.4
Maine	.1	.1	1.0	.9	4.2
Massachusetts	.4	.4	.4	.7	.9
New Hampshire	.3	.3	.1	.8	.7
Rhode Island	.1	.1	—	.1	.3
Vermont	.3	.6	.2	.5	1.3
Middle Atlantic	**.2**	**.5**	**.2**	**.4**	**.3**
New Jersey	.1	.2	.1	.3	.2
New York	.4	.7	.3	.4	.3
Pennsylvania	.5	1.0	.4	.6	2.1
East North Central	**.2**	**.2**	**.3**	**.5**	**.3**
Illinois	.3	.5	.3	.6	.4
Indiana	.4	.9	.5	.8	1.1
Michigan	.4	.1	1.0	2.6	1.3
Ohio	.4	.4	.2	.8	.6
Wisconsin	.3	.6	.3	.3	2.3
West North Central	**.2**	**.3**	**.2**	**.2**	**2.5**
Iowa	.3	.5	.7	.5	.5
Kansas	.3	.7	.3	.2	1.4
Minnesota	.4	.8	1.0	.3	1.1
Missouri	.3	.7	.3	.3	1.0
Nebraska	.6	.9	.4	.7	9.1
North Dakota	.6	.8	2.0	2.0	1.3
South Dakota	.5	.9	.8	.7	2.4
South Atlantic	**.1**	**.2**	**.1**	**.2**	**.2**
Delaware	.2	.1	.1	.4	.6
District of Columbia	—	—	—	—	—
Florida	.2	.4	.3	.5	.6
Georgia	.4	.8	.3	.2	.9
Maryland	.2	.3	.2	.2	.7
North Carolina	.4	.7	.4	.4	1.0
South Carolina	.4	.6	.3	.5	.3
Virginia	.3	.6	.2	.6	.2
West Virginia	.1	.3	.1	.2	1.0
East South Central	**.3**	**.5**	**.4**	**.3**	**1.2**
Alabama	.5	1.2	1.0	.3	1.6
Kentucky	.8	1.2	.4	.9	.2
Mississippi	.6	.6	.5	.6	.9
Tennessee	.6	1.0	.9	.5	5.9
West South Central	**.2**	**.5**	**.2**	**.3**	**.5**
Arkansas	.4	.7	.4	.6	1.5
Louisiana	.8	.5	.4	.8	.5
Oklahoma	.5	1.1	.6	.6	2.3
Texas	.3	.7	.2	.3	.6
Mountain	**.2**	**.2**	**.2**	**.2**	**1.0**
Arizona	.2	.2	.2	.3	1.0
Colorado	.3	.4	.2	.3	4.1
Idaho	.5	.5	1.1	.6	4.5
Montana	1.0	.8	.3	.6	1.1
Nevada	.6	1.0	.4	.3	.7
New Mexico	2.0	.5	.5	.7	1.2
Utah	.3	.4	.5	.1	1.4
Wyoming	.6	.9	1.1	.4	11.8
Pacific Contiguous	**.5**	**.3**	**.2**	**.9**	**1.9**
California	.3	.5	.3	.6	3.4
Oregon	.8	.8	1.0	1.4	9.8
Washington	1.7	.5	.3	3.1	1.0
Pacific Noncontiguous	**.2**	**.1**	**.3**	**.7**	**2.6**
Alaska	.7	.3	.6	4.0	3.7
Hawaii	.1	.1	.1	.1	.1
U.S. Total	**.1**	**.1**	**.1**	**.2**	**.3**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •See technical notes for CV estimation methodology. It should be noted that such things as large changes in retail sales, reclassification of retail sales, or changes in billing procedures can contribute unusually high coefficients of variation.

Sources: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions.''

Table 25. Revenue from Retail Sales by U.S. Electric Utilities to Ultimate Consumers by Sector, Census Division, and State, 1997

(Million Dollars)

Census Division and State	All Sectors	Residential	Commercial	Industrial	Other[1]
New England	**11,398**	**4,645**	**4,468**	**2,080**	**206**
Connecticut	2,986	1,317	1,157	458	53
Maine	1,136	466	340	315	15
Massachusetts	4,980	1,873	2,156	863	88
New Hampshire	1,053	457	365	209	22
Rhode Island	716	301	275	118	22
Vermont	529	231	175	117	6
Middle Atlantic	**31,791**	**12,547**	**12,665**	**5,194**	**1,385**
New Jersey	7,026	2,716	3,095	1,122	93
New York	14,735	5,662	6,607	1,325	1,141
Pennsylvania	10,030	4,169	2,963	2,746	151
East North Central	**34,380**	**13,243**	**10,361**	**9,706**	**1,071**
Illinois	9,754	3,876	3,038	2,247	593
Indiana	4,784	1,878	1,113	1,740	53
Michigan	6,928	2,500	2,566	1,767	95
Ohio	9,798	3,725	2,768	3,027	279
Wisconsin	3,115	1,264	875	925	51
West North Central	**13,407**	**5,885**	**3,804**	**3,364**	**354**
Iowa	2,145	959	495	610	81
Kansas	2,041	851	715	439	37
Minnesota	3,108	1,242	609	1,204	54
Missouri	3,976	1,867	1,367	675	67
Nebraska	1,192	512	353	246	81
North Dakota	462	215	122	104	20
South Dakota	483	240	143	86	15
South Atlantic	**42,067**	**20,324**	**13,575**	**6,889**	**1,279**
Delaware	706	300	218	182	7
District of Columbia	747	122	589	12	24
Florida	12,731	7,165	4,279	897	390
Georgia	6,419	2,817	2,107	1,386	108
Maryland	3,951	1,840	1,614	430	67
North Carolina	7,068	3,262	2,001	1,664	140
South Carolina	3,744	1,611	953	1,128	51
Virginia	5,386	2,641	1,487	775	483
West Virginia	1,314	565	326	414	8
East South Central	**13,814**	**5,845**	**2,750**	**4,901**	**319**
Alabama	3,894	1,654	912	1,287	41
Kentucky	3,073	1,170	559	1,202	143
Mississippi	2,318	1,024	565	674	54
Tennessee	4,529	1,997	714	1,738	81
West South Central	**26,921**	**11,932**	**7,269**	**6,567**	**1,154**
Arkansas	2,247	1,013	513	676	45
Louisiana	4,602	1,846	1,147	1,439	170
Oklahoma	2,403	1,147	676	461	118
Texas	17,669	7,925	4,933	3,991	820
Mountain	**11,858**	**4,777**	**3,989**	**2,679**	**414**
Arizona	4,010	1,824	1,399	662	124
Colorado	2,270	913	860	417	81
Idaho	822	341	249	216	15
Montana	636	248	197	174	18
Nevada	1,342	526	342	440	34
New Mexico	1,201	405	438	269	89
Utah	1,056	392	371	257	36
Wyoming	522	128	134	244	16
Pacific Contiguous	**26,982**	**10,871**	**10,308**	**5,290**	**513**
California	21,290	8,331	8,580	4,034	345
Oregon	2,193	966	687	505	35
Washington	3,499	1,575	1,041	751	133
Pacific Noncontiguous	**1,662**	**592**	**580**	**458**	**32**
Alaska	500	199	214	63	24
Hawaii	1,162	393	366	396	7
U.S. Total	**214,280**	**90,659**	**69,768**	**47,126**	**6,727**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •Values for 1997 are preliminary, based on revised Form EIA-826 estimates. •Revenue and average revenue per kilowatthour do not include taxes such as sales and excise taxes that are assessed on the consumer and collected through the utility. •Weather-related phenomena, reclassification of retail sales, changes in number of customers, prior period adjustments, and changes in billing procedures may contribute to substantial year-to-year changes in the data in this table. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions,''

Table 26. Estimated Coefficients of Variation of Revenue from Retail Sales by U.S. Electric Utilities by Census Division and State, 1997

(Percent)

Census Division and State	All Sectors	Residential	Commercial	Industrial	Other[1]
New England	**0.4**	**0.3**	**0.6**	**0.6**	**0.7**
Connecticut	.1	.1	.2	.1	.3
Maine	.1	.1	.8	1.2	2.0
Massachusetts	.9	.7	1.1	1.4	.8
New Hampshire	.3	.2	.1	.8	5.0
Rhode Island	.1	.1	—	.1	.2
Vermont	.4	.4	.3	1.3	1.7
Middle Atlantic	**.3**	**.5**	**.3**	**.3**	**.3**
New Jersey	.1	.2	.1	.3	—
New York	.5	.6	.5	.5	.3
Pennsylvania	.7	1.3	.6	.5	1.3
East North Central	**.2**	**.3**	**.3**	**.5**	**.3**
Illinois	.3	.5	.3	.4	.1
Indiana	.5	1.0	.5	.6	.6
Michigan	.6	.3	1.0	2.4	.8
Ohio	.3	.5	.2	.4	.9
Wisconsin	.4	.6	.4	.4	1.5
West North Central	**.3**	**.4**	**.3**	**.3**	**1.5**
Iowa	.4	.7	.5	.5	.3
Kansas	.7	.9	.7	.6	3.4
Minnesota	.8	1.1	1.2	.6	.7
Missouri	.6	.9	.5	.8	1.7
Nebraska	.8	1.1	.8	1.2	6.1
North Dakota	.6	.7	1.8	2.2	1.1
South Dakota	.7	1.0	.8	.8	1.7
South Atlantic	**.2**	**.3**	**.2**	**.2**	**.2**
Delaware	.2	.2	.2	.4	.3
District of Columbia	—	—	—	—	—
Florida	.4	.5	.4	.6	.5
Georgia	.5	1.0	.3	.2	.7
Maryland	.4	.5	.4	.5	.3
North Carolina	.4	.8	.4	.5	1.0
South Carolina	.7	1.0	.7	.8	.5
Virginia	.5	.8	.2	.6	.2
West Virginia	.1	.3	.2	.2	.6
East South Central	**.7**	**.6**	**.5**	**.3**	**1.0**
Alabama	.7	1.3	1.2	.5	1.4
Kentucky	2.9	1.5	.6	.6	.3
Mississippi	.5	.6	.6	.7	1.4
Tennessee	.6	1.0	.9	.6	3.7
West South Central	**.5**	**.7**	**.5**	**.5**	**.9**
Arkansas	.5	.6	.5	.8	1.7
Louisiana	.7	.7	.7	.7	1.4
Oklahoma	1.0	1.4	1.2	1.0	1.9
Texas	.7	1.0	.7	.8	1.2
Mountain	**.2**	**.2**	**.2**	**.3**	**.8**
Arizona	.4	.3	.4	.5	1.3
Colorado	.6	.5	.4	.5	1.4
Idaho	.6	.5	1.2	1.2	2.9
Montana	1.4	.6	.5	1.2	1.7
Nevada	.8	.9	.4	.9	1.0
New Mexico	.4	.6	.3	.8	2.5
Utah	.2	.3	.5	.1	1.0
Wyoming	.6	.8	1.0	.5	6.3
Pacific Contiguous	**.3**	**.4**	**.5**	**.9**	**1.8**
California	.3	.4	.6	.9	2.6
Oregon	1.0	.9	1.0	2.0	3.0
Washington	1.5	.6	.4	4.0	1.9
Pacific Noncontiguous	**.3**	**.2**	**.4**	**.7**	**2.6**
Alaska	.7	.4	1.0	4.4	3.4
Hawaii	.3	.2	.2	.4	.3
U.S. Total	**.1**	**.2**	**.1**	**.2**	**.2**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •See technical notes for CV estimation methodology. It should be noted that such things as large changes in retail sales, reclassification of retail sales, or changes in billing procedures can contribute unusually high coefficients of variation.

Sources: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions.''

Table 27. Average Revenue per Kilowatthour for U.S. Electric Utilities by Sector, Census Division, and State, 1997

(Cents)

Census Division and State	All Sectors	Residential	Commercial	Industrial	Other[1]
New England	**10.5**	**12.0**	**10.4**	**8.0**	**15.0**
Connecticut	10.5	12.1	10.3	7.8	14.3
Maine	9.5	12.8	10.4	6.4	23.8
Massachusetts	10.5	11.6	10.3	8.8	15.0
New Hampshire	11.6	13.6	11.3	9.0	15.6
Rhode Island	10.7	12.1	10.4	8.5	12.4
Vermont	10.0	11.7	10.4	7.4	15.3
Middle Atlantic	**9.8**	**12.0**	**10.6**	**6.0**	**9.8**
New Jersey	10.6	12.1	10.4	8.1	18.3
New York	11.2	14.2	12.2	5.3	9.3
Pennsylvania	7.9	9.8	8.3	5.8	11.6
East North Central	**6.5**	**8.6**	**7.4**	**4.4**	**7.0**
Illinois	7.7	10.5	8.0	5.3	6.9
Indiana	5.4	7.1	6.1	4.0	9.5
Michigan	7.1	8.7	7.9	5.0	11.3
Ohio	6.3	8.6	7.6	4.2	6.1
Wisconsin	5.2	6.9	5.6	3.7	6.8
West North Central	**5.9**	**7.3**	**6.2**	**4.3**	**6.2**
Iowa	6.0	8.3	6.7	4.0	6.2
Kansas	6.3	7.6	6.4	4.6	9.5
Minnesota	5.7	7.3	6.3	4.3	7.5
Missouri	6.1	7.1	6.0	4.5	6.8
Nebraska	5.2	6.4	5.4	3.7	5.2
North Dakota	5.7	6.3	6.3	4.6	4.4
South Dakota	6.3	7.2	6.7	4.5	4.7
South Atlantic	**6.6**	**8.0**	**6.6**	**4.3**	**6.3**
Delaware	7.0	9.3	7.3	4.9	12.5
District of Columbia	7.4	7.9	7.4	4.4	6.5
Florida	7.3	8.1	6.7	5.2	7.0
Georgia	6.4	7.8	7.1	4.2	8.6
Maryland	7.0	8.3	6.9	4.2	9.1
North Carolina	6.5	8.1	6.4	4.7	7.1
South Carolina	5.5	7.6	6.4	3.7	6.0
Virginia	6.2	7.8	6.0	4.0	5.2
West Virginia	5.0	6.3	5.5	3.7	8.9
East South Central	**5.0**	**6.3**	**6.1**	**3.7**	**6.0**
Alabama	5.3	6.7	6.5	3.8	7.6
Kentucky	4.1	5.6	5.2	2.9	4.7
Mississippi	5.9	7.1	6.7	4.2	8.2
Tennessee	5.3	6.0	6.1	4.3	7.8
West South Central	**6.1**	**7.6**	**6.7**	**4.2**	**6.3**
Arkansas	6.2	7.9	6.8	4.4	7.2
Louisiana	6.1	7.6	7.1	4.4	6.7
Oklahoma	5.4	6.6	5.7	3.7	4.8
Texas	6.2	7.8	6.7	4.1	6.4
Mountain	**6.0**	**7.5**	**6.4**	**4.1**	**5.2**
Arizona	7.4	8.8	7.8	5.1	4.8
Colorado	6.0	7.5	5.8	4.3	8.1
Idaho	3.9	5.1	4.2	2.6	4.7
Montana	5.1	6.5	5.9	3.4	7.6
Nevada	5.6	6.8	6.3	4.5	3.7
New Mexico	6.9	9.1	8.0	4.6	5.9
Utah	5.2	6.9	5.7	3.5	4.2
Wyoming	4.3	6.2	5.3	3.4	3.4
Pacific Contiguous	**7.6**	**8.9**	**8.4**	**5.1**	**5.8**
California	9.5	11.4	9.9	6.8	7.6
Oregon	4.7	5.6	5.1	3.2	5.0
Washington	4.1	5.0	4.8	2.7	3.6
Pacific Noncontiguous	**11.6**	**13.4**	**11.5**	**9.8**	**15.7**
Alaska	10.1	11.4	9.5	7.6	16.7
Hawaii	12.4	14.7	13.2	10.3	13.1
U.S. Average	**6.88**	**8.46**	**7.64**	**4.56**	**6.90**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •Values for 1997 are preliminary, based on revised Form EIA-826 estimates. •Revenue and average revenue per kilowatthour do not include taxes such as sales and excise taxes that are assessed on the consumer and collected through the utility. •Weather-related phenomena, reclassification of retail sales, changes in number of customers, prior period adjustments, and changes in billing procedures may contribute to substantial year-to-year changes in the data in this table. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions,''

Table 28. Estimated Coefficients of Variation for Average Revenue per Kilowatthour for U.S. Electric Utilities by Sector, Census Division, and State, 1997

(Percent)

Census Division and State	All Sectors	Residential	Commercial	Industrial	Other[1]
New England	**0.3**	**0.3**	**0.5**	**0.5**	**0.6**
Connecticut	.1	.1	.1	.2	.4
Maine	.2	.1	.3	.4	2.1
Massachusetts	.7	.6	1.0	1.0	.8
New Hampshire	.2	.2	.2	.4	4.8
Rhode Island	.1	.1	—	.1	.3
Vermont	.5	.7	.3	.9	1.2
Middle Atlantic	**.1**	**.1**	**.1**	**.2**	**.2**
New Jersey	—	.1	—	.1	.2
New York	.2	.2	.2	.4	.2
Pennsylvania	.3	.4	.3	.2	1.0
East North Central	**.2**	**.2**	**.1**	**.2**	**.2**
Illinois	.2	.3	.2	.4	.3
Indiana	.4	.6	.3	.4	1.0
Michigan	.5	.3	.1	.5	.6
Ohio	.3	.3	.2	.5	.5
Wisconsin	.3	.4	.3	.3	1.4
West North Central	**.2**	**.3**	**.2**	**.2**	**1.2**
Iowa	.5	.8	.5	.5	.3
Kansas	.4	.4	.5	.5	4.0
Minnesota	.4	.5	.4	.4	.8
Missouri	.6	.7	.6	.8	1.4
Nebraska	.6	.5	.5	1.1	3.1
North Dakota	.3	.4	.5	.5	.9
South Dakota	.4	.3	.4	.4	1.6
South Atlantic	**.1**	**.2**	**.1**	**.1**	**.1**
Delaware	.2	.2	.2	.3	.4
District of Columbia	—	—	—	—	—
Florida	.4	.3	.4	.5	.3
Georgia	.3	.5	.2	.1	.5
Maryland	.3	.3	.3	.3	.5
North Carolina	.2	.3	.3	.2	.4
South Carolina	.6	.7	.6	.4	.5
Virginia	.2	.2	.1	.7	.2
West Virginia	.1	.1	.2	—	1.2
East South Central	**.7**	**.2**	**.2**	**.3**	**.4**
Alabama	.4	.4	.2	.5	1.1
Kentucky	3.0	.5	.4	.6	.2
Mississippi	.2	.4	.2	.4	1.1
Tennessee	.3	.1	.6	.3	2.4
West South Central	**.4**	**.4**	**.4**	**.5**	**.8**
Arkansas	.5	.3	.4	1.0	.8
Louisiana	.5	.6	.5	.4	1.4
Oklahoma	.6	.7	.8	.9	.9
Texas	.6	.5	.6	.7	1.1
Mountain	**.2**	**.1**	**.2**	**.2**	**.9**
Arizona	.3	.2	.3	.6	1.1
Colorado	.4	.3	.4	.5	3.5
Idaho	.2	.4	.2	.6	2.3
Montana	.6	.6	.6	.7	1.1
Nevada	.4	.1	.3	.7	1.3
New Mexico	1.8	.5	.6	.7	2.6
Utah	.1	.1	.1	.1	.6
Wyoming	.2	.3	.3	.2	6.0
Pacific Contiguous	**.4**	**.2**	**.4**	**.8**	**1.7**
California	.4	.2	.5	.9	2.6
Oregon	.6	.6	.6	1.0	4.3
Washington	.7	.4	.4	1.4	1.4
Pacific Noncontiguous	**.2**	**.2**	**.2**	**.3**	**2.9**
Alaska	.5	.3	.5	1.4	4.1
Hawaii	.2	.2	.2	.3	.2
U.S. Average	**.1**	**.1**	**.1**	**.1**	**.2**

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Notes: •See technical notes for CV estimation methodology. It should be noted that such things as large changes in retail sales, reclassification of retail sales, or changes in billing procedures can contribute unusually high coefficients of variation.

Sources: Energy Information Administration, Form EIA-826, ''Monthly Electric Utility Sales and Revenue Report with State Distributions.''

Appendix A

Technical Notes

Data Sources

The *Electric Power Annual* is prepared by the Electric Power Division; Office of Coal, Nuclear, Electric and Alternate Fuels; Energy Information Administration (EIA); U.S. Department of Energy (DOE). Data published in the *Electric Power Annual Volume 1* (EPA) are compiled from three statistical forms filed monthly and two forms filed annually by electric utilities. Those forms are: the Form EIA-759, "Monthly Power Plant Report"; the Federal Energy Regulatory Commission (FERC) Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants"; the Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions"; the Form EIA-861, "Annual Electric Utility Report"; and the Form EIA-860, "Annual Electric Generator Report." Each form is summarized below.

Form EIA-759

The Form EIA-759 is a mandatory survey of operators of electric utility plants producing electric power for public use. The Form EIA-759 is used to collect monthly data on net generation, consumption of coal, petroleum, and natural gas; and end-of-the-month stocks of coal and petroleum for a sample of plants by fuel-type and State. Remaining plants are surveyed annually to form an annual census of all plants. Summary data from the Form EIA-759 are also published in the *Electric Power Monthly (EPM)*, the *Monthly Energy Review (MER)*, and the *Annual Energy Review (AER)*. These reports present aggregated data for electric utilities at the U.S., Census division, and North American Electric Reliability Council Region (NERC) levels.

Instrument and Design History. Prior to 1936, the Bureau of the Census and the U.S. Geological Survey collected, compiled, and published data on the electric power industry. In 1936, the Federal Power Commission (FPC) assumed all data collection and publication responsibilities for the electric power industry and implemented the FPC Form 4. The Federal Power Act, Sections 311 and 312, and FPC Order 141 define the legislative authority to collect power production data. The Form EIA-759 replaced the FPC Form 4 in January 1982.

Data Processing. The Form EIA-759, along with a return envelope, is mailed to respondents approximately 4 working days before the end of the month. The respondents names are obtained from a computerized mailing address file. The completed forms are to be returned to the EIA by the 10th working day after the end of the reporting month. After receipt, data from the completed forms are manually logged in and edited before being keypunched for automatic data processing. An edit program checks the data for errors not found during manual editing. The electric utility companies are telephoned to obtain data in cases of missing reports and to verify data when questions arise during editing. Following EIA approval, the data are made available for public use.

FERC Form 423

The FERC Form 423, a restricted census, is a monthly record of delivered-fuel purchases, submitted by approximately 230 electric utilities for each plant with a total steam-electric and combined-cycle nameplate capacity of 50 or more megawatts. Summary data from the FERC Form 423 are also published in the *EPM* and the *MER*. These reports present aggregated data on electric utilities at the U.S. and Census division level.

Instrument and Design History. On July 7, 1972, the FPC issued Order Number 453 enacting the New Code of Federal Regulations, Section 141.61, legally creating the Form 423. Originally, the form was used to collect data only on fossil-steam plants, but was amended in 1974 to include data on internal combustion and combustion turbines. The FERC Form 423 replaced the FPC Form 423 in January 1983. Peaking units were eliminated from the FERC Form 423. In addition, the nameplate capacity threshold was changed from 25 megawatts to 50 megawatts. This reduction in coverage eliminated approximately 50 utilities and 250 plants.

In 1991, the FERC Form 423 was amended to include combined-cycle generating units. This increase in coverage added 5 electric utilities and approximately 15 additional electric plants. Several plants, already reporting on the FERC Form 423, began including fuel receipts for combined-cycle units starting with 1991 data.

Data Processing. Starting with the January 1993 data, the FERC began collection of the data directly from the respondents. The FERC processes the data through edits and each month provides the EIA with a diskette containing the data. The EIA reviews the data for accuracy. Following EIA approval, the data are made available for public use.

Form EIA-826

The Form EIA-826 is a monthly collection of data from 252 U.S. electric utilities, which generally account for the largest share of retail sales within the State for which they report.

Instrument and Design History. The collection of electric power sales, revenue, and income data began in the early 1940's and was established as FPC Form 5 by FPC Order 141 in 1947. In 1980, the report was revised with only selected income items remaining and became the FERC Form 5. The Form EIA-826 replaced the FERC Form 5 in January 1983. In January 1987, the Form EIA-826 was changed to the "Monthly Electric Utility Sales and Revenue Report with State Distributions;" it was formerly titled, "Electric Utility Company Monthly Statement." The Form EIA-826 was revised in January 1990, and some data elements were eliminated.

Frame. The current sample for the Form EIA-826, which was designed to obtain estimates of electricity sales and revenue per kilowatthour at the State level by end-use sector, was chosen to be in effect for the January 1993 data. The frame for the Form EIA-826 was originally based on the 1989 submission of the Form EIA-861, which consisted of approximately 3,250 electric utilities selling retail and/or sales for resale. Note that for the Form EIA-826, we are only interested in retail sales and revenue. Updates have been made to the frame to reflect mergers that affect data processing. Some electric utilities serve in more than one State. Thus, the State-service area is actually the sampling unit. For each State served by each utility, there is a utility State-part, or "State-service area." This approach allows for an explicit calculation of estimates for State, Census division, and U.S. level sales, revenue and revenue per kilowatthour by end-use sector (residential, commercial, industrial and other). A model-based cutoff sample is used currently. Regressor data came from the Form EIA-861. (Note that estimates at the "State level" are for sales for the entire State, and similarly for "Census division" and "U.S." levels.)

The preponderance of electric power sales to ultimate consumers in each State are made by a few large utilities. Ranking of electric utilities by retail sales on a State-by-State basis revealed a consistent pattern of dominance by a few electric utilities in nearly all 50 States and the District of Columbia. These dominant electric utilities were selected as a model sample. These electric utilities constitute about 8 percent of the population of U.S. electric utilities, but provide three-quarters of the total U.S. retail electricity sales. The procedures used to derive electricity sales, revenue, average revenue per kilowatthour, and associated coefficient of variation (CV) estimates are provided in the Formulas and Calculations section of this Appendix.

Data Processing. The forms are mailed each year to the electric utilities with State-parts selected in the sample. The completed form is to be returned to the EIA by the last calendar day of the month following the reporting month. Nonrespondents are telephoned to obtain the data. Imputation, in model sampling, is an implicit part of the estimation. That is, data that are not available either because they were not part of the sample or because the data are missing are estimated using a model. The data are edited and entered into the computer where additional checks are completed. After all forms have been received from the respondents, the final automated edit is submitted. After EIA approval, the data are made available for public use.

Form EIA-861

Data for the Form EIA-861 are collected at the utility level from all electric utilities in the United States, its territories, and Puerto Rico. Form EIA-861 data in this publication are for the United States only. These data are then aggregated to provide geographic totals at the State, NERC region, Census division, and national level. Sources and disposition of data are also provided by utility class of ownership and retail consumer class of service. Average revenue (nominal dollars) per kilowatthour of electricity sold is calculated by dividing total annual retail revenue (nominal dollars) by the total annual retail sales of electricity.

Average revenue per kilowatthour is defined as the cost per unit of electricity sold and is calculated by dividing retail electric revenue by the corresponding sales of electricity. The average revenue per kilowatthour is calculated for all consumers and for each sector (residential, commercial, industrial, and other sales).

Electric utilities typically employ a number of rate schedules within a single sector. These alternative rate schedules reflect the varying consumption levels and patterns of consumers and their associated impact on the

costs to the electric utility for providing electrical service. The average revenue per kilowatthour reported in this publication by sector represents a weighted average of consumer revenue and sales within that sector and across sectors for all consumers.

The electric revenue used to derive the average revenue per kilowatthour is the operating revenue reported by the electric utility. Operating revenue includes energy charges, demand charges, consumer service charges, environmental surcharges, fuel adjustments, and other miscellaneous charges.

Electric utility operating revenues cover, among other costs of service, State and Federal income taxes and taxes other than income taxes paid by the utility. The Federal component of these taxes are, for the most part, "payroll" taxes. State and local authorities tax the value of plant (property taxes), the amount of revenues (gross receipts taxes), purchases of materials and services (sales and use taxes), and a potentially long list of other items that vary extensively by taxing authority. Taxes deducted from employees' pay (such as Federal income taxes and employees' share of social security taxes) are not a part of the utility's "tax costs," but are paid to the taxing authorities in the name of the employees. These taxes are included in the utility's cost of service (for example, revenue requirements) and are included in the amounts recovered from consumers in rates and reported in operating revenues.

Electric utilities, like many other business enterprises, are required by various taxing authorities to collect and remit taxes assessed on their consumers. In this regard, the electric utility serves as an agent for the taxing authority. Taxes assessed on the consumer, such as a gross receipts tax or sales tax, are called "pass through" taxes. These taxes do not represent a cost to the utility and are not recorded in the operating revenues of the utility. However, taxing authorities differ as to whether a specific tax is assessed on the utility or the consumer—which, in turn, determines whether or not the tax is included in the operating revenue of the electric utility.

Form EIA-860

The Form EIA-860 is a mandatory census of electric utilities in the United States that operate power plants or plan to operate a power plant within 10 years of the reporting year. The survey is used to collect data on existing power plants from the electric utilities and their 10-year plans for constructing new plants, and modifying and retiring existing plants. Data on the survey are collected at the generating unit level. These data are then aggregated by energy source, geographic area, and prime mover. Final data from the Form EIA-860 are also summarized in the *Inventory of Power Plants in the United States.*

Instrument and Design History. The Form EIA-860 was implemented in January 1985 to collect data as of year-end 1984. The Federal Energy Administration Act of 1974 (Public Law 93-275) defines the legislative authority to collect these data.

Data Processing. The Form EIA-860 is mailed to approximately 900 respondents in December of the reporting year and the completed forms are to be returned to the EIA by February 15 containing data as of January 1 of the following year. Effective with the 1996 reporting, respondents have the option of filing Form EIA-860 directly with the EIA or through an agent—such as the respondent's regional electric reliability council. Data reported through the regional electric reliability councils are submitted to the EIA electronically from the North American Electric Reliability Council (NERC). Data for each respondent are preprinted from the applicable data base. Respondents are instructed to verify all preprinted data and to supply missing data. The data are manually edited before being keyed for automatic data processing. Computer programs containing additional edit checks are run. Respondents are telephoned to obtain correction or clarification of reported data and to obtain missing data, as a result of the manual and automatic editing process. After EIA approval, the data are made available for public use.

Quality of Data

The Office of Coal, Nuclear, Electric and Alternate Fuels (CNEAF) is responsible for routine data improvement and quality assurance activities. All operations in this office are done in accordance with formal standards established by the EIA. These standards are the measuring rod necessary for quality statistics. Data improvement efforts include verification of data-keyed input by automatic computerized methods, editing by subject matter specialists, and follow up on nonrespondents. The CNEAF office supports the quality assurance efforts of the data collectors by providing advisory reviews of the structure of information requirements, and of proposed designs for new and revised data collection forms and systems. Once implemented, the actual performance of working data collection systems is also validated. Computerized respondent data files are checked to identify those who fail to respond to the survey. By law, nonrespondents

may be fined or otherwise penalized for not filing a mandatory EIA data form. Before invoking the law, the EIA tries to obtain the required information by encouraging cooperation of nonrespondents.

Completed forms received by the CNEAF office are sorted, screened for completeness of reported information, and keyed onto computer tapes for storage and transfer to random access data bases for computer processing. The information coded on the computer tapes is manually spot-checked against the forms to certify accuracy of the tapes. To ensure the quality standards established by the EIA, formulas that use the past history of data values in the data base have been designed and implemented to check data input for errors automatically. Data values that fall outside the ranges prescribed in the formulas are verified by telephoning respondents to resolve any discrepancies. It is very important, however, to concentrate on accuracy in the earliest stages of data collection. The data quality community now recognizes that editing can only be used to find the largest errors. Trying to "correct" smaller errors can lead to substantial bias. (Please consult http://www.dataquality.com and other data quality resource references.)

Conceptual problems affecting the quality of data are discussed in the report, *An Assessment of the Quality of Selected EIA Data Series*:[21]

Data Editing System

Data from the form surveys are edited using automated systems. The edit includes both deterministic checks, in which records are checked for the presence of required fields and their validity; and statistical checks, in which estimation techniques are used to validate data according to their behavior in the past and in comparison to other current fields.

Rounding Rules for Data

Given a number with r digits to the left of the decimal and d+t digits in the fraction part, with d being the place to which the number is to be rounded and t being the remaining digits which will be truncated, this number is rounded to r+d digits by adding 5 to the (r+d+1)th digit when the number is positive or by subtracting 5 when the number is negative. The t digits are then truncated at the (r+d+1)th digit. The symbol for a rounded number truncated to zero is (*).

CNEAF Data Revision and Policy

The Office of Coal, Nuclear, Electric and Alternate Fuels has adopted the following policy with respect to the revision and correction of recurrent data in energy publications:

1. Annual survey data collected by this office are published either as preliminary or final when first appearing in a data report. Data initially released as preliminary will be so noted in the report. These data will be revised, if necessary, and declared final in the next publication of the data.

2. All monthly and quarterly survey data collected by this office are published as preliminary. These data are revised only after the completion of the 12-month cycle of the data. No revisions are made to the published data before this unless approved by the Office Director.

3. The magnitude of changes due to revisions experienced in the past will be included in the data reports, so that the reader can assess the accuracy of the data.

4. After data are published as final, corrections may be made in the event of a greater than one percent difference at the national level. Corrections for differences that are less than the before-mentioned threshold are left to the discretion of the Office Director.

This report presents the most current annual data available to the EIA. The statistics may differ from those published previously in EIA publications due to corrections, revisions, or other adjustments to the data subsequent to its original release.

On a chapter basis, the status of the data contained in this report is:

- **Generating Capability at U.S. Electric Utilities**
  Total net summer capability data from the Form EIA-860 are preliminary in this publication. Final data will be reported in the *Inventory of Power Plants in the United States.*

- **Net Generation at U.S. Electric Utilities**
  The Form EIA-759 data are supplemented annually to become a census, and are final in this

[21] Energy Information Administration, Office of Statistical Standards, *An Assessment of the Quality of Selected EIA Data Series: Electric Power Data*, DOE/EIA-0292(87) (Washington, DC, 1989).

report. A comparison of preliminary versus final data is provided in the Technical Notes of the *Electric Power Monthly* (EPM), when available.

- **U.S. Electric Utility Fossil-Fuel Statistics**
  All FERC Form 423 data are final. A comparison of preliminary versus final data is provided in the Technical Notes of the EPM, when available.

- **U.S. Electric Utility Retail Sales, Revenue, and Average Revenue per Kilowatthour**
  Values for sales, revenue, and average revenue per kilowatthour from the Form EIA-826 are preliminary. Historical annual data from the Form EIA-861, "Annual Electric Utility Report," are final.

Formulas and Calculations

Average Heat Content. In order to determine the Btu value per unit of consumption for each of the fossil fuels collected on the Form EIA-759, the heat content values contained on the FERC Form 423 were used. Data on the FERC Form 423 represent approximately 85 percent of the total generator nameplate capacity for all electric utilities.

Percent Difference. The following formula is used to calculate percent differences.

$$\text{Percent Difference} = \left(\frac{x(t_2) - x(t_1)}{x(t_1)} \right) \times 100,$$

where $x(t_1)$ and $x(t_2)$ denote the quantity at year t_1 and subsequent year t_2.

Form EIA-759

Data for the Form EIA-759 are collected at the plant level. These data are then aggregated to provide geographic totals at the State, Census division, and U.S. level, or totals by type of plant. Consumption of fuel(s) is converted from quantities (in short tons, barrels, or thousand cubic feet) to Btu at the plant level. End-of-month fuel stocks for a single generating plant may not equal beginning-of-the-month stocks, plus receipts, less consumption, for many reasons, including the fact that several plants may share the same fuel stock.

FERC Form 423

Data for the FERC Form 423 are collected at the plant level. These data are then used in the following formulas to produce aggregates and averages for each fuel type at the State, Census division, and U.S. level. For these formulas, receipts and average heat content are at the plant level. For each geographic region, the summation, Σ, represents the sum of all plants in that geographic region. Additionally,

- For coal, units for receipts *(R)* are in tons, units for average heat content *(A)* are in Btu per pound, and the unit conversion *(U)* is 2,000 pounds per ton;

- For petroleum, units for receipts *(R)* are in barrels, units for average heat content *(A)* are in Btu per gallon, and the unit conversion *(U)* is 42 gallons per barrel;

- For gas, units for receipts *(R)* are in thousand cubic feet (Mcf), average heat content *(A)* are in Btu per cubic foot, and the unit conversion *(U)* is 1,000 cubic feet per Mcf.

Where I denotes a plant; R_i = receipts for plant I; A_I = average heat content for receipts at plant I; and, U = unit conversion:

$$\text{Total Btu} = \sum_i (R_i \times A_i \times U),$$

and

$$\text{Weighted Average Heat Content} = \frac{\sum_i (R_i \times A_i)}{\sum_i R_i},$$

for a given fuel type.

Where I denotes a plant; R_i = receipts for plant I; A_I = average heat content for receipts at plant I; and, C_i = cost at plant I in cents per million Btu;

Weighted Average Cost (cents per million Btu) =

$$\frac{\sum_i (R_i \times A_i \times C_i)}{\sum_i (R_i \times A_i)},$$

and

Weighted Average Cost (dollars per unit) =

$$\frac{U \sum_i (R_i \times A_i \times C_i)}{(10)^8 \sum_i R_i}.$$

Form EIA-826

The Form EIA-826 data are collected at the utility level by end use sector and State. When a utility has sales in more than one State, the data are only required for those States in which the sales for the given utility are large enough to meet the sample selection requirements. Data from the Form EIA-826 are used to determine estimates by sector at the State, Census division, and national level for the entire corresponding State, Census division, or national category. Form EIA-861 data were used as the frame from which the sample was selected, and also as regressor data.

A cutoff model sample is used, so that only utilities that have relatively large sales in one or more end use sectors in a given State were selected. The sample consists of 252 electric utilities. This includes a somewhat larger number of State-service areas for electric utilities. Estimation procedures include imputation to account for nonresponse. State-level sales-and-revenue estimates are calculated. Also, a ratio estimation procedure is used for estimation of average revenue per kilowatthour at the State level. These estimates are accumulated separately to produce estimates for Census division and U.S. levels.

The coefficient of variation (CV) statistic, usually given as a percent, is an estimate that describes the magnitude of sampling error that might reasonably be incurred. The CV, sometimes referred to as the relative standard error, is the square root of the estimated relative variance of the variable of interest. The variable of interest may be a single variable (for example, sales) or it may be the ratio of two variables (for example, revenue to sales).

CV's were not specifically designed to account for nonsampling errors, such as errors of misclassification or transposed digits. They are, however, affected by nonsampling errors. Using the Central Limit Theorem, which applies to sums and means, there is an approximate 68-percent chance that the true mean is within one CV of the estimated mean, when there is no nonsampling error. In reality, a large CV often is caused by a large nonsampling error that the system has failed, up to that point, to correct. Several large nonsampling errors have been found this way.

As an example of an ordinary application of CVs, suppose that a revenue-per-kilowatthour value is estimated to be 5.13 cents per kilowatthour with an estimated CV of 1.6 percent. This means that, ignoring any nonsampling error, there is approximately a 68-percent chance that the true average revenue per kilowatthour is within approximately 1.6 percent of 5.13 cents per kilowatthour (that is, between 5.05 and 5.21 cents per kilowatthour). There is approximately a 95-percent chance of a true sampling error being 2 CV's or less.

For sales or revenue in any sector at the State level, if we let x represent an observation from the Form EIA-861, y represents an observation from the Form EIA-826, and $\hat{y}$ represents an estimated value for data not collected, then

$$y_i = b x_i + x_i^{\gamma} e_{o_i},$$

$$\hat{y}_i = \hat{b} x_i,$$

$$\hat{b}(\gamma) = \left[\sum_{k=1}^{n} x_k^{1-2\gamma} y_k \right] / \left[\sum_{k=1}^{n} x_k^{2-2\gamma} \right]$$

Here, n is the Form EIA-826 sample size for that State, and b is the factor ('slope') relating x to y in the linear regression. γ is taken to be ½ although more research could refine this. For the Form EIA-826, γ = ½ has been shown to be robust.

CV estimates may also be provided for **annualized estimates** of sales and revenue. These CV estimates may be biased to larger than actual values, in general, because covariances between the various months of data are ignored. Even so, many of these estimates are less than one percent, and the national level estimates are quite small. Also, note that experience with past test data indicates that when CV estimates are only a few tenths of a percent, they may often be biased high even before aggregation. (However, the opposite may be true for somewhat larger CVs.) Thus, these CV estimates, especially at the national level, are likely to be over estimated. Further, CV estimates, although designed to measure sampling error, are impacted by nonsampling error. This along with information given in the *Electric Power Monthly* (EPM) Table B2, "Comparison of Preliminary Versus Final Published Data at the U.S. Level," and Table B4, "Comparison of Sample Versus Census Published Data at the U.S. Level by End-Use Sector," give a fairly good indication of overall data accuracy.

Sales and revenue data are expected, generally, to be highly positively correlated, and when estimating CV's for average revenue per kilowatthour, that covariance

should not be ignored.[22] A covariance formula to handle this was developed by Professor Poduri S.R.S. Rao.

(For additional technical information, see the EPM, April 1995, page 254).

Form EIA-860

Data for the Form EIA-860 are submitted at the generating unit level and then aggregated by energy source, prime mover, and geographic area. Estimated values for net summer and net winter capability for nonnuclear electric generating units were developed by use of a regression formula, using year-end 1992 data on net summer capability, net winter capability, and generator nameplate capacity of units in commercial operation during three intervals of time: 1940 or earlier, 1941 through 1980, and 1981 to present.[23]

A heterogeneous, zero-intercept linear regression model with generator nameplate capacity (expressed in kilowatts) as the regressor data was used since examination of the data shows that the intercepts are generally near zero.[24] [25]

In all formulas, the symbol, *, is an operator meaning multiplied by.

For nonnuclear units,

Net Capability = b*(Nameplate Capacity),

where

b, represents the slope or factor by which nameplate capacity has to be multiplied to obtain a capability estimate.

Using this model in the following,

δ represents the standard error for b.

Net Summer Capability

b = .90, δ = .04, 1940 or earlier; b = .927, δ = .002, 1941-1980; b = .937, δ = .004, 1981 through present, for coal steam units (Unit Types, ST, AB, PB)

b = 1.00, δ = .03, 1940 or earlier; b = .961, δ = .002, 1941 - 1980; b = .93, δ = .01, 1981 through present, for noncoal steam units (Unit Types, ST, AB, PB)

b = .856, δ = .003, 1980 or earlier; b = .85, δ = .01, 1981 through present, for gas-turbine units (Unit Types, GT, JE).

b = .94, δ = .01, 1940 or earlier; b = .84, δ = .01, 1941 - 1980; b = .86, δ = .02, 1981 through present, for combined-cycle units (Unit Types, CA, CS, CW, CT, IG)

b = .884, δ = .009, 1940 or earlier; b = .925, δ = .002, 1941 - 1980; b = .976, δ = .003, 1981 through present, for internal combustion units (Unit Type, IC)

b = .975, δ = .005, 1940 or earlier; b = 1.034, δ = .004, 1941 - 1980; b = .950, δ = .008, 1981 through present, for conventional and pipeline hydroelectric units (Unit Types, HC, HL)

b = .93, δ = .03, 1940 or earlier; b = 1.03, δ = .01, 1941 - 1980; b = 1.01, δ = .006, 1981 through present, for pumped-storage hydroelectric units (Unit Type, HR)

b = 1, for all other units (Including Unit Types, CG, FC, GE, OC, SP, SS, WT), where limited data are available.

Net Winter Capability

b = .88, δ = .05, 1940 or earlier; b = .934, δ = .002, 1941 - 1980; b = .940, δ = .004, 1981 through present, for coal steam units (Unit Types, ST, AB, PB)

b = 1.02, δ = .03, 1940 or earlier; b = .965, δ = .002, 1941 - 1980; b = .94, δ = .01, 1981 through present, for noncoal steam units (Unit Types, ST, AB, PB)

b = 1.023, δ = .004, 1980 or earlier; b = .98, δ = .01, 1981 through present, for gas-turbine units (Unit Types, GT, JE)

b = 1.02, δ = .03, 1940 or earlier; b = .96, δ = .01, 1941 - 1980; b = .94, δ = .02, 1981 through present, for combined-cycle units (Unit Types, CA, CS, CW, CT, IG)

[22] This model is discussed in Knaub, J.R., Jr. (1994), "Relative Standard Error for a Ratio of Variables at an Aggregate Level Under Model Sampling," *Proceedings of the Section on Survey Research Methods*, pp. 310-312, American Statistical Association.

[23] Respondents report summer and winter capability and nameplate for all nuclear units.

[24] See model 4.1 in Knaub, J.R., Jr. (1997), "Weighting in Regression for Use in Survey Methodology," April 1997, *Interstat*, on the Internet, http://interstat.stat.vt.edu/Interstat, shown here under Form EIA-826.

[25] For a more general formula for the related estimate of the total, "T," see section 4 of "Weighted Multiple Regression Estimation for Survey Model Sampling," May 1996, *Interstat*, on the Internet, http://interstat.stat.vt.edu/Interstat.

b = .893, δ = .008, 1940 or earlier; b = .940, δ = .002, 1941 - 1980; b = .987, δ = .002, 1981 through present, for internal combustion units (Unit Type, IC)

b = .979, δ = .005, 1940 or earlier; b = 1.026, δ = .004, 1941 - 1980; b = .92, δ = .01, 1981 through present, for conventional and pipeline hydroelectric units (Unit Types, HC, HL)

b = .96, δ = .05, 1940 or earlier; b = 1.02, δ = .01, 1941 - 1980; b = 1.03, δ = .01, 1981 through present, for pumped-storage hydroelectric units (Unit Type, HR)

b = 1, for all other units (Unit Types, FC, GE, OC, SP, SS, WT, CG), where limited data are available.

General Information

Use of the Glossary

The terms in the glossary have been defined for general use. Restrictions on the definitions as used in these data collection systems are included in each definition when necessary to define the terms as they are used in this report.

Table A1. Unit-of-Measure Equivalents

Unit	Equivalent		
Kilowatt (kW)	1,000	(One Thousand)	Watts
Megawatt (MW)	1,000,000	(One Million)	Watts
Gigawatt (GW)	1,000,000,000	(One Billion)	Watts
Terawatt (TW)	1,000,000,000,000	(One Trillion)	Watts
Gigawatt	1,000,000	(One Million)	Kilowatts
Thousand Gigawatts	1,000,000,000	(One Billion)	Kilowatts
Kilowatthours (kWh)	1,000	(One Thousand)	Watthours
Megawatthours (MWh)	1,000,000	(One Million)	Watthours
Gigawatthours (GWh)	1,000,000,000	(One Billion)	Watthours
Terawatthours (TWh)	1,000,000,000,000	(One Trillion)	Watthours
Gigawatthours	1,000,000	(One Million)	Kilowatthours
Thousand Gigawatthours	1,000,000,000	(One Billion)	Kilowatthours
U.S. Dollar	1,000	(One Thousand)	Mills
U.S. Cent	10	(Ten)	Mills

Source: Energy Information Administration, Coal and Electric Data and Renewables Division.

Table A2. Metric Conversion

Type of Unit	U.S. Unit	*multiplied by*	Conversion Factor	*equals*	Metric Unit
Mass	short tons (2,000 lb)	x	0.907 184 7	=	metric tons (t)
	pounds (lb)	x	0.453 592 37[a]	=	kilograms (kg)
Volume	barrels of oil (bbl)	x	0.158 987 3	=	cubic meters (m^3)
	cubic feet (ft^3)	x	0.028 316 85	=	cubic meters (m^3)
	U.S. gallons (gal)	x	3.785 412	=	liters (L)
Energy	British thermal units (Btu)	x	1,055.055 852 62[ab]	=	joules (J)

[a]Exact conversion.
[b]The Btu used in this table is the International Table Btu adopted by the Fifth International Conference on Properties of Steam, London, 1956.

Notes: ●Spaces have been inserted after every third digit to the right of the decimal for ease of reading. ●Most metric units belong to the International System of Units (SI), and the liter and metric ton are acceptable 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, SVIEEE Std 268-1992, pp. 28 and 29.

Glossary

Acid Rain: Also called acid precipitation or acid deposition, acid rain is precipitation containing harmful amounts of nitric and sulfuric acids formed primarily by nitrogen oxides and sulfur oxides released into the atmosphere when fossil fuels are burned. It can be wet precipitation (rain, snow, or fog) or dry precipitation (absorbed gaseous and particulate matter, aerosol particles or dust). Acid rain has a pH below 5.6. Normal rain has a pH of about 5.6, which is slightly acidic. The term pH is a measure of acidity or alkalinity and ranges from 0 to 14. A pH measurement of 7 is regarded as neutral. Measurements below 7 indicate increased acidity, while those above indicate increased alkalinity.

Ampere: The unit of measurement of electrical current produced in a circuit by 1 volt acting through a resistance of 1 ohm.

Anthracite: A hard, black lustrous coal, often referred to as hard coal, containing a high percentage of fixed carbon and a low percentage of volatile matter. Comprises three groups classified according to the following ASTM Specification D388-84, on a dry mineral-matter-free basis:

	Fixed Carbon Limits		Volatile Matter	
	GE	LT	GT	LE
Meta-Anthracite	98	-	-	2
Anthracite	92	98	2	8
Semianthracite	86	92	8	14

Ash: Impurities consisting of silica, iron, alumina, and other noncombustible matter that are contained in coal. Ash increases the weight of coal, adds to the cost of handling, and can affect its burning characteristics. Ash content is measured as a percent by weight of coal on an :q.as received:eq. or a "dry" (moisture-free, usually part of a laboratory analysis) basis.

Available but not Needed Capability: Net capability of main generating units that are operable but not considered necessary to carry load, and cannot be connected to load within 30 minutes.

Average Revenue per Kilowatthour: The average revenue per kilowatthour of electricity sold by sector (residential, commercial, industrial, or other) and geographic area (State, Census division, and national), is calculated by dividing the total monthly revenue by the corresponding total monthly sales for each sector and geographic area.

Barrel: A volumetric unit of measure for crude oil and petroleum products equivalent to 42 U.S. gallons.

Base Bill: A charge calculated through multiplication of the rate from the appropriate electric rate schedule by the level of consumption.

Baseload: The minimum amount of electric power delivered or required over a given period of time at a steady rate.

Baseload Capacity: The generating equipment normally operated to serve loads on an around-the-clock basis.

Baseload Plant: A plant, usually housing high-efficiency steam-electric units, which is normally operated to take all or part of the minimum load of a system, and which consequently produces electricity at an essentially constant rate and runs continuously. These units are operated to maximize system mechanical and thermal efficiency and minimize system operating costs.

Bbl: The abbreviation for barrel.

Bcf: The abbreviation for 1 billion cubic feet.

Bituminous Coal: The most common coal. It is dense and black (often with well-defined bands of bright and dull material). Its moisture content usually is less than 20 percent. It is used for generating electricity, making coke, and space heating. Comprises five groups classified according to the following ASTM Specification D388-84, on a dry mineral-matter-free (mmf) basis for fixed-carbon and volatile matter and a moist mmf basis for calorific value.

	Fixed Carbon Limits		Volatile Matter Limits		Calorific Value Limits Btu / lb	
	GE	LT	GT	LT	GE	LE
LV	78	86	14	22	-	-
MV	69	78	22	31	-	-
HVA	-	69	31	-	14000	-
HVB	-	-	-	-	13000	14000
HVC	-	-	-	-	10500	13000

LV = Low-volatile bituminous coal
MV = Medium-volatile bituminous coal
HVA = High-volatile A bituminous coal
HVB = High-volatile B bituminous coal
HVC = High-volatile C bituminous coal

Boiler: A device for generating steam for power, processing, or heating purposes or for producing hot water for heating purposes or hot water supply. Heat from an external combustion source is transmitted to a fluid contained within the tubes in the boiler shell. This fluid is delivered to an end-use at a desired pressure, temperature, and quality.

Btu (British Thermal Unit): A standard unit for measuring the quantity of heat energy equal to the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit.

Capability: The maximum load that a generating unit, generating station, or other electrical apparatus can carry under specified conditions for a given period of time without exceeding approved limits of temperature and stress.

Capacity: The amount of electric power delivered or required for which a generator, turbine, transformer, transmission circuit, station, or system is rated by the manufacturer.

Capacity (Purchased): The amount of energy and capacity available for purchase from outside the system.

Capacity Charge: An element in a two-part pricing method used in capacity transactions (energy charge is the other element). The capacity charge, sometimes called Demand Charge, is assessed on the amount of capacity being purchased.

Census Divisions: The nine geographic divisions of the United States established by the Bureau of the Census, U.S. Department of Commerce, for the purpose of statistical analysis. The boundaries of Census divisions coincide with State boundaries. The Pacific Division is subdivided into the Pacific Contiguous and Pacific Noncontiguous areas.

Circuit: A conductor or a system of conductors through which electric current flows.

Coal: A black or brownish-black solid combustible substance formed by the partial decomposition of vegetable matter without access to air. The rank of coal, which includes anthracite, bituminous coal, subbituminous coal, and lignite, is based on fixed carbon, volatile matter, and heating value. Coal rank indicates the progressive alteration from lignite to anthracite. Lignite contains approximately 9 to 17 million Btu per ton. The contents of subbituminous and bituminous coal range from 16 to 24 million Btu per ton and from 19 to 30 million Btu per ton, respectively. Anthracite contains approximately 22 to 28 million Btu per ton.

Cogenerator: A generating facility that produces electricity and another form of useful thermal energy (such as heat or steam), used for industrial, commercial, heating, or cooling purposes. To receive status as a qualifying facility (QF) under the Public Utility Regulatory Policies Act (PURPA), the facility must produce electric energy and :q.another form of useful thermal energy through the sequential use of energy,:eq. and meet certain ownership, operating, and efficiency criteria established by the Federal Energy Regulatory Commission (FERC). (See the Code of Federal Regulations, Title 18, Part 292.)

Coincidental Demand: The sum of two or more demands that occur in the same time interval.

Coincidental Peak Load: The sum of two or more peakloads that occur in the same time interval.

Coke (Petroleum): 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 factor is 5 barrels (42 U.S. gallons each) per short ton.

Combined Cycle: An electric generating technology in which electricity is produced from otherwise lost waste heat exiting from one or more gas (combustion) turbines. The exiting heat is routed to a conventional boiler or to a heat recovery steam generator for utilization by a steam turbine in the production of electricity. This process increases the efficiency of the electric generating unit.

Combined Cycle Unit: An electric generating unit that consists of one or more combustion turbines and one or

more boilers with a portion of the required energy input to the boiler(s) provided by the exhaust gas of the combustion turbine(s).

Combined Pumped-Storage Plant: A pumped-storage hydroelectric power plant that uses both pumped water and natural streamflow to produce electricity.

Commercial: The commercial sector is generally defined as nonmanufacturing business establishments, including hotels, motels, restaurants, wholesale businesses, retail stores, and health, social, and educational institutions. The utility may classify commercial service as all consumers whose demand or annual use exceeds some specified limit. The limit may be set by the utility based on the rate schedule of the utility.

Commercial Operation: Commercial operation begins when control of the loading of the generator is turned over to the system dispatcher.

Consumption (Fuel): The amount of fuel used for gross generation, providing standby service, start-up and / or flame stabilization.

Contract Price: Price of fuels marketed on a contract basis covering a period of 1 or more years. Contract prices reflect market conditions at the time the contract was negotiated and therefore remain constant throughout the life of the contract or are adjusted through escalation clauses. Generally, contract prices do not fluctuate widely.

Contract Receipts: Purchases based on a negotiated agreement that generally covers a period of 1 or more years.

Cooperative Electric Utility: An electric utility legally established to be owned by and operated for the benefit of those using its service. The utility company will generate, transmit, and / or distribute supplies of electric energy to a specified area not being serviced by another utility. Such ventures are generally exempt from Federal income tax laws. Most electric cooperatives have been initially financed by the Rural Electrification Administration, U.S. Department of Agriculture.

Cost: The amount paid to acquire resources, such as plant and equipment, fuel, or labor services.

Current (Electric): A flow of electrons in an electrical conductor. The strength or rate of movement of the electricity is measured in amperes.

Demand (Electric): The rate at which electric energy is delivered to or by a system, part of a system, or piece of equipment, at a given instant or averaged over any designated period of time.

Demand-Side Management: The planning, implementation, and monitoring of utility activities designed to encourage consumers to modify patterns of electricity usage, including the timing and level of electricity demand. It refers only to energy and load-shape modifying activities that are undertaken in response to utility-administered programs. It does not refer to energy and load-shape changes arising from the normal operation of the marketplace or from government-mandated energy-efficiency standards. Demand-Side Management (DSM) covers the complete range of load-shape objectives, including strategic conservation and load management, as well as strategic load growth.

Distillate Fuel Oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. It is used primarily for space heating, on-and-off-highway diesel engine fuel (including railroad engine fuel and fuel for agriculture machinery), and electric power generation. Included are Fuel Oils No. 1, No. 2, and No. 4; and Diesel Fuels No. 1, No. 2, and No. 4.

Distribution System: The portion of an electric system that is dedicated to delivering electric energy to an end user.

Electric Plant (Physical): A facility containing prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and / or fission energy into electric energy.

Electric Rate Schedule: A statement of the electric rate and the terms and conditions governing its application, including attendant contract terms and conditions that have been accepted by a regulatory body with appropriate oversite authority.

Electric Utility: A corporation, person, agency, authority, or other legal entity or instrumentality that owns and / or operates facilities within the United States, its territories, or Puerto Rico for the generation, transmission, distribution, or sale of electric energy primarily for use by the public and files forms listed in the Code of Federal Regulations, Title 18, Part 141. Facilities that qualify as cogenerators or small power producers under the Public Utility Regulatory Policies Act (PURPA) are not considered electric utilities.

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 in order to accomplish tasks. Electrical energy is usually measured in kilowatthours, while heat energy is usually measured in British thermal units.

Energy Charge: That portion of the charge for electric service based upon the electric energy (kWh) consumed or billed.

Energy Deliveries: Energy generated by one electric utility system and delivered to another system through one or more transmission lines.

Energy Efficiency: Refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided. These programs reduce overall electricity consumption (reported in megawatthours), often without explicit consideration for the timing of program-induced savings. Such savings are generally achieved by substituting technically more advanced equipment to produce the same level of end-use services (e.g. lighting, heating, motor drive) with less electricity. Examples include high-efficiency appliances, efficient lighting programs, high-efficiency heating, ventilating and air conditioning
(HVAC) systems or control modifications, efficient building design, advanced electric motor drives, and heat recovery systems.

Energy Receipts: Energy generated by one electric utility system and received by another system through one or more transmission lines.

Energy Source: The primary source that provides the power that is converted to electricity through chemical, mechanical, or other means. Energy sources include coal, petroleum and petroleum products, gas, water, uranium, wind, sunlight, geothermal, and other sources.

Facility: An existing or planned location or site at which prime movers, electric generators, and / or equipment for converting mechanical, chemical, and / or nuclear energy into electric energy are situated, or will be situated. A facility may contain more than one generator of either the same or different prime mover type. For a cogenerator, the facility includes the industrial or commercial process.

Federal Energy Regulatory Commission (FERC): A quasi-independent regulatory agency within the Department of Energy having jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing, oil pipeline rates, and gas pipeline certification.

Federal Power Act: Enacted in 1920, and amended in 1935, the Act consists of three parts. The first part incorporated the Federal Water Power Act administered by the former Federal Power Commission, whose activities were confined almost entirely to licensing non-Federal hydroelectric projects. Parts II and III were added with the passage of the Public Utility Act. These parts extended the Act's jurisdiction to include regulating the interstate transmission of electrical energy and rates for its sale as wholesale in interstate commerce. The Federal Energy Regulatory Commission is now charged with the administration of this law.

Federal Power Commission: The predecessor agency of the Federal Energy Regulatory Commission. The Federal Power Commission (FPC) 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. The FPC was abolished on September 20, 1977, when the Department of Energy was created. The functions of the FPC were divided between the Department of Energy and the Federal Energy Regulatory Commission.

FERC: The Federal Energy Regulatory Commission.

Firm Gas: Gas sold on a continuous and generally long-term contract.

Firm Power: Power or power-producing capacity intended to be available at all times during the period covered by a guaranteed commitment to deliver, even under adverse conditions.

Flue Gas Desulfurization Unit (Scrubber): Equipment used to remove sulfur oxides from the combustion gases of a boiler plant before discharge to the atmosphere. Chemicals, such as lime, are used as the scrubbing media.

Flue Gas Particulate Collectors: Equipment used to remove fly ash from the combustion gases of a boiler plant before discharge to the atmosphere. Particulate collectors include electrostatic precipitators, mechanical collectors (cyclones), fabric filters (baghouses), and wet scrubbers.

Fly Ash: Particule matter from coal ash in which the particle diameter is less than 1×10^{-4} meter. This is removed from the flue gas using flue gas particulate collectors such as fabric filters and electrostatic precipitators.

Forced Outage: The shutdown of a generating unit, transmission line or other facility, for emergency reasons or a condition in which the generating equipment is unavailable for load due to unanticipated breakdown.

Fossil Fuel: Any naturally occurring organic fuel, such as petroleum, coal, and natural gas.

Fossil-Fuel Plant: A plant using coal, petroleum, or gas as its source of energy.

Fuel: Any substance that can be burned to produce heat; also, materials that can be fissioned in a chain reaction to produce heat.

Fuel Expenses: These costs include the fuel used in the production of steam or driving another prime mover for the generation of electricity. Other associated expenses include unloading the shipped fuel and all handling of the fuel up to the point where it enters the first bunker, hopper, bucket, tank, or holder in the boiler-house structure.

Full-Forced Outage: The net capability of main generating units that is unavailable for load for emergency reasons.

Gas: A fuel burned under boilers and by internal combustion engines for electric generation. These include natural, manufactured and waste gas.

Gas Turbine Plant: A plant in which the prime mover is a gas turbine. A gas turbine consists typically of an axial-flow air compressor, one or more combustion chambers, where liquid or gaseous fuel is burned and the hot gases are passed to the turbine and where the hot gases expand to drive the generator and are then used to run the compressor.

Generating Unit: Any combination of physically connected generator(s), reactor(s), boiler(s), combustion turbine(s), or other prime mover(s) operated together to produce electric power.

Generation (Electricity): The process of producing electric energy by transforming other forms of energy; also, the amount of electric energy produced, expressed in watthours (Wh).

Gross Generation: The total amount of electric energy produced by the generating units at a generating station or stations, measured at the generator terminals.

Net Generation: Gross generation less the electric energy consumed at the generating station for station use.

Generator: A machine that converts mechanical energy into electrical energy.

Generator Nameplate Capacity: The full-load continuous rating of a generator, prime mover, or other electric power production equipment under specific conditions as designated by the manufacturer. Installed generator nameplate rating is usually indicated on a nameplate physically attached to the generator.

Geothermal Plant: A plant in which the prime mover is a steam turbine. The turbine is driven either by steam produced from hot water or by natural steam that derives its energy from heat found in rocks or fluids at various depths beneath the surface of the earth. The energy is extracted by drilling and/or pumping.

Gigawatt (GW): One billion watts.

Gigawatthour (GWh): One billion watthours.

Greenhouse Effect: The increasing mean global surface temperature of the earth caused by gases in the atmosphere (including carbon dioxide, methane, nitrous oxide, ozone, and chlorofluorocarbon). The greenhouse effect allows solar radiation to penetrate but absorbs the infrared radiation returning to space.

Grid: The layout of an electrical distribution system.

Gross Generation: The total amount of electric energy produced by a generating facility, as measured at the generator terminals.

Heavy Oil: The fuel oils remaining after the lighter oils have been distilled off during the refining process. Except for start-up and flame stabilization, virtually all petroleum used in steam plants is heavy oil.

Hydroelectric Plant: A plant in which the turbine generators are driven by falling water.

Industrial: The industrial sector is generally defined as manufacturing, construction, mining agriculture, fishing and forestry establishments Standard Industrial Classification (SIC) codes 01-39. The utility may classify industrial service using the SIC codes, or based on demand or annual usage exceeding some specified limit. The limit may be set by the utility based on the rate schedule of the utility.

Intermediate Load (Electric System): The range from base load to a point between base load and peak. This point may be the midpoint, a percent of the peakload, or the load over a specified time period.

Internal Combustion Plant: A plant in which the prime mover is an internal combustion engine. An internal combustion engine has one or more cylinders in which the process of combustion takes place, converting energy released from the rapid burning of a fuel-air mixture into mechanical energy. Diesel or gas-fired engines are the principal types used in electric plants. The plant is usually operated during periods of high demand for electricity.

Interruptible Gas: Gas sold to customers with a provision that permits curtailment or cessation of service at the discretion of the distributing company under certain circumstances, as specified in the service contract.

Interruptible Load: Refers to program activities that, in accordance with contractual arrangements, can interrupt consumer load at times of seasonal peak load by direct control of the utility system operator or by action of the consumer at the direct request of the system operator. It usually involves commercial and industrial consumers. In some instances the load reduction may be affected by direct action of the system operator (remote tripping) after notice to the consumer in accordance with contractual provisions. For example, loads that can be interrupted to fulfill planning or operation reserve requirements should be reported as Interruptible Load. Interruptible Load as defined here excludes Direct Load Control and Other Load Management. (Interruptible Load, as reported here, is synonymous with Interruptible Demand reported to the North American Electric Reliability Council on the voluntary Office of Energy Emergency Operations Form OE-411, "Coordinated Regional Bulk Power Supply Program Report," with the exception that annual peakload effects are reported on the Form EIA-861 and seasonal (i.e., summer and winter) peakload effects are reported on the OE-411).

Kilowatt (kW): One thousand watts.

Kilowatthour (kWh): One thousand watthours.

Light Oil: Lighter fuel oils distilled off during the refining process. Virtually all petroleum used in internal combustion and gas-turbine engines is light oil.

Lignite: A brownish-black coal of low rank with high inherent moisture and volatile matter (used almost exclusively for electric power generation). It is also referred to as brown coal. Comprises two groups classified according to the following ASTM Specification D388-84 for calorific values on a moist material-matter-free basis

	Limits Btu / lb.	
	GE	LT
Lignite A	6300	8300
Lignite B	-	6300

Load (Electric): The amount of electric power delivered or required at any specific point or points on a system. The requirement originates at the energy-consuming equipment of the consumers.

Maximum Demand: The greatest of all demands of the load that has occurred within a specified period of time.

Mcf: One thousand cubic feet.

Megawatt (MW): One million watts.

Megawatthour (MWh): One million watthours.

MMcf: One million cubic feet.

Natural Gas: A naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in porous geological formations beneath the earth's surface, often in association with petroleum. The principal constituent is methane.

Net Capability: The maximum load-carrying ability of the equipment, exclusive of station use, under specified conditions for a given time interval, independent of the characteristics of the load. (Capability is determined by design characteristics, physical conditions, adequacy of prime mover, energy supply, and operating limitations such as cooling and circulating water supply and temperature, headwater and tailwater elevations, and electrical use.)

Net Generation: Gross generation minus plant use from all electric utility owned plants. The energy required for pumping at a pumped-storage plant is regarded as plant use and must be deducted from the gross generation.

Net Summer Capability: The steady hourly output, which generating equipment is expected to supply to system load exclusive of auxiliary power, as demonstrated by tests at the time of summer peak demand.

Net Winter Capability: The steady hourly output which generating equipment is expected to supply to system load exclusive of auxiliary power, as demonstrated by tests at the time of winter peak demand.

Noncoincidental Peak Load: The sum of two or more peakloads on individual systems that do not occur in the

same time interval. Meaningful only when considering loads within a limited period of time, such as a day, week, month, a heating or cooling season, and usually for not more than 1 year.

Non-Firm Power: Power or power-producing capacity supplied or available under a commitment having limited or no assured availability.

Nonutility Power Producer: A corporation, person, agency, authority, or other legal entity or instrumentality that owns electric generating capacity and is not an electric utility. Nonutility power producers include qualifying cogenerators, qualifying small power producers, and other nonutility generators (including independent power producers) without a designated franchised service area, and which do not file forms listed in the Code of Federal Regulations, Title 18, Part 141.

Nuclear Fuel: Fissionable materials that have been enriched to such a composition that, when placed in a nuclear reactor, will support a self-sustaining fission chain reaction, producing heat in a controlled manner for process use.

Nuclear Power Plant: A facility in which heat produced in a reactor by the fissioning of nuclear fuel is used to drive a steam turbine.

Off-Peak Gas: Gas that is to be delivered and taken on demand when demand is not at its peak.

Ohm: The unit of measurement of electrical resistance. The resistance of a circuit in which a potential difference of 1 volt produces a current of 1 ampere.

Operable Nuclear Unit: A nuclear unit is :q.operable:eq. after it completes low-power testing and is granted authorization to operate at full power. This occurs when it receives its full power amendment to its operating license from the Nuclear Regulatory Commission.

Outage: The period during which a generating unit, transmission line, or other facility is out of service.

Peak Demand: The maximum load during a specified period of time.

Peak Load Plant: A plant usually housing old, low-efficiency steam units; gas turbines; diesels; or pumped-storage hydroelectric equipment normally used during the peak-load periods.

Peaking Capacity: Capacity of generating equipment normally reserved for operation during the hours of highest daily, weekly, or seasonal loads. Some generating equipment may be operated at certain times as peaking capacity and at other times to serve loads on an around-the-clock basis.

Percent Difference: The relative change in a quantity over a specified time period. It is calculated as follows: the current value has the previous value subtracted from it; this new number is divided by the absolute value of the previous value; then this new number is multiplied by 100.

Petroleum: A mixture of hydrocarbons existing in the liquid state found in natural underground reservoirs, often associated with gas. Petroleum includes fuel oil No. 2, No. 4, No. 5, No. 6; topped crude; Kerosene; and jet fuel.

Petroleum Coke: See Coke (Petroleum).

Petroleum (Crude Oil): A naturally occurring, oily, flammable liquid composed principally of hydrocarbons. Crude oil is occasionally found in springs or pools but usually is drilled from wells beneath the earth's surface.

Planned Generator: A proposal by a company to install electric generating equipment at an existing or planned facility or site. The proposal is based on the owner having obtained (1) all environmental and regulatory approvals, (2) a signed contract for the electric energy, or (3) financial closure for the facility.

Plant: A facility at which are located prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and/or nuclear energy into electric energy. A plant may contain more than one type of prime mover. Electric utility plants exclude facilities that satisfy the definition of a qualifying facility under the Public Utility Regulatory Policies Act of 1978.

Plant Use: The electric energy used in the operation of a plant. Included in this definition is the energy required for pumping at pumped-storage plants.

Plant-Use Electricity: The electric energy used in the operation of a plant. This energy total is subtracted from the gross energy production of the plant; for reporting purposes the plant energy production is then reported as a net figure. The energy required for pumping at pumped-storage plants is, by definition, subtracted, and the energy production for these plants is then reported as a net figure.

Power: The rate at which energy is transferred. Electrical energy is usually measured in watts. Also used for a measurement of capacity.

Power Pool: An association of two or more interconnected electric systems having an agreement to coordinate operations and planning for improved reliability and efficiencies.

Price: The amount of money or consideration-in-kind for which a service is bought, sold, or offered for sale.

Prime Mover: The engine, turbine, water wheel, or similar machine that drives an electric generator; or, for reporting purposes, a device that converts energy to electricity directly (e.g., photovoltaic solar and fuel cell(s)).

Profit: The income remaining after all business expenses are paid.

Public Authority Service to Public Authorities: Public authority service includes electricity supplied and services rendered to municipalities or divisions or agencies of State or Federal governments, under special contracts or agreements or service classifications applicable only to public authorities.

Public Street and Highway Lighting: Public street and highway lighting includes electricity supplied and services rendered for the purposes of lighting streets, highways, parks, and other public places; or for traffic or other signal system service, for municipalities, or other divisions or agencies of State or Federal governments.

Pumped-Storage Hydroelectric Plant: A plant that usually generates electric energy 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 a power plant at a lower level.

Purchased Power Adjustment: A clause in a rate schedule that provides for adjustments to the bill when energy from another electric system is acquired and it varies from a specified unit base amount.

Pure Pumped-Storage Hydroelectric Plant: A plant that produces power only from water that has previously been pumped to an upper reservoir.

Qualifying Facility (QF): A cogeneration or small power production facility that meets certain ownership, operating, and efficiency criteria established by the Federal Energy Regulatory Commission (FERC) pursuant to the Public Utility Regulatory Policies Act (PURPA). (See the Code of Federal Regulations, Title 18, Part 292.) Part 292.

Railroad and Railway Services: Railroad and railway services include electricity supplied and services rendered to railroads and interurban and street railways, for general railroad use, including the propulsion of cars or locomotives, where such electricity is supplied under separate and distinct rate schedules.

Rate Base: The value of property upon which a utility is permitted to earn a specified rate of return as established by a regulatory authority. The rate base generally represents the value of property used by the utility in providing service and may be calculated by any one or a combination of the following accounting methods: fair value, prudent investment, reproduction cost, or original cost. Depending on which method is used, the rate base includes cash, working capital, materials and supplies, and deductions for accumulated provisions for depreciation, contributions in aid of construction, customer advances for construction, accumulated deferred income taxes, and accumulated deferred investment tax credits.

Ratemaking Authority: A utility commission's legal authority to fix, modify, approve, or disapprove rates, as determined by the powers given the commission by a State or Federal legislature.

Receipts: Purchases of fuel.

Regulation: The governmental function of controlling or directing economic entities through the process of rulemaking and adjudication.

Reserve Margin (Operating): The amount of unused available capability of an electric power system at peakload for a utility system as a percentage of total capability.

Residential: The residential sector is defined as private household establishments which consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking and clothes drying. The classification of an individual consumer's account, where the use is both residential and commercial, is based on principal use. For the residential class, do not duplicate consumer accounts due to multiple metering for special services (water, heating, etc.). Apartment houses are also included.

Residual Fuel Oil: The topped crude of refinery operation, includes No. 5 and No. 6 fuel oils as defined in ASTM Specification D396 and Federal Specification VV-F-815C; Navy Special fuel oil as defined in Military Specification MIL-F-859E including Amendment 2 (NATO Symbol F-77); and Bunker C fuel oil. Residual fuel oil is used for the production of electric power,

space heating, vessel bunkering, and various industrial purposes. Imports of residual fuel oil include imported crude oil burned as fuel.

Restricted-Universe Census: This is the complete enumeration of data from a specifically defined subset of entities including, for example, those that exceed a given level of sales or generator nameplate capacity.

Retail: Sales covering electrical energy supplied for residential, commercial, and industrial end-use purposes. Other small classes, such as agriculture and street lighting, also are included in this category.

Revenue: The total amount of money received by a firm from sales of its products and/or services, gains from the sales or exchange of assets, interest and dividends earned on investments, and other increases in the owner's equity except those arising from capital adjustments.

Running and Quick-Start Capability: The net capability of generating units that carry load or have quick-start capability. In general, quick-start capability refers to generating units that can be available for load within a 30-minute period.

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 public street and highway lighting, other sales to public authorities and railways, and interdepartmental sales.

Sales for Resale: Energy supplied to other electric utilities, cooperatives, municipalities, and Federal and State electric agencies for resale to ultimate consumers.

Scheduled Outage: The shutdown of a generating unit, transmission line, or other facility, for inspection or maintenance, in accordance with an advance schedule.

Short Ton: A unit of weight equal to 2,000 pounds.

Small Power Producer (SPP): Under the Public Utility Regulatory Policies Act (PURPA), a small power production facility (or small power producer) generates electricity using waste, renewable (water, wind and solar), or geothermal energy as a primary energy source. Fossil fuels can be used, but renewable resource must provide at least 75 percent of the total energy input. (See Code of Federal Regulations, Title 18, Part 292.)

Spinning Reserve: That reserve generating capacity running at a zero load and synchronized to the electric system.

Spot Purchases: A single shipment of fuel or volumes of fuel, purchased for delivery within 1 year. Spot purchases are often made by a user to fulfill a certain portion of energy requirements, to meet unanticipated energy needs, or to take advantage of low-fuel prices.

Stability: The property of a system or element by virtue of which its output will ultimately attain a steady state. The amount of power that can be transferred from one machine to another following a disturbance. The stability of a power system is its ability to develop restoring forces equal to or greater than the disturbing forces so as to maintain a state of equilibrium.

Standard Industrial Classification (SIC): A set of codes developed by the Office of Management and Budget, which categorizes business into groups with similar economic activities.

Standby Facility: A facility that supports a utility system and is generally running under no-load. It is available to replace or supplement a facility normally in service.

Standby Service: Support service that is available, as needed, to supplement a consumer, a utility system, or to another utility if a schedule or an agreement authorizes the transaction. The service is not regularly used.

Steam-Electric Plant (Conventional): A plant in which the prime mover is a steam turbine. The steam used to drive the turbine is produced in a boiler where fossil fuels are burned.

Stocks: A supply of fuel accumulated for future use. This includes coal and fuel oil stocks at the plant site, in coal cars, tanks, or barges at the plant site, or at separate storage sites.

Subbituminous Coal: Subbituminous coal, or black lignite, is dull black and generally contains 20 to 30 percent moisture. The heat content of subbituminous coal ranges from 16 to 24 million Btu per ton as received and averages about 18 million Btu per ton. Subbituminous coal, mined in the western coal fields, is used for generating electricity and space heating.

Substation: Facility equipment that switches, changes, or regulates electric voltage.

Sulfur: One of the elements present in varying quantities in coal which contributes to environmental degradation when coal is burned. In terms of sulfur content by weight, coal is generally classified as low (less than or equal to 1 percent), medium (greater than 1 percent and

less than or equal to 3 percent), and high (greater than 3 percent). Sulfur content is measured as a percent by weight of coal on an "as received" or a "dry" (moisture-free, usually part of a laboratory analysis) basis.

Switching Station: Facility equipment used to tie together two or more electric circuits through switches. The switches are selectively arranged to permit a circuit to be disconnected, or to change the electric connection between the circuits.

System (Electric): Physically connected generation, transmission, and distribution facilities operated as an integrated unit under one central management, or operating supervision.

Transformer: An electrical device for changing the voltage of alternating current.

Transmission: The movement or transfer of electric energy over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers, or is delivered to other electric systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.

Transmission System (Electric): An interconnected group of electric transmission lines and associated equipment for moving or transferring electric energy in bulk between points of supply and points at which it is transformed for delivery over the distribution system lines to consumers, or is delivered to other electric systems.

Turbine: A machine for generating rotary mechanical power from the energy of a stream of fluid (such as water, steam, or hot gas). Turbines convert the kinetic energy of fluids to mechanical energy through the principles of impulse and reaction, or a mixture of the two.

Uniform System of Accounts: Prescribed financial rules and regulations established by the Federal Energy Regulatory Commission for utilities subject to its jurisdiction under the authority granted by the Federal Power Act.

Useful Thermal Output: The thermal energy made available for use in any industrial or commercial process, or used in any heating or cooling application, i.e., total thermal energy made available for processes and applications other than electrical generation.

Voltage Reduction: Any intentional reduction of system voltage by 3 percent or greater for reasons of maintaining the continuity of service of the bulk electric power supply system.

Watt: The electrical unit of power. The rate of energy transfer equivalent to 1 ampere flowing under a pressure of 1 volt at unity power factor.

Watthour (Wh): An electrical energy unit of measure equal to 1 watt of power supplied to, or taken from, an electric circuit steadily for 1 hour.

Wheeling Service: The movement of electricity from one system to another over transmission facilities of intervening systems. Wheeling service contracts can be established between two or more systems.

Wholesale Sales: Energy supplied to other electric utilities, cooperatives, municipals, and Federal and State electric agencies for resale to ultimate consumers.